European Food Safety Authority

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The Community Summary Report[1]

on

Trends and Sources of Zoonoses, Zoonotic Agents, Antimicrobial Resistance and Foodborne Outbreaks in the European Union

in 2005

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EXECUTIVE SUMMARY

Zoonoses are diseases or infections, which are transmissible from animals to humans. The infection can be acquired directly from animals, or through ingestion of contaminated foodstuffs. In humans, the gravity of these diseases can vary from mild symptoms to life threatening conditions. The importance of a zoonosis as a human disease depends on several factors, such as severity of the disease, the case fatality, and number of cases (incidence) in the population.

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, information is collected and analysed from all European Union (EU) Member States in order to help the Community to improve control measures in the food production chain and to protect human health.

In 2005, twenty-four Member States submitted information on the occurrence of zoonoses, zoonotic agents, antimicrobial resistance and foodborne 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). This data covered 16 zoonotic 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, three countries not belonging to EU provided information on zoonoses for the report.

The analysis of the 2005 data highlighted campylobacteriosis as the most frequently reported zoonotic disease in humans within the EU. Reported *Campylobacter* cases increased by 7.8% compared to the previous year rising to an incidence rate of 51.6 cases per 100,000 people and to a total of 197,363 recorded cases. Salmonellosis remained the second most frequent zoonosis with 176,395 reported human cases, despite the fall of 9.5% to an incidence rate of 38.2 compared to 2004.

Amongst foodstuffs, the highest proportion of *Campylobacter* positive samples was reported for fresh poultry meat, where up to 66% samples were found positive. *Campylobacter* was also commonly detected from live poultry, pigs and cattle.

Salmonella was most often reported from fresh poultry and pig meat where proportions of positive samples up to 18% were detected. In table eggs, findings of positive samples ranged from 0% to 6%, but over the past 5 years an overall decreasing trend in occurrence of *Salmonella* in eggs was observed. In animal populations, *Salmonella* was most frequently detected in poultry flocks.

Salmonella, *Campylobacter*, and viruses were the most important causes of reported foodborne outbreaks in 2005. Egg and bakery products were the most common sources of *Salmonella* outbreaks, whereas broiler meat was an important source for both *Salmonella* and *Campylobacter* outbreaks. Foodborne virus outbreaks were most often caused by drinking water, fruit and vegetables.

Relatively high proportions of *Campylobacter* and *Salmonella* isolates from animals and food were resistant to antimicrobials commonly used in treatment of human diseases. This is especially the case of resistance to fluoroquinolones in *Campylobacter* isolates from poultry, where up to 94% of isolates were reported resistant to ciprofloxacin. Foodborne infections caused by these resistant bacteria pose a particular risk to humans due to possible treatment failure.

In 2005, a total of 9,630 human yersiniosis cases were reported. Other bacterial zoonoses - listeriosis, infections caused by verotoxigenic *Escherichia coli* (VTEC) and brucellosis – accounted for approximately 1,000 - 3,000 reported human cases each, whereas a total of 119 tuberculosis cases caused by *M. bovis* was registered.

Very few ready-to-eat foods contained *Listeria monocytogenes* bacteria at levels over a limit that poses a significant risk to human health. Samples exceeding this limit were most often found in fishery products. The lack of serotype and virulence factor information of the VTEC and *Yersinia* findings in food and animals prevented a proper assessment of the relevance of these findings to human disease cases.

Most of the Member States are either officially free from bovine tuberculosis and bovine or caprine/ovine brucellosis, or reported no positive cases in 2005. However, in some of the non-free Member States prevalence at the levels of 3-4% was still detected in bovine/sheep/goat populations.

The parasitic zoonoses, echinococcosis, and trichinellosis, accounted for 320 and 174 reported human disease cases respectively in 2005. *Trichinella* was rarely detected in slaughter animals. For both zoonoses, wildlife is an important reservoir of infections. There is a distinct geographical distribution of the findings of the parasites in the EU. The *Toxoplasma* parasite was reported from various animal species in 2005.

Four cases of human rabies were reported in 2005, but the infection originated from outside the EU. However, the increased reporting of cases in farm and wild animals in the eastern part of the EU is of concern.

The report also contains information about Bovine Spongiform Encephalopathy, Avian Influenza, *Cysticerci* and *Sarcocystis* parasites and Q fever in animal populations.

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1. Introduction

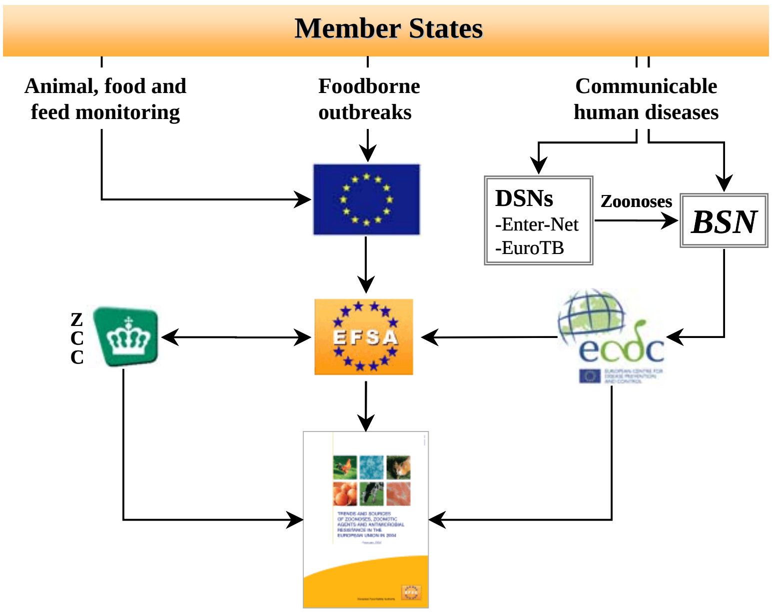
The framework of reporting

The Community system for monitoring and collection of information on zoonoses is based on the Zoonoses Directive 2003/99/EC[2], 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 preparing the Community Summary Report.

Data collected in the framework of Directive 2003/99/EC relate to the occurrence of zoonotic agents isolated from animals, food and feed as well as to antimicrobial resistance in these agents. This includes both data on sporadic findings as well as on causative agents in foodborne outbreaks. The information concerning zoonoses cases in humans and related antimicrobial resistance is derived from the structures and/or authorities referred to in Article 1 of Council Decision No 2119/98/EC[3].

The data flow for the 2005 Community Summary Report is shown in Figure 1.

Figure IN1. Scheme of the data flow for the Community Summary Report, 2005



[2] 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)

[3] Decision No 2119/89/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)

Regarding year 2005, the European Centre for Disease Prevention and Control (ECDC) provided, for the first time, the data on cases of zoonoses in humans and also the analysis of these data for the Community Summary Report. The data used for analysis were derived from several disease networks; the Basic Surveillance Network (BSN) and two Dedicated Surveillance Networks (DSN): Enter-Net and Euro-TB.

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 2005. These data were kindly provided by the Commission, and are based on their summary reports on these diseases in 2005.

Data received in 2005

In 2005, 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.* In addition, 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 MS, data were reported on the following agents and zoonoses: *Yersinia*, rabies, *Toxoplasma*, *Cysticerci, Sarcocystis*, Q fever and antimicrobial resistance in indicator *E. coli* isolates.

Twenty-four MS submitted national zoonoses reports concerning the year 2005. In addition two non-Member States, Norway and Switzerland transferred reports. For Switzerland, this was the first national report on zoonoses submitted to the Commission. No national zoonoses report was received from Hungary. From the Communicable Disease Networks, data on human zoonoses cases were received from all 25 MS and additionally from two non-MS, Norway and Iceland.

For the second year, the countries submitted the data on animals, food, feed and foodborne outbreaks using an online zoonoses reporting system that is maintained by EFSA.

The deadline for data submission was 31 May 2006. The majority of the national reports (20) were received by this timeline, and the remaining 6 reports were transferred by 14 June. Data was frozen in the zoonoses database as of 15 June 2006.

The draft report was sent to MS for consultation on 9 October 2006 and comments were collected by 1 November 2006. The utmost efforts were made to incorporate comments and data amendments within the available time frame. The final report was published online by EFSA in December 2006.

The structure of the report

The Community Summary Report on Trends and Sources of Zoonotic Agents is divided into three levels. Level 1 consists of an abstract introducing the report and presenting the important zoonotic trends and findings in the Community for 2005. Level 2 of the report presents a Community assessment with interpretation of the trends and sources, covered by data analysis for each pathogen, as well as an overview of monitoring programmes implemented in the Community. Level 1 and Level 2 are covered by this report and are available in print. Level 3 of the report consists of an overview of all data submitted by the MS in table formats 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 therefore, may not accurately represent the national situation on zoonoses. Results are generally not directly comparable between MS.

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 comparison, leading to a table or a figure. However, for some data, e.g. 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 in 2005

- Campylobacteriosis is the most frequently reported zoonotic disease in humans. Poultry meat is assumed to be amongst the most important sources of foodborne *Campylobacter* infections, and in line with this the highest proportion of *Campylobacter* positive samples in 2005 were reported for this food category. The proportion of positive samples in fresh poultry meat was high in most MS.

- Despite a decrease in the number of human cases when compared to 2004, salmonellosis remains the second most frequently reported zoonosis in the EU. The major sources of foodborne *Salmonella* infections are eggs as well as poultry and pig meat. In 2005, *Salmonella* was most frequently reported from fresh poultry and pig meat. An overall decreasing trend in *Salmonella* prevalence was apparent in table eggs over the last 5 years.

- Relatively high proportions of *Campylobacter* and *Salmonella* isolates from animals and food showed resistance to antimicrobials commonly used in human therapy. This is especially the case for resistance to fluoroquinolones in *Campylobacter* isolates from poultry. Foodborne infections caused by these resistant bacteria pose a particular risk to humans, as therapeutic options to treat the disease cases may be limited.

- Verotoxigenic *Escherichia coli* (VTEC) infections and yersiniosis are also important zoonotic diseases, with considerable incidences in EU. The lack of information on the association of the VTEC and *Yersinia* findings in food and animals to human disease cases, inhibits a proper assessment of the relevance of different foods and animal species as sources of human infections. There is a need for more detailed information on the serotypes and other virulence factors related to human pathogenic serotypes as well as for harmonisation of the analytical methodology.

- Listeriosis is an important zoonosis in humans due to the severity of the disease. Ready-to-eat food (RTE) are the main source of the foodborne infections. Among the large number of different types of RTE foods examined, typically very few carried *Listeria monocytogenes* at levels over the limit that poses a significant risk to human health (100 bacteria/g). However, in RTE fishery products more positive findings and samples over the 100 cfu/g limit were made indicating that this food category is of higher risk for consumers.

- *Salmonella*, *Campylobacter* and foodborne viruses are the most important causes of foodborne outbreaks. For *Salmonella* outbreaks egg products and broiler meat were the most frequent vehicles of the infection. For *Campylobacter* outbreaks broiler meat remained the major source of infection, though the largest *Campylobacter* outbreaks were caused by contaminated drinking water. Caliciviruses are the most common causative agents of foodborne virus outbreaks. The most common sources are drinking water, fruit and vegetables. Further harmonisation of the reporting on outbreaks would improve the quality of the Community analyses.

- The incidence of the two foodborne parasitic zoonoses, trichinellosis and echinococcosis, was low in humans, but relevant due to severity of the disease. *Trichinella* was rarely detected in farm animals. For both zoonoses, wildlife is an important reservoir. There is a distinct geographical distribution of cases and related risk of acquiring disease within the EU.

- No information on human cases of *Toxoplasma* infections was available for 2005. Data on *Toxoplasma* in food was also sparse. There is a need to define the optimal monitoring schemes for the agent and to improve detection and reporting in the EU.

- The Community measures to eradicate brucellosis and bovine tuberculosis in animals have contributed towards most of the MS being officially free of the diseases or reporting no positive cases. However, the progress towards eradication of the diseases is slow in some of the non-free MS.

- Even though there were only few rabies cases in humans reported, the increased reporting of cases in domestic animals and wildlife in the eastern part of the EU is of concern.

2.2. Zoonoses and item specific summaries

Salmonella

Humans

In 2005, a total of 176,395 of human salmonellosis cases were reported by 24 MS. The EU incidence was 38.2 cases per 100,000 population, ranging from 4.4 to 321.5 per 100,000 population. Even though seven MS reported a slight increase in cases, an overall decrease of 9.5% in the incidence was observed compared with 2004. German cases accounted for approximately 30% of the registered cases in 2005.

A seasonal peak during the late summer and autumn was generally observed in all MS. The highest numbers of reported cases were for age group 0-4 years, 5-14 years and 25-44 years. As in previous years, *S.* Enteritidis and *S.* Typhimurium were the most frequently reported serovars. Data on the origin of cases (domestic/imported) were provided by 15 MS and varied considerably between MS.

Food

A wide range of foodstuffs was tested for *Salmonella,* but the majority of samples were from various types of meat and products thereof. *Salmonella* was most frequently reported from poultry meat, followed by pig meat and the highest proportions of positive findings were also observed in these food categories.

Salmonella was isolated in poultry meat, at all levels of production. In 2005, the MS reported positive findings in 0% to18% of the tested samples of fresh broiler meat. Similar findings were reported for turkey meat. Overall, fewer positive findings were reported in fresh pig meat, even though 0% to 18% of the samples were found positive by MS. The reported proportions of positive findings in bovine meat were generally lower than 2%, and these findings are in line with the findings reported in 2004.

Few MS reported *Salmonella*-positive samples of ready-to-eat products of meat origin in 2005, but percentages of positive samples up to 3-5 % were occasionally observed. Findings of *Salmonella* in ready-to-eat products constitute a particular human health risk.

For those MS reporting data on table eggs, no major changes were observed in the proportion of *Salmonella* positive samples in 2005 compared to 2004. In these MS 0% to 6% of the tested table eggs were reported to be *Salmonella* contaminated. However, when the results reported by the MS over the 5 previous years are compared, there is a decreasing trend in the *Salmonella* contamination of table eggs.

Very few positive findings of *Salmonella w*ere made from milk and dairy products and from fruit and vegetables. However, a quite substantial proportion of positive samples was reported in spices and herbs (3%-7%). There were also occasional reports of *Salmonella* in fishery products and live bivalve molluscs with proportions of positive samples up to 4%.

As in 2004, the lowest levels of *Salmonella* positive samples in poultry, pig and bovine meat samples were reported by the Nordic countries.

Animals

In 2005, *Salmonella* was reported in various animal species, including farm, pet and zoo animals and wildlife. However, the most frequent findings were made from poultry flocks.

The mandatory control programme for *Salmonella* in breeding flocks of fowl (*Gallus gallus)* ensures relatively comparable data within the Community. Overall, 6% of the parent-breeding flocks for laying hens and 5% of parent-breeding flocks for broilers were found infected with *Salmonella* in 2005. Compared to 2004, this represents a small decrease in the number of positive parent breeding flocks for laying hens, but a small increase for parent breeding flocks in the broiler production

In laying hen flocks, 0.1% to 13% flocks were found infected with *Salmonella* in the routine monitoring, while the prevalences observed in broiler flocks ranged from 0% to 18%. In flocks of turkeys, ducks and geese, 0% to 17% of the flocks were reported infected.

When the results of the routine monitoring of laying hen flocks are compared to the results from an EU-wide, fully harmonised *Salmonella* baseline study in laying hen holdings, the prevalences in the baseline study are remarkably higher than those in routine monitoring. This reflects the different sensitivities of sampling scheme and sample types used; and demonstrates that a harmonised protocol should be used when comparing the situation in one MS with another.

Few MS have active monitoring of *Salmonella* in pigs and cattle. Six countries reported prevalences from 0% to 28% in pig herds. For cattle the reported prevalences in animals varied from 0% to 7%.

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.

Feedingstuffs

Information on *Salmonella* in feedingstuffs was received from the majority of the MS. In 2005, the decline in the occurrence of *Salmonella* in fishmeal continued. Overall, MS reported proportions of *Salmonella* positive findings in meat and bone meal of less than 1.5%. The largest proportions of *Salmonella* positive samples were found in vegetable derived feed material, specifically in oil seeds and products thereof (0.4% to 7%). In compound feedingstuffs, *Salmonella* was isolated in 0% to 6% of the samples tested. As in 2004, *S.* Enteritidis and *S.* Typhimurium were detected in several types of feedingstuffs, but were not the dominant serovars encountered.

***Salmonella* serovars**

The available information on the distribution of *Salmonella* serovar and phage types along the food chain varied greatly between countries. As in previous years, *S.* Enteritidis and *S.* Typhimurium were the most commonly reported serovars in humans, accounting for 52% and 9% of the reported cases, respectively (BSN data). All other serovars each caused 1% or less of the reported human cases.

In 2005, *S*. Enteritidis was the most commonly reported serovar in broiler meat, followed by *S*. Paratyphi B var. *S.* Java, and *S*. Typhimurium. However, the predominant serovar in broiler meat varied between the MS. *S*. Enteritidis was the predominating serovar in table eggs. The dominant serovars isolated from laying hens and broilers were *S.* Enteritidis, *S*. Infantis and *S*. Typhimurium. Although variations between MS occur, *S.* Typhimurium was the predominant serovar isolated from pigs and pig meat, followed by *S.* Derby. In feedingstuffs, the most frequently reported serovars were *S.* Livingstone, *S.* Senftenberg and *S.* Montevideo.

Antimicrobial resistance in *Salmonella*

Amongst *Salmonella* isolates from humans, the majority of *S*. Enteritidis isolates were fully sensitive to all antimicrobials tested and less than 1% were resistant to more than 4 antimicrobials. The situation for *S.* Typhimurium was markedly different, as only 26% of isolates were fully sensitive, and 27% of the isolates were resistant to more than 4 of the antimicrobials tested.

For antimicrobial resistance in *Salmonella* isolates from animals and food, large variation between MS was observed. Resistance to ampicillin (up to 35%), nalidixic acid (up to 17 %) and tetracycline (up to 59%) was common among isolates from pig meat. Several MS reported high levels of resistance to ampicillin, tetracycline and sulphonamide in *Salmonella* from animals (cattle, pigs and *Gallus gallus* and turkeys). In addition, a relatively high proportion of resistance to nalidixic acid was reported by some MS. Nalidixic acid is an indicator for emerging resistance to fluoroquinolones, an important group of substances used to treat salmonellosis in humans. Indeed, some MS reported resistance to fluoroquinolones in isolates from food and animals, but still at a low level (<2%).

The information on antimicrobial resistance in *Salmonella* demonstrates the presence of a reservoir of antimicrobial resistance in farm animals and food of animal origin. Emergence of infections in humans, caused by resistant *Salmonella* bacteria possibly originating from the animal reservoir is a concern, as effective treatment may be compromised.

Campylobacter

Humans

In 2005, a total of 197,363 cases of campylobacteriosis was reported by 22 MS. The EU incidence was 51.6 per 100,000 population, proving campylobacteriosis the most frequently reported zoonotic disease in EU. The incidence varied strongly between countries, ranging from <0.1 to 302.7. As in earlier years, the most commonly reported species was *C. jejuni* followed by *C. coli*. The Community incidence increased by 7.8% compared to the incidence in 2004, but no common trend within the MS was evident. Overall, 13 MS provided information on the origin (domestic vs. imported) of the infections, and the situation varied considerably between the MS. The highest numbers of cases were observed in the age group 25-44 years. There was a distinct seasonal variation in the human cases, with a peak in the number of cases reported during the summer months.

Foodstuffs

Most data concerning *Campylobacter* in animals and food originates from poultry and products thereof. In fresh broiler meat, up to 66% of the investigated samples were found positive for *Campylobacter* in 2005. No apparent trend was observed for *Campylobacter* in poultry meat and the contamination has generally remained at high levels, amongst the MS that have provided data for the last five years. In fresh pig and bovine meat, proportions of positive samples were considerably lower. In fresh pig meat, 0% to 7% of the samples were positive. In fresh bovine meat, up to 2% of the samples tested positive. *Campylobacter* were also isolated, at low frequencies, from a variety of other foods such as cow milk, cheese, fishery products and fruit and vegetables.

Animals

In animals substantial *Campylobacter* findings were reported in poultry flocks and also from pig herds and cattle herds. The prevalence in broiler flocks ranged from 0.2% to 85%, whereas in pig herds the prevalence varied from 25% to 85% and in cattle herds from 0.3% to 47%.

It is noteworthy that considerably lower contamination levels were observed in pig and bovine meat than in pig and cattle herds. This may be a consequence of less faecal contamination during slaughter and the inability of the bacteria to survive on the dry surfaces of pig and bovine meat.

The most commonly isolated species from animals was *C. jejuni*, except in pigs where *C. coli* predominated. The importance of poultry as the source of infections in humans was supported by the *Campylobacter* species distribution.

Some *Campylobacter* findings were made from pets and wildlife, which shows that these animals may also serve as a source of the bacteria.

Control programmes for *Campylobacter* in broilers have been implemented in Denmark, Finland, Norway, The Netherlands, Sweden and the United Kingdom. Denmark, Norway and Sweden have experienced a decreasing trend in the number of *Campylobacter* positive broiler flocks over the last years.

Antimicrobial resistance in Campylobacter

The highest proportions of antimicrobial resistance in *Campylobacter* isolates were found in isolates from animals, particularly in poultry and pigs. An observation of major concern is the high proportions of resistance to ciprofloxacin in animals and to less extend in isolates from broiler meat.

In *Campylobacter* isolates from humans, resistance to ciprofloxacin was reported to be common, ranging from 37% (*C. jejuni*) to 48% (*C. coli*). In *C. jejuni,* resistance to tetracycline and ampicillin was less common, whereas in *C. coli* a higher proportion of isolates resistant to tetracycline (38%) was observed.

Among *Campylobacter* isolates from food, the highest proportions of resistant isolates were reported for tetracycline and ciprofloxacin (up to 23% and 16%, respectively), whereas the levels of resistance to erythromycin was generally low. In isolates from animals, resistance to ciprofloxacin and tetracycline was the highest, ranging up to 94% and 99%, respectively. Resistance to erythromycin and streptomycin in *C. coli* ranged up to 72% and 90%, respectively. The reported levels of resistance in *C. coli* in pigs was generally higher than *C. jejuni* in cattle and poultry.

Ciprofloxacin is a fluoroquinolone, which is used to treat human infections, and findings of resistance towards this in animals and food implies a risk for foodborne transmission of the resistant *Campylobacter* to humans.

In general, the proportions of resistant *Campylobacter* isolates from animals reported by Nordic countries was lower than those reported by other MS. This trend was also evident in 2004.

Listeria

Humans

A total of 1,439 cases of listeriosis were reported from 23 MS in 2005. The EU incidence was 0.3 per 100,000 population, which was similar to 2004 and 2003. Germany reported an increase of approximately 72% in the number of cases, compared with 2004. The highest incidence was reported by Denmark, Belgium, Finland, Germany and The Netherlands. Listeriosis mainly occurred among adults and elderly people, with 53% of cases occurring in individuals above 65 years of age. Based on the information provided by the MS that reported on the origin of cases, the majority of reported cases were domestically acquired.

Foodstuffs

In 2005, a variety of different foodstuffs were tested for *L. monocytogenes* in the reporting 23 MS, covering mainly ready-to-eat (RTE) foods. *L. monocytogenes* was relatively seldom found in the RTE foods, but in a few investigations proportions of positive samples up to 39% were reported. RTE products containing more than 100 bacteria/gram are generally regarded to pose a significant risk for human health. The highest proportion of positive samples and samples containing over 100 bacteria/ gram were reported in RTE fishery products. Samples exceeding the limit of 100 bacteria/gram were also reported from RTE meat products and cheeses, but at lower rates.

Animals

In 2005, six MS and one non-MS reported on *Listeria* in animals. Some results are related to clinical investigations, as listeriosis is a well-known disease in ruminants. *Listeria* was detected in cattle, pigs, sheep, goats and poultry.

Verotoxigenic *Escherichia coli* (VTEC)

Humans

In 2005, a total of 3,314 human VTEC cases were reported from 18 MS. Germany and The United Kingdom accounted for approximately 70% of all reported cases. The EU incidence was 1.2 per 100,000 population, which was similar to 2004. However, for the ten MS that have reported consistently over a three-year period, a slight increasing trend in incidences could be observed. The most commonly identified VTEC serogroup was O157. Overall, more than one third of the VTEC cases occurred in 0-4 year old children. There was a marked seasonality in the human VTEC cases, which reflected the seasonality pattern of the serogroup O157.

Foodstuffs

Seventeen MS and one non-MS reported data on the occurrence of VTEC in foodstuffs. VTEC and the serogroup O157 was occasionally found in fresh bovine, pig and poultry meat as well as cheeses, other dairy products and raw cow milk. The reported proportion of positive samples for VTEC varied from 0% to 15% in the fresh meat samples, and the percentage of positives did not markedly differ between the meat categories. The serogroup O157 was most often isolated from fresh bovine meat with rates up to 6%. Other serogroups that are frequently isolated from human cases, were also found from meat and dairy products. The reported levels of VTEC in foods are comparable with the reported findings in previous years. The information available on the serogroups is sparse.

Animals

Fourteen MS provided data on the occurrence of VTEC in different animals. VTEC was detected in several animal species, including cattle, pigs, poultry, sheep and cats. The majority of positive samples were isolated from cattle where the prevalence ranged from 0% to 22% and most of the O157 serogoup findings were reported for cattle. This indicates that cattle serve as an important reservoir for human exposure to VTEC. The data for VTEC in animals, reported in 2005, were comparable with the data reported in 2004. Data on serogroup were only given in a minor part of the reported investigations.

Farm-to-fork

The general lack of serotyping information (and other relevant data, such as VT subtype, presence of additional virulence factors) makes it difficult to use the current data to assess the importance of the VTEC findings in animals and foods to the human disease.

Tuberculosis due to *Mycobacterium bovis*

Humans

In total, 119 human cases of tuberculosis due to *M. bovis* were reported by 17 MS. This is the highest number of reported cases since 2001. Cases from Germany and The United Kingdom accounted for 77% of the cases reported to BSN in 2005. Most reported cases due to *M. bovis* occurred in individuals older than 65 years of age.

Animals

Eleven MS, two non-MS and nine provinces in Italy were Officially Tuberculosis Free (OTF) in 2005. Among these, only Belgium and France reported some positive cattle herds in 2005. All 15 non-OTF MS have implemented national eradication programmes for bovine tuberculosis. Overall, 0.6% of the existing herds were found positive or infected in the non-OTF MS. Compared to 2004, all the co-financed non-OTF MS reported similar or less positive cattle herds in 2005 and a decreasing general trend in positive herds over the years was obvious. Spain reported the highest proportion of positive herds out of existing herds (1%) among these MS. Three non co-financed non-OTF MS reported positive cattle herds and The United Kingdom and Ireland had the highest proportion of positive herds (4% and 3%, respectively).

Few MS reported *M. bovis* in sheep, goats and pigs. No positive findings were reported from farmed deer. In wildlife populations, few MS reported *M. bovis* in deer, foxes and wild boars. Some zoo animals were also diagnosed with tuberculosis due to *M. bovis*.

Brucella

Humans

In 2005, 1,218 cases were reported by 22 MS. The Community incidence was 0.2 cases per 100,000 population, which represents a slight decrease compared to 2004. In recent years, the highest incidences of human brucellosis have been recorded in Greece (no data for 2005), Italy, Portugal and Spain. Overall, 63.9% of cases occurred in persons aged between 25 and 64 years. In five MS that reported the origin of the infections, imported cases accounted for 5% of the confirmed cases. *B. melitensis* was the most frequently reported species in human cases.

Foodstuffs

Data on foodstuffs were sparse. Greece, Italy and Belgium provided data for cow and sheep milk and products thereof. Findings ranged from no positives to 6% positive samples in milk. The majority of positive samples was from sheep milk or products thereof.

Animals

In 2005, 12 MS, most of The United Kingdom (Great Britain), 44 provinces in Italy and minor areas of Portugal were officially free of brucellosis in cattle (OBF), as well as in sheep and goat (ObmF). Hungary, Ireland, Slovakia, the remaining part of The United Kingdom (Northern Ireland), as well as 64 départements in France and the Canaries in Spain were ObmF, only.

With the exception of two infected sheep/goat herds in Austria, *Brucella* spp. was not detected in any OBF/OBmF countries, or non co-financed non-officially free MS in 2005. In the non-OBF MS, a total of 0.3% of bovine herds were found infected or tested positive for brucellosis, whereas 2% of the sheep/goat herds in non-OBmF MS were positive for ovine/caprine brucellosis. Overall, the proportions of positive herds in MS with co-financed eradication programmes were slightly reduced compared to 2004. However, Ireland and Italy experienced an increase in positive bovine herds and Portugal in sheep/goat herds. There were sporadic reports on *Brucella* findings in wildlife, zoo animals and other domestic animals.

Yersinia

Humans

Twenty-one MS reported a total of 9,630 cases of yersiniosis. The cases reported by Germany accounted for 58% of the total number of cases in 2005. The overall EU incidence was 2.6 per 100,000 population, representing an increase of approximately 8%, compared to 2004. Most reported cases occurred in age groups 0-4 and 5-14 years. Approximately 28% of all cases were reported as imported. The most common species of *Yersinia* isolated from human cases was *Y. enterocolitica*, with O:3 as the dominating serotype. Few MS reported *Y. pseudotuberculosis* cases.

Foodstuffs

Four MS reported on *Y. enterocolitica* findings from meat and milk. Finland investigated only vegetables. The highest proportion of *Y. enterocolitica* positive samples was from pig meat, up to 17%. Positive findings were also made from cow milk, bovine meat and poultry meat. Available information was sparse concerning the human pathogenicity of the isolated *Y. enterocolitica* strains.

Animals

Four MS reported on investigations of *Y. enterocolitica* in animals. Germany in particular contributed with a number of large investigations in various animal species. Strains of *Y. enterocolitica,* including human pathogenic strains, were found in pigs, cattle, sheep and goats. The highest prevalence of *Y. enterocolitica* was reported from cattle (12%) and pigs (3%).

Trichinella

Humans

Twenty-one MS reported information on trichinellosis in 2005, although the 175 human cases were from six MS. The majority of cases was reported by Latvia and Poland. The EU incidence was <0.1 per 100,000 population. This represents a decrease compared to 2004, when Poland had an outbreak involving 163 cases, but is similar to the 2003 incidence. Only two MS reported on the origin of cases and a total of 27% of the confirmed cases were imported. The majority of the human cases was in the age group 45-64 years.

Animals

All MS and two non-MS reported data for *Trichinella* in animals. Pigs, horses, wild boars and game are examined for *Trichinella* at slaughter. In pigs, low number of *Trichinella* positive animals were reported by five MS, and the proportion of positive samples was below 0.0001% in these MS. *Trichinella* was not detected in horses. In the wildlife population, a higher proportion of positive samples was observed in a variety of carnivorous wild animal species, particularly in wild boars, where the prevalence was 0.1%. This indicates that wildlife serves as a reservoir for the parasite. As in previous years, positive findings were reported mostly from the eastern and north-eastern parts of EU.

Echinococcus

Humans

Twenty MS reported 320 cases of human echinococcosis in 2005. Five of the reporting MS had no cases. The EU incidence was <0.1 per 100,000 population. Most MS reported similar numbers to the previous years. *E. granulosus* accounted for 39% of the confirmed case and *E. multilocularis* for 15%. For the remaining cases, the species were not specified. Information concerning the origin of infection was not complete: nine MS reported the origin of cases and three of these MS reported imported cases. Most of the human cases were evenly distributed among the age groups 25-44, 45-64 and ≥ 65 years.

Animals
Twenty-two MS and 2 non-MS provided information concerning *Echinococcus* in animals. Among these, only 3 MS reported no findings. In domestic animals, all samples are collected during meat inspection at the slaughterhouse, and the highest prevalence of positive findings came from several Mediterranean MS, The United Kingdom and Poland. A generally decreasing trend has been observed during the last five years in the Mediterranean countries. Only four MS provided information about the species distribution in domestic animals, all being reported findings of *E. granulosus.*

E. multilocularis was reported in foxes by six MS and in voles by Norway. *E. granulosus* was reported in badgers, marten, mouflons and wolves. Unspecified *Echinococcus* was reported in wild boars. Most of the *Echinococcus* findings in wildlife were reported by central European countries. The findings in foxes and other canids are of utmost importance for human health, as humans may come infected by ingestion of the eggs excreted by these animals.

Toxoplasma

Humans
In 2005, no data was available for toxoplasmosis cases in humans from BSN. However, in 2004, the EU reported incidence was 0.6 cases per 100,000 population. The majority of cases was laboratory-confirmed clinical cases. Very few MS have a routine surveillance for toxoplasmosis in pregnant women or newborns.

Animals
Ten MS and two non-MS provided data on *Toxoplasma* in animals. As most samples were based on clinical suspicion, the results do not reflect the general prevalence in animal populations and cannot readily be compared between MS. In general, the focus of toxoplasmosis in animals is on *T. gondii* as a causative agent for abortions in sheep and goats. Therefore, a major part of samples and the positive findings were from sheep and goats. Dogs and cats were as well commonly tested with positive results. Positive samples were also reported from cattle, fur animals and wildlife.

Rabies

Humans
Generally, the very few human rabies cases reported in EU are imported from outside the Community. In 2005, four cases were reported. Three of these cases were the result of organ transplantation from a rabies infected donor who was infected while travelling outside the EU.

Animals
Twelve MS reported rabies in various animal species. The majority of rabies cases in domestic and wild animals was reported by the eastern European MS, where wildlife (especially foxes and raccoon dogs) is frequently infected. Vaccination programmes to control the disease have proven effective in MS where the wild carnivore population carries the infection. All MS with positive findings have eradication programmes in action.

Bovine Transmissible Spongiform Encephalopathies (BSE)

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 2005 indicates that only low number of bovine animals tested positive for bovine spongiform encephalopathies (BSE) in the MS. Apart from the confirmation of the suspected BSE case in a goat already detected in 2004, no new BSE cases were confirmed in sheep or goats in 2005.

Avian Influenza

The Commission has published a Report on Surveys for Avian Influenza in Poultry in Member States during 2005. According to the report 78 poultry holdings in the MS tested positive for avian influenza A virus out of which 74 were confirmed positive for H5 or H7 virus subtypes.

Cysticerci and *Sarcocystis*

Data on cysticercus (*Tania saginata*) and *Sarcocystis* was only provided by Belgium. Samples were collected during meat inspection of bovine carcasses at slaughterhouse. The number of positive cysticercus cases had decreased and the number of *Sarcocystis* cases remained at the same level when compared to 2004. Overall, 0.3% of the carcasses were found infected with cysticercus and very few (0.002%) with *Sarcocystis*.

Q fever

For the first time information concerning Q fever was provided. Belgium and Portugal reported data concerning *Coxiella burnetii* in animals. Cows, sheep and goats were investigated due to increased abortion cases and Portugal reported one positive cow. Belgium also examined some bulls, but all results were negative.

Foodborne Outbreaks

2005 was the first year for which reporting on foodborne outbreaks was mandatory for MS. Twenty-three MS reported a total of 5,311 foodborne outbreaks, involving 47,251 people, and resulting in 5,330 hospitalisations and 24 deaths. This represents a general decrease in number of outbreaks since last year despite the inclusion of more causative agents and more MS reporting. For a large part of the reported outbreaks, information on sources and other details were not available, as some of the most populous MS provided exclusively aggregated data for the outbreaks.

As in previous years, the most common agent responsible for reported foodborne outbreaks in 2005 was *Salmonella*, followed by *Campylobacter* (64% and 9% of all outbreaks, respectively). *S.* Enteritidis and *S.* Typhimurium were the predominant serovars associated with *Salmonella* outbreaks. Outbreaks caused by *S.* Hadar, *S.* Virchow and *S.* Agona required hospitalisation in a relatively large proportion of cases (69%, 46% and 34%, 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 broiler meat were the most common causes implicated in outbreaks.

Campylobacter was the causative agent in 9% of all reported outbreaks, involving 2,478 persons, of which 6% were hospitalised. Broiler meat is the most commonly reported source for *Campylobacter* outbreaks. In Finland, *Campylobacter* was the causative agent of two large waterborne outbreaks.

Other important causes of foodborne outbreaks in the EU were foodborne viruses (6% of all reported outbreaks), bacterial toxins (i.e. *Staphylococcus* spp. (3%), *Clostridium* spp. (2%) and *Bacillus* spp. (1%)), pathogenic *E. coli* (1%), *Shigella* (1%) and *Giardia* (1%). Outbreaks caused by viruses involved more people than outbreaks caused by *Salmonella* or *Campylobacter*, but required less hospitalisations.

Antimicrobial resistance in *E. coli* indicators

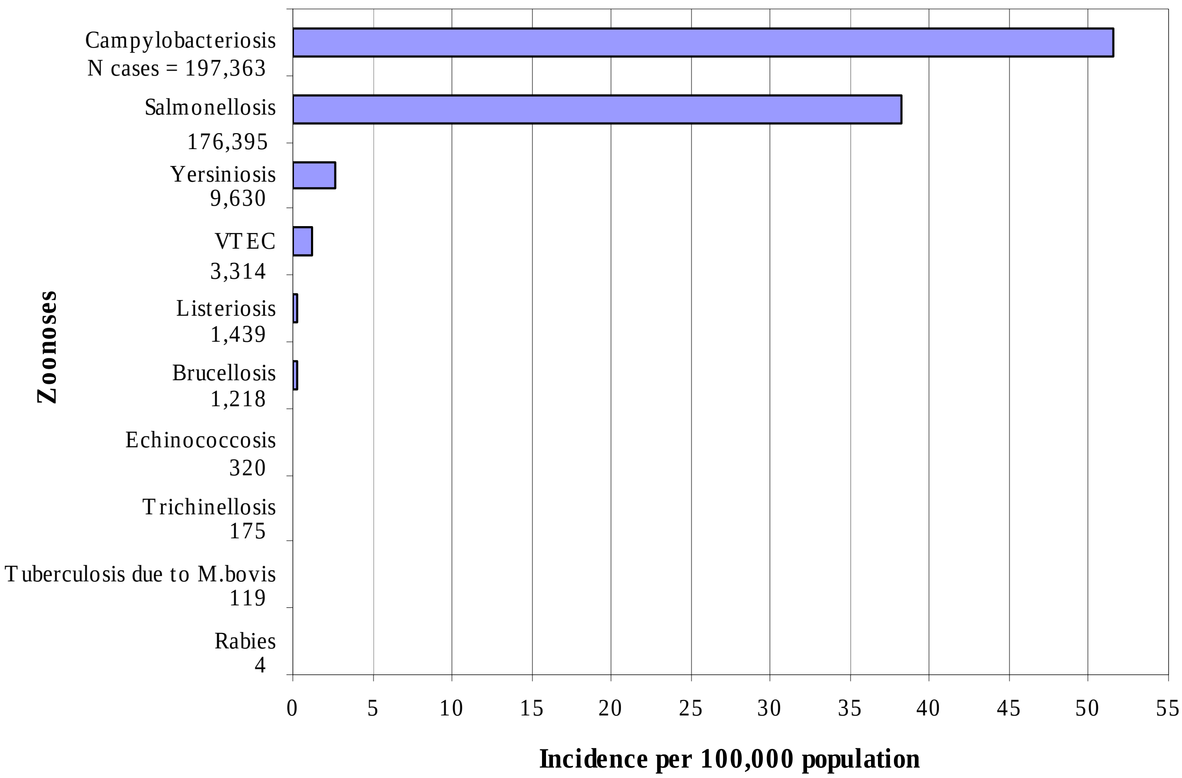
Monitoring of antimicrobial resistance in *E. coli* indicators allows to follow trends of resistance in animals and foods with no or low prevalence of pathogenic zoonotic bacteria. For *E. coli* isolates from food, the level of antimicrobial resistance was generally lower than in animals. In general, a large variation in the prevalence of antimicrobial resistance in *E. coli* indicator isolates was observed.

The proportions of resistant isolates reported for fowl (*Gallus gallus)* were generally higher than for pigs and cattle. In *E. coli* isolates from cattle and pigs, the highest level of resistance was reported for ampicillin and tetracycline, whereas for poultry, high levels of resistance to nalidixic acid were also observed with several countries reporting prevalences of more than 50%. The highest prevalences of fully sensitive isolates for *E. coli* overall were reported by Austria, Denmark, Estonia, Poland and Finland. The observations were in line with those made in 2004.

Animal populations

For the first time the information on animal populations provided by the MS was summarised. Together 23 MS and two non-MS reported data. The largest reported fowl (*Gallus gallus*) population was in Poland and the densest ones in The Netherlands and Czech Republic. The cattle population was the largest in France, Germany and The United Kingdom. The densest population was reported in The Netherlands and Germany. The largest pig population was reported in Germany and Spain. Denmark and The Netherlands reported the highest density of pigs. The largest sheep populations, by far, were reported in Spain and The United Kingdom. The United Kingdom together with Norway also had the highest density of sheep population.

Figure SU1. The reported incidences of the zoonoses in humans, 2005



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 – Foodborne outbreaks

For 2005, the focus of the year in the analyses of the information was foodborne outbreaks. The analysis of the results of the investigations received from the MS has been summarised above. Below a general overview of the reporting is provided together with a description of activities to improve the reporting further.

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 human cases exceeds the expected number and where the cases are linked, or are probably linked, to the same food source. This includes outbreaks caused by any virus, bacteria, algae, fungus, parasite, other biological agents or their toxins, which are likely to cause food borne illness. Outbreaks caused by ingestion of drinking water are also considered foodborne.

The Directive 2003/99/EC covers the epidemiological investigation of foodborne outbreaks. Under the Directive, the reporting of foodborne outbreaks became mandatory for all MS starting from 2005. The minimum requirements of the information to be reported are laid down in Annex IV to the Directive. The reporting system covers the results of the foodborne outbreak investigations carried out in the MS. The purpose of the Community reporting system on foodborne outbreaks is to collect the data necessary to evaluate trends and sources of these outbreaks in the Community. This includes data on the number of outbreaks and persons involved. Furthermore, information on the number of hospitalised cases and deaths allow for the estimation of the scale and severity of an outbreak. As data on human morbidity and mortality are to be reported, foodborne outbreaks is the only field, under the new Directive, where MS submit information on human cases directly to the Commission and EFSA.

EFSA and ECDC collaborate in developing a reporting system that meets the requirements of the Directive and provides the necessary information at Community level. A joint Working Group, comprising experts from human health and food/veterinary sectors, is working on the description of the variables to be reported and on the reporting format. EFSA’s contractor, the Bundesinstitut fur Risikobewertung (BfR), is assisting the Working Group in this exercise. The BfR conducted a questionnaire survey to obtain an overview of the reporting systems currently in place in the MS and to assess the needs for information on foodborne outbreaks at the Community level.

In 2005, twenty-three MS and one non-MS reported a total of 5,311 foodborne outbreaks involving a total of 47,251 people. This is a decrease of 22% in the number of reported outbreaks from 2004 to 2005, but affecting 10% more people. Although a substantial amount of data on foodborne outbreaks is being reported, it still proves difficult to gain full insight into the importance of various foodborne pathogens, outbreak settings and contributing factors on a Community level. A total of 73% of all foodborne outbreaks were reported in aggregated form and although these data provide information on the total number of people involved, hospitalisations and deaths, it is not possible to assign certain sources and locations to individual outbreaks.

The level of detail of the reported data varied greatly between MS. Finland, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovenia, The United Kingdom and one non-MS only reported on individual foodborne outbreaks. Austria, Belgium, Denmark and Sweden mainly reported individual outbreaks, although 3% to 18% of their outbreaks were reported in aggregated form, typically foodborne outbreaks with unknown causative agent, food vehicle and/or location. The remaining MS reported between 44% (Estonia) and 100% (Czech Republic, France) of outbreaks in various levels of aggregated form. In these countries, outbreaks were often aggregated according to common causative agent or unspecified food vehicle groups. As the source of an outbreak is not always found and some of the most populous MS provided aggregated data for foodborne outbreaks (e.g. France, Germany, Spain, Italy), details on locations and sources of outbreaks were not available for a large proportion of outbreaks reported by the MS in 2005 (40% and 55%, respectively).

The data provided on sources of foodborne outbreaks was generally informative but also varied greatly. Whereas some sources were described very precisely, others referred to an event (e.g. buffet) or composite foods and products. Unfortunately, in some cases where detailed information was provided, the outbreaks were reported in aggregated form so that the relative impact of the various sources could not be assessed. For 76% of all reported foodborne outbreaks no type of evidence was indicated. The remaining outbreaks were either laboratory confirmed (5%), supported by descriptive and/or analytical epidemiological investigation (8%) or both (11%). Information on contributing factors to foodborne outbreaks is generally difficult to obtain. Only 24% of reported outbreaks provided information on contributing factors, including inadequate heating of contaminated raw material, improper storage temperature, deficiency in food handling and preparation, contamination by infected persons, poor hygiene and breakdown of HACCP systems. Contributing factors to a foodborne outbreak are often a combination of these common factors.

The information gathered under the headings ‘suspected’ and ‘confirmed’ appear to have been interpreted differently by reporting officers in contributing countries, where some referred to the strength of the evidence concerning the source, while others referred to the status of human cases with regard to their association with the outbreak. For 25% of all reported foodborne outbreaks the source/cases were indicated as ‘suspected’ and for 15% the source/cases were ‘confirmed’.

Information on the incriminated food source, type of evidence, location of exposure and contributing factors was provided as free text, resulting in a large variety of descriptions. Free text data entry does not allow for descriptive analysis without categorisation of the input values first. As not all entries are easy to interpret, misclassification of a number of outbreaks with regard to source and location may have occurred.

Through the efforts of the joint Working Group of experts, ECDC and EFSA, assisted by the Foodborne Outbreaks Contractor (BfR), recording and reporting of foodborne outbreaks will become increasingly harmonised at Community level with regard to the recorded variables and level of detail. This will greatly improve the completeness and the quality of the data that are a prerequisite for evaluating trends and sources of foodborne outbreaks within the Community.

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 and humans and faecally contaminated environments.

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.

3.1.1. Salmonellosis in humans

In 2005, a total of 177,963 cases of human salmonellosis were reported to the Basic Surveillance Network (BSN) from 24 EU MS (176,395 cases), Iceland and Norway (Table SA1). Germany accounted for 31% of all cases. Countries indicated 97.4% of all cases as laboratory confirmed. The overall incidence in the EU was 38.2 per 100,000 population. Despite a general decrease of 9.5% in the incidence compared to 2004, some countries experienced an increase: Czech Republic, Denmark, Estonia, Hungary, Latvia and Lithuania. This may be explained by improved surveillance systems (particularly in the new MS), but also to the occurrence of large-scale foodborne outbreaks.

Twenty-two countries (21 EU MS and one non-MS) reported 100,424 cases to Enter-net. For Greece this was the only source of information for human cases of salmonellosis. The incidence has not been calculated for these cases, since the Enter-net data, represent only those cases reported to the National Reference Laboratories, and thus may represent only a subset of the total number of cases.

Table SA1. Reported salmonellosis cases in humans indicating: Type of report/total number of cases/confirmed cases/incidence reported to BSN in 2005, total number reported through Enter-net in 2005, number of cases 2001-2004 by all countries

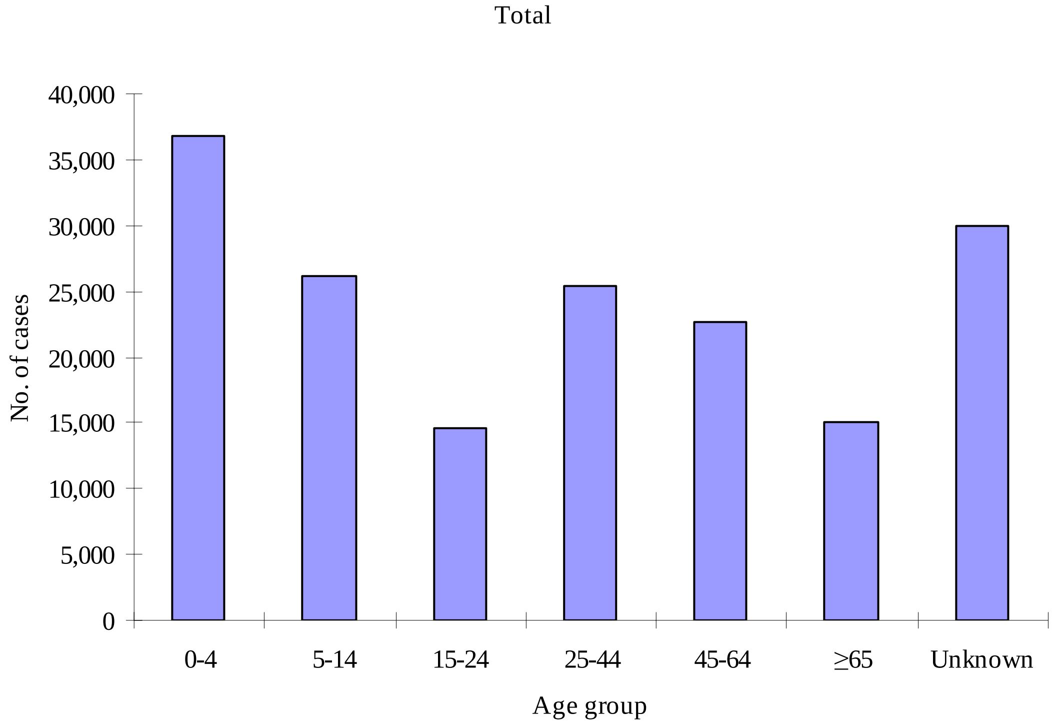
Country	2005						2004	2003	2002	2001
	Report Type[1]	Cases	Confirmed Cases (N,%)		Cases/ 100,000 population	Enter-net	Cases			
Austria	A	5,164	5,164	100	62.9	5,552	7,286	8,251	8,322	7,219
Belgium	C	4,916	4,916	100	47.1	4,792	9,545	12,894	9,753	10,784
Cyprus	C	59	59	100	7.9	-	89	73	117	146
Czech Republic	C	32,860	32,860	100	321.5	32,171	30,724	-	-	-
Denmark	C	1,798	1,798	100	33.2	1,765	1,538	1,713	2,075	2,918
Estonia	C	312	312	100	23.2	312	135	184	337	304
Finland[2]	C	2,478	2,478	100	47.3	2,478	2,248	2,290	2,357	2,731
France	A	5,877	5,877	100	9.4	5,877	6,352	6,199	6,575	7,456
Germany	C	52,245	52,245	100	63.3	2,482	59,947	63,044	72,377	77,386
Greece	-	-	-	-	-	545	1,493	837	460	284
Hungary	C	8,155	7,820	95.9	77.4	-	7,557	-	-	-
Ireland	C	349	344	98.6	8.4	351	410	449	369	430
Italy	?	5,004	5,004	100	8.6	3,680	6,696	6,352	10,744	8,215
Latvia	C	655	639	97.6	27.7	650	520	799	927	936
Lithuania	A	2,348	2,348	100	68.5	2,022	1,854	1,161	-	-
Luxembourg	C	211	211	100	46.4	204	-	421	528	319
Malta	C	66	66	100	16.4	98	79	-	-	-
The Netherlands	A	1,388	1,388	100	8.5	1,374	1,520	2,142	1,588	2,082
Poland	A	16,006	15,048	94.0	39.4	-	15,958	16,617	20,688	19,881
Portugal	C	514	468	91.1	4.4	-	691	720	330	696
Slovakia	C	12,051	10,766	89.3	199.9	12,248	12,667	14,153	15,854	19,517
Slovenia	C	1,519	-	-	-	1,543	3,247	3,980	-	-
Spain	A	6,048	6,048	100	14.1	6,136	7,109	8,558	7,968	6,366
Sweden	C	3,588	3,168	88.3	35.2	962	3,562	3,794	4,508	4,617
United Kingdom	C	12,784	12,784	100	21.3	13,719	14,809	18,069	16,547	15,982
EU-Total		**176,395**	**171,811**	**97.4**	**38.2**	**98,961**	**196,036**	**172,700**	**182,424**	**188,269**
Iceland	C	86	86	100	29.3	-	-	-	-	-
Norway	C	1,482	1,482	100	32.2	1,463	1,567	1,539	1,495	1,899
Total		**177,963**	**173,379**	**97.4**	**38.1**	**100,424**	**197,603**	**174,239**	**183,919**	**190,168**

1. A: aggregated data report, C: case-based report, 0: 0 cases reported, -: No cases reported
2. Finland - the calculated figures are based on Enter-net data, data include all notified cases

Only data from laboratory confirmed cases were used for analysis in the following.

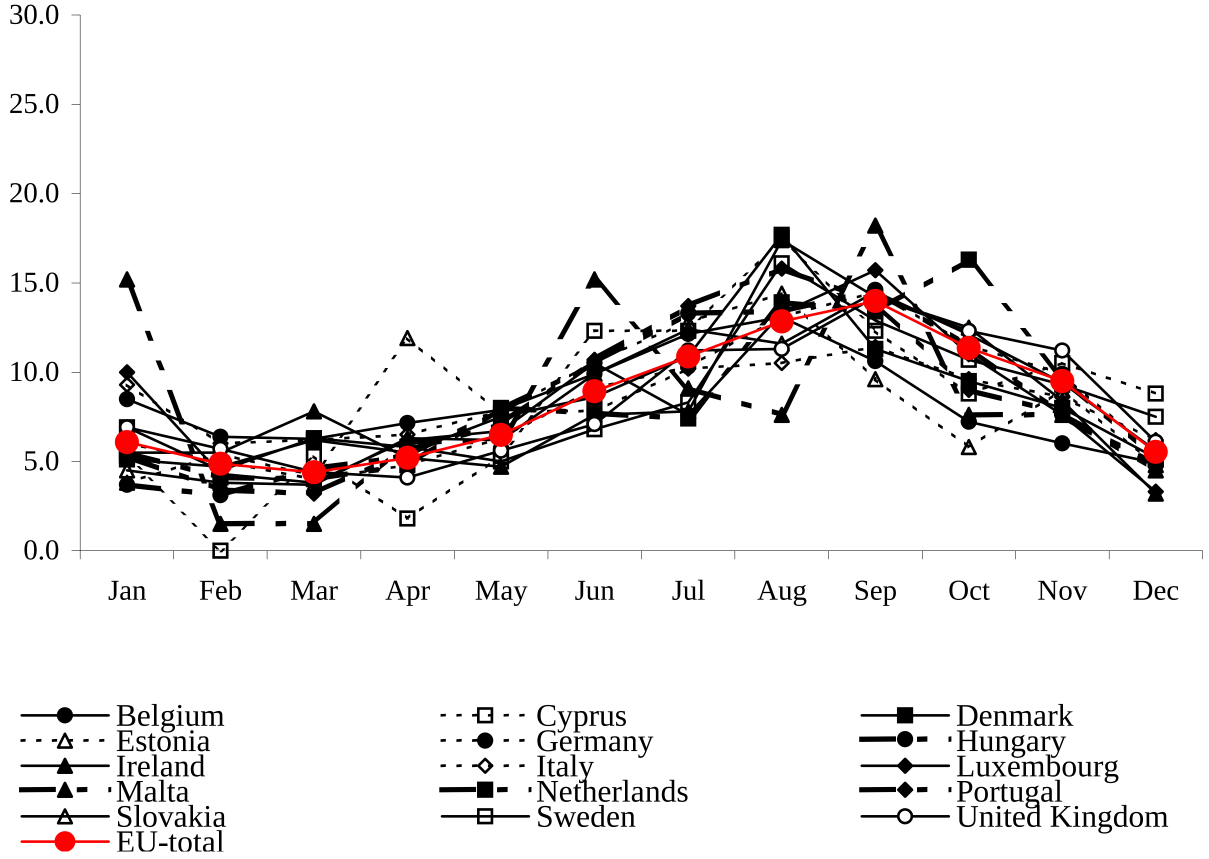
The highest number of cases was reported in the age group 0-4 years, representing 21% of all cases, followed by the 5-14 and 25-44 year both representing approximately 15% of all cases (Figure SA1). Compared to 2004, the age group 45-64 has increased in 2005 and accounted for 13% of cases. As some MS reported aggregated data, age group could only be analysed for 18% of cases.

Figure SA1. Total number of reported confirmed cases of human salmonellosis in reporting countries and relative frequency of age group, BSN data, 2005



A peak in the number of reported cases was evident in the late summer/autumn months. Figure SA2 is based on the data from the 15 MS, which provided case-based data.

Figure SA2. Reported confirmed salmonellosis cases in humans by reporting countries and month, BSN data, 2005



Imported cases (cases acquired outside the MS)

Half of the reported cases were domestically acquired, while only 7% of the cases were reported to be acquired abroad. For 43% of the cases no information whether the infection was acquired domestically or abroad was available. Sweden and The Netherlands had the highest proportion of imported cases (Table SA2). The non-MS had the same high level of imported cases. 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 SA2. Reported confirmed salmonellosis cases in humans by reporting countries and origin of case (imported/domestic), BSN data, 2005 (%)

Country	Domestic	Imported	Unknown	Total (n)
Austria	-	-	100	5,164
Belgium	98.7	1.3	0	4,916
Cyprus	88.1	8.5	3.4	59
Czech Republic	99.3	0.7	0	32,860
Denmark	14.6	15.1	70.3	1,798
Estonia	92.9	7.1	0	312
Finland[1]	17.7	77.9	4.4	2,478
France	-	-	100	5,877
Germany	88.6	11.4	0	52,245
Hungary	-	-	100	7,820
Ireland	9.6	11.6	78.8	344
Italy	100	0	0	5,004
Latvia	99.7	0.3	0	639
Lithuania	100	0	0	2,348
Luxembourg	-	-	100	211
Malta	100	0	0	66
The Netherlands	13.0	87.0	0	1,388
Poland	100	0	0	15,048
Portugal	-	-	100	468
Slovakia	99.6	0.2	0.2	10,766
Spain	-	-	100	6,048
Sweden	19.0	80.2	0.8	3,168
United Kingdom	-	18.6	81.4	12,728
Total EU	**49.6**	**7.6**	**42.8**	**171,755**
Iceland	8.1	76.7	15.1	86
Norway	17.6	78.5	3.9	1482
Total	**49.3**	**8.3**	**42.5**	**173,323**

1. Finland - the calculated figures are based on Enter-net data

Human *Salmonella* serovars

S. Enteritidis was the most frequently reported serovar in both BSN and Enter-net, followed by *S.* Typhimurium. Twenty-one MS and Iceland reported 86,536 (52%) *S.* Enteritidis cases and 15,058 (9%) *S.* Typhimurium cases to BSN, whereas Enter-net received reports of 69,290 (69%) *S.* Enteritidis cases and 12,828 (13%) *S.* Typhimurium cases. The ranking of serovars, in Table SA3, is based on the sum of the reported serovars. *S.* Bovismorbificans scored high behind *S.* Enteritidis, *S.* Typhimurium and *S.* Infantis due to a large outbreak in Germany. Table SA3 compares the frequencies of serovars reported to BSN and Enter-net. *S.* Enteritidis and *S.* Typhimurium were the most frequently reported to both networks, but the proportions are higher in the Enter-net data where these two serovars account for 82% compared with 61% in the BSN data. It should be noted that for 34% of cases in the BSN dataset the serovar was unknown.

Table SA3. Reported confirmed salmonellosis cases in humans by reporting countries and serovar (10 most frequent serovars), BSN and Enter-net data, 2005

Top ten BSN			Top ten Enter-net		
Serovar	**N**	**%**	**Serovar**	**N**	**%**
S. Enteritidis	86,536	52.2	*S.* Enteritidis	69,290	69.1
S. Typhimurium	15,058	9.1	*S.* Typhimurium	12,828	12.8
S. Infantis	1,354	0.8	*S.* Hadar	2,064	2.1
S. Bovismorbificans	621	<0.5	*S.* Virchow	1,026	1
S. Hadar	577	<0.5	*S.* Infantis	887	0.8
S. Virchow	535	<0.5	*S.* Agona	606	0.6
S. Derby	259	<0.5	*S.* Newport	599	0.6
S. Newport	245	<0.5	*S.* Stanley	535	0.5
S. Anatum	179	<0.5	*S.* Bovismorbificans	533	0.5
S. Goldcoast	173	<0.5	*S.* Derby	481	0.5

S. spp. reported through the BSN, N=56,619 (34.1%)
S. spp. reported through Enter-net N=2,626 (2.6%)

Table SA4 shows the distribution of phage types among *S.* Enteritidis and *S.* Typhimurium for Enter-net.

Table SA4. Reported confirmed salmonellosis cases in humans by reporting countries and phagetype for *S.* Enteritidis and *S.* Typhimurium, Enter-net data, 2005

Enter-net					
***S.* Enteritidis (N=16,411)**			***S.* Typhimurium (N=5,036)**		
Phage type	**N**	**% Pos**	**Phage type**	**N**	**% Pos**
4	4,359	26.4	104	1,114	21.4
1	3,176	19.2	120	482	9.3
8	2,370	14.4	193	377	7.3
21	1,815	11.0	RDNC	398	7.9
14B	1,100	6.7	NT	498	9.9
6	972	5.9	U302	297	5.9
6A	458	2.8	104B	262	5.0
RDNC	334	2.0	506	219	4.3
5A	178	1.1	12	138	2.7
12	156	1.0	507	106	2.1

3.1.2. *Salmonella* in food

In 2005, no single harmonised scheme was agreed upon for monitoring the occurrence of *Salmonella* in foodstuffs. However, the *Salmonella* criteria laid down by the Community legislation provided guidance for the sampling and testing. These criteria, which were applicable until the end of 2005, were set down for milk and dairy products (Dir. 92/46/EEC), egg products (Dir. 87/437/EEC), minced meat and meat preparations (Dir. 94/65/EEC), cooked crustaceans and molluscan shellfish (Dir. 93/51/ EEC) and live bivalve molluscs (Dir. 91/492/EEC). Sample sizes, and sometimes also analyses and sampling methods, were also fixed in reference in line with Directive 89/397/EEC. Nevertheless, there are still differences in the sampling schemes and analyses methods, as well as the type of foodstuffs selected for analyses, between MS. Therefore, results are not directly comparable between MS and comparison between years within the same country should be made with caution.

Only results based on more than 25 samples tested are addressed in the following. Details on the monitoring schemes applied in the MS are summarised in Appendix Tables SA9, SA12, SA18 and SA21.

Poultry meat and products thereof

A number of MS have applied monitoring schemes for *Salmonella* in poultry (Appendix Tables SA7 and SA8). Data on the occurrence of *Salmonella* in broiler meat at different stages of the production line, in MS that have applied such programmes and that have reported consistently from 2001-2005, are presented in Table SA5 and Figure SA3.

Denmark, Finland, Ireland, Sweden and Norway have had programmes for the control of *Salmonella* in broiler meat 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 SA5). Despite considerable fluctuation in some countries, a slight decreasing trend can be observed for the remaining five countries that have also reported throughout this period (Figure SA3). However, compared with 2004, an increase in the number of positive samples was observed at slaughter in Denmark, Italy and Spain, and at processing in Belgium.

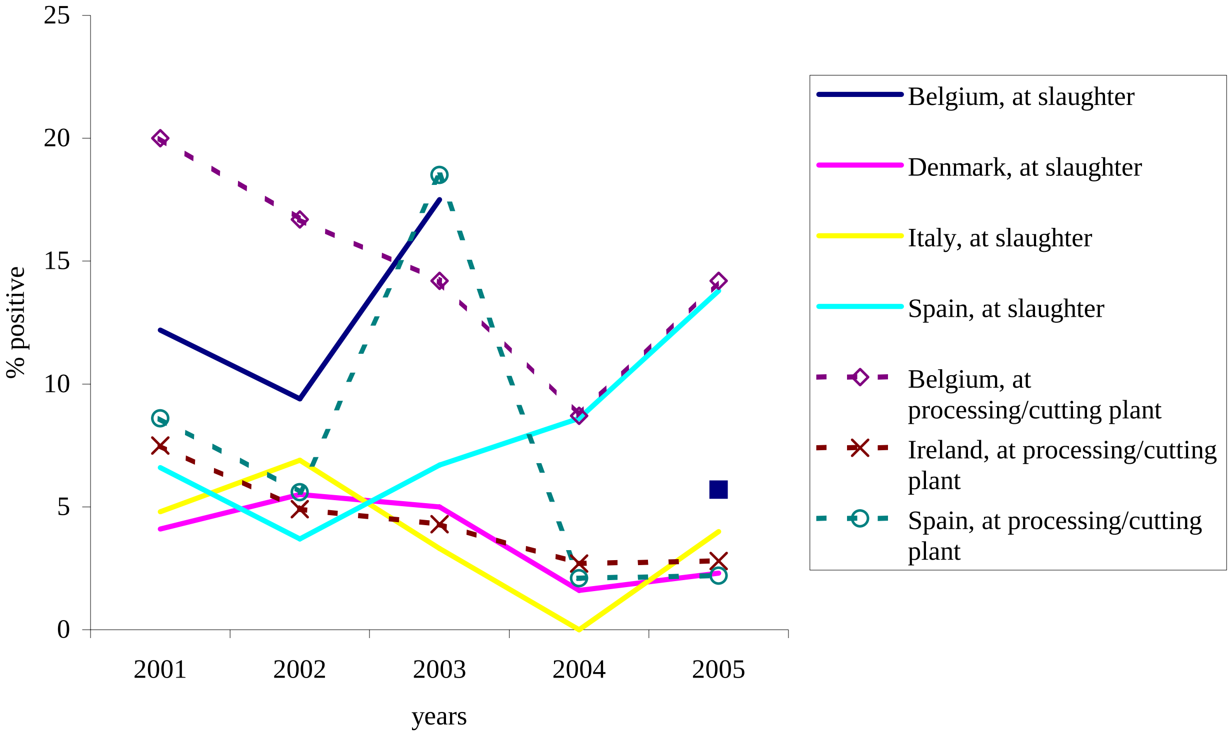
Table SA5. ***Salmonella*** **in fresh broiler meat (unless otherwise stated) at slaughter, processing level and retail, in countries with a monitoring/control programme[1], 2001-2005**

	2005		2004		2003		2002		2001	
	N	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**
At slaughter										
Belgium[2]	228	5.7	-	-	189	17.5	171	9.4	222	12.2
Denmark[3]	1,174	2.3	1,472	1.6	1,552	5.0	1667	5.5	1,695	4.1
Spain[6]	203	13.8	151	8.6	30	6.7	241	3.7	242	6.6
Sweden[4]	3,506	0	3,730	0.1	4,209[2]	0	4,466[2]	0.1	4,243[2]	0
Norway[3,4,6]	6,056	<0.1	7,239[2]	1.0	7,183[2]	0	6959[2]	0	7,135[2]	0
At processing/cutting plant										
Belgium[2]	260	14.2	1,832	8.7	1,485	14.2	1,383	16.7	1,503	20.0
Finland[5]	772	0	777	0.1	1,034	0.1	946	0.2	637	0.2
Ireland	7,485	2.2	6,955	2.7	1,869[5]	4.3	3,222	4.9	3,287	7.5
Spain[6]	93	2.2	141	2.1	168	18.5	288	5.6	93	8.6
Sweden[5]	1,014	0	1,025	0	1,130	0	1,146	0	1,121	0
At retail										
Belgium	46	2.2	126	13.5	101	2	88	2.3	58	8.6
Greece	33	18.2	25	0	207	6.3	47	34	41	2.4
Latvia[3]	96	11.5	345	7.3	-	-	-	-	-	-
Sweden	196	4.1	197	2.0	195	1.0	421	10.4	179	1.1

Note: Data from 2001-2003 is on poultry meat

1. Data are only presented for sample size ≥25
2. Carcass (presence in 1g)
3. Batch based sampling
4. Neck skin (presence in > 10g)
5. Crushed meat (presence in 25 g)
6. Meat from unspecified poultry

Figure SA3. ***Salmonella*** **in poultry meat at slaughter and processing levels, from selected MS with monitoring programmes and that have reported for most years in 2001-2005**



In 2005, more than 40,000 samples of broiler meat and products thereof were collected and tested in 20 MS and two non-MS. However, sample sizes and the type of products sampled varied. Also, some data related to single samples, while others related to batches. Data for countries collecting 25 samples or more in 2005 are summarised in Table SA6 and subsequent tables.

Most of the countries providing data on *Salmonella* in fresh broiler meat in 2005, reported substantial numbers of positive samples (Table SA6). At slaughter, the reported proportions of positive samples ranged from 2.3% to 9.1%. At the processing level, positive proportions of up to 21.5% (Estonia, batch based data) were reported, while other MS reported no positive findings. At retail the percentage of positive samples varied between 2.2% and 18.2%. The highest proportion of positives was reported by Cyprus, isolating *Salmonella* from all 27 batches sampled (sample level not stated). For the countries reporting results from different stages of production (Belgium, Estonia and Latvia) the highest percentages of positives were reported at processing (for Belgium and Estonia) or retail (Latvia).

Table SA6. *Salmonella* in fresh broiler meat[1], 2005

	Sample unit	Sample weight	N	% Pos
At slaughter				
Belgium, with skin	Single	1g	228	5.7
Denmark	Batch	25g/50g[4]	1,174	2.3
Estonia[2]	Single	25g	33	9.1
Estonia	Batch	25g	56	8.9
Latvia	Batch	25g	39	5.1
Sweden	Single	25g	3,506	0
At processing/cutting plant				
Belgium, with skin	Single	1g	260	14.2
Estonia	Batch	25g	93	21.5
Finland	Single	25g	772	0
Greece	Single	25g	785	2.8
Ireland, surveillance	-	-	5,527	1.8
Ireland, monitoring	Single	Varies	1,958	3.5
Slovenia	Single	25g	70	0
Sweden	Single	25g	1,014	0
At retail				
Belgium, skinned meat	Single	25g	44	2.3
Belgium, with skin	Single	25g	46	2.2
Estonia	Single	25g	51	11.8
Greece	Single	1,5 kg	33	18.2
Latvia	Batch	25g	96	11.5
Sweden	Single	25g	117	6.8
Sampling level not stated				
Austria	Single	25g	1,015	13.2
Cyprus	Batch	25g[3]	27	100
Czech Republic	Batch	25g	459	2.2
Germany	Single	25g	1,391	10.3
Italy	Single	25g	1,392	4.0
Lithuania	Flock	Swab	963	4.6
Luxembourg	Single	25g	47	0
Poland	Batch	-	537	11.7
Portugal	Single	25g	50	4.0
Slovakia	Single	25g	201	7.0
United Kingdom	Single	-	914	5.5
Switzerland	Batch	25 g	550	0.6

1. Data are only presented for sample size >25
2. In Estonia, samples from import meat included
3. In Cyprus, 25 g from each of 5 units within each batch
4. 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

In samples of non-ready-to-eat broiler meat products, nine of the 10 reporting MS found *Salmonella* positive proportions ranging from 1.6% to 16.6% (Table SA7). The highest level was reported by Poland (batch sampling). Fewer positive samples were obtained from ready-to-eat (RTE) broiler products, where only three of the nine MS reported finding positive samples. Among such samples, *Salmonella* was detected at a relatively high level in Austria (11.1%) and at lower levels in Luxembourg and Ireland.

Table SA7. *Salmonella* in broiler meat preparation and product samples[1], 2005

		Sample unit	Sample weight	N	% Pos
NON-READY-TO-EAT					
At processing plant					
Greece	Meat product	Single	25g	35	2.9
Ireland[2]	Meat product	-	-	1,309	2.6
At retail					
Czech Republic	Meat product	Batch	25g	50	2.0
Greece	Meat product	Single	25g	474	0
Sweden	Meat product	Single	25g	79	0
Sampling level not stated					
Austria	Meat product	Single	25g	175	6.3
	Meat preparation	Single	25g	36	0
Cyprus	Meat product	Batch	-	33	3.0
	Meat preparation	Batch	25g	170	0
Czech Republic	Meat preparation	Batch	25g	775	2.1
Italy	Meat product	Single	25g	462	2.8
	Meat preparation	Single	25g	164	2.5
Poland	Meat product	Batch	Unknown	349	16.6
Slovakia	Meat product	Single	25g	256	1.6
Slovenia	Meat preparation	Single	25g	106	7.5
READY-TO-EAT					
At processing plant					
Greece	Meat product	Single	25g	295	0
Ireland[2]	Meat product	-	-	2,296	0.1
At retail					
Estonia	Meat product	Single	25g	66	0
Ireland	Meat product	Single	25g	1,281	0
Sampling level not stated					
Austria	Meat product	Single	25g	207	11.1
Czech Republic	Meat product	Batch	25g	203	0
Italy	Meat product	Single	25g	100	0
Luxembourg	Meat product	Single	25g	37	2.7
Poland	Meat product	Batch	Unknown	115	0
Slovakia	Meat product	Single	25g	229	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

A total of 15 MS and one non-MS provided data on *Salmonella* in turkey meat. Reports from countries testing more than 25 samples are shown in Table SA8. The percentage of positive samples in fresh turkey meat varied from none to 11.0% positive samples. Czech Republic reported the highest percentage of positive samples in RTE turkey meat products (5.0%).

Table SA8. *Salmonella* in turkey meat samples[1], 2005

		Sample unit	Sample weight	N	% Pos
Cutting and processing plant					
Finland	Fresh meat	Single	25g	363	0
Slovenia	Fresh meat	Single	25g	25	0
Ireland	Fresh meat	Not stated	Not stated	316	2.5
	Fresh meat	Single	Varies	250	2.0
Ireland	Meat product, RTE	-	-	682	0
	Meat product, RTE	Single	25g	28	0
	Meat product, raw, intended to be eaten cooked	-	-	55	5.5
Retail					
Ireland	Meat product, RTE	Single	25g	260	0
Sampling level not stated					
Austria	Fresh meat	Single	25g	109	11.0
Germany	Fresh meat	Single	25g	737	6.8
Italy	Fresh meat	Single	25g	206	5.8
Poland	Fresh meat	Batch	Unknown	193	7.3
Czech Republic	Meat product, RTE	Batch	25g	40	5.0
	Minced meat	Batch	25g	135	5.9
	Meat preparation	Batch	25g	245	0
Italy	Meat product, RTE	Single	25g	76	0
	Meat preparation	Single	25g	65	6.2
Poland	Meat product, raw, intended to be eaten cooked	Batch	Unknown	60	3.3
	Meat product, RTE	Batch	Unknown	168	0
	Minced meat	Batch	Unknown	407	6.1
Slovakia	Meat product, raw, intended to be eaten cooked	Single	25g	29	0
	Minced meat	Single	25g	29	0
Switzerland	Fresh meat	Single	25g	172	5.8

1. Data are only presented for sample size ≥25
2. In Ireland, two studies on fresh turkey pooled

Other poultry meat

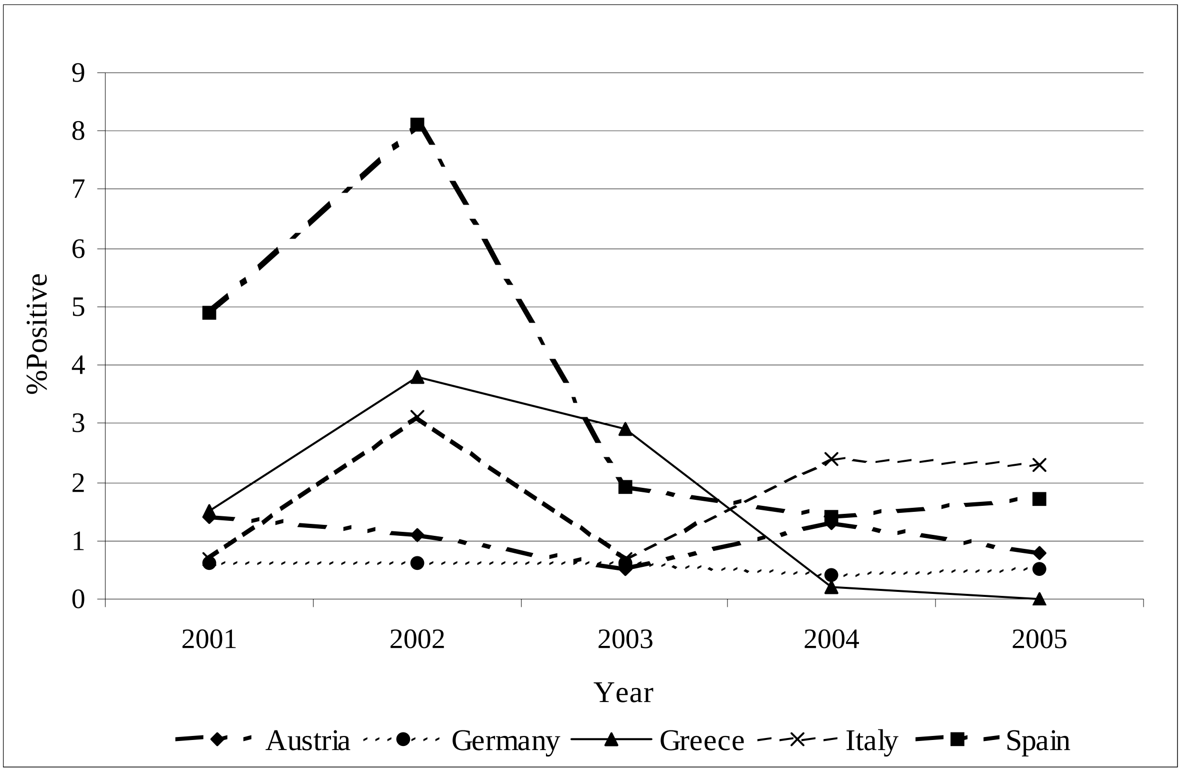
Ireland found 39.0% of the investigated samples of duck meat positive, however it was not specified whether the samples were fresh meat/products or RTE/not RTE. Italy and Germany reported *Salmonella* findings in 15.0% and 17.5% of the investigated samples of fresh duck meat, respectively. Germany also tested fresh geese meat and found 10.1% positive for *Salmonella*. Please refer to Level 3 for further information.

Eggs and egg products

Control of *Salmonella* in the table egg sector is generally done by monitoring and controlling for *Salmonella* in live hens in layer flocks. These programmes are described in Appendix Tables SA5 and SA6. *Salmonella* was found in fresh eggs, raw material at processing and at retail level at levels similar to previous years. Proportions of positive samples found in table eggs, 2001-2005, are shown in Figure SA4, and results from raw materials and egg products are presented in Table SA9 and Table SA10.

For the five MS included in Figure SA4, an overall decreasing trend was observed over the years 2002 to 2004 in table eggs. Compared with 2004, Spain and Germany reported slight increases in the proportion of positive eggs.

Figure SA4. ***Salmonella*** **in table eggs in MS that have reported consistently from 2001-2005**



Findings of *Salmonella* in table egg samples reported in 2005 are presented in Table SA9. With the exception of Italy that reported 6.3% of the tested samples to be positive, all MS reported less than 3% positive samples at packing centres or at retail. At retail, five of 10 MS did not detect *Salmonella* in any of the investigated samples.

Table SA9. *Salmonella* in table egg samples[1], 2005

	Sample unit	Sample weight	n	% Pos
At packing centre				
Austria	Single	25g	280	2.9
Cyprus	Batch	-	681	1.2
Czech Republic	Batch	25g	478	2.7
Estonia	Single	25g	180	0
Greece	Batch	-	81	2.5
Italy	Single	25g	524	6.3
Poland	Batch	-	401	1.2
Spain	Batch	25g	3,089	1.7
Slovakia	Single	-	470	1.1
At retail				
Austria	Single	25g	473	0.8
Germany	Single	25g	5,649	0.5
Estonia	Single	25g	43	0
Greece	Single	-	197	0
Ireland	Single	25g	168	0
Italy	Single	25g	1,242	2.3
Poland	Batch	-	480	2.3
Sweden	Single	25g	34	0
Slovenia	Single	25g	102	2.0
Slovakia	Single	-	51	0

1. Data are only presented for sample size ≥25

In raw materials for egg products, Austria reported the highest proportion of positives (11.7%). However, it should be noted that the practice of channelling eggs from *Salmonella*-positive flocks to the egg product industry might influence the results from different countries. In egg products, very few positive findings were reported by the five MS providing data. (Table SA10).

Table SA10. *Salmonella* in eggs and egg products[1], 2005

	N	% Pos
Raw materials for egg products (different sampling places)		
Austria	60	11.7
Ireland	215	0
Italy	199	0
Spain	378	0.3
Egg products (final products)		
Austria	274	1.1
Germany	1,996	0
Ireland	53	0
Italy	1,747	<0.1
Spain	143	1.4

1. Data are only presented for sample size ≥25

Pig meat and products thereof

In 2005, 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, and a number of different types of sample are collected, such as surface swabs and meat samples. In Table SA11, data on the occurrence of *Salmonella* in pig meat are summarised for countries that have monitoring programmes. Denmark, Finland, Norway and Sweden have consistently reported low levels of *Salmonella* contamination. For 2004 and 2005, Estonia and Slovenia also reported low levels of contamination. Considerably higher proportions of positive samples were reported in Belgium, but the country has experienced a decrease in the proportion of positive carcass samples and samples taken at retail (Table SA11).

Table SA11. ***Salmonella*** **in fresh pig meat in countries, which run a monitoring/surveillance programme, 2001-2005**

	2005		2004		2003		2002		2001	
	N	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**
Pigs (sample based data) - carcass swabs - at slaughterhouse										
Belgium	442	9.3	374	12.3	287	14.6	298	15.4	293	20.8
Denmark [1]	30,730	1.0	33,890	1.3	34,250	1.4	36,690	1.4	36,460	1.3
Estonia	671	0	648	0	-	-	-	-	-	-
Finland	6,609	0	6,576	<0.1	6,186	<0.1	6,260	<0.1	6,254	<0.1
Sweden	5,764	<0.1	5,940	0	6,281	0	6,420	<0.1	6,578	<0.1
Norway	3,157	0	2,456	0	2,353	<0.1	2,371	<0.1	2,417	<0.1
Fresh pig meat at slaughterhouse and cutting plants										
Belgium [2]	307	7.2	374	12.3	278	6.1	224	11.2	-	-
Estonia [3]	457	0	442	0.2	-	-	-	-	-	-
Finland [2]	3,226	0	3,092	0	2,826	0.1	1,840	0.1	2,605	0
Slovenia [2]	113	0	188	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	-	-	-	-	-	-

1. 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.
2. In Belgium, Finland and Slovenia, at cutting plants
3. In Estonia, samples from both slaughter house and cutting plant
4. In Belgium, minced meat
5. In Latvia, fresh meat

Results of the investigations of fresh pig meat carried out in 2005 are summarised in Table SA12. *Salmonella* positive samples were also found in high proportions of pig meat (Table SA6). However, six of 20 reporting countries found no positive samples, which is more than in fresh broiler meat. At slaughter, the reported proportions of positive samples ranged from 0 to 9.3%. At processing plants the proportion of positives generally ranged from 0 to 18.4%, with the highest proportion reported by Ireland. At retail, only Greece reported positive findings in pig meat. Portugal reported the highest percentage of positives (16.7%) from investigations where the level of sampling was not specified. Spain reported positive samples only at slaughter, and not at processing or and retail.

Overall, 15 countries provided information on *Salmonella* in non-RTE products of pig meat origin. (Table SA13). All, except one, reported positive findings at levels 0.3-12.5%. The highest proportion of positives was reported by Greece in meat products at processing. Table SA13a presents the results from RTE products of pig meat origin. Most countries reported low percentages of positive findings in RTE meat products. Many of the positive findings were reported for RTE minced meat and meat preparations, where the positive results are more likely to be expected.

Data on the serovar distribution in pig meat were incomplete, but the reported data indicate that *S.* Typhimurium is the dominating serovar isolated from pig meat.

Table SA12. *Salmonella* in fresh pig meat samples[1], 2005

		Sample unit	Sample weight /swabbing area	N	% Pos
At slaughter	**Description**				
Belgium	Carcass	Single	600 cm2	442	9.3
	Carcass	Single	Destructive	261	3.1
Denmark[3]	Carcass	Pools	300 cm2	30,730	1.0
Estonia		Single	25g	141	0
	Carcass	Single	Swab	671	0
Finland	Fattening pigs, carcass	Single	1400 cm2	3,395	0
	Sows, carcass	Single	1400 cm2	3,214	0
Latvia		Batch	25g	35	0
Spain		Single	25g	263	4.9
Sweden	Carcass	Single	1400cm2	5,764	<0.1
Norway	Carcass	Single	1400 cm2	3,157	0
At processing/cutting plant					
Belgium	Processing plant	Single	25g	300	7.3
Belgium	Cutting plant	Single	25g	307	7.2
Estonia	Cutting plant	Single	25g	309	0
Finland	Cutting plant	Single	25g	3,226	0
Ireland	Processing plant	-	-	2,803	1.6
	Processing plant	Single	25g	38	18.4
Slovenia	Cutting plant	Single	25g	113	0
Spain	Processing plant	Single	25g	26	0
At retail					
Greece		Single	200g	28	3.6
Latvia		Batch	25g	47	0
Spain		Single	25g	174	0
Level of sampling not stated					
Austria		Single	25g	98	1.0
Cyprus[2]		Batch	25g	60	6.7
Czech Republic		Batch	100 cm2	2,445	1.9
Germany		Single	25g	1,831	3.2
Italy		Single	25g	2,010	2.6
The Netherlands		Single	25g	356	2.2
Poland		Batch	Unknown	1,153	2.6
Portugal		Single	25g	30	16.7
Slovakia		Single	25g	247	0

1. Data are only presented for sample size ≥25
2. In Cyprus, 25 g from each of 5 units within a batch
3. In Denmark, prevalence of *Salmonella* in single swab samples is estimated from results of pooled analysis.

Table SA13. *Salmonella* in pig minced meat, meat preparation and product samples[1], 2005

		Sample unit	Sample weight /swabbing area	N	% Pos
NON-READY-TO-EAT					
At processing plant	**Description**				
Belgium	Minced meat	Single	25g	292	3.4
Greece	Meat product	Single	25g	40	12.5
Ireland[2]	Meat product	-	-	3,159	1.2
Spain	Meat product	Single	25g	773	1.3
At retail					
Belgium	Minced meat	Single	25g	155	6.5
Estonia	Minced meat	Single	25g	46	4.3
	Meat preparation	Single	25g	25	0
Level of sampling not stated					
Austria	Meat product	Single	25g	35	0
	Minced meat	Single	25g	185	1.1
Cyprus	Meat preparation	Batch	25g	132	5.3
Czech Republic	Meat product	Batch	25g	2,084	0.2
	Minced meat	Batch	25g	682	0
Germany	Minced meat	Single	25g	140	1.4
	Meat preparation	Single	25g	914	3.1
Italy	Meat product	Single	25g	1,896	1.8
	Minced meat	Single	25g	339	8.3
	Meat preparation	Single	25g	1,167	5.4
The Netherlands	Minced meat	Single	25g	47	0
Poland	Minced meat	Batch	25g	3,820	0.6
	Meat preparation	Batch	25g	1,756	1.2
Portugal	Meat product	Single	25g	142	1.4
	Meat product	Single	100g	120	2.5
Slovakia	Meat product	Single	25g	199	0.5
Sweden	Meat preparation	Single	25g	768	0.3
READY-TO-EAT					
At processing plant					
Greece	Meat product	Single	25g	26	0
Ireland	Meat product	Single	25g	165	0
	Meat product	-	-	4,529	<0.1
At retail					
Belgium	Meat product	Single	25g	119	0
Estonia	Meat product	Single	25g	75	0
Greece	Meat product	Single	Varying	102	0
Ireland	Meat product	Single	25g	1,848	0
Level of sampling not stated					
Austria	Meat product	Single	25g	72	0
Cyprus	Meat product	Batch	25g	216	1.9
Czech Republic	Meat product	Batch	25g	4,095	<0.1
Germany	Meat product	Single	25g	755	0
	Minced meat	Single	25g	1,020	3.2
Italy	Meat product	Single	25g	2,378	2.5
	Minced meat	Single	25g	451	2.7
	Meat preparation	Single	25g	931	4.8
Luxembourg	Meat product	Single	25g	82	0
Poland	Meat product	Batch	25g	7,561	0.2

Portugal	Meat product	Single	10g	108	0
	Meat product	Single	25g	78	0
	Meat product	Single	100g	80	2.5
Slovakia	Meat product	Single	25g	2,058	<0.1

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). Data have been summarised for MS with monitoring and surveillance programmes that have reported data consistently for the past years (Table SA14).

In general, the reported proportions of positive findings in bovine meat are low throughout the period 2001-2005. With few exceptions, the proportion of positive samples is approximately 1%, below.

Table SA14. ***Salmonella*** **in fresh bovine meat in countries with a monitoring/surveillance programme, 2001-2005**

	2005		2004		2003		2002		2001	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Bovine meat sampled at slaughterhouse (sample based) - carcass swabs										
Denmark[4]	9,550	0.6	10,695	0.5	11,660	0.4	12,700	0.2	10,455	0.1
Estonia	388	0.0	371	0	-	-	-	-	-	-
Finland	3,218	0	3,251	0	3,406	<0.1	3,146	<0.1	3,536	0.3
Sweden	3,297	<0.1	3,475	0	3,220	<0.1	3,121	0	3,243	<0.1
Norway	2,076	0	2,136	0	2,353	<0.1	2,371	<0.1	2,417	0
Bovine meat sampled at slaughterhouse and cutting plants										
Estonia[2]	343	0.6	310	4	-	-	-	-	-	-
Estonia [3]	85	0	60	0	-	-	-	-	-	-
Finland [3]	2,370	0	2,458	<0.1	2,404	0.1	1,948	0.4	2,050	0.2
Bovine meat sampled at retail										
Belgium[1]	171	0.6	98	0	207	0.5	2,041	2.9	-	-

1. Minced meat samples
2. At slaughterhouse
3. At cutting plants
4. 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

Overall, 16 countries provided information on *Salmonella* in fresh bovine meat in 2005 (Table SA15). The proportion of positive samples was low in most reporting countries, not exceeding 0.6% in fresh meat at slaughter, processing or cutting plant, with the exception of Spain, where 6.3% of samples at slaughter were positive. At retail and in investigations where sampling stage was not defined, occasional higher percentages of positives were reported, with the highest one reported by Cyprus, where 8.3% of the examined batches were positive for *Salmonella*.

Table SA15. *Salmonella* in fresh bovine meat samples[1], 2005

		Sample unit	Sample weight /swabbing area	N	% Pos
At slaughter	**Description**				
Denmark[2]	Carcass	Pool	300 cm2	10,160	0.4
Estonia[3]	-	Single	25g	343	0.6
Estonia	Carcass	Swab	1400 cm2	388	0
Finland	Carcass	Swab	1400 cm2	3,218	0
Spain	-	Single	25g	64	6.3
Sweden	Carcass	Single	1,400 cm2	3,297	<0.1
Norway	Carcass	Swab	1400 cm2	2,076	0
At processing/cutting plant					
Estonia	Cutting plant	Single	25g	85	0
Finland	Cutting plant	Single	25g	2,370	0
Ireland	Processing plant	Single	25g	31	0
	Processing plant	-	-	21,168	0.2
Slovenia	Cutting plant	Single	25g	107	0
Spain	Processing plant	Single	25g	47	0
At retail					
Spain	-	Single	25g	137	2.9
Level of sampling not stated					
Cyprus	-	Batch	25g from 5 units	48	8.3
Czech Republic	-	Batch	25g	1,440	0.1
Germany	-	Single	-	544	1.1
Greece	-	Single	200g	41	2.4
Italy	-	Single	25g	2,292	0.2
The Netherlands	-	Single	25g	484	0.2
Poland	-	Batch	Unknown	831	2.2
Slovakia	-	Single	25g	121	0

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

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 SA16. *Salmonella* was isolated from non-RTE products in several countries, but generally only in a few samples. In RTE products, Germany and Italy reported low percentages of *Salmonella* positive findings in minced meat and meat preparations intended to be eaten raw.

Overall, of 339 positive samples from MS providing information on serovar distribution in routine samples, 43 were *S.* Enteritidis and 53 were *S.* Typhimurium. The proportions of *S.* Enteritidis and *S.* Typhimurium varied between MS, see Level 3 for more information.

Table SA16. *Salmonella* in bovine minced meat, meat preparation and product samples[1], 2005

		Sample unit	Sample weight /swabbing area	N	% Pos
NON-READY-TO-EAT					
At processing plant	**Description**				
Belgium	Minced meat	Single	25g	280	1.4
Ireland[2]	Meat product	-	-	5,809	0.1
Spain	Meat product	Single	25g	57	0
At retail					
Czech Republic	Meat product	Batch	25g	52	1.9
Spain	Meat product	Single	25g	81	0
Level of sampling not stated					
Austria	Minced meat	Single	25g	39	0
Cyprus	Minced meat	Batch	25g[6]	25	0
Czech Republic	Meat product	Batch	25g	434	0
	Minced meat	Batch	25g	355	0
Germany	Minced meat	Single	25g	647	0.6
	Meat preparation	Single	25g	89	0
Italy	Meat product	Single	25g	491	1.4
	Minced meat	Single	25g	1,553	1.7
	Meat preparation	Single	25g	305	0.7
Luxembourg	Minced meat	Single	10g	32	0
The Netherlands	Minced meat	Single	25g	485	2.1
Poland	Minced meat	Batch	Unknown	1,219	0.7
	Meat preparation	Batch	Unknown	152	0
READY-TO-EAT					
At processing plant					
Ireland[2]	Meat product	-	-	638	0
At retail					
Belgium	Meat preparation	Single	25 g	116	0.9
	Minced meat	Single	25 g	171	0.6
Ireland	Meat product	Single	25 g	395	0
Level of sampling not stated					
Czech Republic	Meat product	Batch	25 g	928	0
Germany	Meat product	Single	25 g	55	0
	Minced meat	Single	25 g	647	0.6
Italy	Minced meat	Single	25 g	56	3.6
	Meat product	Single	25 g	329	0
	Meat preparation	Single	25 g	55	1.8
Luxembourg	Minced meat	Single	25 g	39	0
Poland	Meat product	Batch	Unknown	131	0
Slovakia	Meat product	Single	25 g	46	0

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

Other foods

Milk and dairy products

Very few positive findings of *Salmonella* in cow milk were reported in 2005. Data from investigations of raw milk intended for direct human consumption were reported by 11 MS. Sample sizes ranged from five to 1,058 and *Salmonella* was isolated only from one of 1,058 investigated samples (<0.1%) in Spain. Ten MS reported data on investigations of pasteurised milk with sample sizes ranging from five to 989 samples. None of these was found positive. These results are consistent with the levels reported in previous years.

A large number of dairy products were also investigated in 17 MS, generally yielding no positive findings. However, Germany reported four of 9,705 samples (<0.1%) and Spain 10 of 2,071 samples (0.4%), from unspecified dairy products, positive for *Salmonella*. Ready-to-eat ice cream was investigated by 12 MS with sample size ranging from 24 to 1,392. *S.* Enteritidis was isolated from one of 1,357 samples (<0.1%) from Austria and *Salmonella* spp. from two of 586 samples (0.3%) from Spain.

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 SA17). The number of investigated samples varied considerably, but in general, very few findings of *Salmonella* were reported. *Salmonella* positive samples were reported from two investigations of cheeses made from raw or low heath treated milk and from two investigations of cheeses made from pasteurised milk. The remaining positive findings were from cheeses made from unspecified milk. The majority of the *Salmonella* positive findings were from soft or semi-soft cheeses.

Table SA17. *Salmonella* in cheeses[1], 2005

		Sample unit	Sample weight	N	% Pos
Made from raw or thermised milk from cows					
Austria	Soft and semi-soft	Single	25g	91	0
Belgium	Soft and semi-soft, at farm	Single	25g	141	0
	Soft and semi-soft, at processing	Single	25g	38	0
Italy	Soft and semi-soft	Single	25g	1,041	0.1
Made from pasteurised milk from cows					
Austria	Soft and semi-soft	Single	25g	649	0.2
Belgium	Soft and semi-soft, at processing	Single	25g	144	0
	Soft and semi-soft, at retail	Single	25g	185	0
Czech Republic	Hard	Batch	25g	40	0
	Soft and semi-soft	Batch	25g	85	0
	Unspecified	Batch	25g	36	0
Estonia	Hard, at processing	Single	25g	68	0
	Soft and semi-soft	Single	25g	27	0
Finland	Soft and semi-soft	Batch	25g	50	0
Italy	Soft and semi-soft	Single	25g	675	0
The Netherlands	Soft and semi-soft	Single	25g	27	0
Portugal	Soft and semi-soft	Single	25g	79	0
	Soft and semi-soft	Single	1g	103	0
Slovenia	Hard, soft and semi-soft	Single	25g	40	0
Made from milk from sheep					
Austria	Soft and semi-soft, from pasteurised milk	Single	25g	55	0
Greece	Unspecified	Single	-	82	0
Italy	Unspecified	Single	25g	781	1.3
	Soft and semi-soft	Single	25g	279	0.4
	Soft and semi-soft, from pasteurised milk	Single	25g	259	0
	Soft and semi-soft, from raw or thermised milk	Single	25g	61	3.3
Portugal	Soft and semi-soft, from raw or thermised milk	Single	1g	49	0
Slovakia	Unspecified	Single	-	596	0
Made from milk from goats					
Austria	Unspecified	-	-	565	0
	Soft and semi-soft, from pasteurised milk	-	-	45	0
Cyprus	Soft and semi-soft	-	-	270	0
	Soft and semi-soft, from pasteurised milk	-	-	572	0.2
Ireland	Unspecified, retail	Single	25g	60	0
Italy	Unspecified	Single	25g	96	0
	Soft and semi-soft, from raw or thermised milk	Single	25g	51	0
Made from unspecified milk					
Ireland	Soft and semi-soft, processing	Single	25g	281	0
	Soft and semi-soft, processing	Batch	25g	28	0
	Soft and semi-soft, retail	Single	25g	200	0
	Hard, processing	Single	25g	935	0
	Hard, processing	Batch	25g	58	0
	Unspecified, processing	Single	25g	45	0
	Unspecified, retail	Single	25g	1,008	0
Italy	Unspecified	Single	25g	164	0
Sweden	Unspecified	Single	25g	58	0
Norway	Unspecified	Single	25g	307	0

1. Data are only presented for sample size ≥25

Spices and herbs
Eight MS reported data on spices and herbs with sample size ranging from three to 205. Three MS, Austria, the Czech Republic and Sweden reported 3.1% (N=129), 2.7% (N=74) and 7.3% (N=55) positive samples, respectively.

Fruits and vegetables
In 2005, twelve MS reported data from investigation of fruits and vegetables. In total, 5,798 samples were analysed and 3 of 564 (0.5%) were found positive in Sweden and 1 of 3,365 (0.03%) in Ireland. Sample sizes varied between MS, ranging from two to 3,079. Juices from fruits and vegetables were investigated by four MS (in total, 46 samples) with no positive findings.

Three MS; Germany, Ireland and Slovenia reported investigations on sprouted seeds. These MS investigated 56, 22 and 45 samples, respectively, and only Ireland isolated *Salmonella* in one sample (4.5%). However, two serovars, *S.* Fresno and *S.* Fanti, were detected in this sample.

Fish and fishery products
Findings of *Salmonella* in fish and fishery products were reported by 16 MS with at total of 11,318 investigated samples. Positive findings were found in 0.4% (Spain, N=461) to 3.3% (Greece, N=61) in fish and from <0.1% (Germany, N=3,276) to 3.7% (Lithuania, N=27) in fishery products.

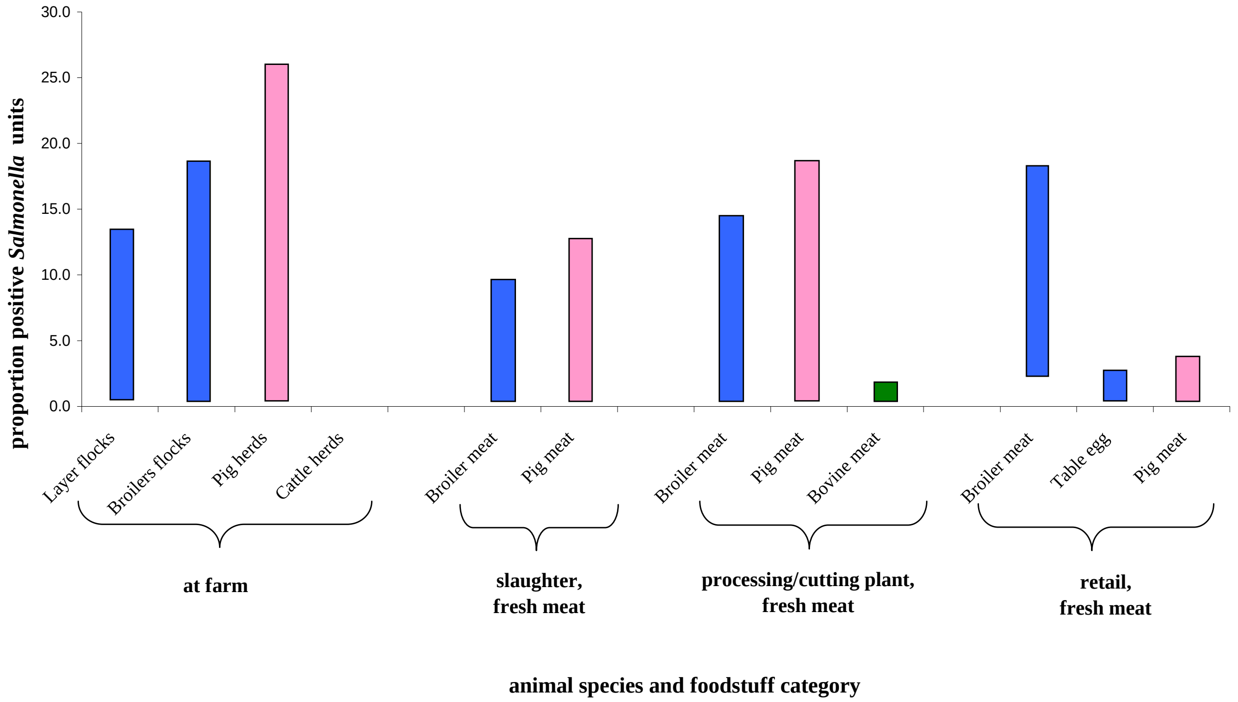
Other foodstuffs
Eight MS tested samples of meat from sheep, but most countries tested only very few samples. In larger studies, Ireland reported 1 positive sample of 901 (0.1%) and 12 positive of 1,872 samples (0.6%). Norway reported three positive samples (all *S.* diarizonae) of 2,692 investigated (1.1%).

Bakery products were tested by eight MS. Only Austria (N=91), Belgium (N=188), Estonia (N=315) and Spain (N=1,331) reported positive samples ranging from 0.3% to 1.1%.

Investigations with *Salmonella* positive findings of live bivalve molluscs were reported by Italy (N=3,336), Greece (N=238), Spain (N=420) and Belgium (N=98). The proportion of positive findings ranged from 0.5% to 2.0% in the investigated samples.

Figure SA5 presents an overview of the minimum and maximum proportions of *Salmonella* positive samples found in laying hens, broilers, pigs and bovine animals and products thereof at different levels of production.

Figure SA5. **Minimum to maximum proportions of *Salmonella* positive samples reported by MS, by animal species and by production level, EU, 2005[1]**



[1] Fresh meat includes minced meat, covers only data for sample size >25

3.1.3. *Salmonella* in animals

Information on *Salmonella* in different animal species was provided by all the reporting MS and two non-MS. Many countries have *Salmonella* control or surveillance programmes in place for a number of farm animal species. The data received are presented below, divided according to the animal species and production lines

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

In 2005, MS were obliged to run control programmes for *S* Enteritidis and *S.* Typhimurium in breeding flocks of *Gallus gallus*, in accordance with the Zoonoses Directive 2003/99/EC. 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, before movement to production, or during the laying period. The monitoring in breeding flocks of *Gallus gallus*, and laying hen flocks described in Regulation 2160/2003 becomes mandatory on 1/1/2007 and 1/2/2008, respectively.

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

Laying hen production line

A total of 16 MS and one non-MS provided information on *Salmonella* in laying hen breeding flocks in 2005. Information from laying hen flocks was received from 17 MS and 2 non-MS.

Elite-breeding flocks and grandparent-breeding flocks
Czech Republic, France and The Netherlands reported results from sampling in elite-breeding flocks. No flocks were *Salmonella* positive. A total of seven MS and Norway reported on grand-parent-breeding flocks with no positive findings.

Parent-breeding flocks
In parent-breeding flocks for laying hen production, the levels of *Salmonella* in 2005 for MS with monitoring and control programmes are presented in Table SA18. Overall, a total of 5.7% of the parent-breeding flocks were infected. This is a slight decrease compared with 2004, where the overall prevalence was 6.4%. Eleven MS and one non-MS reported no infected flocks, while six MS reported prevalences between 6.8% and 18.2%. Most isolates were either *S.* Enteritidis or *S.* Typhimurium, except in Spain and The United Kingdom, where all the *Salmonella* isolates were other serovars. *S.* Enteritidis was the dominating serovar, and *S*. Typhimurium was only reported from layer breeding flocks in Greece and Poland.

The highest prevalences were reported by Portugal and Slovenia, where all the detected flocks were infected with *S.* Enteritidis. Seven MS that reported positive findings in 2004 detected no positive flocks in 2005, suggesting an improvement of flock status. Greece, Slovenia and Spain experienced an increase in the proportion of positive flocks, but Spain reported no *S.* Enteritidis or *S.* Typhimurium positive flocks.

Over the years 2003-2005, 10 MS (half of the reporting countries) reported a decrease in *S.* Enteritidis or *S.* Typhimurium prevalence or no positive findings of these two serovars.

Table SA18. *Salmonella* in breeding flocks for laying hen production, *Gallus gallus* (all age groups[1], flock based data) in countries running control programmes in accordance to the Zoonoses Directive 92/117/EEC, 2003-2005

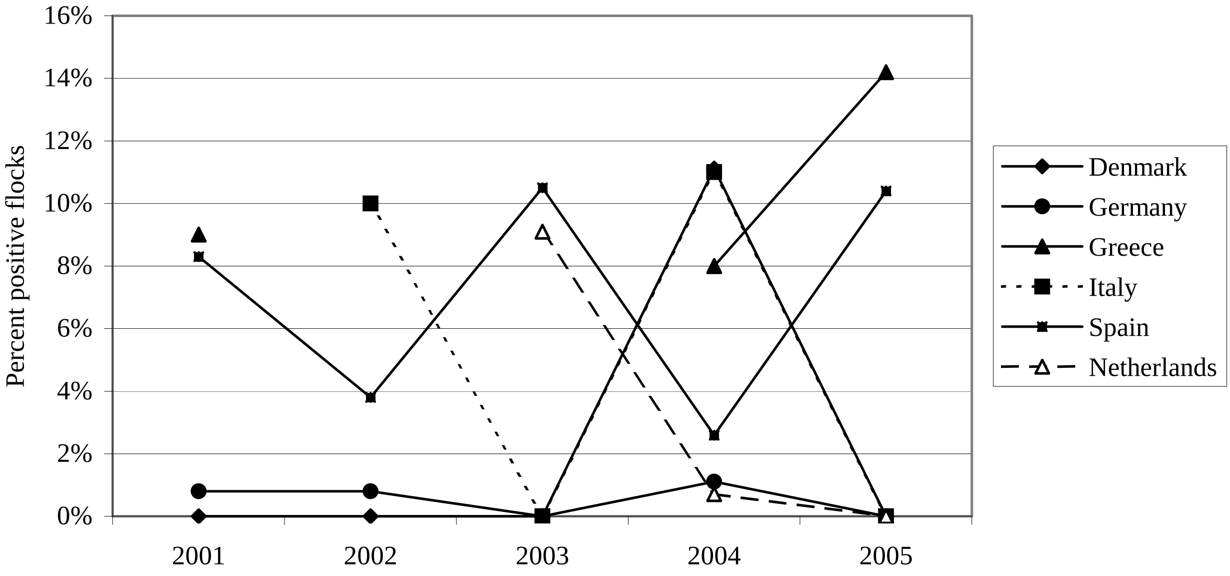
	2005				2004				2003			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	36	0	0	0	20	5.0	5.0	0	-	-	-	-
Belgium	68	0	0	0	95	4.2	-	-	-	-	-	-
Czech Republic	-	-	-	-	42	33.3	33.3	0	-	-	-	-
Denmark	25	0	0	0	18	11.1	0	0	39	0	0	0
Finland	93	0	0	0	67	0.5	0	0.5	-	-	-	-
France	164	0	0	0	140	0	-	-	133	2.2	0.7	1.5
Germany	22	0	0	0	89	1.1	0	1.1	29	0	0	0
Greece	141	14.2	7.8	0.7	118	7.6	5.9	0	-	-	-	-
Hungary	-	-	-	-	199	1.0	1.0	0	-	-	-	-
Ireland	30	0	0	0	-	-	-	-	51	0	0	0
Italy	11	0	0	0	144	11.1	-	-	31	0	0	0
Latvia	9	0	0	0	22	9.1	9.1	0	-	-	-	-
The Netherlands	405	0	0	0	282	0.7	0.4	0.4	55	9.0	7.0	0
Poland	460	13.9	5.2	1.7	518	14.3	7.5	0	-	-	-	-
Portugal	12	16.7	16.7	0	-	-	-	-	-	-	-	-
Slovenia	11	18.2	18.2	0	52	0	0	0	-	-	-	-
Spain	48	10.4	0	0	192	2.6	-	-	143	11.0	4.0	0
Sweden	38	0	0	0	26	0	0	0	30	3.3	0	0
United Kingdom	88	6.8	0	0	87	14.9	-	-	-	-	-	-
EU total	**1,661**	**5.7**			**2,111**	**6.4**			**511**	**-**	**-**	**-**
Norway[2]	65	0	0	0	27	0	0	0	-	-	-	-

1. Sampling results from both the rearing and laying period 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. In Norway, data relates to farms not flocks

For MS operating control programmes for parent-breeding flocks according to the Zoonoses Directive 92/117/EEC, and reporting consistently during the period 2001 to 2005, the occurrence of *Salmonella* varied in these years (Figure SA6). No clear trend can be observed in the overall *Salmonella* prevalence in these MS.

Figure SA6. Proportion of *Salmonella* positive parent-breeding flocks for egg production (all age groups[1]) in MS running a control programme, 2001-2005.



Note: In Sweden infected breeding flocks were only detected in 2003 (1%), In Ireland, no infected flocks were detected in 2001 to 2005 (no data from 2004) and in Norway no infected flocks were detected 2001-2005. No data from Greece in 2002-2003, Italy 2001 and The Netherlands 2001 and 2002.

Laying hen flocks

In 2005, several countries reported the national results from the EU baseline study (see further description below) as part of the monitoring results from laying hen flocks. For clarification, these results are not included in Table SA19, which presents only results of the regular monitoring conducted at the flock level. A total of 15 MS and one non-MS reported on *Salmonella* in laying hen flocks in 2005. All MS reported findings, but Finland and Sweden detected only a single positive flock. Overall, a total of 3.0% of the laying hen flocks were reported to be infected during 2005, which is at the same level as in 2004. Overall, the proportion of positive flock varied from 0.1% or less in Finland and Sweden to 13.3% in Slovakia in 2005. Seven MS reported a decrease compared with 2004, while five MS experienced an increase in the *Salmonella* prevalence. *S* Enteritidis was the dominating serovar, except in Italy and Slovakia (Table SA19).

Nine MS reported data from both breeding and laying hen flocks. With the exception of Belgium, all MS (Austria, Denmark, Finland, France, Germany, Ireland, Sweden and The Netherlands) reporting no infected breeding flocks also reported relatively low *Salmonella* occurrence (less than 4%) in laying hen flocks.

Table SA19. ***Salmonella*** **in laying hen flocks (all age groups[1], flock based data), 2003-2005**

	2005				2004				2003			
	N	**% Pos**	**% *S.* Ent**	**% *S.* Typ**	**N**	**% Pos**	**% *S.* Ent**	**% *S.* Typ**	**N**	**% Pos**	**% *S.* Ent**	**% *S.* Typ**
Austria	4,735	1.4	0.9	0.1	2,649	1.5	0.8	0	-	-	-	-
Belgium	979	4.9	-	-	265	27.2	-	-	-	-	-	-
Cyprus	-	-	-	-	75	12.0	4.0	0	-	-	-	-
Czech Republic	-	-	-	-	270	6.7	6.7	0	-	-	-	-
Denmark	913	1.4	1.3	0	1,009	0.6	0.3	0.1	2,934	0.6	0.5	0
Finland	2,035	0	0.0	0	2,111	0.0	-	<0.1	2,347	0	0	0
France[2]	5,456	1.6	1.5	0	5,935	1.7	1.6	0.4	5,421	2.3	1.9	0.4
Germany	5,331	3.1	2.2	0.2	4,916	2.3	1.1	0.4	3,623	2.6	0.9	1.0
Greece	-	-	-	-	90	32.2	14.4	2.2	258	0.8	0.4	0
Ireland	217	2.8	1.4	0.0	355	0.8	0.8	0	-	-	-	-
Italy	699	8.6	0.7	1.1	-	-	-	-	-	-	-	-
Latvia	23	8.7	8.7	0	-	-	-	-	-	-	-	-
Lithuania	981	1.0	0.9	0	1,392	0.4	0.2	-	-	-	-	-
Luxembourg	-	-	-	-	44	0.0	-	-	-	-	-	-
The Netherlands	4,117	3.5	1.8	0.2	3,148	3.7	-	-	2,328	3.7	3.5	0.4
Poland	2,869	8.8	-	0.1	3,114	8.6	-	-	-	-	-	-
Portugal	-	-	4.2	-	11	27.3	-	-	-	-	-	-
Slovakia	309	13.3	-	0.6	219	4.6	-	-	-	-	-	-
Slovenia	130	6.2	5.4	0	167	2.4	-	-	-	-	-	-
Spain	-	-	-	-	50	28.0	20.0	0	991	18.1	9.5	1.7
Sweden	1,109	0.1	-	0	909	0.2	-	-	1,178	0.2	0.1	0
EU-total	**29,903**	**3.0**	**1.5**	**0.1**	**26,729**	**3.0**			**19,080**			
Norway	732	0	0	0	1,090	0	0	0	844	0	0	0
Switzerland	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

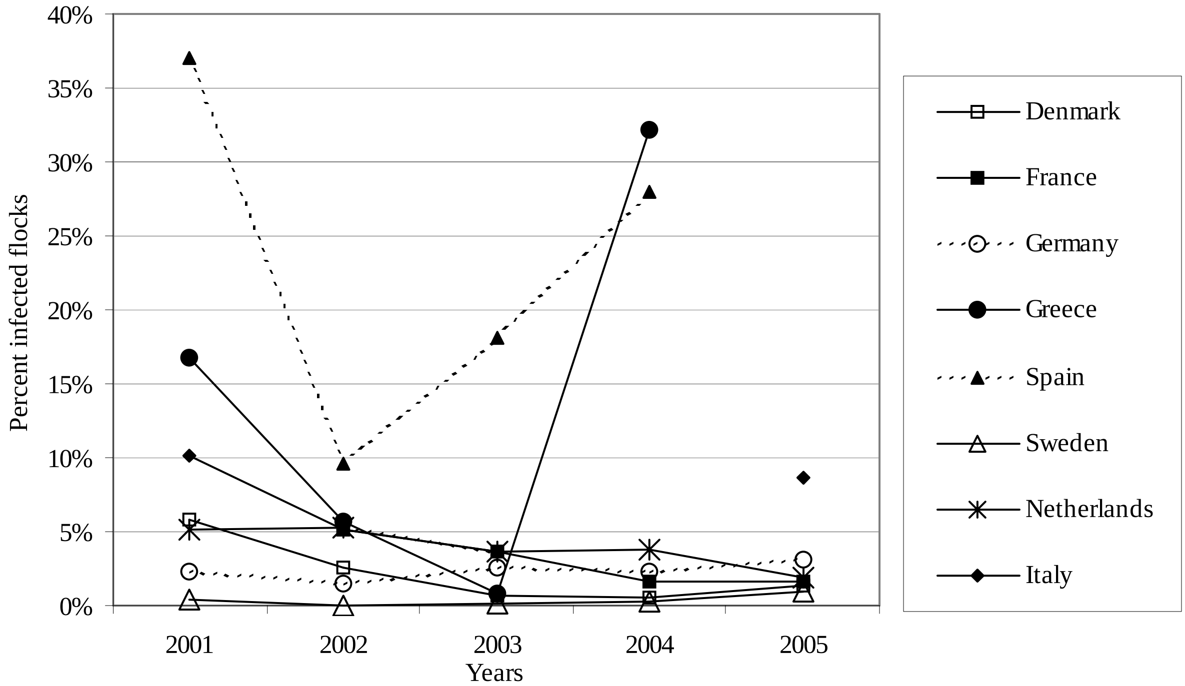
2. In France, the regular mandatory monitoring concerns only *S.* Enteritidis and *S.* Typhimurium in rearing flocks and *S.* Enteritidis in production flocks

3. In Norway, holding based data

Data from MS that have a monitoring and control programme in laying hen flocks, and have reported consistently from 2001-2005, are shown in Figure SA7. Most of these MS have observed a slight decreasing trend in the prevalence since 2001.

An overview of the reported data is presented in Level 3.

Figure SA7. Proportion of *Salmonella* positive layer flocks (all age groups[1]) in MS running a monitoring and control programme, 2001-2005



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.

Information from the Baseline Study on the Prevalence of *Salmonella* in laying hen flocks of *Gallus gallus*, 2005

From 1 October 2004 to 30 September 2005, an EU-wide fully harmonised *Salmonella* baseline study was conducted on commercial large-scale laying hen holdings with at least 1,000 laying hens in the flock. Norway participated in the study on a voluntary basis.

The study was carried out in accordance with Regulation EC/2160/2003, which requires an EU target for reducing *Salmonella* prevalence in laying hens to be laid down. Therefore, comparable data on current prevalence in MS needed to be available. According to Commission Decision 2004/665/EC one flock per holding was examined at the end of their production period by taking five faecal dropping samples and two dust samples. In total, 5,007 laying hen holdings in the EU met the inclusion criteria for the study. After data validation, Slovakia had no data remaining and Malta did not submit any data at all.

The EU and MS-specific *Salmonella* holding observed prevalences are presented in Table SA20 and Figure SA8. The *Salmonella* spp. EU weighted holding observed prevalence was 30.7% and the *S.* Enteritidis - *S.* Typhimurium prevalence 20.4%.

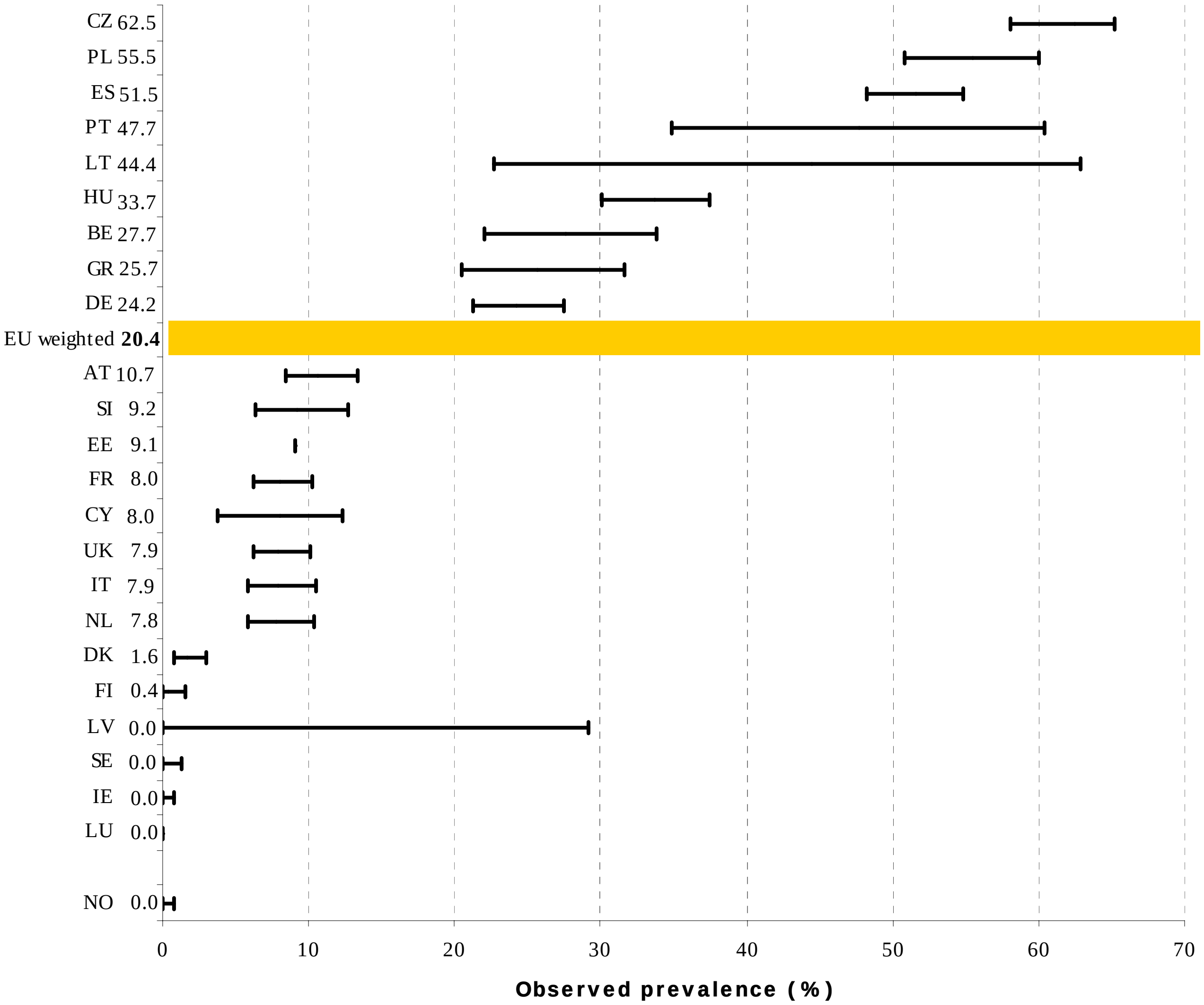
Table SA20. Observed prevalence of *Salmonella* in holdings with ≥1,000 laying hen in the flock in the EU and Norway, 2004 – 2005. Data from the EU-wide baseline study conducted from 1 October 2004 to 30 September 2005. (SE/STM = *S*. Enteritidis or/and *S*. Typhimurium; CI=confidence interval)

	No. of validated holdings[1]	***Salmonella* spp.**				**SE/STM**			
				95 CI				**95 CI**	
	N	**n**	%	**Lower limit**	**Upper limit**	**n**	%	**Lower limit**	**Upper limit**
Austria	337	52	15.4	12.7	18.5	36	10.7	8.4	13.4
Belgium	141	53	37.6	31.4	44.1	39	27.7	22.1	33.9
Cyprus	25	7	28.0	21.7	33.0	2	8.0	3.7	12.3
Czech Republic	64	42	65.6	61.3	68.2	40	62.5	58.0	65.2
Denmark	185	5	2.7	1.6	4.3	3	1.6	0.8	3.0
Estonia	11	2	18.2	18.2	18.2	1	9.1	9.1	9.1
Finland	250	1	0.4	0	1.6	1	0.4	0.0	1.6
France	511	88	17.2	14.6	20.2	41	8.0	6.2	10.3
Germany	553	160	28.9	25.7	32.3	134	24.2	21.2	27.5
Greece	140	69	49.3	42.8	55.5	36	25.7	20.5	31.6
Hungary	267	117	43.8	39.9	47.6	90	33.7	30.0	37.4
Ireland	146	2	1.4	0.6	2.6	0	0	0	0.7
Italy	367	107	29.2	25.4	33.1	29	7.9	5.9	10.5
Latvia	6	1	16.7	1.0	46.8	0	0	0.0	29.1
Lithuania	9	4	44.4	22.6	62.9	4	44.4	22.6	62.9
Luxembourg	9	0	0	0	0	0	0	0	0
The Netherlands	409	63	15.4	12.6	18.6	32	7.8	5.9	10.4
Poland	328	250	76.2	72.0	79.9	182	55.5	50.8	60.0
Portugal	44	35	79.5	66.7	87.7	21	47.7	34.9	60.4
Slovenia	98	19	19.4	15.4	23.8	9	9.2	6.4	12.7
Spain	485	355	73.2	70.1	76.0	250	51.5	48.2	54.8
Sweden	168	0	0	0	1.3	0	0	0	1.3
United Kingdom	454	54	11.9	9.9	14.7	36	7.9	6.2	10.1
EU[2]	**5,007**	**1,487**	**29.7**	**-**	**-**	**986**	**19.7**	**-**	**-**
EU weighted prevalence		**-**	**30.8**	**29.8**	**31.8**	**-**	**20.4**	**19.5**	**21.3**
Norway	303	0	0	0	0.8	0	0	0	0.8

1. Validated on the contents-level by EFSA
2. These EU figures do not include data for Malta and Slovakia

The five most frequently isolated *Salmonella* serovars were, in descending order: *S.* Enteritidis, *S.* Infantis, *S.* Typhimurium, *S.* Mbandaka and *S.* Livingstone.

Figure SA8. Observed prevalence of *S.* Enteritidis and *S.* Typhimurium in laying hens holdings, with 95% confidence intervals, for EU Member States and Norway, 2004 – 2005



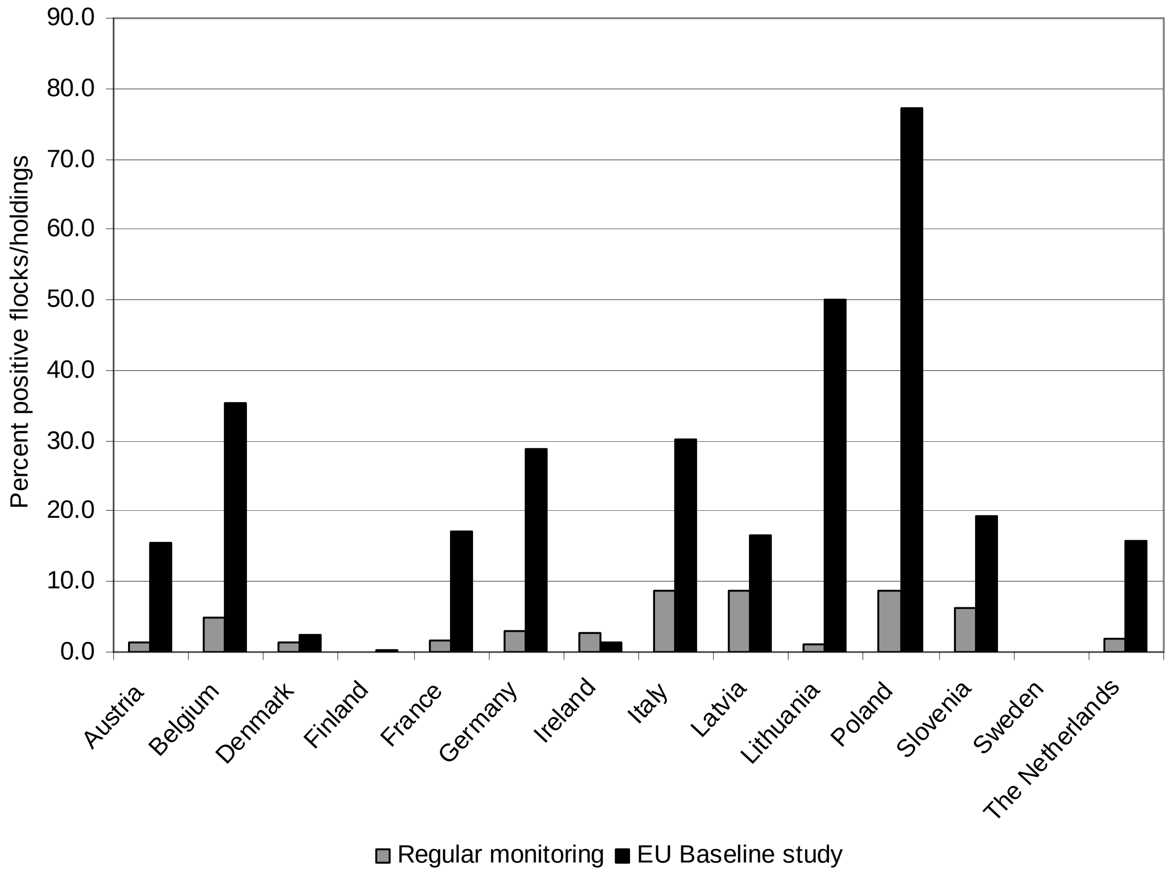
To date, few surveys have estimated the *Salmonella* prevalence in laying hens at the regional or national levels. Moreover, such surveys are affected by the nature of the study design (amongst others the diagnostic test used, the sample size, and the sample material), the type and size of holdings or flocks studied, the type of prevalence parameters studied (holding or flock prevalence), and the age of the tested animals (rearing or production flocks). Comparison of these survey results is therefore difficult, if not impossible.

In general both the observed prevalences for *Salmonella* spp. and *S*. Enteritidis- *S*. Typhimurium in MS in the baseline study were substantially higher compared to the prevalences reported by the MS for laying hen flocks in the national zoonoses reports for previous years as well as for the regular monitoring results from 2005 (Figure SA9). This may be explained by the more sensitive sampling design applied in the baseline study. Indeed the number of samples taken from a flock was generally higher, and the variety of sample material collected greater, than those normally used by most MS. Also, the baseline study specifically investigated flocks at the end of their production period, where the within flock *Salmonella* prevalence is presumably the highest, whereas the laying hen flocks prevalence reported in the Community zoonoses report covered all age groups (day-old chicks, rearing and production).

Finally, it should be noted that the baseline study was performed at the holding level (one flock per holding) resulting in an absolute minimum estimate for the flock prevalence, since negative holdings may, in fact, have had one or more positive flocks that were not sampled. The results underline the importance of harmonisation of the monitoring especially when common criteria are going to be applied for all MS.

More information on the analysis of the study results can be found in EFSA report:
http://www.efsa.europa.eu/en/science/monitoring_zoonoses/reports/1541.html

Figure SA9. Comparison of the proportion of *Salmonella* positive laying hen flocks found as part of the regular monitoring in 2005 and the *Salmonella* holding prevalence observed in the EU baseline study conducted from October 2004 to September 2005.



Meat production line of *Gallus gallus*

A total of 16 MS and one non-MS provided information on *Salmonella* in breeding flocks for meat production line in 2005. Information from broiler flocks was received from 11 MS and 2 non-MS.

Elite-breeding flocks and grandparent-breeding flocks
Two elite breeding flocks were found *Salmonella* positive in The Netherlands. Eight MS and one non-MS reported investigations of grandparent flock without any positive findings.

Parent-breeding flocks
Overall, 5.2% of flocks of the investigated parent-breeding flocks were found infected in 2005 in MS running control programmes. This is a slight increase compared to 2004, where the observed prevalence was 3.3%. Five MS reported no infected flocks, whereas 11 MS reported prevalences

from 0.4% to 27.0%. Several MS found serovars other than *S*. Enteritidis and *S*. Typhimurium. However, *S*. Enteritidis remained the predominant serovar. *S*. Typhimurium was reported by four MS (Table SA21).

Compared to 2004, seven MS reported fewer positive findings, while six MS reported an increase in the *Salmonella* prevalence. The highest prevalences in 2005 were reported by Portugal.

Table SA21. *Salmonella* in broiler parent-breeding flocks (all age groups[1], flock based data) in MS running control programmes in accordance to Council Directive 92/117/EEC, 2003-2005

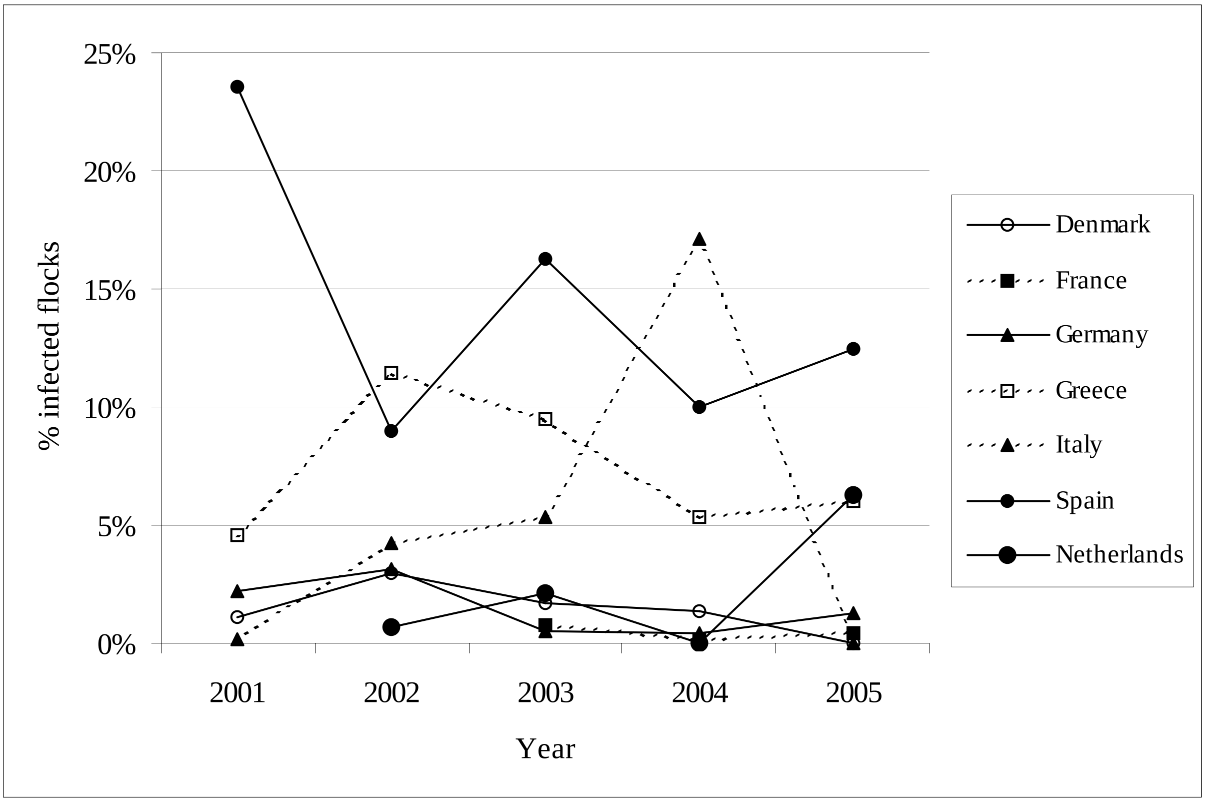
	2005				2004				2003			
	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ	N	% pos	% *S.* Ent	% *S.* Typ
Austria	142	1.4	1.4	-	57	3.5	-	-	-	-	-	-
Belgium	925	1.9	0.3	0	1,010	3.5	0.1	0.4	-	-	-	-
Denmark	120	0	-	-	438	1.4	-	-	408	1.7	0.2	1.5
Finland	305	0	-	-	255	0.4	-	-	-	-	-	-
France	1,833	0.4	0.3	0.1	2,186	0.2	0.1	<0.1	2,250	0.7	0.5	0.2
Germany	2,409	1.3	-	0	2,271	0.4	-	-	207	0.5	0	0
Greece	168	6.0	2.4	-	660	5.3	1.8	0.9	148	9.5	6.1	0.7
Ireland	522	11.5	0	0	548	7.3	-	-	-	-	-	-
Italy	31	0	-	-	352	13.6	0.4	0.6	266	5.3	0.4	0
Latvia	14	0	-	-	28	0	-	-	-	-	-	-
The Netherlands	590	6.3	0.5	0.3	2,589	<0.1	<0.1	0.0	389	2.3	1.7	0.3
Poland	1,698	9.4	5.1	0.6	2,297	5.1	3.3	0.1	-	-	-	-
Portugal	111	27.0	22.5	0.9	-	-	-	-	-	-	-	-
Slovenia	71	1.4	1.4	-	35	5.7	5.7	0	-	-	-	-
Spain	823	12.5	7.3	1.7	1,000	10.4	2.4	0	-	-	-	-
Sweden	138	0	-	-	115	0	-	-	86	0	-	-
United Kingdom	567	18.7	0.2	0	533	37.1	0	0	-	-	-	-
EU-total	**10,467**	**5.2**			**14,374**	**3.3**			**3,754**			

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

Seven MS, with control programmes for parent-breeding flocks according to the Zoonoses Directive 92/117/EEC, have reported consistently on the occurrence of *Salmonella* over the period from 2001 to 2005. In most of these MS a decreasing trend was observed over these years, although some fluctuation was evident. However, Italy and The Netherlands appeared to experience an increasing trend over the years (Figure SA10).

Slovakia provided information only on unspecified parent breeding flocks. Of the 1,235 flocks tested 2.6% were *Salmonella*-positive, 1.6% positive for *S*. Enteritidis and 0.16% for *S*. Typhimurium.

Figure SA10. Proportion of *Salmonella* positive broiler parent-breeding flocks (all age groups[1]) in MS conducting surveillance programme, 2001-2005



Note: In Sweden and Norway infected breeding flocks were not detected 2001-2004. No data from France and The Netherlands 2001.

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

Broiler production flocks

Eleven MS and one non-MS provided data on *Salmonella* in broiler flocks in 2005. The proportion of positive broiler flocks in countries reporting, ranged from less than 0.1% in Finland to 18.3% in Germany. No positive findings were reported by Italy and Sweden. Five MS reported an increase in prevalence compared with 2004, while four MS reported a decrease in the *Salmonella* prevalence (Table SA22). Among the MS reporting data from both parent-breeding and broiler production flocks, the MS reporting low *Salmonella* occurrence in the broiler parent-breeding flocks also reported relatively few infected broiler flocks. An exception was Germany reporting the highest occurrence in broilers, but only 1.3% in broiler parent-breeding flocks. None of the MS, except Poland, reporting high *Salmonella* prevalence in the broiler parent-breeding flocks (>6%) reported data from production flocks.

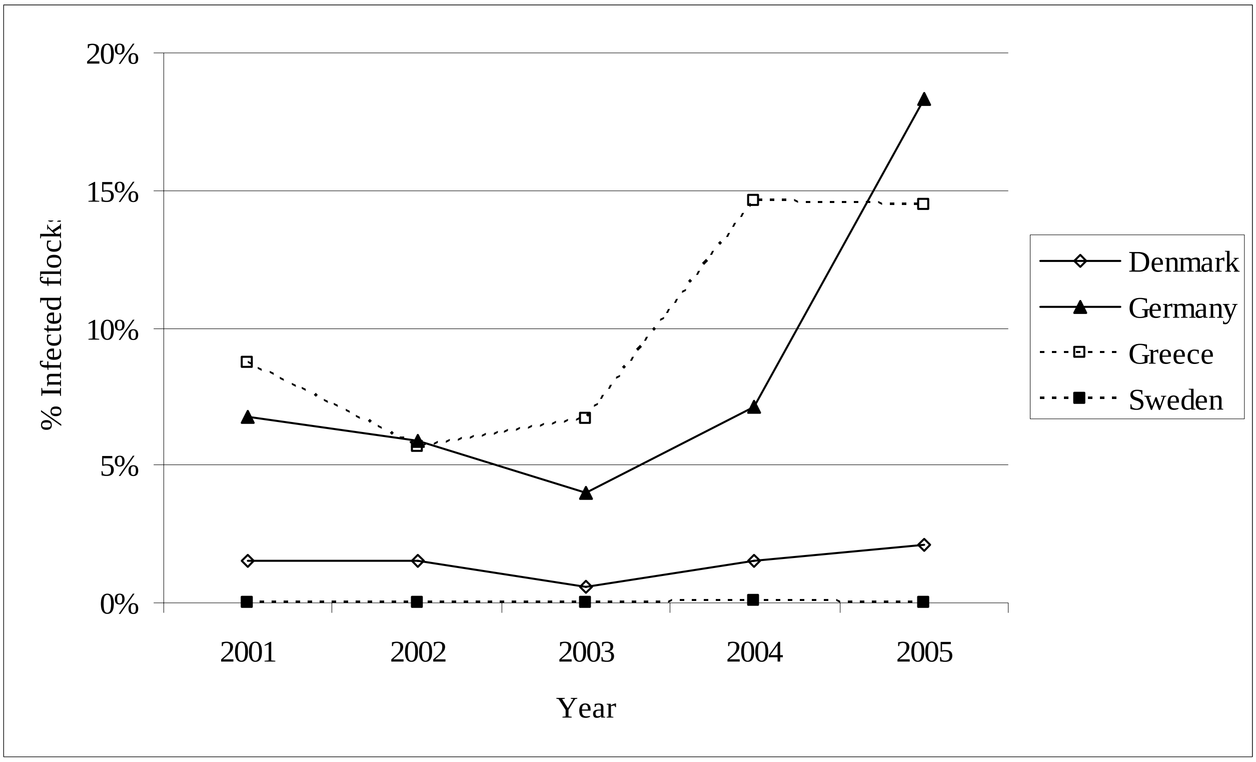
Table SA22. *Salmonella* in broiler flocks (all age groups[1], flock based data), 2003-2005

	2005				2004				2003			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	6,021	3.3	2.2	0.1	3,619	3.3	2.0	0.1	-	-	-	-
Belgium	14,768	3.4	-	-	5,381	7.2	-	-	-	-	-	-
Denmark	4,083	2.1	0.2	0.5	4,313	1.5	0.1	0.3	13,155	0.6	0	0.2
Finland	3,087	0.1	0	0	3,132	0.2	-	-	3,447	0.1	0	0
Germany	1,521	18.1	1.0	0.9	1,546	7.1	0.2	0.6	227	4.0	2.6	0
Italy	57	0	0	0	-	-	-	-	-	-	-	-
Lithuania	788	1.3	1.3	0	1,737	1.0	0.8	-	-	-	-	-
The Netherlands	58,635	2.8	0.2	0.1	28,279	3.9	0.1	0.2	-	-	-	-
Poland	20,073	9.4	2.7	0.3	22,552	7.8	3.4	0.3	-	-	-	-
Slovenia	621	1.1	0.3	0.2	1,146	1.0	0.3	-	-	-	-	-
Sweden	2,368	0	0	0	3,000	0.1	-	-	2,815	0	0	0
Norway	3,883	<0.1	0	0	3,772	0	0	0	3,633	<0.1	0	<0.1

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 MS with a monitoring programmes for broiler flocks, who reported consistently during the period 2001 to 2005 (Figure SA11), some increasing trends were apparent. However, Sweden and Denmark remained at approximately the same low level.

Figure SA11. Proportion of *Salmonella* positive broiler flocks (all age groups[1]) in MS running a monitoring and control programme, 2001-2005



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 of reported data please refer to Level 3.

Ducks and geese

As in 2004, only Poland tested a substantial number of duck-breeding flocks in 2005, finding 15.3% of the tested flocks infected with *Salmonella*. This represents a small increase in the prevalence from 2004 to 2005. Within the MS reporting data from at least 25 production flocks, Sweden and Norway found no flocks positive. The proportion of infected flocks in the other four MS ranged from 7.1 to 15.3% (Table SA23).

Table SA23. *Salmonella* in production flocks[1] of ducks (all age groups[2], flock based data), 2005

	N	% Pos	% S. Ent	% S. Typ
Austria	46	8.7	2.2	6.5
Belgium	28	7.1	0	0
Germany	160	7.5	0	1.9
Poland	568	15.3	1.6	0.5
Sweden	26	0	0	0
Norway	40	0	0	0

1. Data are only presented for sample size ≥25
2. 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.

Only Poland tested a substantial number of geese breeding flocks, and found 3.4% infected. Within the three MS reporting data from at least 25 production flocks, the proportion of infected flocks ranged from 0% to 17.2% (Table SA24).

Table SA24. *Salmonella* in production flocks[1] of geese (all age groups[2], flock based data), 2005

	N	% Pos	% S. Ent	% S. Typ
Austria	151	17.2	0	10.6
Poland	2,377	10.1	1.1	0.9
Sweden	42	0	0	0

1. Data are only presented for sample size ≥25
2. 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

In 2005, Poland tested the majority (82.7%) of their turkey breeding flocks and found 2.1% infected with *Salmonella*. Germany and Ireland also tested a number of turkey breeding flocks, finding 0% (N=130) and 2.8% (N=106) positive flocks, respectively. Within the MS and Norway reporting data from at least 25 production flocks, the proportion of infected flocks ranged from 0 to 11.1% (Table SA25).

Table SA25. *Salmonella* in production flock of turkeys[1], 2005

	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	1,092	6.3	0.1	0
Belgium	127	7.9	0	0
Germany	353	3.4	0.3	0
Finland	900	0.1	0	0
Italy	40	5.0	0	2.5
Poland	4,952	8.1	0.5	1.2
Slovenia	72	11.1	0	1.2
Sweden	108	0	0	0
Norway	310	0	0	0

1. Data are only presented for sample size ≥25

An overview of the reported data is presented in Level 3.

Pigs

Five MS and Norway reported data from active bacteriological monitoring of pigs in breeding and fattening herds (Table SA26). At the farm, The Netherlands reported the highest herd prevalence (up to 28.3%), at the slaughterhouse Slovenia found 5.4% animals, tested by sampling lymph nodes, positive, whereas Italy reported 60% of tested slaughter batches positive by sampling lymph nodes. The high proportion of positive herds and batches from these countries were in agreement with findings in previous years. Finland and Sweden reported low prevalences similar to those reported in the previous years.

Most of the other reported pig data were from diagnostic samples and *S*. Typhimurium was the dominant serovar reported among a wide range of different serovars and unspecified serovars.

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

Table SA26. *Salmonella* in pigs from MS running a monitoring programme, 2005

	Unit	N	Pos	% Pos
Farm, faecal samples				
Estonia	Animal	562	8	1.4
Finland	Animal	113	0	0
Finland	Herd (AI station)	275	0	0
The Netherlands[1]	Herd (fattening)	97	25	25.8
The Netherlands[2]	Herd (fattening)	46	13	28.3
Sweden[3]	Herd (fattening)	1,271	0	0
Norway	Herd (breeding)	148	0	0.0
Slaughter, lymph nodes				
Finland	Animal (breeding)	3,181	5	0.2
Finland	Animal (fattening)	3,252	7	0.2
Italy[4]	Slaughter batch[5]	40	24	60.0
Slovenia	Animal (fattening)	242	13	5.4
Sweden	Animal (fattening)	3,073	1	0
Sweden	Animal (breeding)	2,674	6	0.2
Norway	Animal (breeding)	1,100	0	0

Norway	Animal (fattening)	2,376	0	0

1. In The Netherlands, data collected January - July
2. In The Netherlands, data collected July - December, data represent only 3 regions (data from 2 regions is missing)
3. In Sweden, 850 pooled samples from 1271 herds in the voluntary programme BIS run by the industry
4. In Italy, only the Veneto Region has a monitoring programme
5. In Italy, ileocaecal lymph nodes from 15 animals per batch are examined

Cattle

Data from active bacteriological monitoring of cattle herds were reported in five MS, and Norway (Table SA27). In Finland, Norway and Sweden, the situation was comparable to previous years, as no or very few *Salmonella* infected herds/animals were identified in 2005. Also Estonia and Slovenia had prevalence below 1%. In Italy, batches of cattle were investigated prior to slaughter and the proportion of infected batches was 6.7%.

Most of reported data from cattle were from diagnostic samples, where *S.* Enteritidis and *S.* Typhimurium were the dominant serovars even though a wide range of different serovars and unspecified serovars were reported.

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

Table SA27. *Salmonella* in cattle from MS running a monitoring programme, 2005

	Unit	N	Pos	% Pos
Farm, faecal samples				
Estonia[1]	Animal	1,581	15	0.9
Finland	Herd (bulls at AI station)	256	0	0
Prior to slaughter, faecal samples				
Italy[2, 3]	Slaughter batch	30	2	6.7
Slovenia	Animal	232	1	0.4
Slaughter, lymph nodes				
Finland	Animal	3,003	3	0.1
Sweden	Animal	3,297	2	0.1
Norway	Animal	2,209	2	0.1

1. In Estonia, faecal samples from 5-10 animals were pooled for investigation
2. In Italy, only the Veneto Region has a monitoring programme
3. In Italy, faecal samples 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 both *S.* Enteritidis and *S.* Typhimurium may be present. 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 (Austria, Czech Republic, Germany, Italy, Norway, Portugal, Sweden, Slovakia and The United Kingdom), goats (Czech Republic, Germany, Italy, Poland, Spain and The United Kingdom) and solipeds (Latvia, The Netherlands, Slovakia, Sweden and The United Kingdom). In Norway, only the specific serotype *S. enterica* subsp. *diarizonae* 61:(k):1,5,(7) was isolated from 16 (13.9 %) of 115 sheep samples of primarily diagnostic origin. In Italy, control programmes and surveys found none of 142 sheep holdings infected whereas 10.3% (n=52) of 506 samples from individual sheep were positive. Similarly, none of 79 goat holdings were infected whereas 3% (n=2) of 71 investigated individual samples were found 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 cats whereas 1.1% of samples from dogs were positive. A relatively high proportion of *Salmonella* positive samples from reptiles, snakes and turtles was observed. An overview of the reported data is presented in Level 3.

3.1.4. *Salmonella* in feedingstuffs

Information regarding *Salmonella* in feedingstuffs was reported by all MS, except Malta. 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 directly comparable between MS, and cannot be considered as national prevalences. All reported data are presented in Level 3.

The decline in the occurrence of *Salmonella* in fishmeal observed in 2004 continued in 2005 and among those MS reporting data for 25 samples or more, positive findings were only reported from Poland and The Netherlands (Table SA28). Lithuania reported no *Salmonella* contamination of meat and bone meal. All the other countries reporting data for 25 samples or more reported contamination levels below 3%, except for Spain that reported 33.3% positive samples in meat and bone meal.

Table SA28. *Salmonella* in animal derived feed material, 2001-2005

	2005		2004		2003		2002		2001	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Fishmeal										
Belgium	34	0	29	3.4	8	12.5	-	-	-	-
France[1]	49	0	41	0	57	1.8	12	0	-	-
Greece[1]	65	0	43	4.7	13	0	57	0	132	1.5
Italy	157	0	110	0	183	1.1	371	1.1	203	3.9
Lithuania	84	0	130	0.8	108	1.9	-	-	-	-
The Netherlands	508	0.8	821	0.9	493	1.2	799	3.8	109	6.4
Poland	288	0.7	1,720	0	-	-	-	-	-	-
Slovakia	28	0	-	-	-	-	-	-	-	-
Spain[1,2]	29	0	89	5.6	83	2.4	265	0.8	51	0
Sweden	120	0	669	3.4	228	0.0	332	0.3	321	0
Norway[2]	48	0	49	0	5,187	<0.1	8,989	<0.1	6,466	<0.1
Meat and bone meal										
Denmark	8,825	1.1	7,979	2.1	5,365	0.3	269	2.2	269	0
Finland	131	1.5	117	0	97	0	98	0	203	0
Germany	481	1.2	974	1.7	1,360	1.5	827	4.4	252	3.2
Italy	323	1.5	1,983	0.1	197	2.0	247	2.8	467	0.9
Lithuania	171	0	-	-	9	0	-	-	-	-
Poland	596	3.0	1,239	1.3	0	-	-	-	-	-
Spain[2]	30	33.3	41	2.4	88	0	366	1.9	382	2.6
Sweden[2]	76	1.3	716	1.8	932	0.3	155	1.3	1,364	0.1
Norway	668	0.3	611	0.2	584	0.9	684	0.1	820	0

1. Data include other fish products in the fishmeal category from Austria (2001, 2002), France (2001), Greece (2001, 2002) and Spain (2002)

2. Import data excluded from Finland (2003), Germany (2004), Norway (2001, 2002), Spain (2001, 2002), Sweden (2002) and The United Kingdom: 2001, 2002

The level of *Salmonella* contamination in feed material of vegetable origin also varied considerably between countries in 2005, especially for oil seeds and products thereof. No general trend was apparent (Table SA29). *Salmonella* contamination of cereals ranged from 0% to 3.3%, and from 0.4% to 6.7% for oil seeds and products, for MS reporting data for 25 samples or more in at least one reporting year. Overall, the results indicate that oil seeds, such as soybean and rape and products thereof, probably are the most likely sources of *Salmonella* in animal feed.

Table SA29. *Salmonella* in vegetable derived feed material, 2001-2005

	2005		2004		2003		2002		2001	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cereals										
Austria	26	0	410	3.2	444	1.4	70	2.9	17	0
Finland[1]	49	0	44	0	61	1.6	79	1.3	98	1.0
Germany	768	0.3	892	0.6	871	0.9	829	1.0	394	1.3
Ireland	78	1.3	44	0	37	0	33	0	18	0
Italy	164	1.2	116	1.7	57	0	762	2.5	129	2.3
The Netherlands	2,532	0.3	2,994	0.3	2,232	0.6	2,425	0.8	207	0
Poland	883	1.1	466	0.6	-	-	-	-	-	-
Slovakia	91	3.3	-	-	-	-	-	-	-	-
Sweden[1]	144	0	225	2.7	-	-	192	0	158	0
Norway[1]	32	0	1,083	0	-	-	-	-	-	-
Oil seeds and products										
Austria	424	4.5	21	0.0	469	3.0	273	6.2	258	5.0
Belgium	119	6.7	156	0.6	29	0	-	-	5	0
Denmark	1,119	6.4	1,101	4.5	104	1.9	-	-	-	-
Finland[1]	232	0.4	444	4.7	264	1.5	322	6.8	275	0.7
Germany	894	3.8	1,544	7.6	1,345	7.5	1,201	8.1	693	1.9
Ireland	58	1.7	62	6.5	36	0	39	7.7	13	7.7
Italy	390	5.9	119	2.5	28	7.1	44	0	9	22.2
Lithuania	186	4.8	173	2.9	-	-	-	-	-	-
The Netherlands	13,482	4.6	12,675	6.8	10,421	5.1	9,305	6.0	525	6.3
Poland[1]	992	4.9	1,261	2.6	-	-	-	-	-	-
Slovakia	49	2.0	-	-	-	-	-	-	-	-
Sweden	2,904	2.3	2,431	2.2	1,252	0.5	1,993	0.3	1,692	0
Norway	27	3.7	1,298	0.1	25	4.0	6	0	1	0

1. Import data excluded from Finland (2001, 2002, 2003), Norway (2001, 2002, 2003), Spain (2001, 2002) and Sweden (2001, 2002)

In compound feedingstuffs (final products), the proportion of *Salmonella* positive findings ranged from 0-2.4% in cattle feed, 0-1.7% in pig feed and 0-6.2% in poultry feed (Table SA30). In poultry feed, a relatively high *Salmonella* occurrence was found in Greece (6.2%) and Italy (4.2%) in 2005. As for all results on feedingstuffs, the relevance of these positive findings depend on whether the data are representative of the feedingstuffs on the market in the country, or whether it reflects intensive sampling of high risk products. The national reports from 2005 do not provide this information.

Table SA30. *Salmonella* in compound feedingstuffs (final products), 2001-2005

	2005		2004		2003		2002		2001	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cattle feed										
Finland	431	0	453	0	513	0	439	0	370	0
Germany	304	0.7	261	0	-	-	-	-	-	-
Ireland	65	0	56	0	44	0			39	5.1
Italy	350	1.4	206	1.0	168	0	44	2.3	76	0
The Netherlands	2,467	0.5	-	-	1,409	0.9	1,671	0.8	3,394	0
Poland	441	1.8	477	0.4	-	-	-	-	-	-
Slovakia	32	0	-	-	-	-	-	-	-	-
Slovenia	47	0	-	-	26	7.7	-	-	-	-
Spain	82	2.4	177	1.1	384	2.3	470	4.5	336	1.2
Pig feed										
Finland[1]	350	0	299	0	241	0	235	0	157	0
Germany	904	0.3	569	0.2	-	-	-	-	-	-
Italy	180	1.7	116	0.9	-	-	-	-	-	-
Latvia	36	0	67	0	152	2.6	-	-	-	-
Luxembourg	29	0	-	-	-	-	-	-	-	-
The Netherlands	3,301	0.4	3,048	0.6	2,904	0.6	3,146	0.6	3,213	0.3
Poland	1,224	1.7	1,827	1.2	-	-	-	-	-	-
Slovakia	34	0	-	-	-	-	-	-	-	-
Slovenia	101	1.0	53	1.9	43	4.7	-	-	-	-
Spain	46	0	97	1.0	89	0	120	8.3	64	1.6
Norway	51	0	44	0	69	0	104	0	67	0
Poultry feed										
Austria	249	0	-	-	683	0.9	377	1.6	656	5.2
Finland[1]	181	0	175	0	243	0	180	0	146	0
Germany	1,726	1.1	408	0.5	-	-	-	-	-	-
Greece	227	6.2	176	6.3	344	3.2	68	0	36	0
Italy	613	4.2	356	3.9	-	-	-	-	-	-
Latvia	197	0	150	2.7	120	2.5	-	-	-	-
The Netherlands	8,256	0.4	-	-	-	-	-	-	-	-
Poland	2,050	1.4	2,682	0.9	-	-	-	-	-	-
Slovakia	29	0	-	-	-	-	-	-	-	-
Slovenia	127	0.8	-	-	-	-	-	-	-	-
Norway	50	0	28	0	61	0	78	0	78	0

1. Import data excluded from Finland (2001, 2003)

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 Italy and The Netherlands and from feed materials in general in Germany, Latvia and Slovakia.

S. Typhimurium was detected in different kinds of feed materials in Finland, Germany, Greece, Italy, Norway, Slovakia, Sweden and The United Kingdom. In specific, Finland and Germany reported findings of *S.* Typhimurium in final products of compound feedingstuffs for farm animals.

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 between the reporting countries. In all MS serotyping of *Salmonella* isolates is done according to the Kaufmann-White Scheme. For phage typing of *S.* Enteritidis and *S.* Typhimurium the Colindale scheme is predominantly used. The Netherlands, however, classified *S.* Typhimurium with another set of phages. Therefore, phage type data are not included here.

The ten most common *Salmonella* serovars and the ten most common phage types of *S*. Enteritidis and *S*. Typhimurium isolated from humans, foodstuffs, (broiler meat, eggs, pig meat), animals (cattle, pigs, *Gallus gallus*) and feedingstuffs (total for all categories) are presented in the following. Ranking was done by adding up the number of each serotype (for *S*. Enteritidis and *S*. Typhimurium) across all MS. For humans, the Community serovar distribution was estimated, assuming the serovar distribution in non-serotyped isolates was the same as among the serotyped isolates in each MS. For foodstuffs and animals, only MS that reported typing results for at least 25 monitoring isolates per food type or animal species were included. The serovar and phage type distributions for each MS were based on the number of typed isolates, including non-typeable isolates.

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

Most MS reported data on *Salmonella* serovar distributions in foodstuffs (no data from France, Luxembourg, Malta and Portugal), and animals (no data from Cyprus, Latvia, Lithuania, Luxembourg, Malta and Portugal) and feedingstuffs (no data from Czech Republic, Luxembourg and Malta).

Data on serovars in humans, foodstuffs, animals and feedingstuffs from each MS is presented in Level 3, as well as the data on phage types in humans.

Serovars in foodstuffs

Broiler meat
Overall, *S*. Enteritidis was the most commonly occurring serovar isolated from the monitoring of broiler meat in 2005, followed by *S*. Paratyphi B var. Java and *S*. Typhimurium (Table SA31). However, the predominance of specific serovars in broiler meat varied significantly between the MS. *S*. Enteritidis dominated in broiler meat in Czech Republic, Estonia, Germany, Latvia, Poland, Slovakia and Slovenia; *S*. Blockley and *S*. Livingstone in Greece; *S*. Typhimurium in Ireland and *S*. Paratyphi B var. Java in The Netherlands. Other serovars not included in the list, but which were common in particular MS, are presented in the footnotes for Table SA31. The relative occurrences of all the other reported serovars were 5% or less. Apart from an increasing occurrence of *S*. Paratyphi B var. Java, the serotype distribution in broilers meat in 2005 was largely comparable to the distribution in 2004.

Table SA31. Distribution of the ten most common *Salmonella* serovars in broiler 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 serotyped isolates	S. Enteritidis	S. Paratyphi B var. Java	S. Typhimurium	S. Infantis	S. Virchow	S. Indiana	S. Kentucky	S. Anatum	S. Blockley	S. Livingstone	Other serovars
Czech Republic	8	63	0	13	0	0	0	13	0	0	0	13
Estonia	38	97	0	3	0	0	0	0	0	0	0	0
Germany	114	23	7	13	12	4	9	0	2	0	0	30
Greece	72	15	0	3	0	1	10	0	17	19	19	15
Ireland	96	22	0	33	2	4	0	18	0	0	0	21
Latvia	21	76	0	0	0	14	0	0	0	0	0	10
The Netherlands	130	7	46	4	15	9	2	2	1	1	1	13

Note: Other common serovars from broiler meat in Czech Republic: *S.* Bovismorbificans (13%), in Slovenia: *S.* Montevideo (28%) and in Slovenia: *S.* Tennessee (10%).

Table eggs

Generally, table eggs are not monitored using bacteriological methods. Only very few isolates were serotyped and reported in relation to the overall description of serovar distribution. Data reported for prevalence description support the conclusion from previously years that *S.* Enteritidis is the predominant serovar in table eggs.

Pig meat

As in 2004, *S*. Typhimurium was the predominant serovar isolated from pig meat during monitoring (0–100%) followed by *S*. Derby (0-33%) (Table SA32). The relative occurrence of the other common serovars varied between the reporting MS. *S.* Rissen was frequently reported from pig meat in Portugal (67%), *S.* London from the Czech Republic (50%), *S.* Dublin from Estonia (29%) and *S.* Bovismorbificans from The Netherlands (11%). Four MS (Estonia, Greece, Poland and Slovenia) reported *S.* Enteritidis to dominate (14-100%) but these reports were based on a very low number of serotyped isolates. The relative occurrence of serotypes not included in Table SA32 was less than 4%. No major changes were observed in relation to the distribution of serovar in pig meat from 2004 to 2005.

Table SA32. Distribution of the ten most common *Salmonella* serovars in pig 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 serotyped isolates	S. Typhimurium	S. Derby	S. Infantis	S. Enteritidis	S. group B	S. Rissen	S. Virchow	S. Dublin	S. London	S. Bovismorbificans	Other serovars
Czech Republic	2	50	0	0	0	0	0	0	0	50	0	0
Denmark	190	49	20	5	0	0	0	0	0	0	0	25
Estonia	7	43	0	0	14	0	0	0	29	0	0	14
Germany	57	67	5	5	0	11	0	0	0	0	0	12
Greece	3	0	33	0	33	0	0	0	0	0	0	33
Ireland	44	98	0	0	0	0	0	0	0	0	0	2
Latvia	5	100	0	0	0	0	0	0	0	0	0	0
The Netherlands	9	67	0	0	0	0	0	0	0	0	11	22
Poland	1	0	0	0	100	0	0	0	0	0	0	0
Portugal	6	17	17	0	0	0	67	0	0	0	0	0
Slovakia	2	0	0	0	100	0	0	0	0	0	0	0
Slovenia	26	35	8	15	19	0	0	12	0	4	0	8

Bovine meat

Several MS provided serovar information for bovine meat in 2005, but the monitoring data was too sparse for a Community evaluation of the serovar distribution. Data reported for prevalence description indicate that *S.* Typhimurium is the predominant serovar in bovine meat followed by *S.* Dublin and *S.* Enteritidis.

Serovars in animals

As in 2004, the dominant serovars isolated from *Gallus gallus* in 2005 were *S.* Enteritidis (ranging from 7.4-99.7%), *S.* Infantis (0-24.4%) and *S.* Typhimurium (2.5-27.9%). *S. Enteritidis* was the most common serotype in most reporting MS, but in Greece and The United Kingdom *S.* Livingstone was the most commonly reported serovar. In Denmark, S. Typhimurium dominated in 2005 (Table SA33). The distribution of serovars in monitoring isolates from laying hens and broiler were reported together.

Table SA33. Distribution of the ten most common *Salmonella* serovars in *Gallus gallus*. 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)

Country	No. of serotyped isolates	S. Enteritidis	S. Infantis	S. Typhimurium	S. Senftenberg	S. Livingstone	S. Paratyphi B var. Java	S. Virchow	S. Mbandaka	S. Agona	S. Hadar	Other serovars
Belgium	1,433	30	5	8	6	1	8	6	2	5	3	26
Denmark	86	8	24	28	-	-	-	1	-	-	-	38
Estonia	319	100	-	.	-	-	-	-	-	-	-	0
Finland	17	-	6	12	-	71	-	-	-	-	-	12
Germany	109	61	9	17	-	-	-	-	-	-	-	13
Greece	111	22	3	5	-	35	-	3	1	1	-	32
Latvia	40	95	-	.	-	-	-	-	-	-	-	5
Lithuania	6	83	-	.	17	-	-	-	-	-	-	0
The Netherlands	1,347	32	12	10	9	2	11	5	5	3	2	11
Poland	470	54	17	3	0	1	-	5	8	-	6	7
Slovakia	32	63	-	6	-	-	-	-	-	-	-	31
Slovenia	40	68	5	5	5	-	-	-	5	-	-	13
United Kingdom	694	7	1	3	12	25	-	2	4	1	-	46

For animal species, other than *Gallus gallus,* the reported information on serovar distributions was sparse in 2005 and dominated by the data from one MS. Thus, no conclusions at the Community level can be made based on these data.

Information on the serovar distributions in isolates from pigs was provided by Estonia, Finland, Germany and The Netherlands. *S.* Typhimurium was by far the dominating serovar, followed by *S.* Derby, *S.* Typhimurium var. Cop, *S.* Panama and *S.* group B. The majority of the data were provided by Germany (74.1%).

For isolates obtained from cattle, data on serovar distributions were provided by Estonia, Finland, Germany and Slovenia. However, data from Germany constituted almost 90% reported information. The dominant serovar was *S.* Typhimurium followed by *S.* Anatum var. 15, *S.* Ohio, *S.* Goldcoast, and *S.* Dublin.

Serovars in feedingstuffs

Serovars most commonly reported for 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 with caution.

The ten most common serovars isolated from feedstuffs are presented in Table SA34. *S.* Enteritidis and *S.* Typhimurium, which are the most commonly encountered serovars in humans, ranked number nine and number five in feedingstuffs, respectively. *S.* Infantis and *S.* Agona which are also among the ten most common serovars found in human cases, were also among the ten most common serovars in feedstuffs. However, the remaining top ten serovars in feedingstuffs are not among the most frequently isolated serovars in humans, broiler meat or pig meat.

Table SA34. Distribution of the ten most common *Salmonella* serovars in feedingstuffs in MS that have reported at least 20 isolates (summed over all reported feeding stuff types, excluding environmental samples). The serovar distribution for each MS was based in the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates)

Country	Serotyped isolates	S. Livingstone	S. Senftenberg	S. Montevideo	S. Infantis	S. Typhimurium	S. Mbandaka	S. Tennessee	S. Agona	S. Bredeney	S. Enteritidis	Other serovars
Austria	24	-	4	79	4	-	-	4	8	-	-	-
Denmark	72	40	-	32	10	0	-	-	-	-	0	18
Germany	20	-	-	-	-	95	-	-	-	-	5	-
Greece	30	-	-	-	-	7	10	-	3	47	-	33
Italy	23	39	-	4	-	4	13	-	-	-	4	35
Latvia	25	-	4	12	4	0	-	24	-	-	4	52
The Netherlands	29	17	31	-	-	-	24	-	3	-	3	21
Norway	40	-	43	-	3	10	20	3	5	-	0	18
Slovakia	51	-	-	-	47	4	-	2	4	-	20	24
Sweden	83	10	7	-	10	5	10	19	6	-	-	34

3.1.6. Antimicrobial resistance in *Salmonella*

Antimicrobial resistance in humans

Data on antimicrobial resistance for *Salmonella* isolates from human salmonellosis cases were provided through Enter-net. Data were available from 15 MS and any interpretation or conclusion at the Community level should be made cautiously. Overall, resistance to nalidixic acid was found in 13.4%, resistance to sulphonamides in 6.4% and resistance to ampicillin in 5.1% of S. Enteritidis isolates. Only 0.4% of the tested *S.* Enteritidis isolates were resistant to ciprofloxacin, however Luxembourg and The Netherlands reported much higher proportions of isolates resistant (14.4% and 12.4%, respectively) (Table AB SA1). For *S.* Typhimurium, the highest levels of resistance were observed for ampicillin, tetracycline and sulphonamide, (59.8%, 57.4% and 50.2%, respectively). Only 0.6% of the *S.* Typhimurium isolates were resistant to ciprofloxacin (Table AB SA2). The proportions of multi-resistant S. Enteritidis and *S.* Typhimurium isolates are presented in Table AB SA3. For *S.* Enteritidis, 76.2% of isolates were fully sensitive to all tested antimicrobials and less than 1% was resistant to more than 4 antimicrobials. The situation for *S.* Typhimurium was markedly different as only 25.5% of isolates were fully sensitive, but 27.0% of the isolates were resistant to more than 4 of the antimicrobials tested. Further data on antimicrobial resistance in *Salmonella* isolates from humans are presented in Level 3.

Table AB SA1. Antimicrobial resistance in *S*. Enteritidis from humans per country, Enter-net data, 2005 (%)

Country	Gentamicin	Kanamycin	Streptomycin	Chloramphenicol	Cefotaxime	Ciprofloxacin	Ampicillin	Nalidixic acid	Sulphonamides	Tetracyclines	Trimethoprim
Austria	0.1	0.1	0.4	0.02	0	0	1.1	3.7	0.5	0.4	0.3
Denmark	0	0	1.1	0	0	0	4.6	16.1	1.1	1.1	1.1
Estonia	0	0	4.9	0	0	1.3	11.3	48.1	29.2	7.7	10.6
Germany	0.1	0.3	0.9	1	0.1	-	1.1	2.5	98.4	4.2	0.6
Greece	0.9	-	-	0		0	4.5	-	-	0.9	0
Ireland	0	0	0	0	0	0	4.8	30.3	2.1	2.8	2.1
Italy	4.0	0.3	1.7	0.8	1.3	0	7	11.4	6.1	2.2	2.5
Latvia	0	0	0.5	1.0	0	0	1.0	1.9	0	1.0	0
Lithuania	1.0	9.9		0.6	0.4	0.2	14.6	-	-	42.2	11.4
Luxembourg	0	0	0	0	0	14.4	2.1	15.5	4.1	2.1	3.1
Malta	0	-	-	-	-	0	6.7	-	-	-	-
The Netherlands		0.3	-	0.5	-	12.4	2.7	-	-	1.9	1.3
Slovenia	0	0	0.1	0	0	0.1	0.8	1.8	2.1	0.2	0.1
Spain	0	0.7	0.7	0.4	0.2	0.2	7.8	52.4	1.4	2.9	1.1
United Kingdom	0.3	0.3	3.3	0.4	0.1	0.1	6.5	23.9	3.7	4.6	1.5
EU Total, N	**64**	**39**	**303**	**57**	**17**	**76**	**967**	**2,528**	**1,200**	**517**	**370**
EU Total, %	**0.3**	**0.2**	**1.6**	**0.3**	**0.1**	**0.4**	**5.1**	**13.4**	**6.4**	**2.7**	**2.0**

Table AB SA2. Antimicrobial resistance in *S*. Typhimurium from humans per country, Enter-net data, 2005 (%)

Country	Gentamicin	Kanamycin	Streptomycin	Chloramphenicol	Cefotaxime	Ciprofloxacin	Ampicillin	Nalidixic acid	Sulphonamides	Tetracyclines	Trimethoprim
Austria	0.3	1.6	50.7	22.3	0.3	0	41.7	6.8	53.5	39.1	6.6
Denmark	1.3	1.8	45.8	24.6	0.2	0.5	45.4	4.6	47.8	48.4	3.8
Estonia	0	0	50	20	0	0	60	0	30	71.4	25
Germany	1.9	4.6	72.9	37.2	0.6	0	70.6	2.3	99.4	72.1	18.3
Ireland	1.2	2.4	70.6	63.5	0	0	72.9	9.4	75.3	78.8	8.2
Italy	9.6	1.1	56.1	26	0.4	0.4	73.4	4.2	55.5	72.4	13
Latvia	0	0	94.4	80.6	0	0	97.2	0	2.8	94.4	2.8
Lithuania	4.9	0	-	39.3	0	0	55.7	-	-	66.7	20
Luxembourg	1.5	1.5	50.8	27.7	0	6.2	53.8	6.2	56.9	69.2	16.9
Malta	0	-	-	-	-	0	64.5	-	-	-	-
Netherlands	-	1.9	-	46.1	-	1.6	65.5	-	-	67.4	12.3
Slovenia	7.0	3.5	33.3	21.1	0	0	45.6	17.5	40.4	42.1	5.2
Spain	2.9	1.8	58	61.1	0.5	-	78.1	10.7	84.6	78.6	13.1
United Kingdom	3	3.5	56.7	34.4	0.1	0.6	50.9	8	60.4	56.9	17.1
EU Total, N	**235**	**160**	**2,655**	**1,897**	**38**	**37**	**3,622**	**331**	**3,042**	**3,480**	**697**
EU Total, %	**3.9**	**2.6**	**43.8**	**31.3**	**0.6**	**0.6**	**59.8**	**5.5**	**50.2**	**57.4**	**11.5**

Table AB SA3. Multi-resistance in *S.* Enteritidis and *S.* Typhimurium from humans, Enter-net data, 2005

Number of antimicrobials	*S.* Enteritidis Resistant Isolates (n)	%	*S.* Typhimurium Resistant Isolates (n)	%
0	14,351	76.2	1,543	25.5
1	3,646	19.4	758	12.5
2	411	2.2	706	11.7
3	126	0.7	526	8.7
4	215	1.1	888	14.7
>4	79	0.4	1,637	27.0
No. of tested isolates (N)	**18,828**		**6,058**	

Food

Relatively few MS reported data on the occurrence of antimicrobial resistance in *Salmonella spp.* from food. Only MS reporting more than 10 isolates, and only food categories for which more than 5 MS reported, were included in this summary report. Five MS provided data on antimicrobial resistance in *Salmonella spp.* from pig meat (Table AB SA4). For data 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 Denmark, Germany, Italy, Slovenia, and Spain (Table AB SA4). Some variation between MS was observed in the proportion of resistant isolates. In general, the highest proportions of resistant isolates were observed for ampicillin, sulphonamide and tetracycline. For most antimicrobials, the proportions reported by Germany, Italy and Spain were higher than the proportions reported by Slovenia and Denmark. The proportion of ampicillin resistant *Salmonella* isolates from pig meat ranged from 21.3% to 35.0%, while the proportion of isolates resistant to sulphonamide ranged from 36.2% to 51.6% and to tetracycline from 38.3% to 59.1%. Resistance to ciprofloxacin was reported in 1.0% of isolates by Denmark, and resistance to enrofloxacin was reported in 0.6% of the isolates by Italy. Any trend over time could not be analysed, as only one MS reported sufficient data in 2004 and 2005.

Table AB SA4. Antimicrobial resistance in *Salmonella* spp. from pig meat, 2005

			Antimicrobial										
	Monitoring programme		Ampicillin	Cefotaxime	Chloramphenicol	Gentamicin	Nalidixic acid	Sulphonamide	Tetracycline	Trimethoprim	Trimethoprim + sulphonamides	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Denmark[1]	Yes	94	21.3	-	5.3	0	2.1	36.2	38.3	3.2	-	-	-
Germany	No	568	33.3	-	15.3	0	4.9	45.1	48.8	14.3	14.3	38	25
Italy[2]	Yes	349	35.0	4.3	16.1	1.7	11.8	51.6	57.3	8.9	28.6	28.9	25
Slovenia	Yes	24	25.0	0	8.3	8.3	16.7	37.5	41.7	16.7	16.7	-	-
Spain	Yes	22	31.8	0	54.6	13.6	0	-	59.1	-	40.9	0	18.2

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

1. Denmark reported *S.* Typhimurium only

2. For Italy; N=347 for sulphonamide, N=45 for trimethoprim, N=301 for trimethoprim-sulphonamide

Animals

Data on the occurrence of antimicrobial resistance in *S.* Typhimurium, *S.* Enteritidis and/or *Salmonella* spp. from animals (*Gallus gallus*, pigs, cattle and turkeys) were provided by 13 MS (Table AB SA5-SA9). Only MS reporting more than 10 isolates, and only animal species for which more than 5 MS reported, were included in this summary report.

Gallus gallus

Data on the occurrence of antimicrobial resistance in *S.* Typhimurium and/or *S.* Enteritidis in *Gallus gallus* were reported by 11 MS (Table AB SA5 and AB SA6). In general, lower levels of antimicrobial resistance were reported for isolates of *S.* Enteritidis than for *S.* Typhimurium. Among reporting MS, the highest proportions of isolates resistant to chloramphenicol, sulphonamides and tetracyclines were reported by The Netherlands and The United Kingdom. For *S.* Typhimurium, the highest levels of resistance among isolates from *Gallus gallus* were reported for ampicillin (up to 73.9%), sulphonamide (up to 69.6%) and tetracycline (up to 73.9%).

Table AB SA5. Antimicrobial resistance in *S.* Typhimurium in *Gallus gallus*, 2005

			Antimicrobial										
	Monitoring programme		Ampicillin	Cefotaxime	Chloramphenicol	Gentamicin	Nalidixic acid	Sulphonamide	Tetracycline	Trimethoprim	Trimethoprim + sulphonamides	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	48	10.4	0	6.3	2.1	0	6.3	6.3	0	-	89.6	6.3
Denmark	Yes	13	0	-	0	0	0	7.7	7.7	0	-	-	0
Germany	No	26	26.9	-	23.1	0	3.9	34.6	30.8	7.7	7.7	50	26.9
Italy[1]	Yes	37	13.5	0	8.1	2.7	5.4	22.2	24.3	100	2.8	71.4	8.6
The Netherlands	Yes	23	73.9	0	52.2	0	4.4	69.6	73.9	8.7	-	17.4	4.4
Slovakia	Yes	10	90	0	50	10	50	50	50	0	0	10	50
United Kingdom	Yes	10	60	0	60	0	20	60	60	-	20	40	60

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

1. For Italy; N=1 for trimethoprim, N=36 for trimethoprim-sulphonamide

Table AB SA6. Antimicrobial resistance in *S.* Enteritidis in *Gallus gallus*, 2005

			Antimicrobial										
	Monitoring programme		Ampicillin	Cefotaxime	Chloramphenicol	Gentamicin	Nalidixic acid	Sulphonamide	Tetracycline	Trimethoprim	Trimethoprim + sulphonamides	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	406	2.7	0	0	0	3.9	1.2	0.5	0.7	-	92.9	-
Czech Republic	Yes	15	0	0	0	0	0	0	0	0	-	-	0
Germany	No	41	0	-	0	0	4.9	0	0	0	0	95.1	0
Greece[1]	Yes	25	3.9	0	0	0	-	0	0	0	0	81.5	-
Italy[2]	Yes	67	6	0	0	0	34.3	7.6	10.5	0	1.5	62.5	1.6
Latvia[3]	Yes	35	0	0	0	0	0	-	-	0	0	-	-
The Netherlands	Yes	43	0	0	0	0	51.2	0	0	0	-	48.8	-
Slovakia	Yes	98	1	0	0	0	2	1	0	0	0	95.9	-
Slovenia	Yes	22	0	0	0	0	0	0	0	0	0	-	-
United Kingdom	Yes	46	2.2	0	0	0	0	0	2.2	-	0	95.6	0

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

1. For Greece; N=27 for tetracycline, N=26 for ampicillin, N=10 for trimethoprim
2. For Italy; N=66 for sulphonamide, N=1 for trimethoprim, N=65 for trimethoprim-sulphonamides
3. For Latvia; N=13 for ampicillin, N=8 for cefotaxime, N=35 for chloramphenicol, N=3 for gentamicin, N=31 for nalidixic acid, N=15 for trimethoprim, N=35 for trimethoprim-sulphonamide

For *S.* Enteritidis, the highest level of resistance was reported for nalidixic acid (up to 51.2%). Resistance to tetracycline was generally low (from 0-10.5%). Italy was the only country to report resistance to ciprofloxacin and enrofloxacin. The proportions of resistant isolates were 0.2% and 0.8%, respectively, in *Salmonella* spp. MS generally reported high proportions of fully sensitive *S.* Enteritidis isolates from *Gallus gallus,* ranging from 48.8% to 95.9%.

The highest proportion of fully sensitive *S*. Typhimurium isolates was reported by Austria (89.6%) and Italy (71.4%), and the highest proportion of multi-resistant isolates was reported by The United Kingdom (60.0%). For *S.* Enteritidis, more MS reported relatively high proportions of fully sensitive isolates: Austria (92.9%), Germany (95.1%), Greece (81.9%), Italy (62.5%) and Slovakia (95.9%).

Pigs

Data on the occurrence of antimicrobial resistance in *S.* Typhimurium from pigs was reported by eight MS (Table AB SA7).

In general, the highest level of resistance in *S*. Typhimurium from pigs was observed for ampicillin (up to 90.0%), sulphonamide (up to 90.0 %) and tetracycline (up to 92.6%). These antimicrobials are frequently used for treatment in pigs, and a considerable variation in the proportions of resistant isolates was observed among the reporting countries. Germany, Czech Republic, Italy and The United Kingdom reported the highest level of resistance to ampicillin, sulphonamide, and tetracycline (proportions ranging from 77.9% to 92.6%). Usage probably does not entirely account for the observed levels of resistance, because some phage types of *S.* Typhimurium, commonly associated with pigs usually show resistance to these antimicrobials and for this reason, clonal spread is also likely to be an important factor. A slightly lower level (60.0% to 90.0%) of resistance was reported by The Netherlands and Spain, while the lowest level of resistance to these antimicrobials was reported by Finland and Denmark (0% to 40.7%). For other antimicrobials, the reported levels were generally low, except for notably higher proportions of isolates resistant to nalidixic acid (40.0%) and trimethoprim (72.7%), reported by Italy. Resistance to chloramphenicol was prevalent in isolates from several countries. Denmark and UK reported resistance to ciprofloxacin (1.6% and 0.6%, respectively).

These differences were to some extent reflected in the reported proportion of multiresistant and fully sensitive isolates. The highest proportion of multiresistant isolates was reported by Germany, Czech Republic and The United Kingdom (ranging from 50.0% to 69.5%), whereas the highest proportion of fully sensitive isolates was reported by Denmark (72.8%).

Table AB SA7. Antimicrobial resistance in *S.* Typhimurium in pigs, 2005

			Antimicrobial										
	Monitoring programme		Ampicillin	Cefotaxime	Chloramphenicol	Gentamicin	Nalidixic acid	Sulphonamide	Tetracycline	Trimethoprim	Trimethoprim + sulphonamides	Fully sensitive	Resistant to >4 antimicrobials
Country		**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Czech Republic	Yes	10	90.0	0	50.0	0	10.0	90.0	90.0	0	-	10.0	50.0
Denmark	Yes	737	26.9	-	10.6	1.4	1.2	38.9	40.7	8.3	-	72.8	22.6
Finland	Yes	11	0	-	0	0	0	0	0	0	-	-	-
Germany	No	302	78.2	-	51.3	3.6	3.6	86.4	52.0	27.2	26.8	7.0	69.5
Italy[1]	Yes	55	74.1	5.5	38.9	10.9	40.0	81.8	92.6	72.7	40.5	2.6	29.0
The Netherlands[2]	Yes	85	60.0	0	40.0	0	0	63.5	70.6	31.8	-	22.4	16.5
Spain	Yes	40	-	5	25.0	7.5	7.5	65.0	90.0	15.0	-	-	-
United Kingdom	Yes	317	77.9	0	58.0	1.0	1.9	83.9	81.1	-	56.2	12.9	56.5

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

1. For Italy; N=54 for ampicillin, chloramphenicol and tetracycline, N=5 for nalilidixic acid, N=11 for trimethoprim, N=42 for trimethoprim-sulphonamide

2. For The Netherlands; N=64 for gentamicin

Cattle

Data on the occurrence of antimicrobial resistance in *S.* Typhimurium isolates from cattle was reported by five MS (Table AB SA8). In general, the highest level of resistance in *S.* Typhimurium isolates from cattle was reported for ampicillin (up to 88.6%), sulphonamide (up to 82.9%) and tetracycline (up to 100%).

The highest proportion of isolates resistant to these antimicrobials, among *S.* Typhimurium isolates from cattle, was reported by Italy and Germany (ranging from 79.1% to 100%). The proportion of resistant isolates reported by The Netherlands, The United Kingdom and Denmark was generally lower. For resistance to nalidixic acid, the highest proportion was reported by Italy (25.7%). Antimicrobial resistance was prevalent in *S.* Typhimurium isolates from cattle, and the reported proportion of fully sensitive isolates was generally low (ranging from 0% to 25%). The highest proportion of multi-resistant was reported by Italy (74.5%), and the lowest by Denmark (0.8%).

Table AB SA8. Antimicrobial resistance in *S.* Typhimurium in cattle, 2005

Country	Monitoring programme	N	Ampicillin %R	Cefotaxime %R	Chloramphenicol %R	Gentamicin %R	Nalidixic acid %R	Sulphonamide %R	Tetracycline %R	Trimethoprim %R	Trimethoprim + sulphonamides %R	Fully sensitive %	Resistant to >4 antimicrobials %R
Denmark	Yes	17	35.3	-	23.5	0	0	35.3	29.4	0	-	1.7	0.8
Germany	No	153	80.4	-	73.2	0.7	3.3	80.4	79.1	13.7	13.1	15.0	74.5
Italy	Yes	35	88.6	5.7	60.0	0	25.7	82.9	100	-	5.7	0	54.3
The Netherlands[1]	Yes	12	75.0	0	33.3	0	8.3	75.0	58.3	33.3	-	25.0	16.7
United Kingdom	Yes	71	74.7	0	63.4	0	7.0	74.7	73.2	-	14.1	16.9	59.1

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

1. For The Netherlands; N=10 for gentamicin

Turkeys

Data on the occurrence of antimicrobial resistance in *Salmonella* spp. in turkeys was reported by five MS (Table AB SA9). In general, the highest level of resistance in *Salmonella spp.* from turkeys was observed for ampicillin (up to 60.5%), sulphonamide (up to 52.1%) and tetracycline (up to 89.5%).

Higher levels of antimicrobial resistance were reported in isolates from turkeys compared with isolates from other animal species. However, comparison must be made with caution, as the proportions of resistant isolates for turkeys were reported as *Salmonella* spp. collectively. High levels of resistance to several antimicrobials were reported by Germany and Italy followed by The United Kingdom. Slightly lower levels were reported by The Netherlands and Austria. The highest proportion of fully sensitive isolates was reported by Austria (83.8%). The highest proportion of multiresistant isolates was reported by Germany (33.3%). A relatively high proportion of nalidixic acid resistant isolates was reported by Italy (83.7%).

Table AB SA9. Antimicrobial resistance in *Salmonella* spp. in turkeys, 2005

Country	Monitoring programme	N	Ampicillin %R	Cefotaxime %R	Chloramphenicol %R	Gentamicin %R	Nalidixic acid %R	Sulphonamide %R	Tetracycline %R	Trimethoprim %R	Trimethoprim + sulphonamides %R	Fully sensitive %	Resistant to >4 antimicrobials %R
Austria	Yes	68	7.4	0	1.5	1.5	1.5	4.4	11.8	2.9	-	83.8	2.9
Germany	No	117	45.3	-	13.7	2.6	17.1	45.3	29.9	13.7	13.7	35.9	33.3
Italy[1]	Yes	86	60.5	1.2	1.2	4.7	83.7	9.3	89.5	0	3.5	4.7	11.8
The Netherlands	Yes	10	50.0	0	10.0	20.0	40.0	50.0	10.0	0	-	50.0	0
United Kingdom	Yes	334	18.9	0	11.1	0	11.1	52.1	49.1	-	15.9	42.2	11.1

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

1. For Italy; N=1 for trimethoprim, N=85 for trimethoprim-sulphonamides

3.1.7. Summary

Humans

In 2005, a total of 176,395 of human salmonellosis cases were reported through the BSN by 24 MS. The EU incidence was 38.2 cases per 100,000 population making salmonellosis the second most frequently reported zoonoses in this report. Although seven MS reported a slight increase in cases, an overall decrease of 9.5% was observed compared with 2004. Data from Germany accounted for almost 30% of the registered cases in 2005. A seasonal peak during the late summer and autumn was generally observed in all MS. The highest numbers of reported cases were for age group 0-4 years, 5-14 years and 25-44 years. As in previous years, *S.* Enteritidis and *S.* Typhimurium were the most frequently reported serovars. Data on the origin of cases (domestic/imported) were provided by 15 MS and two non-MS and varied considerably between MS (imported cases: 0-80.2%).

Food

Data on *Salmonella* were reported on a wide range of foodstuffs, but the majority of samples were from various types of meat and meat products. *Salmonella* was most frequently found from poultry meat, followed by pig meat.

Salmonella was isolated in poultry meat, at all levels of production. For poultry meat samples collected at slaughter or processing, a slightly decreasing general trend was observed for the proportion of positive findings in the five MS that have provided data over the last five years. In 2005, the MS reported considerable numbers of *Salmonella* positive samples of fresh broiler meat. The positive findings ranged from 0% to 18.2% in the broiler meat samples. In turkey meat up to 11% of samples were positive.

Overall, fewer positive findings were reported in fresh pig meat than in poultry meat, even though the proportion of positive samples varied between 0 and 18.4%. The reported proportions of positive findings in bovine meat were generally lower than 2%, similar to the findings reported in 2004.

Only few MS reported *Salmonella* in ready-to-eat products of meat origin, but percentages of positive samples up to 3-5 % were occasionally found constituting a risk to human health.

For those countries reporting data on table eggs, 0% to 6.3% of the tested table eggs were reported to be *Salmonella* contaminated. In the five MS that have reported over the past five years, there is a clear decreasing trend in the *Salmonella* contamination of table eggs.

A large number of milk samples and various dairy products were investigated, generally yielding no positive findings of *Salmonella.* This was also the case for the investigated samples of fruit and vegetables. However, more positive samples were found in spices and herbs (2.7-7.3%). Also, fish, fishery products and live bivalve molluscs were analysed in 16 MS, with positive findings ranging from 0.1% to 3.7%.

Animals

MS provided information on *Salmonella* in various animal species. *Salmonella* was most frequently reported in poultry flocks.

The mandatory control programme for *Salmonella* in breeding flocks of *Gallus gallus* ensures relatively comparable data within the Community. Overall, 5.7% of the parent-breeding flocks for laying hens and 5.2% of parent-breeding flocks for broilers were found infected with *Salmonella* in 2005. Compared to 2004, this represents a small decrease in the number of positive parent breeding flocks for laying hens, but a small increase for parent breeding flocks in the broiler production. For the MS that have provided information over the past five years, no clear common trend in

Salmonella prevalence in the breeding flocks is apparent. In 2005, infected laying hen breeding flocks were found in six MS with prevalences ranging from 6.8% to 18.2%. Eleven MS reported findings of *Salmonella* positive broiler breeding flocks, with prevalences ranging from 0.4% to 27.0%.

In laying hen flocks 0%-13.3% of the flocks were reported positive in the routine monitoring, while the prevalences observed in broiler flocks ranged from 0-18.1%. In flocks of turkeys, ducks and geese, 0.1-17.2% of flocks were reported infected with *Salmonella*. In most MS that reported over the five previous years there is a slight decreasing trend in *Salmonella* in laying hens.

In 2005, results from an EU-wide fully harmonised *Salmonella* baseline study conducted on commercial large-scale laying hen holdings were made available. In general, the observed prevalences for *Salmonella* in laying hen flocks for MS in this study were markedly higher when compared with the prevalences reported in the national zoonoses reports for 2005. These differences are mainly due to more sensitive sampling design of the baseline study. This reflects the different sensitivities of sampling schemes and sample types used and demonstrates that harmonised protocols should be used when comparing data from different MS.

Few MS have active monitoring of *Salmonella* in pigs and cattle. Seven countries reported prevalences of 0-60.0% in pigs. For cattle the reported prevalences in animals was 0-6.7%.

Finland, Sweden and Norway all reported no *Salmonella* findings or very low prevalences in poultry, pigs and cattle.

Salmonella was also reported in a number of other animal species, including other farm animals, pet and zoo animals.

Feedingstuffs

Regarding the feed materials, the decline in the occurrence of *Salmonella* in fishmeal continued in 2005. Most MS reported proportions of *Salmonella* positive findings in meat and bone meal of less than 1.5%. The largest proportions of *Salmonella* positive samples were found in vegetable derived feed, specifically in oil seeds and products thereof (0.4%-6.7%). In compound feedingstuffs, *Salmonella* was isolated in 0-6.2% of samples tested. As in 2004, *S.* Enteritidis and *S*. Typhimurium were detected in several types of feedingstuffs, but were not the dominant serovars encountered.

***Salmonella* serovars**

The available information on the distribution of *Salmonella* serovar and phage types along the food chain varied greatly between countries and fewer data were reported in 2005 than in 2004. However, as in previous years, *S.* Enteritidis and *S.* Typhimurium were the most commonly reported serovars in humans, accounting for 52% and 9% of the reported cases, respectively (BSN data). All other serovars each caused 1% or less of the reported human cases.

In 2005, *S.* Enteritidis was the most commonly reported serovar in broiler meat, followed by *S*. Paratyphi B var. *S.* Java, and *S*. Typhimurium. However, the predominant serovar in broiler meat varied between the MS. *S*. Enteritidis was the predominating serovar in table eggs. The dominant serovars isolated from laying hens and broilers (*Gallus gallus*) were *S.* Enteritidis *S*. Infantis and *S.* Typhimurium. Although variations between MS occur, *S.* Typhimurium was the predominant serovar isolated from pigs and pig meat, followed by *S*. Derby. In feedingstuffs, the most frequently reported serovars were *S.* Livingstone, *S.* Senftenberg and *S.* Montevideo

Antimicrobial resistance in *Salmonella* from humans, food and animals
Data on the occurrence of antimicrobial resistance in *Salmonella* isolates from humans, various animal species and food of animal origin were provided by MS. For *Salmonella* isolates from humans, the majority of *S.* Enteritidis isolates were fully sensitive to all antimicrobials tested and less than 1% were resistant to more than 4 antimicrobials. The situation for *S.* Typhimurium was markedly different, as only 26% of isolates were fully sensitive, and 27% of the isolates were resistant to more than 4 of the antimicrobials tested. Variation between MS was evident.

For antimicrobial resistance in *Salmonella* isolates from animals and food, large variation between MS was observed. Resistance to ampicillin (ranging up to 35.0%), nalidixic acid (ranging up to 16.7%) and tetracycline (ranging up to 59.1%) was common among isolates from pig meat. Several MS reported high levels of resistance to ampicillin, tetracycline and sulphonamide in *Salmonella* from animals (cattle, pigs and *Gallus gallus* and turkeys). In addition, a relatively high level of resistance to nalidixic acid was reported by some MS (nalidixic acid is an indicator for emerging resistance to fluoroquinolones, important for the treatment of salmonellosis in humans). Indeed, some MS reported resistance to fluoroquinolones in isolates from food and animals, but still at a low level (<2%).

The results demonstrate the presence of a reservoir of antimicrobial resistance in food animals and food of animal origin that possibly reflects antimicrobial usage in food animals in the MS. Emergence of infections in humans, caused by resistant bacteria possibly originating from the animal reservoir is a concern, as effective treatment may be compromised.

3.1.8. Sources of *Salmonella* data

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, reporting of food poisoning is mandatory, however, isolation and specification of the organism is voluntary. In 2005, all human data for the Community Report were provided by the European Centre for Disease Prevention and Control and were compiled, based on data reported through the Basic Surveillance Network and Enter-Net.

Food
Data on *Salmonella* in foodstuffs were reported by most MS and Norway in 2005. However, the sampling schemes, place of sampling, sampling frequency, and diagnostic methods applied varied between MS and in the different types of food sampled. For a full description of the monitoring schemes implemented in the individual MS and the diagnostic methods used, please refer to Appendix Tables SA9, SA12, SA18 and SA21. The monitoring schemes are based on a variety of different samples such as neck skin samples, carcass swabs, caecal contents and meat cuttings, collected at slaughter, processing, meat cutting plants and at retail. A few MS reported data collected as part of HACCP programmes, based on sampling at critical control points. These samples are targeted samples, specifically sampled at certain point of the production and may not be compared directly with samples collected randomly for monitoring purposes and have therefore not been included in the tables. Information on serotype distribution was not provided consistently from all MS. All data reported by the MS have been summarised in Level 3

Animals
Salmonella in poultry (*Gallus gallus*) and other animals is notifiable in most MS and the two non-MS (Appendix, Table SA23), except for Hungary. In Denmark, only clinical cases are notifiable. No information was received from Luxembourg, Malta. Monitoring of *Salmonella* in animals is mainly conducted as passive laboratory based surveillance of clinical samples, active routine monitoring of flocks of breeding and production animals in different age groups, and testing during

meat inspection (organs). 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 from MS. However, in Belgium and Estonia the monitoring scheme applied differed from that described Directive 92/117/ECC. In Appendix, Table SA2-4 the monitoring programmes and control strategies in breeding flocks of *Gallus gallus* applied in the different MS are shown. The 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. All data reported by the MS have been summarised in Level 3.

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 risk products. 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 are either “batch” (usually based on pooled samples) or “sample” (often several samples from the same batch). In 2005, most MS did 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 data, and due to the lack of a harmonised surveillance approach data are not comparable between the countries. Nevertheless, data are presented in the same tables. Information was requested on feed materials of animal and vegetable origin and of compound feedstuffs (mixture of feed materials intended for feeding 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 2001 to 2005 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 number of positive units were missing or if directly labelled as imported. The tables only include MS reporting results for at least 25 samples or batches in 2005. 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. Results were requested for the Community Report as proportion of resistant isolates of the total number of isolates tested against each antimicrobial for each bacterial species, in each specific sample category. MS were requested to report on certain antimicrobials, whereas no constraints were placed on the variation in serovars or sample categories. This has caused some heterogeneity of data on antimicrobial resistance in Salmonella reported for 2005. 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 MS 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 laboratory based monitoring approaches; either by active and systematic monitoring of healthy animals, foods, and other sources, or by passive monitoring based on diagnostic submissions of samples from cases of clinical salmonellosis in animals and by testing of foods only on suspicion. In some MS, *Salmonella* prevalence in animals and food is very low and only a limited number of isolates, or none, were available for susceptibility testing.

In most MS standard methods and breakpoints published by the Clinical Standards Laboratory Institute (CLSI, formerly known as NCCLS)[1,2] are used for susceptibility testing of *Salmonella* isolates, but for some substances national standards are used. For a few antimicrobials, no CLSI standard breakpoints are established. Most reporting MS provided data on *Salmonella* serovars (*S.* Enteritidis or *S.* Typhimurium). To facilitate comparison of data, this summary is based only on reporting of antimicrobial resistance in these two serovars, or when data for all *Salmonella* isolates were reported collectively, as the proportion of resistance in *Salmonella* spp. When comparing results of antimicrobial susceptibility testing of *Salmonella* isolates, special attention should be given to variation in breakpoints used by different countries. Please refer to Level 3, for information on breakpoints and ranges used by different countries.

[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)).

3.2. *Campylobacter*

Campylobacteriosis in humans is caused by thermophilic *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*, but *C. lari*, *C. fetus*, and *C. upsaliensis* have also caused human infections.

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 recently 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 or death.

Thermophilic *Campylobacter* spp. are widespread in nature. The principal reservoirs are the alimentary tracts of both 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. However, animals rarely succumb to disease 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 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 incriminated in large outbreaks.

3.2.1. Campylobacteriosis in humans

As in 2004, *Campylobacter* was the most commonly reported gastrointestinal bacterial pathogen in humans in the EU in 2005. A total of 200,122 cases of campylobacteriosis were reported from 22 EU MS and two non-MS in 2005 (Table CA1), the number of reported cases in EU being 197,363. No data were available from Greece, Italy and Portugal. In total, 99.0% of the cases were laboratory confirmed. The overall incidence of campylobacteriosis in the EU was 51.6 per 100,000 population, ranging from <0.1 – 302.7 cases per 100,000 population.

The overall EU incidence represents an increase in 2005, of 7.8%, when compared to 2004. Austria, Denmark, France, Hungary, Lithuania and Spain reported a decrease in the number of human cases of campylobacteriosis in 2005 when compared with 2004.

The variation in the incidences among the reporting countries is remarkable. However, it should be noted that comparisons between MS, and even comparison of data from year to year within the same MS, is difficult due to the variability of the monitoring systems and microbiological methods used.

Table CA1. Reported campylobacteriosis cases in humans, 2001-2005 and incidence[1] for confirmed cases, 2005

	2005				2004	2003	2002	2001
	Report type[2]	**Total cases**	**Confirmed cases**	**Confirmed cases/100,000 population**	**Total cases**			
Austria	A	5,065	5,065	61.7	5,365	3,926	4,446	3,919
Belgium	C	6,879	6,879	65.8	6,716	6,556	7,354	7,357
Cyprus	C	0	0	0	-	-	-	-
Czech Republic	C	30,268	30,268	302.7	25,492	-	-	-
Denmark	C	3,677	3,677	68.0	3,724	3,537	4,385	4,620
Estonia	C	124	124	9.2	124	98	114	113
Finland	C	4,002	4,002	76.4	3,583	3,190	3,738	3,969
France	A	2,049	2,049	3.3	2,127	1,997	1,353	203
Germany	C	62,114	62,114	75.3	55,796	47,876	56,350	54,410
Greece	-	-	-	-	392	1	-	386
Hungary	A	8,293	8,288	82.1	9,087	-	-	-
Ireland	C	1,803	1,794	43.7	1,711	1,568	1,336	1,286
Italy	-	-	-	-	-	1	5	-
Latvia	0	0	0	0	0	1	3	0
Lithuania	A	694	694	20.3	797	617	-	-
Luxembourg	C	194	194	42.6	-	-	-	287
Malta	C	91	91	22.6	-	-	-	-
The Netherlands	A	3,761	3,761	46.2	3,273	2,805	3,421	3,682
Poland	A	47	47	0.1	24	-	-	-
Portugal	-	-	-	-	-	-	-	-
Slovakia	C	2,204	2,204	40.9	1,691	1,195	1,267	1,353
Slovenia	C	1,088	0	0	1,063	890	-	-
Spain	C	5,513	5,513	12.8	5,958	6,048	5,051	6,149
Sweden	C	6,811	5,969	66.2	6,169	7,149	7,137	7,845
United Kingdom	C	52,686	52,686	88.5	50,388	52,126	54,372	62,052
EU-Total		**197,363**	**195,419**	**51.6**	**183,480**	**139,581**	**150,332**	**157,631**
Iceland	C	128	128	43.6	-	-	-	-
Norway	C	2,631	2,631	57.1	-	-	-	-
Total		**200,122**	**198,178**	**51.7**	**183,480**	**139,581**	**150,332**	**157,631**

1. EU-total incidence is based on population in reporting countries
2. A: aggregated data report; C: case-based report; 0: 0 cases reported; -: No cases reported

About half of the MS reported information on whether the confirmed campylobacteriosis cases were of reported cases were imported or domestically acquired. (Table CA2). In the Czech Republic, Lithuania and Slovakia >99%, respectively, were domestic. In contrast 61.4% and 52.3% of the reported cases in Sweden and Finland were imported.

Table CA2. Distribution of confirmed campylobacteriosis cases in humans by reporting country origin of cases (imported/domestic), 2005

	Domestic	Imported	Unknown	Total
Czech Republic	99.1	0.9	0	30,268
Denmark	7.6	11.7	80.8	3,677
Estonia	92.7	7.3	0	124
Finland	21.7	52.3	26.0	4,002
France	-	4.7	95.3	2,049
Germany	87.2	12.3	0	62,114
Ireland	4.0	0.2	95.8	1,794
Lithuania	100	-	-	694
Malta	96.7	3.3	0	91
The Netherlands	83.2	6.5	10.4	3,761
Slovakia	99.4	0.4	0.2	2,204
Sweden	35.4	61.4	3.3	5,969
United Kingdom	-	1.4	98.6	52,686
EU Total	**48.6**	**8.0**	**43.4**	**169,433**
Iceland	43.0	42.2	14.8	128
Norway	46.5	47.2	6.4	2,631

As reported in previous years, the highest numbers of confirmed cases were observed in the age group 25-44 years (Table CA3). The gender distribution showed no difference between reported female and male cases within countries.

Table CA3. Distribution (%) of confirmed campylobacteriosis cases in humans by reporting countries and age group, 2005

	0-4 yrs	5-14 yrs	15-24 yrs	25-44 yrs	45-64 yrs	>=65 yrs	Unknown	Total
Austria	-	-	-	-	-	-	100	5,065
Belgium	25.5	13.7	11.2	20.4	13.7	11.4	1	7,168
Cyprus	0	0	0	0	0	0	0	0
Czech	26.0	19.6	18.4	20.9	9.9	5.1	0	30,268
Denmark	9.2	9.5	19.0	36.0	19.5	6.8	0	3,677
Estonia	52.4	15.3	8.9	10.5	8.1	4.8	0	124
Finland	2.1	3.9	14.8	43.2	28.0	8.1	0	4,002
France	-	-	-	-	-	17.4	83	2,049
Germany	8.2	9.7	15.7	34.6	20.6	11.1	<0,1	62,114
Hungary	41.7	15.4	11.7	16.4	9.8	5.1	0	8,293
Ireland	25.1	10.3	13.5	24.8	15.1	10.2	0	1,813
Lithuania	-	-	-	-	-	-	100	694
Luxembourg	25.3	22.2	7.2	27.8	10.3	7.2	0	194
Malta	44.0	24.2	9.9	7.7	4.4	8.8	1	91
The Netherlands	9.8	8.0	15.1	23.5	21.1	11.9	10	3,761
Poland	-	-	-	-	-	-	100	47
Slovakia	36.7	21.6	13.5	16.7	7.3	4.3	0	2,204
Spain	56.4	10.3	2.2	6.1	5.5	5.9	14	5,513
Sweden	5.4	5.4	17.5	36.3	28.0	7.4	0	5,969
United Kingdom	6.9	5.3	12.4	31.9	28.8	13.9	0.6	52,689
EU Total	**14.4**	**9.9**	**13.9**	**28.0**	**19.3**	**9.9**	**5**	**195,735**
Iceland	6.3	3.9	14.1	34.4	30.5	10.9	0	128
Norway	6.8	5.1	16.9	38.8	24.9	7.4	0	2,631

Finally, a distinct seasonal distribution of cases, with a higher number of cases being reported during the summer months, from June to September, was observed in 2005, as in previous years (see Level 3). All other reported data on *Campylobacter* in humans are presented in Level 3.

3.2.2. *Campylobacter* in food

Sixteen MS and two non-MS reported data on *Campylobacter* in food. The number of samples ranged from a few to several thousands and covered several different food categories. Poultry meat was the most frequently sampled food category. No data were reported for *Campylobacter* originating from water sources. The sampling and testing methods varied between countries and, as such, the results of the different countries are not directly comparable. Also, the proportion of positive samples observed might be influenced by the time of year during which the samples were taken, as *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 at different stages of production from 2001-2005 are summarised in Table CA4 and retail level in Figure CA1. Data were available from 9 MS. Data on frozen meat are not included in the table. There is no clear general trend apparent among the countries over the 5 years and typically strong fluctuation between the years is observed. However, in Denmark and The Netherlands there seem to be a decreasing trend, whereas in Germany and Belgium the trend was increasing.

Table CA4. *Campylobacter* in fresh broiler meat[1] sampled at slaughter, processing and at retail, sample based data, 2001-2005

	2005		2004		2003		2002		2001	
	N	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**
At slaughter										
Belgium	270	19.6	197	4.1	142[5]	16.2	138[5]	19.6	147[5]	22.5
Estonia	225	2.2	27	37.0	1,868[2,5]	58.1	3,222[5]	53.0	3,213[5]	54.3
Sweden	3,062	18.5	2,981	19.8	144	21.1	3,764	24.4	2,110	23.2
At processing plants										
Belgium	249	22.9	131	26.0	-	-	-	-	-	-
Ireland	854	51.4	2,620	54.7	-	-	-	-	-	-
At retail										
Austria[4]	162	9.3	525	45.3	231	47.2	74	9.5	172	32.6
Belgium	77	20.8	77	35.1	99	20.2	92	16.3	82	2.4
Denmark	2,686	19.1	584	23.5	407[2]	32.9	712	41.7	1,896[3]	29.5
Germany	1,334	42.1	1,480	43.0	1,396	19.6	1,510	25.0	1,058	14.5
The Netherlands	1,605	23.5	1,477	29.3	1,510	26.0	1,600	31.3	1,578	32.5
Sweden	32	3.1	27	55.6	425	13.2	-	-	79	11.4
United Kingdom	1,791	66.4	1,533	62.2	734	73.0	-	-	-	-
Norway	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 and meat preparations are not included.
2. Domestic broiler meat
3. Data includes broiler and turkey meat
4. Sampling at retail and processing plants
5. Sampling at slaughterhouse or processing plants

Figure CA1. ***Campylobacter*** **in fresh broiler meat at retail 2001-2005**

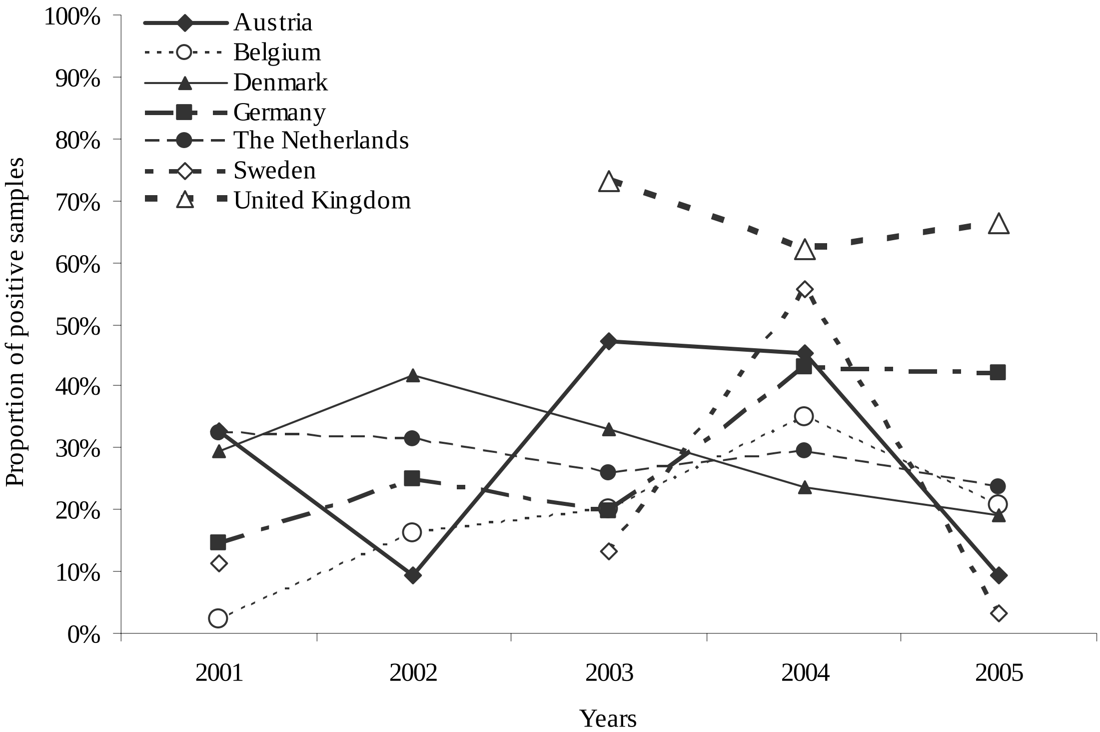


Table CA5 summarises the data reported for 2005 on *Campylobacter* in fresh poultry meat (broiler, turkey and other poultry meat) sampled at different stages in the production chain. Most countries reported high *Campylobacter* contamination levels. At slaughter, the proportion of positive samples ranged from 4.6% to 56.1%; at processing, the rates varied from 3.8% to 51.9%, and at retail between 3.1% and 66.4%. In Spain the proportion of positive samples at retail was lower than at slaughter and processing, but in Belgium, this was not the case.

Table CA5. ***Campylobacter*** **in fresh poultry meat[1] at slaughter, processing and retail, 2005**

	Slaughter		Processing		Retail		Point of sampling not specified	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Broilers								
Austria	-	-	-	-	162	9.3	-	-
Belgium	270	19.6	249	22.9	77	20.8	-	-
Denmark	-	-	-	-	2,686	19.1	-	-
Estonia	235	4.6	-	-	32	18.8	-	-
Germany	-	-	-	-	1,334	42.1	-	-
Ireland	-	-	854	51.4	-	-	-	-
Italy	-	-	-	-	-	-	226	14.6
Luxembourg	-	-	-	-	-	-	42	61.9
The Netherlands	-	-	-	-	1,605	23.5	-	-
Slovenia	-	-	73	35.6	-	-	-	-
Sweden	3,062	18.5	-	-	32	3.1	-	-
United Kingdom	-	-	-	-	1,791	66.4	-	-
Norway	-	-	-	-	938	6.0	-	-
Turkeys								
Austria	-	-	-	-	35	20.0	-	-
Belgium	29	13.8	-	-	-	-	-	-
Germany	-	-	-	-	238	15.1	-	-
Ireland	-	-	89	30.4	-	-	-	-
Italy	-	-	-	-	-	-	26	3.8
The Netherlands	-	-	-	-	911	25.5	-	-
Slovenia	-	-	26	3.8	-	-	-	-
Switzerland	-	-	-	-	-	-	172	37.8
Other poultry								
Belgium	644	10.9	-	-	57	21.1	-	-
Latvia[2]	25	12.0	-	-	125	9.6	-	-
The Netherlands[3]	-	-	-	-	42	7.1	-	-
The Netherlands[4]	-	-	-	-	33	48.5	-	-
Slovenia	-	-	-	-	106	44.3	-	-
Spain	164	56.1	54	51.9	267	12.4	-	-

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.

2. Batch based data

3. Pheasant

4. Guinea fowl

Samples of poultry meat preparations intended to be eaten cooked were collected in Belgium (at processing and retail level) and in Italy (point of sampling not specified). Both countries reported positives ranging from 1.7% to 3.7%, respectively.

Samples of poultry meat products were collected by several MS. Ready-to-eat and non-ready-to-eat products tested in Ireland, Slovakia, Spain and Sweden were negative for thermophilic *Campylobacter*, whereas meat products tested in Austria, the Czech Republic, Germany, Greece and Italy were positive with proportions of positive samples ranging from 1.3% in Austria to 96.7% in Greece (from raw products intended to be cooked) (Level 3).

Pig meat and products thereof

Data reported on the occurrence of *Campylobacter* in fresh pig meat sampled at retail in the period 2002-2005 are summarised in Table CA6 In 2005, the proportion of positive samples at retail was generally low (0-0.5 %). Germany reported a decreasing trend compared to previous years.

Table CA6. *Campylobacter* in fresh pig meat[1] at retail, sample based data, 2002-2005

	2005		2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Germany	391	0.5	454	2.0	188	2.7	254	1.2
The Netherlands	389	0	287	1.1	227	0	97	2.1
Spain	107	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.

Few data have been reported for slaughter and processing of fresh pig meat, and the proportion of positives is generally rather low (0-7.2%) (Table CA7).

Table CA7. *Campylobacter* in fresh pig meat[1] at slaughter, processing and retail, 2005

	Slaughter		Processing		Point of sampling not specified	
	N	% Pos	N	% Pos	N	% Pos
Austria	-	-	-	-	89	1.1
Belgium[2]	433	7.2	-	-	-	-
Belgium	261	6.5	-	-	-	-
Italy	-	-	-	-	207	0.5
Slovenia	-	-	101	0	-	-
Spain	46	0	-	-	-	-

1. Data are only presented for sample size ≥25

2. Carcass swab

In minced pig meat, Belgium reported proportions of positive findings of *Campylobacter* at processing (N=288) and retail (N=155) of 0.6% and 0.7%, respectively. This represents a lower number of positive findings than reported for fresh pig meat at the slaughter level (Table CA7) and may reflect a die-off of *Campylobacter* during mincing and/or storage. In Italy and The Netherlands (N=255 and N=41, respectively), *Campylobacter* spp. were not found in this food category.

Campylobacter was not isolated from pig meat products sampled in Austria (N=105), Italy (N=100), Ireland (N=234, retail), or Spain (N=50, processing; N=139, retail) (Level 3).

Bovine meat and products thereof

The few data reported on *Campylobacter* in fresh bovine meat are summarised in Table CA8. In 2005, the proportion of samples of fresh bovine meat at retail found positive for *Campylobacter* was generally low (2.1% or less). Italy and The Netherlands have reported consistently low proportions of positive samples from 2002-2005.

Table CA8. *Campylobacter* in fresh bovine meat[1] at retail, sample based data, 2002-2005

	2005		2004		2003		2002	
	N	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**
Germany	47	2.1	-	-	-	-	-	-
Italy	394	0.5	196	0	161	0.6	90	1.1
The Netherlands	463	1.1	847	0.8	678	0.2	489	0.2
Spain	54	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 *Campylobacter* in fresh bovine meat at processing. The 109 samples investigated were found negative for *Campylobacter*. No MS reported data at the slaughter.

In minced bovine meat, at processing, Italy reported no positive findings in 185 samples investigated. In The Netherlands, 0.4% (N=473) of samples collected at retail were positive.

Samples of bovine meat products, collected at retail in Spain (N=47) and Ireland (N=115; cooked, ready-to-eat), were all negative (Level 3).

Other food

Other food than meat from poultry, pigs and cattle were also tested for presence of *Campylobacter* and the results are presented Table CA9.

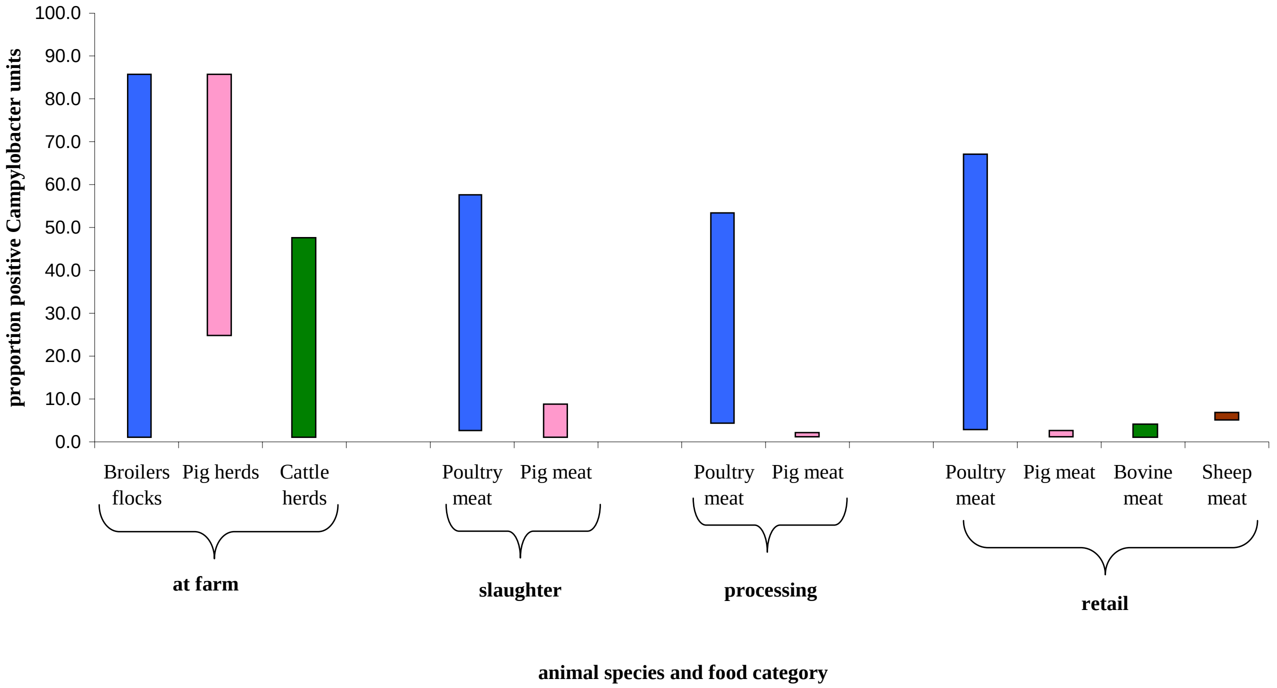
In fresh meat from sheep, The Netherlands reported 4.7% of the samples positive, whereas Italy found no positives. Three of 7 reporting MS found *Campylobacter* positive samples in raw cow milk, but at low levels. Italy was also the only country to report a positive finding of *Campylobacter* in dairy products. Belgium found relatively high proportion of positive samples (11.2%) in live bivalve molluscs. Germany and Sweden reported low *Campylobacter* rates in fish and vegetables, respectively (Table CA9).

Table CA9. *Campylobacter* in other food[1], 2005

	Description	N	% Pos
Meat			
Italy	Meat from sheep, fresh	109	0
The Netherlands	Meat from sheep, fresh	106	4.7
Cow milk			
Austria	Raw milk for direct human consumption	32	0
Belgium	Raw milk for direct human consumption	173	0.6
Germany	Raw milk for direct human consumption	140	0
Germany	Raw milk ‘at farm’	215	0.5
Italy	Raw milk	325	0.3
Italy	Milk, pasteurised	338	0.6
Italy	Raw milk for manufacture of raw or low heat-treated products	181	0
The Netherlands	Raw milk for manufacture of raw or low heat-treated products	41	0
Slovakia	Raw milk	102	0
Spain	Raw milk for direct human consumption	893	0
Dairy products			
Belgium	Cheeses made from raw or low heat treated cow milk	178	0
Czech Republic	Soft or semi-soft cheeses from pasteurised cow milk	42	0
Italy	Cheese from unspecified milk	617	0.5
Germany	Unspecified (not cheese)	348	0
Spain	Unspecified (not cheese)	208	0
Fishery products and live bivalve molluscs			
Austria	Fish, raw	37	0
Belgium	Live bivalve molluscs	98	11.2
Germany	Fish, unspecified	88	1.1
Fruit and vegetables			
Sweden	Unspecified	209	1.0

1. Data are only presented for sample size ≥25

Figure CA2. Minimum to maximum proportions of *Campylobacter* positive samples reported by MS, by animal species and foodstuff category[1], 2005



[1]Refers to fresh meat, covers only data for sample size ≥25

3.2.3. *Campylobacter* in animals

Seventeen MS and 2 non-MS reported data on *Campylobacter* in animals, especially in broilers, but also in pigs, cattle and pets. All these groups of animals constitute a reservoir for *Campylobacter*.

Broilers and other poultry

Six MS and one non-MS reported data on prevalence of *Campylobacter* in broiler flocks over the past four years. High flock prevalences (up to 91.0%) were reported by several countries. No general trend can be perceived over the years. Austria, Germany, France and the Veneto Region of Italy have repeatedly reported high prevalences during these years. Denmark observed more moderate prevalences, whereas Sweden, Finland and Norway have consistently reported low flock prevalences. Results from those countries that have reported data for several years are presented in Figure CA2. Results for the other MS are presented in Table CA 10. In 2005, the proportion of positive broiler flocks varied extensively from 0.2% to 85.2%.

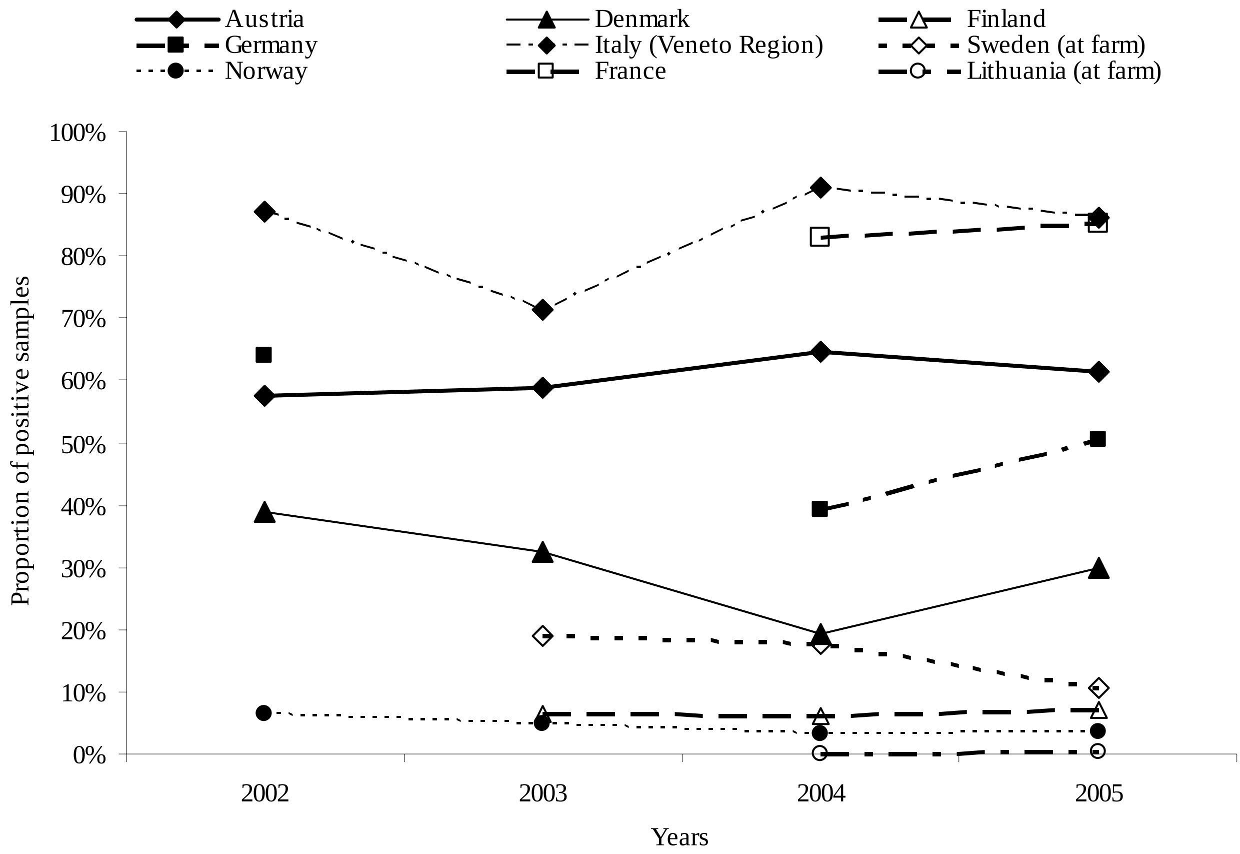
Regarding other poultry than broilers, Lithuania reported positive findings of *Campylobacter* in 11.8% of 34 turkey flocks.

Table CA10. *Campylobacter* in broiler flocks[1], 2001-2005

	2005		2004		2003		2002		2001	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Broilers (flock based data at slaughterhouse; caecal samples if nothing else stated)										
Austria	656	61.4	648	64,5	549	58.7	210	57.6	-	-
Czech Republic	92[3, 5]	52.2	-	-	-	-	-	-	-	-
Denmark[2, 5]	4,918	29.9	520	19.4	349	32.4	294	38.8	-	-
Finland [8]	1,320[3]	7.4	1,315	6.2	77	6.5	-	-	1,069	4.0
Finland [9]	104	1.0								
France	142[4]	85.2	183	83.1	-	-	-	-	-	-
Germany	766	50.4	273	39.2	-	-	180	63.9	-	-
Italy	48[5]	45.3	-	-	-	-	-	-	-	-
Italy (Veneto region)	51[3, 5]	86.3	212[4]	91	154	71.4	23	87.0	-	-
Lithuania[2, 7]	973	0.2	1,806	0	-	-	-	-	-	-
Lithuania	1,007[7]	0.5	-	-	-	-	-	-	-	-
Slovakia	58[4, 7]	5.2	-	-	-	-	-	-	-	-
Slovenia	306[3]	65.0	-	-	-	-	-	-	-	-
Sweden[2, 6]	2,051	10.6	131	17.6	664	18.9	-	-	-	-
Sweden[3,5]	2,974	13.3	3,019	14.2	3,224	17.6	3,842	19.8	4,220	16.2
Norway[2, 6]	3,652	3.6	3,626	1,7	-	-	-	-	-	-
Norway	3,899[3]	3.4	3,842[3]	3.1	3,550	4.9	3,627	6.3	2,270	7.7
Switzerland	596[4, 5]	23.0	-	-	-	-	-	-	-	-

1. Data are only presented for sample size ≥25
2. At farm
3. Slaughter batch based data
4. Animal based data
5. Sampling by cloacal swabs
6. Sock samples
7. Sampling not specified
8. In Finland, data collected June-October
9. In Finland, data collected November-December

Figure CA3. *Campylobacter* in broiler flocks in selected countries, 2002-2005



Pigs

Table CA11 summarises the *Campylobacter* prevalence in pigs and pig herds reported by five MS in the period of 2001-2005. In 2005, the reported prevalence was high, ranging from 24.7% in Germany to 85.4% in Denmark. No decreasing/increasing trends could be identified. The prevalence in pig herds was much higher than the proportion of positive fresh pig meat samples (Table CA6). This indicates a limited contamination of pig meat with faecal material during pig slaughtering/or and the *Campylobacter* dying on the relatively dry carcass surface.

Table CA11. *Campylobacter* in pigs and pig herds[1], 2001-2005

	2005		2004		2003		2002		2001	
	N	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**	**N**	**% Pos**
Pigs (herd based data)										
Austria[2]	532	48.7	741	57.5	262	53.8	276	54.4	-	-
Denmark	185	85.4	191	79.6	259	93.4	240	80.4	238	76.9
Germany	332	24.7	375	24.8	-	-	-	-	-	-
Italy	84	25.0	37	67.6	46	52.2	29	44.8	-	-
Slovakia[2]	53	30.2	-	-	-	-	-	-	-	-

1. Data are only presented for sample size ≥25
2. Animal based sampling

Cattle

Table CA12 summarises the prevalence of *Campylobacter* in cattle and cattle herds in the period of 2001-2005. In 2005, the cattle herd prevalence ranged from 0.3% in dairy cows in Germany to 46.9% in calves also in Germany. All reporting MS reported cattle herd prevalences below 18%, except for Denmark (42,5%) and Germany. From 2002 to 2005, there has been a decreasing trend for animal-based positive samples in Austria and herd-based positive samples in Italy. The prevalence in cattle herds is much higher than the proportion positive fresh cattle meat samples (Table CA8).

At the slaughter level Italy (Veneto Region), reported the highest prevalence of *Campylobacter* in cattle, as 71.4% of slaughter batches tested positive.

Table CA12. *Campylobacter* in cattle and cattle herds, 2001-2005

	2005		2004		2003		2002		2001	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cattle (herd based data)										
Austria[2]	1,012	17.9	898	18.6	346	35.0	350	40.0	-	-
Denmark	73	42.5	67	64.2	88	63.6	87	65.5	76	72.4
Germany	601	12.0	394	14.0	-	-	-	-	-	-
Germany[5]	32	46.9	-	-	-	-	-	-	-	-
Germany[4]	315	0.3	-	-	-	-	-	-	-	-
Italy	295	17.0	150	28.0	119	35.3	229	35.4	-	-
Italy[2]	1,540	3.2	1,444	0.7	-	-	-	-	-	-
Italy[2, 5]	89	3.4	-	-	-	-	-	-	-	-
Italy[2, 4]	35	2.9	-	-	-	-	-	-	-	-
Italy[3] (Veneto Region)	28	71.4	-	-	-	-	-	-	-	-
Lithuania[2,4]	732	1.4	1,424	0.1	-	-	-	-	-	-
Slovakia[2]	524	0.2	-	-	-	-	-	-	-	-
Norway[2]	37	16.2	-	-	-	-	-	-	1,224	18.0

1. Data are only presented for sample size ≥25
2. Animal based data
3. Slaughter batch based data
4. Dairy cows
5. Calves < 1 year

Overall, comparisons of data between MS should be made with caution and awareness of differences in sampling and analytical methods. However, a general view of data from 2005 of selected animal species and foodstuff categories is illustrated in Figure CA3. These data reveal that the proportion of positive samples was much higher in pigs and cattle compared with samples of fresh meat at different stages through the processing line. Conversely, the prevalence of *Campylobacter* in broilers did not significantly decrease throughout the production of fresh meat.

Other farm animals

A number of sheep and goats were investigated by Italy at both herd and animal level. At the animal level, 268 sheep and 39 goats were all tested negative. At the herd level, 12.8% of sheep herds (N=188) and 0% of goat herds were found positive (N=38). Findings in herd-based samples from sheep in Germany yielded 12.1% positive animals (N=33).

Campylobacter spp. were not found in 41 holdings of buffalos in Italy, 608 herds of horses in Germany and 211 horses in The Netherlands.

Pets

In 2005, almost 1,900 pets were tested for *Campylobacter*. The proportion of positive samples observed in dogs ranged from 3.7% to 29.3%. The observed prevalence in cats was much lower: 1.7% to 3.2% (Table CA13).

Table CA13. *Campylobacter* in pets[1], 2005

	Pets	N	% Pos
Germany	Cats	221	3.2
The Netherlands	Cats	238	1.7
Germany	Dogs	803	3.7
Italy	Dogs	211	4.3
The Netherlands	Dogs	133	29.3
Slovakia	Dogs	52	5.8
Sweden	Dogs	57	26.3
Norway	Dogs	78	20.5

1. Data are only presented for sample size ≥25

Wildlife

Italy and The Netherlands reported data on findings of *Campylobacter* in different types of wildlife. Italy reported a prevalence of 9.1% in pigeons (N=187) and 5.2% in wild birds (N=96, two surveys pooled). In The Netherlands no birds out of 103 tested positive for *Campylobacter.*

3.2.4. *Campylobacter* spp. distribution

A total of 15 MS and one non-MS provided information on the *Campylobacter* species distribution among human cases in 2005 (Table CA14). The most commonly reported species were *C. jejuni* and *C. coli*. Very few countries have identified all isolates to the species level. The majority of human isolates speciated were identified as *C. jejuni*.

Table CA14. Distribution (%) of confirmed campylobacteriosis cases in humans by species, 2005

	C. coli	*C. jejuni*	Other	Unknown	Total (N)
Czech Republic	0.2	94.1	5.7	-	30,268
Estonia	0.8	75.0	-	24.2	124
Finland	3.7	85.1	0.2	11.1	4,002
France	13.4	73.5	6.3	6.8	2,049
Germany	17.8	74.8	-	7.4	62,114
Hungary	8.3	68.6	23.1	0	8,288
Ireland	2.3	38.6	0.3	58.7	1,794
Lithuania	5.5	41.6	1.2	51.7	694
Luxembourg	-	40.2	-	59.8	194
Malta	9.9	71.4	5.5	13.2	91
The Netherlands	5.2	76.5	0.2	18.1	3,761
Slovakia	-	100	-	-	2,204
Spain	2.9	84.6	0.4	12.1	5,513
Sweden	-	0.6	1.7	97.7	5,969
United Kingdom	0.1	1.3	<0.1	98.6	49,719
EU-total	**2.4**	**45.9**	**2.0**	**49.7**	**176,784**
Iceland	-	99.2	0.8	-	128

In general, only a small fraction of the positive isolates from animals and food was speciated. The majority of these isolates were obtained from poultry and food of poultry origin. Only results based on 25 or more samples tested are addressed in the following paragraph. For further details, see Level 3.

C. jejuni in food and animals

In fresh broiler meat, C. *jejuni* was isolated from 42-84% of the positive samples, with the exception of Austria, where only 13.3% of the positive samples were identified as *C. jejuni*. *C. jejuni* was also the most commonly isolated species from fresh turkey meat (53%-74%). In fresh meat from other poultry the proportion of *C. jejuni* varied extensively, from 15%-100%.

C. jejuni was the predominant species in live broilers (60%-100%), except in France, where *C. coli* predominated, while in Italy and Austria, the proportion of *C. jejuni* and *C. coli* were approximately the same. In live cattle the *C. jejuni* proportions varied between 20%-100%. Furthermore, *C. jejuni* was also isolated from pigs, but at low proportions (0.3%-7%). With regard to dogs, *C. jejuni* was reported to dominate in Germany.

The fact that *C. jejuni* is the predominant species in both humans and poultry supports the general belief that poultry is one of the major sources of human campylobacteriosis. However, *C. jejuni* is also prevalent in other animals and foods, and these are also potential sources for human infections.

C. coli in food and animals

In pigs and fresh pig meat *C. coli* was the predominant species. *C. coli* was identified in 59%-100% of the isolates from pigs. *C. coli* were also found in relative high proportions in broilers (3%-61%) and cattle (14%-26%). In addition, *C. coli* was identified from positive samples in fresh meat from broilers (0%-45%), turkey meat (0%-25%), and other poultry (15%-70%).

In cattle meat, *C. coli* was the only species found in Germany, whereas in Italy *C. jejuni* was dominating in this food type. In cats, 57% of the speciated isolates were *C. jejuni* and 14% were *C. coli*.

Other Campylobacter species
In Norway *C. upsaliensis* was the most frequently isolated species in dogs. *C. upsaliensis* was not found in other animal or food sources, except from one broiler in Italy. *C. lari* was sporadically found in broilers and cattle and in meat from broilers and turkeys.

3.2.5. Antimicrobial resistance in *Campylobacter*

Occurrence of resistance in *Campylobacter* to the following antimicrobials - ciprofloxacin, erythromycin, streptomycin and tetracycline - is described in this chapter. Regarding food and animals, only data on the occurrence of antimicrobial resistance from countries reporting more than ten tested isolates are included. The data are included in tables if five or more countries reported such data. For further details see Level 3.

It should be noted that antimicrobial resistance patterns in *C. jejuni* and *C. coli* are known to be different. Therefore, when some countries have reported results for more *Campylobacter* species collectively, and some countries for only one species, the comparison of proportion of antimicrobial resistance between countries should be interpreted with caution.

3.2.5.1. Humans
Over 2005, Enter-net (an EU-wide surveillance network for *Salmonella*, VTEC and *Campylobacter* in humans) provided data on antimicrobial resistance of *Campylobacter* isolates from campylobacteriosis cases in humans. The highest resistance levels detected were towards ciprofloxacin: in *C. jejuni* 37%, in *C. coli* 48%, and in other *Campylobacter* species 39%. Considerable levels of resistance to tetracycline (22%) and ampicillin (21%) were observed in *C. jejuni*. For *C. coli*, the resistance to tetracyclines was also relatively high (38%). The proportion of multidrug resistance (≥ 4 antimicrobials) strains was higher for *C. coli* (14%) than for *C. jejuni* (10%).

3.2.5.2. Food
Data on antimicrobial resistance in *Campylobacter* from broiler meat were provided by Denmark, Latvia, The United Kingdom and Norway (Table AB CA1). Isolates reported from Denmark and Norway were from *C. jejuni* only, whereas all other countries reported on more species collectively. In 2005, the highest levels of resistance were reported for tetracycline (0%-23.1%) and ciprofloxacin (2.0%-16.0%), whereas the proportion of isolates resistant to erythromycin (0%-7.1%) was generally low. The same trend was observed in 2004. The highest proportion of resistant isolates was reported from Latvia for all three antimicrobials.

Table AB CA1. Antimicrobial resistance in *Campylobacter spp.* broiler meat, 2005

Country	Monitoring Programme	No. of isolates	Ciprofloxacin % R	Erythromycin % R	Streptomycin % R	Tetracycline % R	Fully sensitive %	Resistant to >4 % R
Denmark[1]	Yes	76	5.3	1.3	3.9	2.6	-	-
Latvia[2]	Yes	30	16	7.1	-	23.1	-	-
United Kingdom	Yes	595	2	1.8	-	-	6.7	0.3
Norway	Yes	35	-	0	-	0	-	-

Note: Only countries reporting more than 10 isolates were included in the table. For data not included, see Level 3. The percentage of multiresistant isolates is based on all antimicrobials tested.

1. For Denmark and Norway, only *C. jejuni* isolates were included.

2. For Latvia: N=25 for ciprofloxacin; N=28 for erythromycin; N=13 for Ciprofloxacin.

3.2.5.3. Animals

Data on the occurrence of antimicrobial resistance in *Campylobacter* from animals (cattle, pigs, poultry and sheep) were provided by the following countries: Austria, Czech Republic, Denmark, Finland, Italy, The Netherlands, Spain, Sweden, and Norway (Table AB CA2 to AB CA6 and Level 3).

A large variation in the prevalence of resistance in *Campylobacter* isolates from animals was observed among the reporting countries. The variation was large for all four antimicrobials, but the highest proportions of resistant isolates were reported for ciprofloxacin (up to 94%) and tetracycline (up to 97%). For ciprofloxacin the highest proportion of resistant isolates were reported from poultry, while the proportions in cattle and pigs in general were lower. The proportion of isolates resistant to streptomycin and erythromycin was, in general, higher in *C. coli* isolates than in isolates of *C. jejuni*. For *Campylobacter* spp. in general, the proportion of resistant isolates reported from the Nordic countries (Denmark, Finland, Norway and Sweden) was low when compared with proportions of resistant isolates reported from southern European countries (e.g. Spain). The same trend was seen in 2004. The large differences between countries in the occurrence of resistance in *Campylobacter* is likely be attributed to national differences in antimicrobial usage in animals.

Poultry

Antimicrobial resistance in *Campylobacter* isolates from *Gallus gallus* was reported by Austria, Czech Republic, Denmark, Finland, Germany, Italy, The Netherlands, Spain and Norway. Austria and Italy also reported results from turkeys (Tables AB CA2 and AB CA3, AB CA4 and level 3).

For *C. jejuni* isolates from *Gallus gallus* (Table AB CA2), considerable variation between countries was seen for resistance to ciprofloxacin (7.9%-93.8%) and tetracyclines (5.3%-52.8%). In general, the proportion of resistance in *C. jejuni* and *Campylobacter* spp. isolates reported from the Nordic countries (Denmark, Finland and Norway) was low when compared to resistance in isolates reported from other countries (Table AB CA2 and Table AB CA4). This trend was also evident in 2004. The highest proportion of fully sensitive *Campylobacter* spp. isolates was reported by Finland (94.4%) and Czech Republic (70.0%) (Table AB CA4.

Table AB CA2. Antimicrobial resistance in *C. jejuni* from *Gallus gallus*, 2005

Country	Monitoring Programme	No. of isolates	Antimicrobial: Ciprofloxacin % R	Erythromycin % R	Streptomycin % R	Tetracycline % R	Fully sensitive %	Resistant to >4 % R
Austria[1]	Yes	195	49.7	3.1	2.1	29.2	0.5	11.3
Denmark	Yes	76	7.9	0	1.3	5.3	-	-
Italy	Yes	36	66.7	0	-	52.8	22.2	0
The Netherlands	Yes	78	43.6	0	0	42.3	-	-
Spain	No	16	93.8	6.3	6.3	43.8	-	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

1. For Austria turkey was included

For *C. coli* isolates from *Gallus gallus* (Table AB CA3), a high proportion of resistant isolates was seen for ciprofloxacin and tetracyclines in 2005, as in 2004. The proportion of isolates resistant to erythromycin was highest for Italy (71.9%), with a large variation between countries.

Table AB CA3. Antimicrobial resistance in *C. coli* from *Gallus gallus*, 2005

Country	Monitoring Programme	No. of isolates	Antimicrobial: Ciprofloxacin % R	Erythromycin % R	Streptomycin % R	Tetracycline % R	Fully sensitive %
Austria[1]	Yes	162	51.2	6.8	22.2	39.5	0.6
Italy	Yes	57	86	71.9	-	94.7	0
Spain[2]	Yes	16	93.8	20	56.3	81.3	-

Note: Only selected antimicrobials are presented in the table. Tables containing results for all antimicrobials tested can be found in Level 3. The percentage of multiresistant isolates is based on all antimicrobials tested.

1. For Austria turkey was included

2. For Spain: N=15 for ciprofloxacin

Table AB CA4. Antimicrobial resistance in *Campylobacter spp.* from *Gallus gallus*, 2005

Country	Monitoring Programme	No. of isolates	Antimicrobial					
			Ciprofloxacin	Erythromycin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4
			% R	% R	% R	% R	%	% R
Austria[1]	Yes	357	50.4	4.8	11.2	33.9	0.6	13.2
Czech Republic	Yes	20	25	5	-	0	70	-
Finland	Yes	90	-	0	-	0	94.4	0
Germany	No	70	48.6	10	-	58.6	-	-
Italy	Yes	93	78.5	44.1	-	78.5	8.6	20.4
Spain	No	32	93.8	12.9	31.3	62.5	-	-
Norway	Yes	69	0	0	-	0	-	-

Note: Only countries reporting more than 10 isolates were included in the table. For data not included in this table, see Level 3. Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested.

1. For Austria turkey was included

Pigs

Antimicrobial resistance in *Campylobacter* isolates from pigs was reported by Austria, Denmark, Italy, The Netherlands, Spain and Sweden (Table AB CA5). Among *C. coli* from pigs, a high proportion of the isolates were resistant to tetracycline (up to 98.6%), ciprofloxacin (up to 87.9%) and streptomycin (up to 90.1%). Additionally, a large variation between countries was observed for all four antimicrobials. The highest proportion of resistant isolates was reported by Spain (69.5%-98.6%) and the lowest proportion of resistant isolates by Denmark (5.7%-47.6%) and Sweden (0%-4.1%). Sweden reported *Campylobacter* spp. collectively (Table AB CA5).

Table AB CA5. Antimicrobial resistance in *C. coli* from pigs, 2005

Country	Monitoring Programme	No. of isolates	Antimicrobial					
			Ciprofloxacin	Erythromycin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4
			% R	% R	% R	% R	%	% R
Austria	Yes	219	29.2	19.2	78.1	76.7	1.4	24.2
Denmark	Yes	105	14.3	20.0	47.6	5.7	-	-
Italy	Yes	40	35.0	37.5	-	87.5	5.0	15.0
The Netherlands	Yes	153	4.6	9.2	86.3	86.3	-	-
Spain[1]	No	143	87.9	69.5	90.1	98.6	-	-
Sweden[2]	Yes	97	-	0	-	4.1	69.1	0

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

1. For Spain: N= 142 for streptomycin; N=141 for erythromycin and tetracycline; N=140 for ciprofloxacin

2. For Sweden *Campylobacter* spp. Collectively

Cattle

Antimicrobial resistance in *Campylobacter* isolates from cattle was reported by Austria, Denmark, Italy and The Netherlands. A relatively high proportion of *C. jejuni* isolates from cattle were resistant to ciprofloxacin and tetracycline in 2005 (Table AB CA6), as well as in 2004. In general, the lowest proportion of resistance was reported for erythromycin and streptomycin. Large variation between countries was seen for tetracycline (0%-63.6%). In contrast, very little variation was seen for resistance to erythromycin (0%-2.8%). Only The Netherlands reported *C. coli* isolates and only Austria reported *Campylobacter* spp. from cattle (see Level 3).

Table AB CA6. Antimicrobial resistance in *C. jejuni* from cattle, 2005

			Antimicrobial					
	Monitoring	No. of	Ciprofloxacin	Erythromycin	Streptomycin	Tetracycline	Fully sensitive	Resistant to >4
Country	Programme	isolates	% R	% R	% R	% R	%	% R
Austria	Yes	141	29.8	2.8	5.7	29.0	0	4.3
Denmark	Yes	41	31.7	2.4	0	0	-	-
Italy	Yes	54	13.0	0	-	22.2	72.2	0
The Netherlands	Yes	44	34.0	0	9.1	63.6	-	-

Note: Only countries reporting more than 10 isolates were included in the table. Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. For data not included in the table, see Level 3.

Sheep

Data on antimicrobial resistance in 27 *Campylobacter* spp. isolates from sheep were provided by Italy. As for other animal species, the prevalence of antimicrobial resistance was higher for ciprofloxacin (48%) and tetracycline (41%) than for other antimicrobials (see Level 3).

3.2.6. Summary

In 2005, a total of 197,363 cases of human campylobacteriosis were reported by 22 MS. The EU incidence of campylobacteriosis was 51.6 per 100,000 population, ranging from <0.1 – 302.7 cases per 100,000 population. This makes campylobacteriosis the most frequently reported zoonotic disease in EU. The 2005 figures represent a 7.8% increase when compared to the general incidence in the EU reported in 2004.

The majority of data on the prevalence of *Campylobacter* in food and animals originates from poultry and poultry products because poultry is believed to be one of the main sources of human campylobacteriosis. Monitoring is, therefore, aimed at this sector of food production. High proportions of *Campylobacter* positive samples were reported for both poultry meat and live poultry. No general EU trends in prevalence of *Campylobacter* were apparent for either poultry meat or for poultry flocks. The general picture, with many positive samples, has remained much the same for the last five years.

In 2005, *Campylobacter* were detected in all the reported investigations of fresh broiler meat. The proportion of positive samples varied from 3.1% to 66.4%. In pig and bovine meat the proportions of *Campylobacter* positive samples were clearly smaller, generally less than 7%. At very low frequencies, *Campylobacter* were also isolated from a variety of other foods such as cow milk, cheese, fishery products, fruit and vegetables. However, one MS reported 11% positive samples from live bivalve molluscs.

All reporting countries found *Campylobacter* in broiler flocks with prevalences ranging from 0.2% to 85.2%. The importance of poultry as a relevant source of infections in humans was supported by the *Campylobacter* species distribution analyses.

High *Campylobacter* prevalences were also reported in live cattle and pigs. In pig herds the prevalences varied from 24.7% to 85.4% and in cattle herds from 0.3% to 46.9%. However, the levels in pig and bovine meat were considerably lower. This indicates lower rates of faecal contamination in slaughter and/or the inability of the bacteria to survive on dry meat of these animal species.

The Nordic countries (Sweden, Norway, Finland and Denmark) have reported consistently low prevalences of *Campylobacter* in broiler flocks, whereas higher prevalences have been reported by other MS.

Some *Campylobacter* were detected in pets and wildlife, which shows that these animals serve as one source of the bacteria.

The highest proportions of antimicrobial resistance in *Campylobacter* isolates were found in isolates from animals, particularly in poultry and pigs, whereas lower levels of resistance were reported in isolates from food. Antimicrobial resistance was commonly found in *Campylobacter* isolates from humans, but usually at lower levels than reported in isolates from animals. Of major concern is the high proportions of resistance to ciprofloxacin, up to 94%, in isolates from animals and to a less extend in isolates from broiler meat. Ciprofloxacin is a fluoroquinolone, which is used to treat human infections, and findings of ciprofloxacin resistance in isolates from animals and food implies a risk for transmission to humans.

3.2.7. Sources of *Campylobacter* data

With the exception of France, Germany, Poland and The United Kingdom, human campylobacteriosis is notifiable in all MS, Norway and Switzerland (see 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). It should be noted that Greece, Italy and Latvia, despite a notification system, report no or very few cases annually. Diagnosis of human infections is generally done by culture from human stool samples (see Appendix Table CA1). In some countries, isolation of the organism is followed by biochemical tests for speciation.

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 (*Gallus gallus* only) (see Appendix Table CA1). The most frequently used methods for detecting *Campylobacter* in animals at farm, slaughter and in food were the bacteriological methods ISO 10272:1995 and NMKL 119:1990 (see Appendix Table CA1 for further details). Additionally, two 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 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.

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 (see Appendix Table CA1 for further details).

Over 2005, Enter-Net, a Community wide surveillance network for *Salmonella*, VTEC and *Campylobacter,* provided the data concerning antimicrobial susceptibility in isolates from human cases.

With exception of Spain and Estonia, all countries providing antimicrobial susceptibility data on *Campylobacter* isolates obtained from food and animals in 2005, generated their data through monitoring programmes. All countries used dilution (MIC) methods for antimicrobial susceptibility testing of *Campylobacter* isolates. Breakpoints, concentrations and range of dilutions applied in individual countries for antimicrobial susceptibility testing are presented in Level 3.

3.3. *Listeria*

The bacterial genus *Listeriae* comprises six species, but human cases of listeriosis are almost exclusively caused by the species *Listeria monocytogenes. Listeriae* are ubiquitous organisms, which are widely distributed in the environment, especially in plant matter and soil.

In healthy adult humans, infection does not result in significant disease, but severe illness may occur in the unborn child, infants, the elderly and those with compromised immune system. Symptoms vary, ranging from mild flu-like symptoms and diarrhoea to life threatening infections characterised by septicaemia and meningoencephalitis. In pregnant women, the infection spreads to the foetus, which will either be born severely ill or die in the uterus, resulting in abortion. Illness is often severe and mortality high. Human disease cases are rare, but are important because of the severity of the disease. These organisms are amongst the most important causes of death from foodborne infections in industrialised countries.

The principal reservoir of *Listeria* is 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 chill temperatures down to 2-4°C, which makes its occurrence in ready-to-eat foods with a relatively long shelf life, particularly important.

In farm animals (especially sheep and goats) clinical listeriosis usually presents 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.

3.3.1. Listeriosis in humans

In 2005, 23 MS, and 2 non-MS reported data on listeriosis in humans (Table LI1). Overall, 1,439 cases were reported in the EU and 99.4% of these were laboratory confirmed. Cases from France, Germany and The United Kingdom accounted for 65% of all the confirmed cases. The overall incidence was estimated to 0.3 confirmed cases per 100,000 population similar to the incidence recorded in 2004 (0.3 per 100,000 population). Generally, the country incidences were at the same level as in previous years, except for Germany where an increase was reported. The highest incidences were recorded in Denmark (0.9), Belgium (0.8) and Finland (0.7). Human listeriosis cases were distributed evenly over the year, except for Germany where a peak was observed in September.

Table LI1. Reported listeriosis cases in humans, 2001-2005 and incidence[1] for confirmed cases, 2005

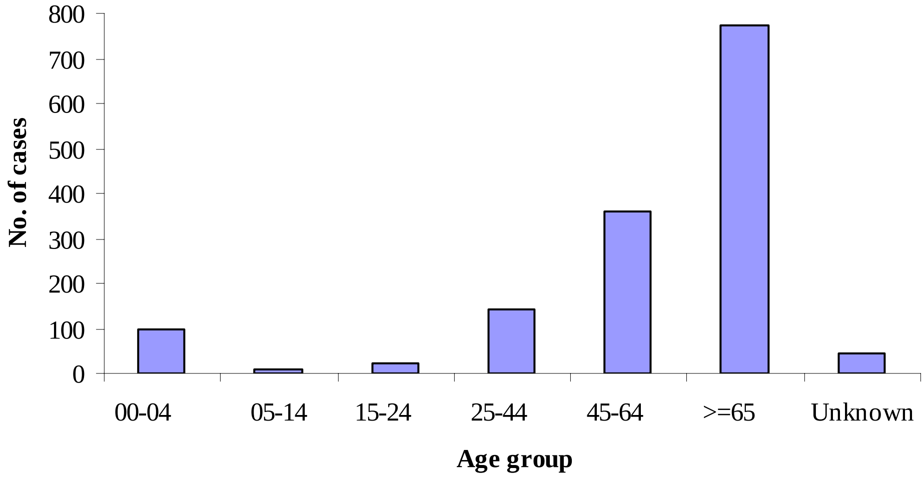
	2005				2004	2003	2002	2001
	Report Type[2]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases			
Austria	A	9	9	0.1	19	8	16	9
Belgium	C	62	62	0.8	70	76	44	57
Cyprus	C	0	0	0	-	-	-	-
Czech Republic	C	15	15	0.1	16	-	-	-
Denmark	C	46	46	0.9	41	29	28	38
Estonia	C	2	2	0.2	2	-	-	-
Finland	C	36	36	0.7	35	41	20	28
France	C	221	221	0.4	236	220	218	187
Germany	C	510	510	0.6	296	256	240	217
Greece	-	-	-	-	3	0	5	3
Hungary	A	10	10	<0.1	16	-	-	-
Ireland	C	12	11	0.3	11	6	6	7
Italy	C	51	51	<0.1	25	0	-	31
Latvia	C	6	3	0.1	5	8	16	11
Lithuania	A	2	2	<0.1	1	2	-	-
Luxembourg	0	0	0	0	-	-	-	-
Malta	0	0	0	0	-	-	-	-
The Netherlands	A	96	96	0.6	55	52	32	16
Poland	A	22	22	<0.1	10	5	31	9
Portugal	-	-	-	-	38	-	-	-
Slovakia	C	5	5	<0.1	8	6	7	6
Slovenia	C	3	0	0	1	6	-	-
Spain	C	68	68	0.2	100	52	49	57
Sweden	C	40	35	0.4	44	48	39	67
United Kingdom	C	223	223	0.3	232	255	158	167
EU-Total	-	**1,439**	**1,427**	**0.3**	**1,264**	**1,070**	**909**	**910**
Iceland	0	0	0	<0.1	-	-	-	-
Norway	C	14	14	0.3	-	-	-	-

1. EU-total incidence is based on population in reporting countries

2. A: aggregated data report; C: case-based report; 0: 0 cases reported; -: No cases reported

Overall, 54% of the reported listeriosis cases occurred in individuals above 65 years. This proportion was similar to that observed in 2004 (51%). Listeriosis cases in children less than four years accounted for 7% of the cases. There was no difference between reported female and male cases by countries. In 2005, 74 listeriosis cases were associated with pregnancy. These cases were reported in Germany (34 cases), France (37 cases) and Denmark (3 cases).

Figure LI1. Distribution of human listeriosis cases by age, 2005



The majority of the reporting countries stated that most cases were of domestic or of unknown origin. Only 4 MS reported confirmed imported cases, generally less than 6% of the cases.

Information on *L. monocytogenes* serotypes was available for 244 cases reported by 6 MS. Among these cases, 48.7% belonged to the 1/2a serotype and 30.3% to the 4b serotype. Cases belonging to the serotypes 1/2, 1/2b, 4 and others accounted for 4.5%, 13.5%, 1.2% and 1.6%, respectively.

All reported data on listeriosis in humans are presented in Level 3.

3.3.2. *Listeria* in food

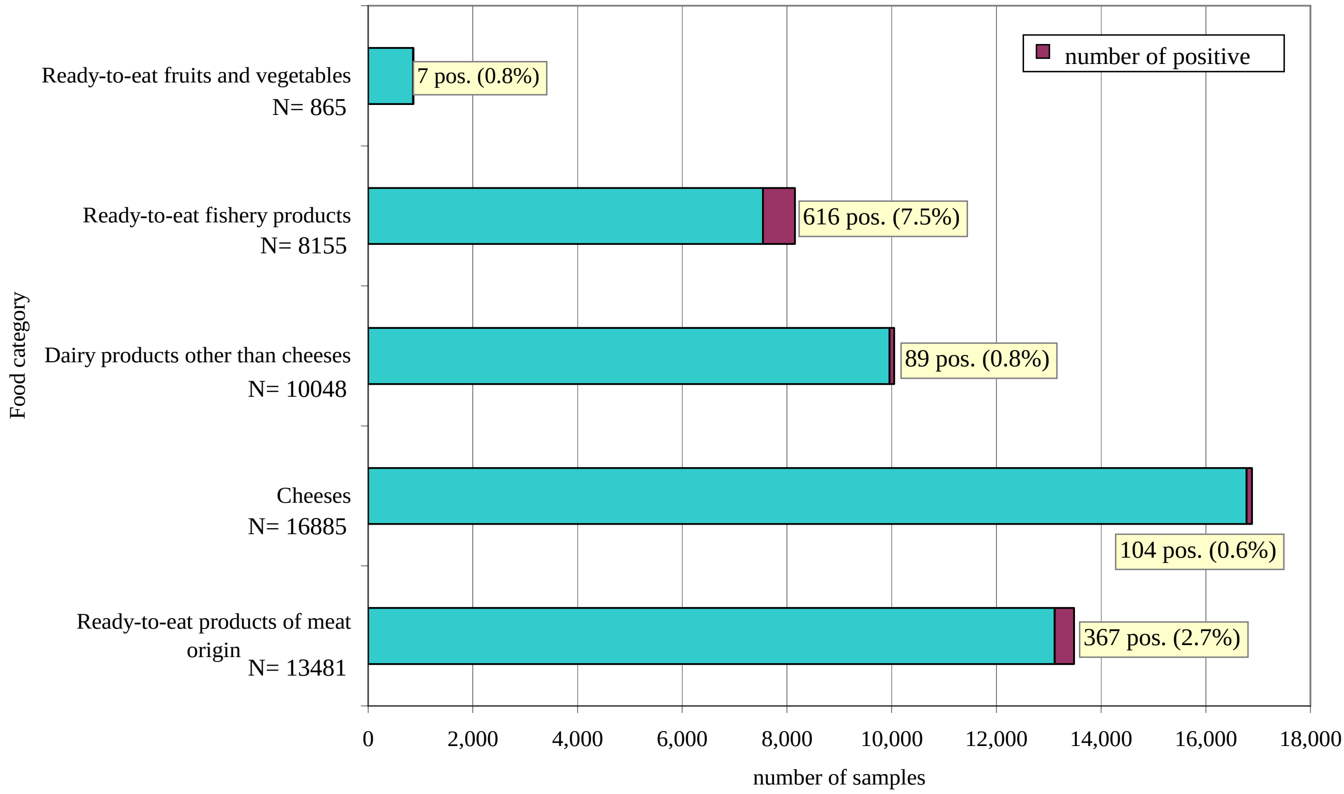
Findings of *Listeria monocytogenes* in foodstuffs are important in two main scenarios:

- Presence of *L. monocytogenes* in foods that are ready-to-eat (RTE) and able to support growth of the bacterium, and
- Findings of *L. monocytogenes* in concentrations greater than 100 colony forming units per gram (cfu/g) in RTE food. Consumption of foodstuff, which contains over 100 L. monocytogenes bacteria per gram, is regarded as a direct risk for human health, whereas concentrations less than 100 bacteria/g are usually not considered significant for human disease, except in vulnerable population groups.

In 2005, the Community legislation laid down criterion of absence on 25 g for *Listeria monocytogenes* in dairy products and pasteurised milk (Directive 92/46/EEC). No Community criteria were in force for other ready-to-eat foods.

Data on the proportion of positive *L. monocytogenes* samples in food were reported by 23 MS and one non-MS. These reports cover a substantial quantity of food samples and RTE food categories Figure LI2. Data presented focuses on RTE foods where *L. monocytogenes* was detected (qualitative data), and findings of *L. monocytogenes* with more than 100 cfu/g (quantitative data).

Figure LI2. Number of food samples tested for *Listeria monocytogenes* by food category and number of positive findings, 2005[1]



1. Data are only presented for sample size ≥25

Table LI2 summarises the results for qualitative *Listeria* findings in food from the years 2004 and 2005. Due to differences in sampling and testing schemes and the reporting countries, data is not directly comparable between years.

Table LI2. L. monocytogenes in food, 2004-2005

Food item	% pos 2005	% pos 2004
Bovine meat products, ready-to-eat	0.7 - 5.3	0 - 48.6
Pig meat products, ready-to-eat	0 - 26.5	0 - 27.6
Poultry meat products, ready-to-eat	0 - 3.1	0 - 40.0
Other meat, ready-to-eat	0 - 39.1	0 - 29.1
Cheeses	0 - 25.0	0 - 12.5
Raw milk	0 - 4.4	0 - 100
Dairy products, ready-to-eat	0 - 8.0	0 - 0.6
Fishery products	0 - 25.9	0 - 29.8
Fruits and vegetables	0 - 6.9	0 - 33.3

Ready-to-eat products of meat origin

Data on examinations for *L. monocytogenes* in RTE products from meat was available from 13 MS. Data are categorised according to the type of meat and the place of sampling, i.e. at the retail level or processing plant.

Data presented in Tables LI3a-c all represent sample sizes ≥ 25 samples. In the analyses, the use of a sample weight of 0.01g has been considered to be equivalent to testing for >100 cfu/g. All other data are presented, in detail, in Level 3.

Table LI3a summarises data on RTE products of bovine meat, which was reported by six MS. The proportion of positive samples was low, ranging from 0.7%-5.3%. Both Belgium and Luxembourg reported findings of *L. monocytogenes* in concentrations above 100 cfu/g in minced meat and meat preparations intended to be eaten raw.

Qualitative data reported by 12 MS on RTE products of pig meat varied considerably. The highest occurrence was reported by Germany, where 26.5% of RTE cooked pig meat products were found positive. Largest number of RTE products of pig meat samples was tested in Italy (2,826) and 3.3% were positive. France reported the highest proportion (2.9%) of RTE pig meat products containing *L. monocytogenes* bacteria >100/g. Also Germany, Ireland and Spain found products exceeding the limit of 100/g but in smaller proportions (Table LI3b).

The proportion of positive *L. monocytogenes* samples in RTE products of poultry meat were low, ranging from 0% to 3.1%. Only Portugal reported a finding of the bacteria in concentrations over 100/g. Data were reported by seven MS. No positive samples were reported from RTE products from sheep meat. Some positive findings were made from RTE products of mixed meat, and Luxembourg reported proportions of positive findings as large as 11.9% and 39.1%. None of the positive samples were found to have *L. monocytogenes* in concentrations above 100 cfu/g. The results are summarised in Table LI3c.

Table LI3a. *L. monocytogenes* in ready-to-eat products of bovine meat[1], 2005

		N	Pos	% Pos	>100 cfu (%)
Spain	Meat products, cooked (sample 25g)	76	4	5.3	-
Ireland	Meat products, cooked, processing plant (sample 25g)	40	1	2.5	0
	Meat products, cooked, retail (sample 25 g)	408	3	0.7	0
Italy	Meat products, cooked (sample 25g)	294	9	3.1	0
The Netherlands	Meat products, cooked	61	1	1.6	0
Belgium	Meat preparation, intended to be eaten raw, at retail (sample 0.01g)	116	1	0.9	1(0.9)
	Minced meat, intended to be eaten raw, at retail (sample 0.01g)	171	2	1.2	2(1.2)
Luxembourg	Minced meat, intended to be eaten raw, at retail (sample 0.01g)	39	2	5.1	2 (5.1)

1. Data are only presented for sample size >25

Table LI3b. *L. monocytogenes* in ready-to-eat products of pig meat[1], 2005

		N	Pos	% Pos	>100 cfu (%)
Austria	Fermented sausages (25g sample)	32	2	6.2	0
	Cooked meat product (25g sample)	161	5	3.1	0
Belgium	Cooked ham, at processing (25g sample)	291	13	4.5	-
	Cooked ham, at retail (0.01g sample)	159	0	0	-
	Fermented sausage, at processing (1g sample)	254	10	3.9	-
	Fermented sausage, at retail (0.01g sample)	92	0	0	-
	Meat product, intended to be eaten raw (0.01g sample)	119	0	0	-
	Pâté, at retail (0.01g sample)	90	0	0	-
	Pâté, at processing plant (25g sample)	286	4	1.4	-
Estonia	Meat product, cooked, at retail (25g sample)	50	0	0	-
France	Meat product, cooked (25g sample)	34	4	11.8	1 (2.9)
Germany	Meat product, cooked (25g sample)	393	104	26.5	1 (0.3)
Ireland	Meat product, cooked, at processing (25g sample)	175	10	5.7	-
	Meat product, cooked, at retail (25g sample)	1,835	2	0.1	1 (0.03)
Italy	Meat product, cooked (25g sample)	2,826	93	3.3	-
Luxemburg	Meat product, cooked (25g sample)	100	1	1.0	0
The Netherlands	Meat product, cooked (25g sample)	566	16	2.8	0
Poland	Meat product, cooked	1,415	0	0	-
Portugal	Meat product, cooked (25g sample)	34	1	2.9	-
Spain	Meat product, cooked (25g sample)	557	26	4.7	5 (0.9)

1. Data are only presented for sample size ≥25

Table LI3c. *L. monocytogenes* in ready-to-eat products of poultry and other meat[1], 2005

		N	Pos	% Pos	>100 cfu (%)
Meat from poultry					
Czech Republic	Broiler, meat products, cooked, at retail (25 g sample)	36	1	2.8	0
Estonia	Broiler, meat product, cooked, at retail (25g sample)	32	1	3.1	-
Ireland	Broiler, meat products, cooked, at retail (25g sample)	1,108	1	0.1	0
	Duck, meat products, cooked, at retail (25g sample)	29	0	0	-
	Poultry (unspecified), meat products, cooked, at retail (25g sample)	25	0	0	-
	Turkey, meat products, cooked, at retail (25g sample)	202	0	0	-
Italy	Broiler, meat products (25g sample)	436	1	0.2	0
The Netherlands	Broiler, meat products, cooked	62	0	0	0
Poland	Broiler, meat product, cooked	206	2	1.0	-
Portugal	Broiler, meat product, cooked (100g sample)	120	1	0.8	1 (0.8)
Meat from sheep					
Ireland	Meat products, at retail (25g sample)	44	0	0	-
Italy	Meat products (25g sample)	48	0	0	0
Mixed meat					
Estonia	Pâté, at retail (25g sample)	80	1	1.3	-
Estonia	Meat product, cooked, at retail (25g sample)	34	0	0	-
Ireland	Meat product, cooked, at retail (25g sample)	67	1	1.5	0
Luxembourg	Meat product, intended to be eaten raw (25g sample)	160	19	11.9	0
Luxembourg	Meat preparation, intended to be eaten raw (25g sample)	64	25	39.1	0
Slovenia	Fermented sausages (25g sample)	54	0	0	-

1. Data are only presented for sample size ≥25

Milk and dairy products

Qualitative data on *L. monocytogenes* in raw milk, intended for direct human consumption, were provided by six MS. No positive samples or proportions of positive samples lower than 4.5% (Table LI4a) were reported.

Examinations for *L. monocytogenes* in pasteurised milk were reported by seven MS (Table LI4a). *L. monocytogenes* was not detected in pasteurised milk with one exception. Germany reported 32.0% of the samples positive for *L. monocytogenes,* which is an unexpectedly high number in heat treated milk products but none of the samples exceeded the limit of 100 cfu/g.

Table LI4a. *L. monocytogenes* in milk from cows for direct human consumption[1], 2005

		N	Pos	% Pos	>100 cfu (%)
Raw milk					
Austria	(25g sample)	26	0	0	-
Belgium	(1g sample)	164	6	3.7	-
Germany		32	0	0	0
Italy	(25g sample)	145	0	0	0
Latvia	(25g sample)	45	2	4.4	-
Poland		30	1	3.3	-
Pasteurised milk					
Austria	(25g sample)	278	0	0	-
Belgium	(25g sample)	105	0	0	-
Germany		225	72	32.0	0
Ireland	At retail (25g sample)	43	0	0	-
Italy	(25g sample)	947	0	0	0
Poland		439	0	0	-
Slovakia	(25g sample)	819	0	0	-

1. Data are only presented for sample size ≥25

In 2005, MS reported a large number of data on other RTE dairy products, including cheese, tested for *L. monocytogenes* (Table LI4b-c).

A large proportion of the tested cheese samples were negative (Table LI4b). The highest proportion of positive samples was reported by Ireland, where 25.0% of hard cheese samples, produced from unspecified milk, were positive. The proportion of positive samples ranged from 0.1% to 8% in other MS. Germany, Ireland and Greece were the only MS reporting findings of more than 100 cfu *L. monocytogenes* per gram, 1.1%, 0.1-3.1% and 0.3% respectively.

The reported results show that *L. monocytogenes* was found more often in cheeses made from raw or low heat-treated milk compared to cheeses made from pasteurised milk. Furthermore, *L. monocytogenes* was found more often in soft/semisoft cheeses compared to hard cheeses. Thus, soft cheeses made from unpasteurised milk seem to be more likely to harbour *L. monocytogenes* than other dairy products tested.

Table LI4b. *L. monocytogenes* in cheese[1], 2005

	Cheeses	N	Pos	% Pos	>100 cfu (%)
	Made from raw or thermised milk from cows				
Austria	Hard cheese (25g sample)	50	0	0	-
	Soft/semisoft cheese	214	1	0.5	0
Belgium	Soft/semisoft cheese, at farm (0.01g sample)	141	7	5.0	-
	Soft/semisoft cheese, at processing plant (25g sample)	39	1	2.6	-
Germany	Soft/semisoft cheese	92	3	3.3	1 (1.1)
Italy	Hard cheese (25g sample)	209	0	0	-
	Soft/semisoft (25g sample)	605	9	1.5	0
Poland	Hard	245	0	0	-
	Soft/semisoft	465	0	0	-
Portugal	Soft/semisoft (25g sample)	35	0	0	-
	Made from pasteurised milk from cows				
Austria	Hard (1g sample)	69	0	0	-
	Hard (25g sample)	56	0	0	-
	Soft/semisoft (25g sample)	538	0	0	-
Belgium	Soft/semisoft, at processing plant (25g sample)	144	0	0	-
	Soft/semisoft, at retail (0.01g sample)	185	0	0	-
Czech Republic	Hard (25g sample)	36	0	0	-
	Soft/semisoft, at retail, domestic production (25g sample)	117	0	0	-
Estonia	Hard, at processing (25g sample)	66	0	0	-
	Soft/semisoft, at processing (25g sample)	26	0	0	-
Finland	Hard (25g sample)	50	0	0	-
Italy	Hard (25g sample)	540	0	0	0
	Soft/semisoft (25g sample)	2,854	12	0.4	0
The Netherlands	Soft/semisoft (25g sample)	52	0	0	0
Poland	Hard	299	0	0	-
	Soft/semisoft (25g sample)	410	3	0.7	-
Portugal	Hard (25g sample)	45	0	0	-
	Soft/semisoft, official control (100g sample)	166	6	3.6	-
	Soft/semisoft (25g sample)	95	0	0	-
	Soft/semisoft, batch, (25g sample)	31	0	0	-
Slovakia	Soft/semisoft (25g sample)	188	0	0	-

Table LI4c. *L. monocytogenes* in cheese[1] , 2005

	Cheeses	N	Pos	% Pos	>100 cfu (%)
	Made from milk from sheep				
Austria	Hard, made from pasteurised milk (25g sample)	39	0	0	-
Cyprus	Soft/semisoft, made from pasteurised milk (25g sample)	270	0	0	-
Italy	Hard, made from pasteurised milk (25g sample)	70	0	0	0
	Soft/semisoft, made from pasteurised milk (25g sample)	233	1	0.4	0
	Soft/semisoft, made from raw or thermised milk (25g sample)	230	3	1.3	0
	Hard (25g sample)	38	0	0	0
	Soft/semisoft (25g sample)	40	0	0	0
	Unspecified (25g sample)	665	8	1.2	0
Poland	Hard, made from pasteurised milk	35	0	0	-
Portugal	Soft/semisoft, made from raw or thermised milk (25g sample)	58	3	5.2	-
Slovakia	(25g sample)	713	0	0	-
	Made from milk from goats				
Austria	Soft/semisoft, made from pasteurised milk (25g sample)	43	2	4.7	0
Italy	Hard, made from pasteurised milk (25g sample)	62	0	0	0
	Hard (25g sample)	35	0	0	0
	Soft/semisoft, made from pasteurised milk (25g sample)	49	0	0	0
	Soft/semisoft, made from unpasteurised milk (25g sample)	33	0	0	0
Ireland	Unspecified (25g sample)	60	0	0	0
Poland	Soft/semisoft, made from raw or thermised milk	58	2	3.4	-
	Made from mixed milk				
Cyprus	Soft/semisoft, made from pasteurised milk (25g sample)	572	1	0.2	-
Slovakia	Unspecified (25g sample)	481	0	0	-
	Made from unspecified milk				
Ireland	Hard, at processing (25g sample)	846	0	0	-
	Hard, at processing (1g sample, batch of 5 samples)	53	0	0	-
	Hard, at processing (1g sample, batch of 5 samples)	60	15	25.0	-
	Hard, at retail (25g sample)	32	1	3.1	1 (3.1)
	At retail (25g sample)	1,042	1	0.1	1 (0.1)
	Soft/semisoft, at processing (25g sample)	391	0	0	-
	Soft/semisoft, at retail (25g sample)	123	0	0	-
Italy	25g sample	982	0	0	0
Greece	Domestic production, retail (1kg sample)	1,230	25	2.0	5 (0.3)
	At processing (250g sample)	280	0	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 2005 (Table LI4c). The reports provided almost exclusively qualitative data with hardly any positive samples. However, there were a few reported findings of *L. monocytogenes*: Belgium reported *L. monocytogenes* in butter made from raw milk and ice cream made on farms in 6.5% and 2.5% of the investigated samples, respectively. Germany found 1.3% of the tested non-specified dairy products to be positive.

All the dairy products, where *L. monocytogenes* was isolated were in non-conformity with the Community criteria, and thus they should not have been placed on the market.

Table LI4d. *L. monocytogenes* in other ready-to-eat dairy products[1], 2005

	Product	N	Pos	% Pos	>100 cfu (%)
Butter					
Austria	(1g sample)	82	0	0	-
	(25g sample)	47	0	0	-
Belgium	Made from past. milk, at processing (25g sample)	106	0	0	-
	Made from raw milk, at farm (1g sample)	184	12	6.5	-
Ireland	At processing (25g sample)	190	0	0	-
Italy	(25g sample)	460	0	0	-
Poland		211	0	0	-
Slovakia		214	0	0	-
Cream					
Austria	(25g sample)	54	0	0	-
Czech Republic	(25g sample)	36	0	0	-
Ireland	At processing (25g sample)	86	0	0	-
	At retail (25g sample)	89	0	0	-
Italy	(25g sample)	101	0	0	-
Poland		280	0	0	-
Ice cream					
Belgium	Made from past. milk, at processing (1g sample)	51	0	0	-
	At farm (1g sample)	40	1	2.5	-
Czech Republic	Made from past. milk, at retail (25g sample)	41	0	0	-
Germany		2,023	0	0	-
Ireland	At processing (25g sample)	81	0	0	-
	At retail (25g sample)	369	0	0	-
Italy	(25g sample)	485	1	0.2	0
Slovenia	At retail (25g sample)	237	0	0	-
Spain	(25g sample)	570	3	0.5	-
Other dairy products					
Austria	Dairy deserts (25g sample)	152	0	0	-
	Dairy deserts (1g sample)	428	0	0	-
Germany	Milk and whey powder	145	0	0	-
Ireland	Milk and whey powder	344	0	0	-
Dairy products not specified					
Austria	Made from past. milk (1g sample)	88	0	0	-
Denmark	At retail (25g sample)	151	1	0.6	-
Estonia	At processing (25g sample)	227	0	0	-
	At retail (25g sample)	57	0	0	-
Germany	Made from raw milk, at retail	629	8	1.3	-
Greece	(500g sample)	317	0	0	-
	(200g sample)	133	0	0	-
Ireland	At processing (25g sample)	221	0	0	-
	At retail (25g sample)	60	0	0	-
Poland		441	0	0	-
Spain	(25g sample)	1,888	30	1.6	-

1. Data are only presented for sample size >25

Fishery products

In 2005, 14 MS and one non-MS reported data on *L. monocytogenes* findings in fishery products (Table LI5). The products tested were mainly smoked fish and unspecified fishery products. Seven MS provided quantitative data.

Fish and fishery products were the food categories in 2005 with the highest proportion of *L. monocytogenes* positive samples as well as the highest proportions of samples with more than 100 *L. monocytogenes* per gram. The highest proportions of positive samples were reported by The Netherlands, Belgium, Austria, and Sweden, all with prevalence ranging from 10.8%-25.9%. Furthermore, The Netherlands, Germany, Italy, Austria and Spain reported products containing the bacteria more than 100 cfu per gram with rates between 0.9-3.5%.

Table LI5. *L. monocytogenes* in fishery products[1], 2005

	Ready-to-eat fishery products	N	Pos	% Pos	>100 cfu (%)
	Fish				
Austria	Smoked (25g sample)	389	35	9.0	0
Belgium	Cold-smoked, at processing (25g sample)	145	23	15.9	-
Germany	Unspecified (25g sample)	2,481	232	9.4	22 (0.9)
	Smoked (25g sample)	773	75	9.7	8 (1.0)
Ireland	Unspecified, at retail (25g sample)	36	0	0	-
	Smoked, at processing (25g sample)	61	1	1.6	-
	Smoked, at retail (25g sample)	26	0	0	-
Italy	Smoked (25g sample)	263	25	9.5	3 (1.1)
The Netherlands	Smoked	568	147	25.9	20 (3.5)
Norway	Unspecified, at processing plants (25g sample)	129	3	2.3	-
	Other fishery products				
Austria	Unspecified (25g sample)	69	9	13.0	2 (2.9)
	Raw fish product	33	3	9.1	1 (3.0)
Denmark	Unspecified (25g sample)	208	4	1.9	0
Estonia	Ready to eat, at processing (25g sample)	30	2	6.7	-
Spain	Unspecified (25g sample)	412	7	1.7	5 (1.2)
Ireland	Unspecified, ready to eat, at retail (25g sample)	303	0	0	-
	Unspecified, at processing (25g sample)	54	3	5.6	-
Italy	Unspecified (25g sample)	548	8	1.5	0
Slovakia	Unspecified (25g sample)	116	2	1.7	-
Sweden	Unspecified (25g sample)	37	4	10.8	-
	Molluscan shellfish				
Greece	Raw product	31	0	0	-
Italy	Cooked (25g sample)	80	0	0	0
Poland	Cooked	129	0	0	-
	Crustaceans				
France	Unspecified, cooked (25g sample)	1,163	33	2.8	0
Italy	Unspecified, cooked (25g sample)	71	0	0	0

1. Data are only presented for sample size ≥25

Other ready-to-eat products
Several MS reported data on findings of *L. monocytogenes* in a variety of other RTE products. Results of testing of samples of fruit, vegetables and bakery products are summarised in Table LI6. The proportion of positive findings was generally, low (<4.5%). Only Latvia found a higher occurrence (6.9%) in sprouted seeds.

The United Kingdom carried out investigations in pre-packaged mixed raw vegetables salads containing either meat or fishery products. Out of the 2686 samples tested 130 (4.8%) were found positive for *L. monocytogenes* and in 2 samples the concentration of these bacteria exceeded the limit 100 cfu/g.

For more information on additional products please refer to Level 3.

Table LI6. *L. monocytogenes* in other ready-to-eat products[1], 2005

	Fruit and vegetables	N	Pos	%	Pos>100 cfu (%)
Belgium	Fruit and vegetables, pre-cut (0.01 sample)	114	0	0	-
	Vegetables, non pre-cut (25g sample)	56	0	0	-
Czech Republic	Vegetables, pre-cut, at retail, domestic prod. (25g sample)	50	0	0	-
Denmark	Fruit and vegetables, pre-cut (25g sample)	42	0	0	-
Finland	Vegetables, non pre-cut, at farm (25g sample)	26	0	0	-
	Vegetables, non pre-cut, at retail, domestic prod. (25g sample)	36	1	2.8	0
	Salad	116	1	0.9	0
Ireland	Fruit, pre-cut (25g sample)	27	0	0	-
	Vegetables, pre-cut, at retail (25g sample)	48	0	0	-
	Vegetable products, at retail (25g sample)	68	0	0	-
	Vegetables, at retail (25g sample)	84	0	0	-
Latvia	Sprouted seeds, at retail (25g sample)	29	2	6.9	-
Slovenia	Fruit and vegetables, pre-cut (25g sample)	60	1	1.7	-
	Fruit, pre-cut (25g sample)	67	2	3.0	-
	Vegetable products (25g sample)	42	0	0	-
	Bakery products				
Belgium	Desserts, containing raw egg, at retail (0.01g sample)	188	1	0.5	-
	Pastry with egg filling (0.01g sample)	118	0	0	-
Ireland	Cakes, at retail (25g sample)	118	0	0	-
	Deserts, at retail (25g sample)	182	0	0	-
	Pastry, at retail (25g sample)	92	1	1.1	-

1. Data are only presented for sample size ≥25

3.3.3. Listeriosis in animals

In 2005, only few countries reported data on *L. monocytogenes* in animals (Table LI7).

It should be noted, that due to variations in sampling and diagnostic methods, results from the different countries may not be directly comparable.

In cattle, the number of positive findings was generally low. An exception was in Estonia where 19.4% of the investigated samples tested positive. However, this result was derived from clinical examinations, where the likelihood of finding *Listeria* is higher than what would be expected in a healthy animal population. The occurrence in pigs and *Gallus gallus* was low (3.7% or below). The higher percentages of positive samples reported in sheep and goats by Estonia relate to clinical samples.

A number of horses were investigated in Germany (N=3,913) and Italy (N=41). In Germany, 0.3% tested positive and in Italy, none of the examined animals tested positive. In Germany, cats and dogs were examined, and 2 out of 1,735 cats were positive, while none of 2,841 dogs tested positive. In addition, *L. monocytogenes* was not found in 37 buffalos or 29 pigeons in Italy (Level 3).

Table LI7. *Listeria* in animals[1], 2005

	Description	N	Pos	% Pos	% Pos *L. monocytogenes*
Cattle					
Estonia	Clinical/diagnostic	31	7	22.6	6 (19.4)
Germany	-	7,201	332	4.6	332 (4.6)
	Dairy cows	1,680	32	1.9	32 (1.9)
Italy	Dairy cows, clinical/diagnostic	186	0	0	0
	Clinical/diagnostic	148	22	14.9	1 (0.7)
Slovakia	-	179	0	0	0
Switzerland	-	81	8	9.9	-
Pigs					
Germany	-	11,590	16	0.1	16 (0.1)
Italy	Clinical/diagnostic	89	0	0	0
Slovakia	-	109	0	0	0
Gallus gallus					
Germany	-	5,014	13	0.3	13 (0.3)
Lithuania	Flocks	27	1	3.7	1 (3.7)
Sheep					
Estonia	Clinical/diagnostic	34	10	29.4	10 (29.4)
Germany	-	1,551	97	6.3	97 (6.3)
Greece	Clinical/diagnostic	73	6	8.2	4 (5.5)
Italy	Clinical/diagnostic	298	1	0.3	0
Slovakia	-	144	14	9.7	14 (9.7)
Goats					
Germany	-	309	22	7.1	22 (7.1)
Greece	Clinical/diagnostic	48	6	12.5	5 (10.4)
Italy	-	74	0	0	0

Note: Animal based data if nothing else is stated

1. Data are only presented for sample size ≥25

3.3.4. Summary

Listeriosis is an important foodborne disease in the EU due to high morbidity and mortality in vulnerable populations, although it remains a relatively rare disease in humans. The total of 1,439 human cases was reported by 23 MS. The reported incidence of human listeriosis in 2005 was, for most countries, low and comparable to the incidence in earlier years. However, Germany reported a remarkable increase in the number of cases from 2004-2005.

In 2005, 23 MS and one non-MS reported findings of *L. monocytogenes* in foodstuffs. Typically large numbers of varying RTE food samples were examined, which indicates that *L. monocytogenes* is perceived as an important foodborne risk. In 2005, *L. monocytogenes* was relatively seldom found in the RTE foodstuffs. The bacteria were most often reported from fishery products, and the findings were more common in meat products than in dairy products. The proportion of positive samples ranged generally from 0%-39.1%.

RTE foodstuffs contaminated with more than 100 bacteria per gram are considered to pose a direct risk to human health. Considering this fact, the most significant findings were reported in fishery products, which showed the highest proportion both of positive samples and samples with concentrations greater than 100 cfu/g. Results higher that 100 cfu/g were also reported, in RTE products of meat origin and cheese. The proportion of products containing the bacteria over 100 cfu/g was usually low (0.03%-5.1%).

The new Community criteria for *L. monocytogenes* in RTE foods (absence in 25 g or $\leq$ 100 cfu/g depending on food type) come into force from beginning of 2006. The data reported from 2005 gives useful guidance on risky food categories and how to target the monitoring and the control measures under the new legislation.

L. monocytogenes was occasionally reported from various animal species, showing that animals are one source of *Listeria* contamination.

3.3.5. Sources of *Listeria* data

In 2005, listeriosis was notifiable in humans in all MS and non-MS, with the exception of Cyprus, The Netherlands and The United Kingdom. Luxembourg did not provide information on their notification system in relation 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 was provided by the ECDC and was compiled based on the data reported through the Basic Surveillance Network and Enter-net.

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).

Monitoring programmes and diagnostic methods for testing samples for *Listeria* are found in Appendix, Table LI1. Surveillance in ready-to-eat foods is performed in most MS. However, due to differences in sampling and analytical methods, comparisons from year to year and between countries are difficult.

3.4. Verotoxigenic *Escherichia coli*

Verotoxigenic (Verocytotoxin producing) or Shiga toxin producing *Escherichia coli* (VTEC/STEC) are a group of *E. coli* bacteria that are characterised by their ability to produce a toxin, verocytotoxin (VT). Human pathogenic VTEC usually harbour additional virulence factors that are important for the development of disease in man. VT encoding *E. coli* has been recognised within a large number of different serotypes. However, the majority of reported human VTEC outbreaks and sporadic cases of VTEC infections are associated with a minor number of O:H serotypes, of which the O157:H7 or the O157:H- serotype (VTEC O157) is the one most frequently reported to be associated with human disease.

The symptoms associated with VTEC infections in humans range from mild to bloody diarrhoea. The diarrhoea is often accompanied by severe abdominal cramps but usually without fever. VTEC infections can also 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.

Infection may be acquired through 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 numerous different animals. The intestines of healthy ruminants seem 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 sources include unpasteurised milk, vegetables and contaminated drinking water. However, the relevance of all the different VTEC serotypes isolated from animals and foodstuffs for infections in humans is not yet clear.

3.4.1. VTEC in humans

In 2005, a total of 3,314 human VTEC cases were reported through BSN from 18 MS, and additional 19 cases by 2 non-MS. Of these, 97.1% were laboratory confirmed (see Table VT1). Germany and The United Kingdom accounted for approximately 70.4% of all reported cases. The overall incidence in the EU was 1.2 per 100,000 population, which is similar to the incidence reported in 2004. The number of reported confirmed cases in 2005 was approximately one forth lower than the number of reported cases in 2004. However, it should be noted that the number of cases in 2004 was heavily influenced by the Czech Republic, reporting 1,743 cases (incidence 17.1 per 100,000 population). In 2005, the Czech Republic provided no human data to the BSN. If incidences are compared for the ten MS that have reported consistently on VTEC cases since 2003, a slight increasing trend is observed, from 1.2 per 100,000 population in 2003 to 1.6 in 2005. However, the increase may partly be explained by changes in the reporting system in the MS, changes in the laboratory methods or be a result of increased awareness.

Countries with human VTEC incidences above the EU average in 2005 were Denmark, Estonia Germany, Ireland, Luxembourg, Malta, Sweden and the United Kingdom. An increase in the number of cases was observed in Austria, Germany, Ireland, Slovakia, Slovenia, Sweden, and The Netherlands. Four MS - Estonia, Luxembourg, Malta and Spain - reported cases for the first time in 2005.

Overall 18 countries sent data to Enter-net (17 EU and Norway), and for Belgium, Finland and Italy this was the only data source available.

There is no clear trend observed in the data on human VTEC cases over 2003-2005. When comparing data it should further be kept in mind, that in addition to the “true” incidence, several factors may be accountable for changes from year to year. In the case of VTEC, this particularly includes the differences in the diagnostic practices, e.g. Sweden experienced a marked increase in the number of reported cases in 2005 due to changes in the reporting system in 2004 and a single large outbreak.

Table VT1. Reported VTEC cases in humans, 2003-2005 (2004, confirmed cases) and incidence[1] for confirmed cases, 2005 (BSN, Enter-net)

	2005					2004	2003
		BSN			Enter-net		
	Report type[2]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases	Confirmed cases	Cases
Austria	A	53	53	0.6	59	45	28
Belgium	-	-	-	-	48	36	39
Cyprus	C	0	0	0	-	-	-
Czech Republic	-	-	-	-	-	1,743	-
Denmark	C	154	154	2.8	161	163	128
Estonia	C	19	19	1.4	13	0	0
Finland	C	21	21	0.4	21	10	14
France	A	-	-	-	108	-	-
Germany	C	1,162	1,162	1.4	759	903	1,100
Greece	-	-	-	-	0	-	-
Hungary	-	-	-	-	-	7	-
Ireland	C	125	125	3.0	125	61	95
Italy	-	-	-	-	18	3	5
Latvia	0	0	-	-	-	-	-
Lithuania	0	0	-	-	-	-	-
Luxembourg	C	8	8	1.8	11	-	-
Malta	C	23	23	5.7	5	-	-
The Netherlands	C	64	64	0.4	46	30	51
Poland	A	4	4	<0.1	-	3	-
Portugal	-	-	-	-	-	-	9
Slovakia	C	61	61	1.1	4	4	1
Slovenia	C	48	-	-	9	2	-
Spain	A	16	16	<0.1	15	-	-
Sweden[3]	C	385	336	4.3	364	149	52
United Kingdom	C	1,171	1,171	2.0	1,130	926	974
EU-Total		**3,314**	**3,217**	**1.2**	**2,896**	**4,085**	**2,496**
Iceland	C	1	-	-	-	-	-
Norway	C	18	18	0.4	18	12	15

1. EU-total incidence is based on population in reporting countries
2. A: Aggregated, C:= Case based, 0: 0 cases reported, -: no report

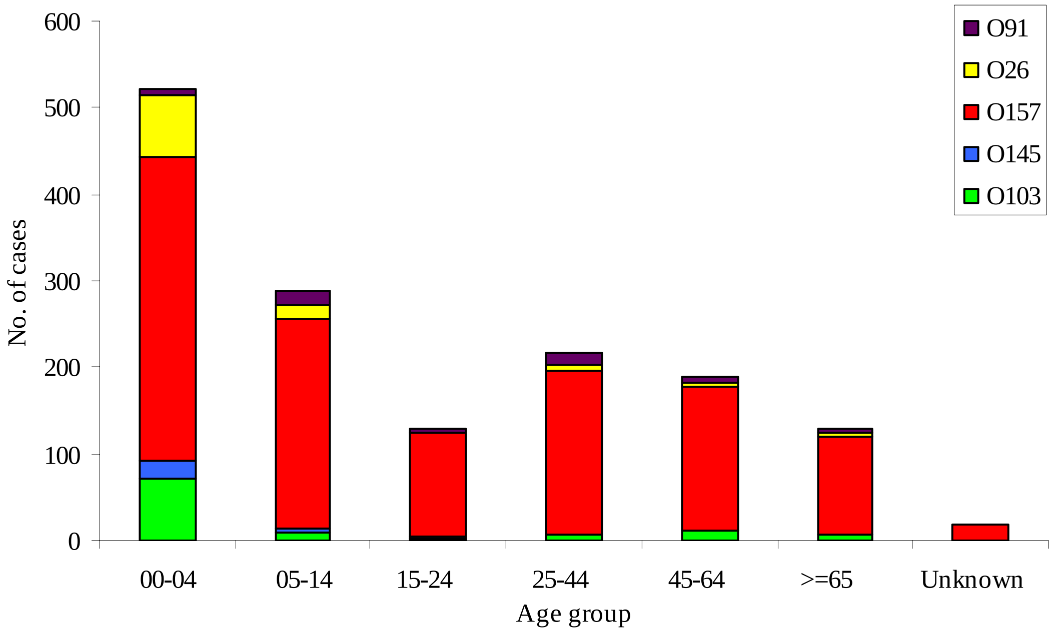
3. In Sweden, in July 2004 the reporting system changed so all serovars became notifiable, before this date only VTEC O157 was notifiable

Information about the serogroup was available for 1,717 out of the 2,877 of the confirmed cases reported through BSN. The most commonly identified serogroup was O157, followed by O26, O103, O91 and O145. These five serogroups accounted for 87.1 % of the cases with information about serogroup. From Enter-net, serogroup information was available for 2,528 out of 2,895 (87.3%) of the cases. The ranking and the relative frequency of the serogroups in the Enter-net data were similar to the one in BSN (Table VT2). Interestingly the BSN data showed that 68% of the O26 cases and 67% of the O103 cases were identified among patients in the age group 0-4 years. Apparently, in this age-group not only the O157- but also the O26- and O103 –serogroups contribute significantly (Figure VT1).

Table VT2. Reported confirmed VTEC cases in humans with known serogroup (top 5), 2005 (BSN and Enter-net)

	BSN		Enter-net	
Serogroup	**No. of cases**	**%**	**No. of cases**	**%**
O157	1,200	69.9	1,745	69.0
O26	103	6.0	168	6.6
O103	107	6.2	124	4.9
O91	55	3.2	84	3.3
O145	31	1.8	56	2.2
Other	221	12.9	351	13.9
Total	**1,717**	**100**	**2,528**	**100**

Figure VT1. Distribution of confirmed VTEC cases in humans by serogroup and age group, 2005 (BSN)



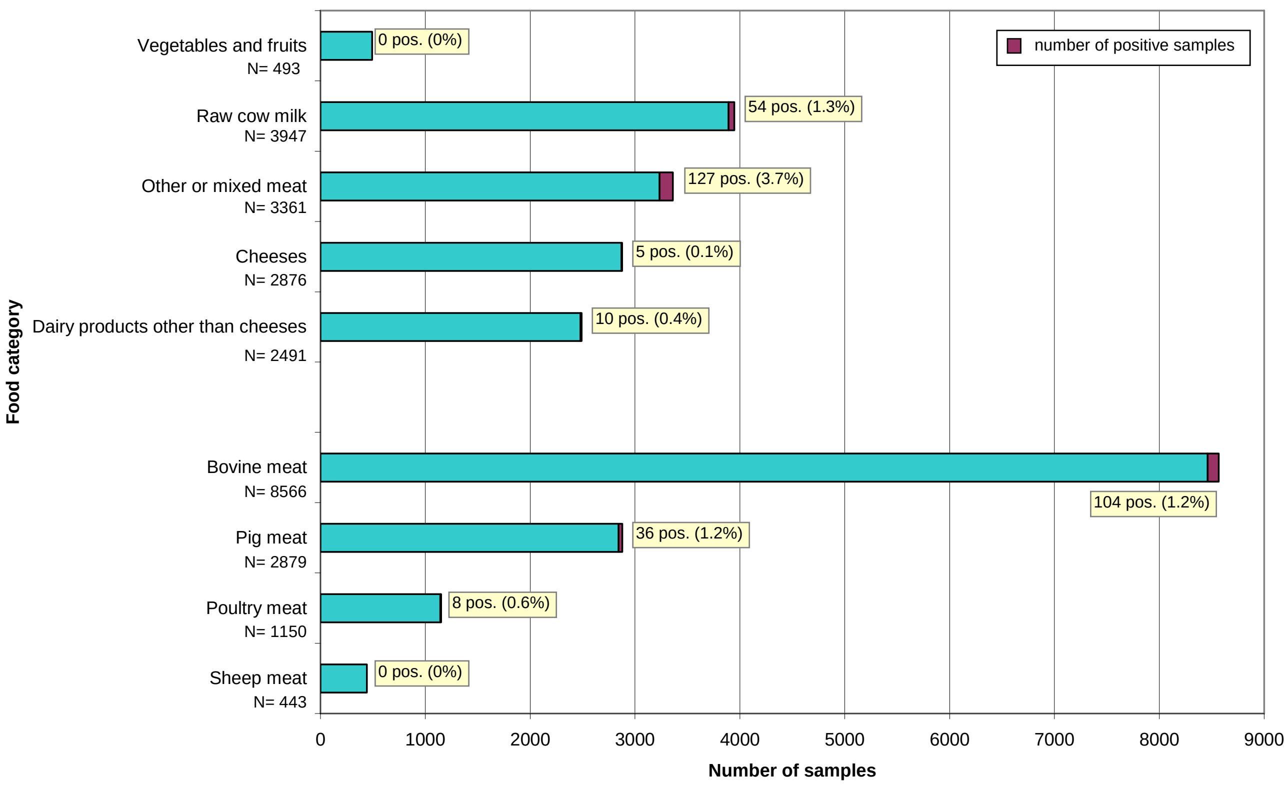
Overall, more than one third of the VTEC cases occurred in 0-4 year old children. However, this was different in Slovakia (57% of cases in ≥ 65 year olds), in Sweden (28% in the 25-44 years age group) and in The Netherlands (almost equal distribution with around 20% of the cases in the age groups from 0-24) (Level 3). The overall gender ratio female/male was 1.2, indicating slightly more cases among women (see Level 3). Interestingly, data from Enter-net indicate that the gender ratio differs between O157 and non-O157 cases.

There is a marked seasonality in human VTEC cases, and most cases are reported in the late summer, from August through October. However, if the seasonal distribution is looked at separately for O157 and non-O157 VTEC, it becomes apparent that the overall trend is determined by the predominant O157 serogroup. For the non-O157, a broader interval can be identified ranging from April/May to September, please refer to Level 3.

3.4.2. VTEC in food

The VTEC in food data reported by 16 MS, and one non-MS are presented in Tables VT3 to VT6. 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 derives from food of bovine origin. All reported data for food are shown in Level 3.

Figure VT2. Number of food samples tested for VTEC by food category, 2005



* Fresh meat, including minced meat and meat preparations. Data are only presented for sample size ≥25

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. Most investigations of food are based on sample weights of 25 grams or swabbing of carcass surfaces (size of swabbed area and stage of swabbing varies). The most widely applied analytical method is solely aimed at detecting *E. coli* O157. A few studies have been performed by the use of methods detecting VTEC e.g. immunological or DNA amplification based methods. In these studies VTEC are isolated, and in a few cases characterised with regard to O-serogroup. However, most data are reported without specification of the applied method and without specification of O-serogroup or O:H serotype. While interpreting the results, it should also be noted that seasonal variation may have had an effect on the outcome of the investigations.

Table VT3 provides an overview of the reported findings in fresh bovine meat at different levels of production. Data was provided by 12 MS, out of which 8 reported findings of VTEC. In these investigations the proportion of positive samples was generally low, but rates up to 7.1% were reported by Slovenia, Spain and Poland. In all investigations, where positive VTEC findings were reported, also VTEC O157 serotype was detected, except one survey on minced meat in Poland. VTEC findings were made both at the slaughter, processing and retail levels. Only Belgium and Denmark reported results from testing of carcass swabs and reported proportion of positive samples of VTEC O157 of 1.1% and 3.4%, respectively.

Germany also reported results from testing unspecified bovine meat for VTEC. Out of the 155 samples taken 2 were positive for VTEC, and in one of the samples the serogroup VTEC O91 was detected. This serogroup is frequently reported as human pathogenic (Level 3).

Together 8 MS reported on investigations in raw cow milk (Table VT4). Three MS reported VTEC findings at levels 1.9-4.4%. Most studies were targeted to raw cow milk intended for direct human consumption, where no positive findings were reported. The largest survey was conducted in Germany, where 1.9% of 2,681 samples from non specified raw milk intended for direct human consumption at a farm was positive for VTEC. The serogroup VTEC O91 was isolated from one of the samples. Only Latvia reported detection of VTEC O157 in milk. All data are presented in Level 3

The VTEC findings reported by 9 countries in dairy products are presented in Table VT5. In most investigations no VTEC positive samples were found. However, Germany reported low levels of VTEC in products made of raw or low heat treated cow milk (0.3-2.3%). Spain, Italy and Slovakia found also VTEC positive samples from cheeses and other dairy products. Serogroup O157 was detected by Italy and Slovakia.

Table VT3. VTEC in fresh bovine meat[1], 2005

	Description	N	VTEC		VTEC O157	Add. serotype information
			Pos	% Pos	Pos	
At slaughter, cutting/processing plant						
Belgium	Carcass swabs[2]	2,554	28	1.1	28	
	Fresh[3]	307	3	1.0	2	Unspecified (1)
	Minced meat[4]	281	0	0	-	
Denmark	Carcass swabs[2]	474	16	3.4	16	
Latvia	Fresh[3]	100	0	0	-	
Slovenia	Fresh[3]	101	6	5.9	6	
Spain	Fresh[2]	76	4	5.3	1	
	Fresh[4]	84	1	1.2	1	
At retail						
Belgium	Meat preparation	116	0	0	-	
	Minced meat	171	1	0.6	1	
Czech Republic	Minced meat	39	0	0	-	
Ireland	Fresh	164	1	0.6	1	
Latvia	Fresh	146	0	0	-	
	Minced meat	95	0	0	-	
Spain	Fresh	102	3	2.9	2	Unspecified (1)
Level of sampling not specified						
Austria	Fresh/minced	28	0	0	-	
Czech Republic	Fresh	93	0	0	-	
Italy	Fresh	747	3	0.4	3	
	Minced meat	404	0	0	-	
Luxembourg	Fresh meat	91	1	1.1	1	
The Netherlands	Fresh meat	964	0	0	-	
Poland	Fresh	285	0	0	-	
	Minced meat, intended to be eaten raw	99	7	7.1	-	

1. Data are only presented for sample size >=25.
2. In Belgium, Denmark, Latvia and Spain, samples collected at slaughter
3. In Belgium and Slovenia, samples collected at cutting plant
4. In Belgium and Spain, samples collected at processing plant

Table VT4. VTEC in raw cow milk[1], 2005

	Description	N	VTEC Pos	VTEC % Pos	VTEC O157 Pos	Add. serotype information
Austria	Intended for direct human consumption or cheese production	26	1	3.8	-	Non typeable
Belgium	Intended for direct human consumption	175	0	0	-	
Czech Republic	Intended for direct human consumption	103	0	0	-	
Germany	Intended for direct human consumption	96	0	0	-	
	Not specified	2,681	51	1.9	-	O91,O8, O84, O88, O136 (2), unspecified (45)
Italy	Intended for direct human consumption	32	0	0	-	
	For manufacture of products made of raw or low heat treated products	95	0	0	-	
	Not specified	115	0	0	-	
Latvia	Not specified	45	2	4.4	2	
Slovakia	Not specified	39	0	0	-	
Spain	Intended for direct human consumption	540	0	0	-	

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

Table VT5. VTEC findings in dairy products[1], 2005

Country	Description	Point of sampling	N	VTEC Pos	VTEC % Pos	VTEC O157 Pos	Add. serotype information
Dairy products, other than cheese							
Belgium	Made from raw or low heat-treated milk	At farm	183	0	0	-	-
Czech Republic	Made from raw or low heat-treated milk	-	80	0	0	-	-
Germany	Made from raw or low heat-treated milk	-	381	1	0.3	-	O136
Greece	-	-	158	0	0	-	-
Slovakia	-	-	47	0	0	-	-
Spain	-	-	368	9	2.4	-	-
Cheeses, made from cow milk							
Belgium	Made from raw or low heat-treated milk	At farm	141	0	0	-	-
	Made from raw or low heat-treated milk	At processing	39	0	0	-	-
Germany	Made from raw or low heat-treated milk	-	43	1	2.3	-	O22
Italy	-	-	220	1	0.5	1	-
Cheeses, made from goat milk							
France	Made from raw or low heat-treated milk	At processing	871	0	0	-	-
Italy	-	-	959	0	0	-	-
Cheeses, made from mixed milk							
Italy	-	-	456	1	0.2	-	-
Slovakia	-	-	88	2	2.3	2	-
Norway	-	-	59	0	0	-	-

1. Data are only presented for sample size ≥ 25

Findings of VTEC from pig meat and poultry meat were typically at low levels, except in Poland where 11.5% of turkey meat samples were positive. In sheep meat, no findings of VTEC were reported. The highest proportion of samples positive for VTEC was from the mixed meat category often reported as minced. Germany reported the highest findings, 6.7% in mixed red meat and 6.4% in minced mixed red meat. Further, Germany reported high proportion of positive samples in diced red meat (13.6%) and in wild game meat of land mammals (14.8%). VTEC O157 was detected in a few samples of pig and poultry meat as well as in mixed meat. The serogroup O91 (related to human infections) was reported by Germany in mixed red meat. Table VT6 presents the results of VTEC investigations conducted on fresh meats of animal species other than cattle.

Table VT6. VTEC findings in fresh meat other than bovine[1], 2005

	Description	Place of sampling	N	VTEC Pos	VTEC % Pos	VTEC O157 Pos	Add. serotype information
Pig meat							
Czech Republic	Swab	At slaughter	66	0	0	-	
Italy	-	-	449	0	0	-	
	Meat preparation	-	97	1	1.0	1	
	Minced meat	-	383	0	0	-	
The Netherlands		-	401	1	0.2	1	
Poland	Minced meat, intended to be eaten raw	-	499	31	6.2	-	
Spain	-	At slaughter	105	1	1.0	-	
	-	At processing	118	1	0.8	1	
	-	At retail	128	0	0	-	
Poultry meat							
Italy	Broiler	-	531	0	0.0	-	
	Turkey	-	48	2	4.2	-	
Latvia	-	At slaughter	25	0	0	-	
	-	At retail	50	1	2.0	1	
Poland	Turkey	-	26	3	11.5	-	
Spain	-	At slaughter	67	2	3.0	1	Unspecified (1)
	-	At processing	95	0	0	-	
	-	At retail	97	0	0	-	
Sheep meat							
Germany	-	-	33	0	0	-	
Italy	-	-	95	0	0	-	
	-	-	39	0	0	-	
The Netherlands	-	-	129	0	0	-	
Spain	-	At slaughter	84	0	0	-	
	-	At processing	31	0	0	-	
	-	At retail	32	0	0	-	
Other meat							
Austria	Mixed meat, minced	-	159	3	1.9	0	O6:H10, O100:H-, O113:H4
Germany	Mixed "red" meat	-	535	36	6.7	0	O36, O91, O146, unspecified (27)
	Diced "red" meat	-	88	12	13.6	0	O36, unspecified (11)
	Mixed "red" meat, minced	-	577	37	6.4	0	O12, O22, O79, O91 (2), O146 (2), O166, unspecified (29)
	Meat from wild game - land mammals	-	162	24	14.8	0	O5, O15, O21(2), O27, O36, O146 (4), unspecified (14)
Ireland	Minced meat	At retail	40	0	0.0		
Luxembourg	Mixed meat, minced	-	60	2	3.3	2	
Slovenia	Mixed meat, minced	At retail	101	0	0	0	
	Fresh meat (red meat)	At retail	51	0	0	0	
Spain	Goat, fresh	At slaughter/ retail	51	0	0	-	

1. Data are only presented for sample size ≥ 25

A few countries reported on VTEC in meat products. Various types of meat products were examined by Czech Republic (N=54), Greece (N=68) and Slovakia (N=205) with no positive findings. Spain investigated a total 1,682 meat product samples and found only three out of 892 samples of mixed meat positive for VTEC (Level 3). Germany found one VTEC O2 positive sample out of 399 investigated samples of stabilised red meat products (Level 3).

Table VT7 presents VTEC in other foodstuffs. A number of investigations were carried out on fruit and vegetables, including sprouted seeds. No positive findings were reported for these types of foodstuffs. However, Greece isolated VTEC from raw fish (18.4%), while Spain reported findings of VTEC in 0.5% of investigated samples of processed food/prepared dishes.

Table VT7. VTEC findings in other foodstuffs[1], 2005

	Description	Place of sampling	N	VTEC		VTEC O157
				Pos	% Pos	Pos
Austria	Processed food/prepared dishes	-	71	0	0	-
Belgium	Vegetables	At processing/retail	76	0	0	-
	Fruits and vegetables, pre-cut, ready to eat	-	114	0	0	-
Greece	Potable water	-	115	0	0	-
	Raw fish	-	163	30	18.4	-
	Live bivalve molluscs	-	70	0	0	-
Latvia	Sprouted seeds	At retail	29	0	0	-
Slovakia	Other products of animal origin	-	78	0	0	-
	Fruits, pre-cut	-	67	0	0	-
	Sprouted seeds	-	45	0	0	-
Slovenia	Fruits, pre-cut	-	67	0	0	-
	Sprouted seeds	-	45	0	0	-
Spain	Vegetables	-	50	0	0	-
	Eggs	-	53	0	0	-
	Processed food/prepared dishes	-	1,333	6	0.5	-

1. Data are only presented for sample size ≥25

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

3.4.3. VTEC in animals

Fifteen MS reported on occurrence of VTEC in animals. The data is presented in Table VT8 for cattle and in Table VT9 for the other animal species.

The data from different studies is not directly comparable due to difference in the sampling and testing schemes. A lot of the reported data is based on samples that are analysed for *E. coli* serogroup O157 and only a minor part of the investigated samples have been analysed with methods that detect VTEC. The animal data are, in many cases, reported without specification of the applied method and without specification of O-serogroup or O:H serotype. While interpreting the results, it should also be noted that seasonal variation may have had an effect on the outcome of the investigations. All submitted data of VTEC in animals is presented at Level 3.

The majority of the VTEC data from cattle (Table VT8) are generated from investigating single animals. However, a few data are presented at herd level. In addition, a few of the data are obtained by analysing non-randomly selected animals, e.g. in connection with foodborne outbreak investigations.

All the 14 MS except Estonia, Czech Republic, Lithuania and Slovakia reported VTEC findings in cattle. The prevalence ranged from 0.5% to 21.6%, Germany reporting the highest prevalence. VTEC findings were made from calves, dairy cows and meat production animals. The reported proportion of positive animals seemed not to differ remarkably between calves and dairy cows, where more information is available. 8 MS reported O157 serogroup findings, and the occurrence ranged form 0% to 6.0%, with the highest proportion reported by the Netherlands. Even though Germany reported the highest VTEC prevalence, they only found one human pathogenic serogroup, O91, from the samples.

Interestingly, Sweden reported a high proportion of positive samples in an on-going study where samples from ears of cattle are tested for VTEC. However, these results should not be compared with data from other testing since the samples were not randomly collected, but part of a pilot study.

Table VT8. VTEC in cattle[1,2], 2005

	Description	Unit	N	VTEC			Add. serotype information
				Pos	% Pos	VTEC O157	
Calves							
Denmark	Bull calves	-	165	6	3.6	6	Only investigated for O157
	Cows and calves	-	500	18	3.6	18	Only investigated for O157
Germany	< 1 year	-	140	0	0	-	
Italy	< 1 year	Herd	27	1	3.7	1	
The Netherlands	< 1 year, (Jan-Jun)	Herd	84	5	6.0	5	
	< 1 year, (Jul-Dec)	Herd	53	2	3.8	-	
Slovakia	< 1 year	-	38	0	0	-	
Dairy cows							
Austria	-	-	138	3	2.2	2	O157:H7; O157:H16 and O1:H10
Czech Republic	-	Batch	201	0	0	-	
Estonia	-	-	200	0	0	-	
The Netherlands	Jan-Jun	Herd	70	4	5.7	4	
	Jul-Dec	Herd	51	4	7.8	-	
Meat Production animals							
Austria	-	-	56	1	1.8	1	0157:H18
Czech Republic	-	Batch	250	0	0	-	
Lithuania	-	-	124	0	0	-	
Other, or not specified							
Latvia	From clinical cases	-	57	4	7.0	1	Unspecified (3)
Finland	-	-	1,564	8	0.5	8	Only investigated for O157
Germany	Cattle	-	305	66	21.6	-	O55, O91, not specified (64)
Italy	-	-	97	5	5.2	-	
	-	Holding	49	0	0	-	
	-	-	178	16	9.0	-	
Portugal	-	-	150	2	1.3		Rough (2)
Slovakia	-	-	59	0	0	-	
Slovenia	-	-	226	12	5.3	12	
Sweden	Ear samples	-	157	23	14.6	23	Non-random samples
	Faecal samples	-	568	24	4.2	24	

1: Animal based data if nothing else is stated

2. Data are only presented for sample size >= 25

Nine MS provided data on VTEC in other animal species and this data are presented in Table VT9. VTEC was isolated from several animal species: pigs, poultry, goats, sheep, cats and rabbits.

Table VT9. VTEC in animals other than cattle[1,2], 2005

	Remark	N	VTEC		Add. serotype information
Pigs			**Pos**	**% Pos**	
Czech Republic	Slaughter batches	625	0	0	
Denmark	Faecal sample	294	0	0	Only investigated for O157
Germany	-	249	23	9.2	
Italy	-	443	2	0.5	
	Holdings	63	2	3.2	
Latvia	Clinical cases	54	1	1.9	
Portugal	-	153	2	1.3	Serogroup O139 and "rough"
Poultry, unspecified					
Italy	-	46	6	13.0	
Latvia	Clinical cases	149	1	0.7	
Lithuania	Flocks	26	0	0	
Portugal	-	96	0	0	
Slovakia	-	52	0	0	
Goats					
Germany	-	34	4	11.8	
Portugal	-	52	0	0	
Sheep					
Austria	-	92	4	4.3	O26:H-, O66:H28, O6:H10 and O76:H19
Italy	-	272	15	5.5	
	Holdings	46	0	0	
Portugal	-	102	0	0	
Dogs					
Germany	-	62	0	0	
Italy	-	31	0	0	
Portugal	-	55	0	0	
Slovakia	-	22	0	0	
Cats					
Germany	-	62	2	3.2	O145 (2)
Portugal	-	31	0	0	
Other animals					
Germany	Not specified	75	7	9.3	O179, not specified (6)
Portugal	Birds	114	0	0	
	Pigeons	44	0	0	
Latvia	Not specified, from clinical cases	51	6	11.8	
Portugal	Solipeds, domestic	25	0	0	
	Zoo animals, all	306	0	0	

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

The highest proportions of positive samples from pigs were reported by Germany and Italy, 9.2% and 3.2% respectively, indicating the there may be a relatively high occurrence of VTEC in this animal species. Also high prevalences for poultry (13.0%) and goats (11.8%) were found by two MS.

No findings of VTEC O157 were reported in the other animal species other than cattle, but Austria and Germany isolated other serogroups (O145 or O26), which are known to be related to human VTEC cases, from sheep and cats.

Unfortunately, no information on the serogroups or toxin type of the isolated strains from pigs was provided. It is well known that a few serogroups of VTEC are related to oedema disease in piglets. Oedema disease causing VTEC strains from pigs are generally accepted as being non-pathogenic for humans.

The findings in the reported levels for VTEC and VTEC O157 in animals are comparable with the findings reported in the 2004.

3.4.4. Summary

In 2005, a total of 3,314 human VTEC cases were reported through BSN from 18 MS. There is no clear trend in the available data for human VTEC cases reported in the period 2003-2005. The overall incidence of human VTEC cases reported in the EU in 2005 was 0.9 per 100,000 population. There is a marked seasonality in human VTEC cases and more than one third of the VTEC cases occurred in young children. The most frequently identified serogroup was O157 (80%), followed by O26, O103, O91, and O145.

The data on VTEC in foodstuffs were mainly focused on non heat-treated products, where the likelihood of finding VTEC is the highest. Food of bovine origin was the food category most often sampled. VTEC, including VTEC O157, was detected, mainly at low frequencies, from bovine meat, pig meat and poultry meat. The serogroup O157 was most often isolated from fresh bovine meat with rates up to 6%. VTEC bacteria were also occasionally reported from raw cow milk and dairy products as well as game meat and fishery products. VTEC was not reported from investigations on fruit and vegetables.

In animals, VTEC and VTEC O157 were most often reported in cattle. However, VTEC finding were also made from pig, poultry, goats and sheep and cats.

The serogroup data confirm that bovine animals are a reservoir for human pathogenic VTEC strains, including VTEC O157. However, the data show that other VTEC serogroups, frequently isolated from human VTEC infections, can also be isolated from bovines, sheep and cats. In foodstuffs VTEC O157 was reported apart from bovine meat and cow milk, also in pig and poultry meat. Other serogroup related to human infections was reported in mixed red meat and cow milk.

The received data on VTEC investigations and serotypes indicate that there is a need for harmonisation of the analytical methods and more information on the serotypes present.This would enable proper analyses of the importance of the VTEC finding in food and animals to human health. The current lack of serotyping data and other relevant data such as VT subtype and presence of additional virulence factors makes it difficult to assess the public health impact of the presence of VTEC in various animal species and foodstuffs.

The data for VTEC in food and animals reported in 2005 are comparable with the data reported in 2004.

3.4.5. Sources of VTEC data

In humans, VTEC infections are notifiable in 16 MS and 2 non-MS Norway (see Appendix, Table VT1). Enterohaemorrhagic *E. coli* (EHEC) is notifiable in Cypres, Estonia, Greece and Ireland. In 2005, all human data for the Community Report were provided by the ECDC and were compiled, based on data reported through the Basic Surveillance Network and Enter-Net.

Food samples were collected in a variety of settings, such as abattoirs, cutting plants, dairies, wholesalers and at the retail level, and represented different matrices like carcass surface swabs, cuts of meats, minced meat, milk, cheeses, as well as 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, random national surveys and as part of HACCP or own check programmes. The number of samples collected and types of food sampled varied among individual MS.

In animals, VTEC is notifiable in 8 MS (Appendix, Table VT1). In Sweden, VTEC O157 became notifiable in cattle in 1996, however, since 1999, findings are notifiable only when associated with human infections.

Most of the animal samples were collected on the abattoir or at farm level. With the exception of a few cases, samples were taken from healthy animals.

3.5. Tuberculosis due to *Mycobacterium bovis*

Tuberculosis is the infection in cattle with any of the disease-causing mycobacterial species within the *Mycobacterium tuberculosis* complex. Man is the natural host for *M. tuberculosis. M. bovis* causes tuberculosis in cattle, but is also highly infectious in humans, which poses a serious zoonotic risk. Tuberculosis in humans caused by *M. bovis* is clinically indistinguishable from infections caused by *M. tuberculosis.* Birds as well as a wide range of animals are the hosts for *M. avium. M. avium* is also able to cause diseases in humans, especially in immunocompromised persons.The recently defined, *M. caprae*, causes tuberculosis among animals and, to a limited extent, in humans. This chapter focuses on zoonotic tuberculosis caused by *M. bovis.*

Transmission of tuberculosis from animals to humans occurs mainly through consumption of raw milk from infected cattle. It may be prevented by heat-treatment such as pasteurisation of milk and milk products. The introduction of pasteurisation and eradication programmes implemented in cattle in combination with vaccination of humans has significantly reduced human infections caused by *M. bovis*.

3.5.1. *M. bovis* in humans

In 2005, 17 MS and one non-MS reported data on tuberculosis due to *M. bovis* to the BSN (Basic Surveillance Network). Among these, nine MS reported 119 cases (see Table TB1).

In addition, Table TB1 shows the number of tuberculosis cases (case-based reporting) reported to EuroTB and in the annual zoonoses report between 2001 and 2004. In total, 14 countries reported to EuroTB during this period. However, only Norway and Austria reported the same number of human cases to both the zoonoses report and to EuroTB. For other countries such as Germany differences in the numbers of reported cases between BSN and EuroTB are due to different cut-off dates in the reporting.

Cases from Germany and The United Kingdom accounted for 77.3% of the cases reported to BSN in 2005. The total number of cases reported in 2005 increased by 25.3% compared to 2004. Differences in the number of cases during the period 2001-2004 are difficult to interpret since the number of countries reporting cases differs between years.

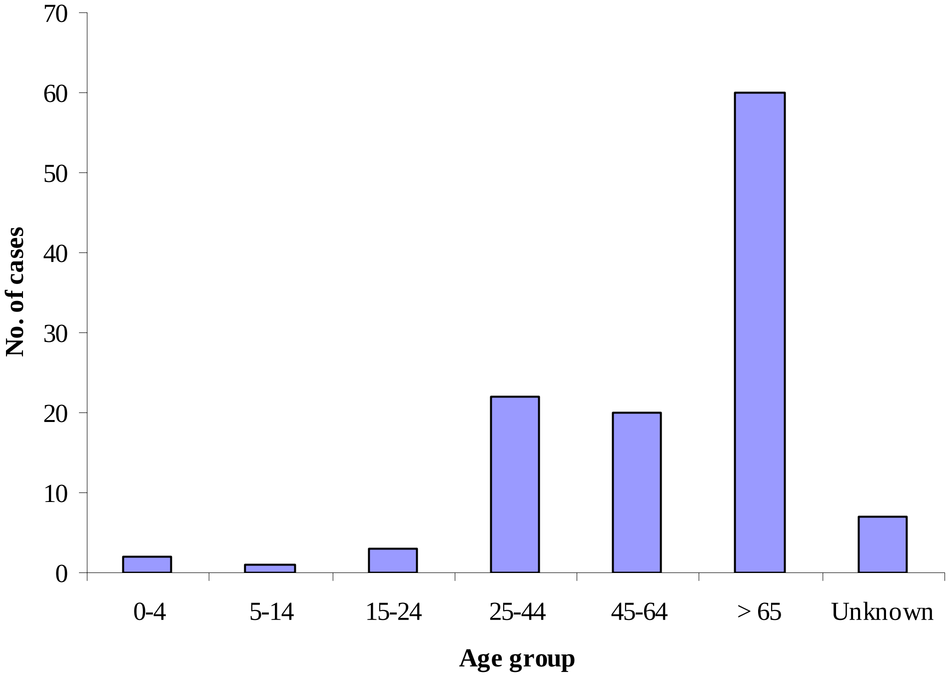
Table TB1. Reported tuberculosis M. bovis cases in humans and incidence[1] for confirmed cases, 2005 (BSN), and reported cases in 2001-2004 (zoonoses report and EuroTB). OTF[2] status is indicated

	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	-	-	-	-
The 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	0	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, 9 provinces are OTF

The distribution of human tuberculosis cases by age groups illustrates that most confirmed cases due to *M. bovis* are observed in age group >65 (Figure TB1). This seems to differ from the distribution pattern in 2004. The age distribution for all human tuberculosis cases in 2004 was available from EuroTB and shows an increase with age, with most cases occurring in the age group 25-44 after which the frequency declines again for the older age groups

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

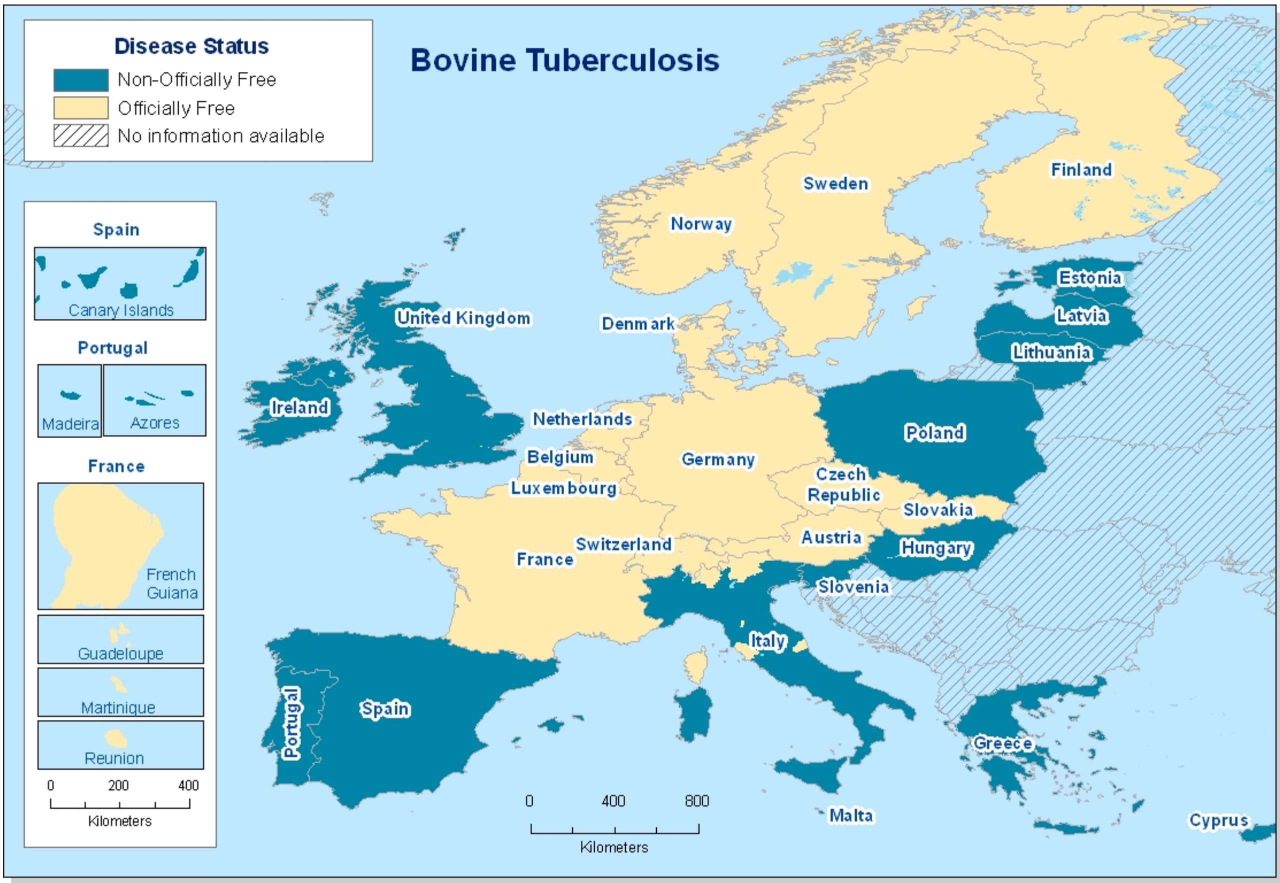


For further information on reported data on tuberculosis in humans please refer to Level 3.

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

Figure TB2 shows the status of the MS regarding bovine tuberculosis in the EU and 2 non-MS in 2005. As in 2004, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Luxembourg, The Netherlands, Sweden, Norway and Switzerland remained officially bovine tuberculosis-free (OTF) in accordance with the Community legislation. Slovakia was declared to be OTF in 2005 (Decision 2005/179/EC). Italy had additional provinces declared to be OTF (Decision 2005/28/EC) and has now nine OTF provinces. All reported data are presented in Level 3.

Figure TB2. Status of bovine tuberculosis, 2005



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 are used.

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.

Officially Tuberculosis Free (OTF) MS and non-MS

With the exception of Belgium and France, no bovine tuberculosis was detected in cattle herds during the year in the 11 OTF MS and two OTF non-MS (Table TB2). In total, 93 herds were tuberculin test positive in these two MS. Also in 2004, infected cattle herds were reported in Belgium (4) and France (65).

Table TB2. Tuberculosis due to *M. bovis* in cattle herds in OTF MS and OTF non-MS, 2004-2005

	2005				2004
Officially free MS	**No of existing herds**	**No of officially free herds**	**No of infected herds**	**% existing herds infected**	**% existing herds infected**
Austria	83,138		0	0	0
Belgium	42,204	42,199	5	0.01	0.01
Czech Republic	33,648	33,648	0	0	0
Denmark	27,748	27,748	0	0	0
Finland	21,493	21,493	0	0	0
France	264,131	264,043	88	0.03	0.02
Germany	179,100	-	-	-	-
Luxembourg	1,584	1,564	0	0	0
The Netherlands	57,361	57,361	0	0	0
Slovakia[1]	11,983	11,983	0	0	0
Sweden	27,626	27,626	0	0	0
OTF MS Total	**750,016**	**487,665**	**93**	**0.01**	**0.01**
Officially free non-MS					
Norway	21,500	21,500	0	0	0
Switzerland	45,433	45,433	0	0	-

1. Slovakia obtained OTF status in 2005

Non-OTF Member States

In total, 13 non-OTF MS reported 1,905,127 existing bovine herds and 0.6% were found infected or positive. No data were submitted by Hungary, but Hungary reported one positive cattle herd in 2004.

All reporting non-OTF MS perform national eradication programmes for bovine tuberculosis. Table TB3 shows the MS with no Community co-financed eradication programme, while Table TB4 shows the six MS with eradication programmes co-financed by the Community (Decision 2004/840/EC).

Five non-OTF MS: Cyprus, Estonia, Latvia, Lithuania and Malta, reported no herds tested positive during 2005 (Table TB3 and TB4). Amongst the non-co-financed non-OTF MS, The United Kingdom and Ireland reported the highest proportion of infected existing herds. Ireland reported similar numbers of infected herds detected during the year (3.1% vs. 3.1%) compared to last year, whereas The United Kingdom reported decreased numbers of infected cattle herds at the end of the year (3.2% vs. 4.0%) compared to last year.

Table TB3. Tuberculosis due to *M. bovis* in cattle herds in non co-financed non-OTF MS, 2004-2005

Non-officially free MS	2005				2004
	No. of existing herds	No. of officially free herds	No. of infected herds	% existing herds infected	% existing herds infected
Estonia	8,149	0	0	0	0
Ireland	123,322	118,869	3,787	3.07	3.0
Latvia	63,456	0	0	0	0
Lithuania	190,373	190,373	0	0	0
Malta	158	-	0	0	0
Slovenia	44,123	11,983	1	0	0
United Kingdom[1]	90,633	84,851	3,187	3.52	1.6
Non-OTF MS Total	**520,214**	**406,076**	**6,975**	**1.34**	**1.5**

1. In The United Kingdom, only data from England, Wales and Scotland

Table TB4. Tuberculosis due to *M. bovis* in cattle herds in co-financed non-OTF MS, 2004-2005

Non-officially free MS	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
Cyprus	355	122	0	0	0	0	0
Greece	34,286	8,492	82	0.24	0.97	0.36	1.21
Italy	168,436	90,221	1,059	0.63	1.17	0.58	1.05
Poland	930,463	229,712	124	0.01	0.05	0.02	0.05
Portugal	83,193	62,532	136	0.16	0.22	0.20	0.26
Spain	166,306	142,880	2,168	1.30	1.52	1.77	1.80
Non-OTF MS Total	**2,313,448**	**533,959**	**3,569**	**0.16**	**0.69**	**0.35**	**0.77**

Amongst the co-financed non-OTF MS, Spain reported the highest proportion of positive existing herds (1.30%) although this indicator decreased compared to 2004. All co-financed non-OTF MS reported similar or less positive cattle herds in 2005 compared to 2004, except Italy which reported an increase for both indicators (Table TB3).

An overview of the *M. bovis* status of cattle herds in co-financed non-OTF MS, at the end of 2005, is given in Table TB5. The percentage of officially free herds amongst the existing herds varies from 25% (Poland) to 86% (Spain).

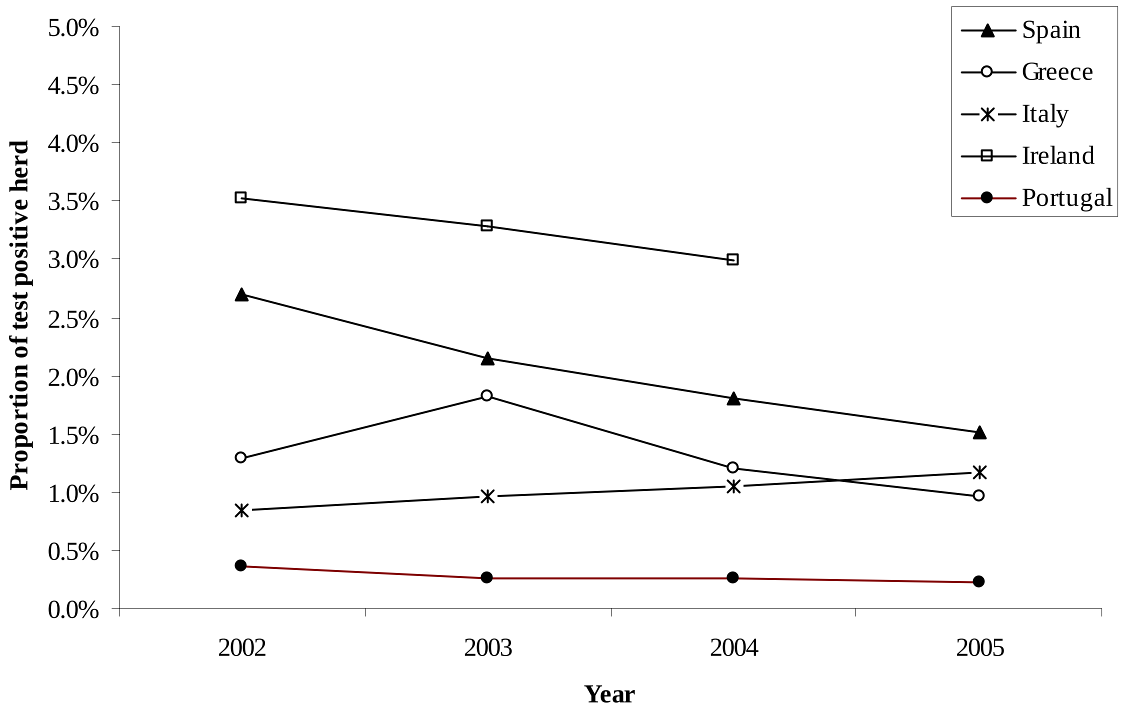
Table TB5. Overview of the *M. bovis* status of cattle herds in co-financed non-OTF MS, 2005

Non-officially free MS	No. of existing herds	No. of herds under control[1]	No. of Officially free herds
Cyprus	355	355	122
Greece	34,286	30,553	21,674
Italy	168,436	102,774	95,653
Poland	1,860,872	235,972	1,162,686
Portugal	83,193	66,395	70,267
Spain	166,306	146,924	143,026
Non-OTF MS Total	**2,313,448**	**582,973**	**1,493,428**

1. Herds under the control programme

Figure TB3 shows the proportion of cattle herds tested tuberculin positive in routine testing during the year, from 2002 to 2005 in selected non-OTF MS. Compared to the previous years, this indicator decreased in Greece, Ireland (no data for 2005) Portugal, and Spain. But in Portugal it decreased only marginally, whereas it slightly increased in Italy (Figure TB3).

Figure TB3. Cattle herds positive for *M. bovis* in selected non-OTF MS, 2002-2005



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 2005, *M. bovis* was detected in sheep in The United Kingdom, and in goats in Portugal, Spain and Italy. In previous years, *M. bovis* in sheep or goats was also reported in France (2002), Ireland (1999 and 2000), Portugal (1999, 2002, 2003 and 2004), Spain (2000, 2001 and 2004) and The United Kingdom (2001, 2002 and 2004).

Findings of *M. bovis* in pigs are notifiable in Denmark, Finland, Sweden and Norway. In 2005, *M. bovis* was detected in pigs only in The United Kingdom, as has been the case since 2002. Further, Spain reported tuberculosis cases in wild boar.

Surveillance of tuberculosis in farmed deer is also performed mostly by *post-mortem* meat inspection, but in some MS also by intradermal tuberculin tests in herds. *M. bovis* is notifiable in farmed deer in Denmark, Finland, Ireland, Sweden, Great Britain and Norway. As in the previous years, no positive findings were reported for farmed deer (herds/animals) during 2005.

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 (Spain and Portugal), foxes (Spain) and in wild boars (Spain and Italy) in 2005.

In 2005, tuberculosis due to *M. bovis* was diagnosed in zoo animals such as lamas (The United Kingdom), monkeys (Belgium), as well as in one onager and in one hyrax (The Netherlands).

All reported data from Mycobacteria are presented in Level 3.

3.5.4. Summary

In 2005, the total number of human cases of tuberculosis due to *M. bovis* (119 cases) was higher than those reported between in 2001 and 2004. Cases from Germany and The United Kingdom accounted for 77.3% of the cases reported to BSN in 2005. The total number of cases reported this year increased by a 25.3% in comparison to the 95 cases reported in 2004. Most cases due to *M. bovis* belonged to the age group $\geq$ 65.

Eleven MS are officially free of bovine tuberculosis, and only very few positives herds were reported by two of them. The occurrence of bovine tuberculosis among cattle herds in the non-OTF MS was 0.6%. Compared to 2004 the proportion of infected herds in the non-OTF MS generally decreased, with the exception of Italy. Amongst the co-financed non-OTF MS, a general decreasing trend over the four previous years is discernable in the proportion of herds tested positive for bovine tuberculosis. 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.

3.5.5. Sources of tuberculosis data

Tuberculosis in humans is notifiable in 22 MS, Norway and Switzerland. Cyprus, Luxembourg, Malta and Poland provided no information on their notification systems. 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).

Rules for intra-Community trade on bovine animals, 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 2005 were approved for Cyprus, Greece, Spain, Italy, Poland and Portugal (Commission Decision 2004/840/EC).

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.

3.6. *Brucella*

Brucellosis is an infectious disease caused by some bacterial species of the genus *Brucella.* There are four 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, or 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 four 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.

3.6.1. Brucellosis in humans

In 2005, 22 MS and two non-MS provided data on human brucellosis. Of these, eight countries (Estonia, Iceland, Latvia, Lithuania, Luxembourg, Malta, Norway and Slovakia) reported no cases. Among the remaining 16 reporting countries, two (Austria and Hungary) provided aggregated data only. A total of 1,218 brucellosis cases were reported in EU, of which 88.7% were reported as confirmed cases (Table BR1). The overall incidence of brucellosis in 2005 was 0.2 confirmed cases per 100,000 population, which is slightly lower than the reported incidence in 2004 (0.4 cases per 100,000 population). However, it should be noted that calculations of incidence for 2001-2004 were based on the total number of reported cases and not on confirmed cases. The incidences are, therefore, not completely comparable.

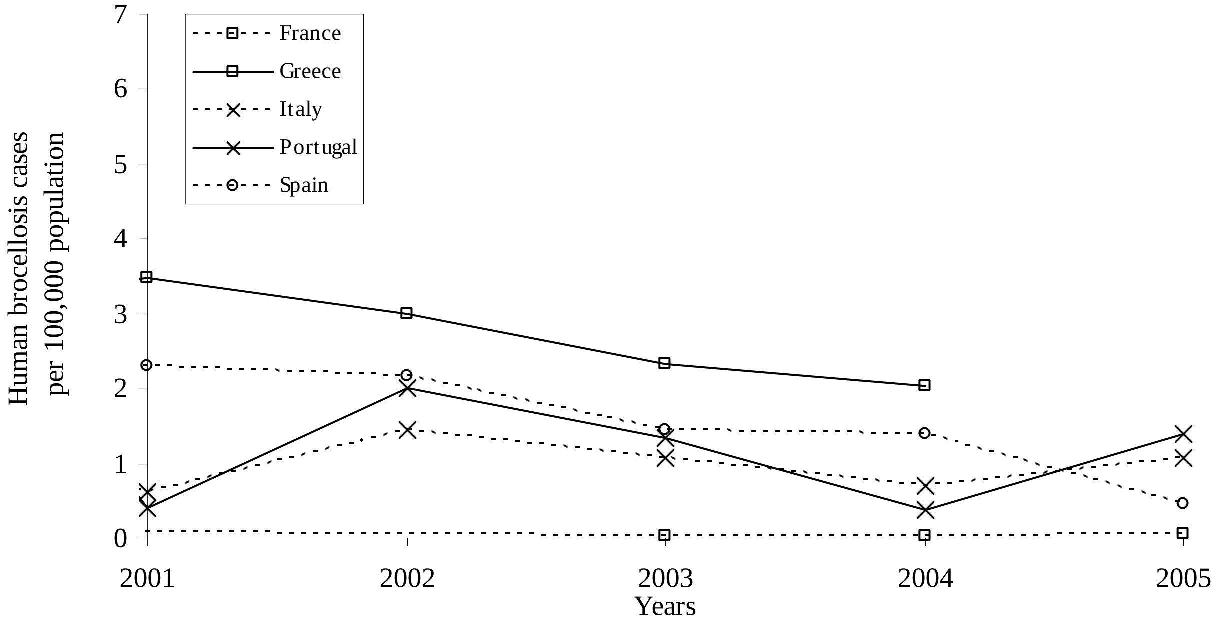
The highest incidences of human brucellosis in 2005 were reported in Portugal, Italy and Spain accounting for 90% of all the confirmed cases (Table BR1). No data were available from Greece, which was among the MS with the highest incidence in 2004 (2.0). Following a number of years with a decreasing trend in incidence, Italy and Portugal experienced increases in the observed human incidence from 2004 to 2005. In contrast, Spain has observed a continued decrease in human incidence from 1.4 in 2004 to 0.5 in 2005. Nonetheless, Italy, Spain and Portugal have generally experienced a decrease in the incidence of human brucellosis over the last five years, where brucellosis eradication programmes among cattle, sheep and goat populations have been ongoing (Figure BR1). The same trend has been observed from 2000 to 2004 in Ireland (from 0.4 to 0.2), which has occurred parallel to the implementation of specific eradication programmes for bovine brucellosis.

Table BR1. Reported brucellosis cases in humans, 2001-2005 and incidence for confirmed cases in 2005, OBF and ObmF[2] status is indicated

	2005				2004	2003	2002	2001
	Report Type[3]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases			
Austria (OBF/ObmF)	A	2	2	<0.1	2	5	4	2
Belgium (OBF/ObmF)	C	2	2	<0.1	8	0	1	1
Cyprus	C	2	2	0.3	1	5	7	1
Czech Republic (OBF/ObmF)	C	1	1	<0.1	0	-	-	-
Denmark[4] (OBF/ObmF)	-	-	-	0	4	14	16	18
Estonia	0	0	0	0	0	0	0	0
Finland (OBF/ObmF)	C	1	1	<0.1	1	1	0	1
France[5](OBF)	C	40	35	<0.1	19	21	37	-
Germany (OBF/ObmF)	C	31	31	<0.1	32	27	35	25
Greece	-				223	255	327	379
Hungary (ObmF)	A	1	1	<0.1	0	-	-	-
Ireland[8] (ObmF)	C	53	7	0.2	2[7]	5	4	14
Italy[9]	C	632	632	1.1	398	-	820	343
Latvia	0	0	0	0	0	-	-	-
Lithuania	0	0	0	0	1	0	-	-
Luxembourg (OBF/ObmF)	0	0	0	0	-	-	-	-
Malta	0	0	0	0	-	-	-	-
The Netherlands (OBF/ObmF)	C	5	2	<0.1	8	4	5	1
Poland	C	4	3	<0.1	1	4	2	3
Portugal[6]	C	170	147	1.4	39	139	206	40
Slovakia (OBF/ObmF)	C	0	0	0	0	1	0	0
Slovenia (ObmF)	-				0	1	-	-
Spain[10]	C	251	196	0.5	589	596	886	924
Sweden (OBF/ObmF)	C	11	6	-	3	3	5	2
United Kingdom (OBF[7]/ObmF)	C	12	12	<0.1	31	21	37	27
EU-Total		**1,218**	**1,080**	**0.2**	**1,362**	**1,102**	**2,392**	**1,781**
Iceland	0	0	0	0	-	-	-	-
Norway (OBF/ObmF)	0	0	0		2	3	3	2

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 departements are ObmF
6. In Portugal, the Azores are OBF/ObmF
7. In The United Kingdom, only Great Britain is OBF
8. In Ireland, only confirmed cases. One additionally unspecified case and 57 probable cases were reported
9. In Italy, 41 provinces are OBF and 44 provinces are ObmF
10. In Spain, the Canary Islands are ObmF

Figure BR1. Incidence of human brucellosis in selected non-OBF MS, 2001-2005

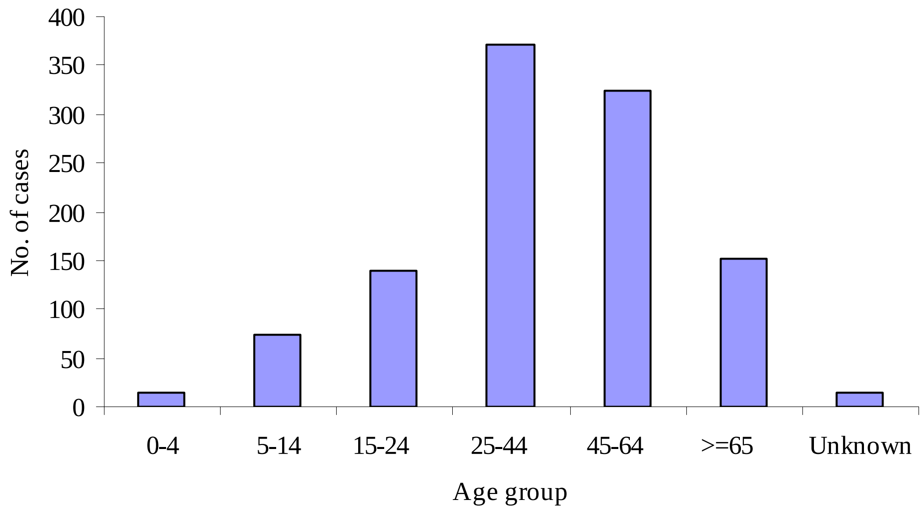


In 2005, the majority (79.0%) of confirmed brucellosis cases in humans occurred from February to August with a peak in May, due to the cases reported by Italy.

The age distribution of confirmed cases is presented in Figure BR2. Overall, 63.9% of cases occurred in persons aged between 25 and 64 years. Cases among children aged less than 15 years accounted for 8.1 % of all the cases.

For more details on seasonal distribution, and age and gender distribution, see Level 3.

Figure BR2. Age distribution of confirmed human cases of brucellosis, 2005



Five countries reported data on imported and domestically acquired cases. In these countries, imported cases accounted for 5% of the confirmed cases. Interestingly, three of the countries (Germany, The Netherlands and Sweden) are recognised as Officially Brucellosis free/Officially *B. melitensis* free (OBF/ObmF). For example, Germany (OBF/ObmF) reported 14 domestic cases in 2005. However, non of the Swedish cases with unreported country of infection were suspected to be of domestic origin.

In 2005, information about *Brucella* species was available for 5.6% of the reported confirmed cases and *B. melitensis* was the cause in 90.1% of the cases. This is in concordance with the reported findings in 2004.

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

3.6.2. *Brucella* in food

Five MS reported on testing of milk, cheese and dairy products for the presence of *Brucella*. The majority of samples were of raw milk, and *Brucella* was only detected in samples from Greece and Italy (Table BR2). The number of collected samples ranged from few samples to many thousands. All data on *Brucella* in food are presented in Level 3.

Since 2000, *Brucella* in raw cow milk has only been reported by Greece, Italy and Portugal. In Portugal, the occurrence has decreased since 2002, with no findings in 2005. Greece also experienced a decrease in the proportions of positive samples from 2002-2004, but in 2005, 6.1% of the investigated samples were found positive. No samples from cow milk were found positive in Italy in 2005.

Table BR2. Number of food samples tested for *Brucella*, 2005

	Description	N	Pos	% Pos
Raw milk from cows				
Greece		213	13	6.1
Italy		615	0	0
Belgium[1]	Milk for manufacture	80,025	0	0
Italy[1]	Milk for manufacture	1,482	0	0
Milk from sheep/other animals/unspecified				
Italy	Sheep, raw	309	7	2.3
	Buffalo, raw	31	0	0
	Other animal milk / unspecified	932	7	0.8
Cheese made from milk from cows				
Italy	Soft and semi-soft	109	0	0
Italy[2]	Soft and semi-soft	195	0	0
Italy		36	0	0
Cheese made from milk from sheep/other animals/unspecified				
Italy	Sheep's milk, soft and semi soft	76	2	2.6
	Sheep's milk	366	1	0.3
	Other animal milk/unspecified	917	11	1.2
	Buffalo	547	0	0
Total		**85,853**	**41**	**0.05**

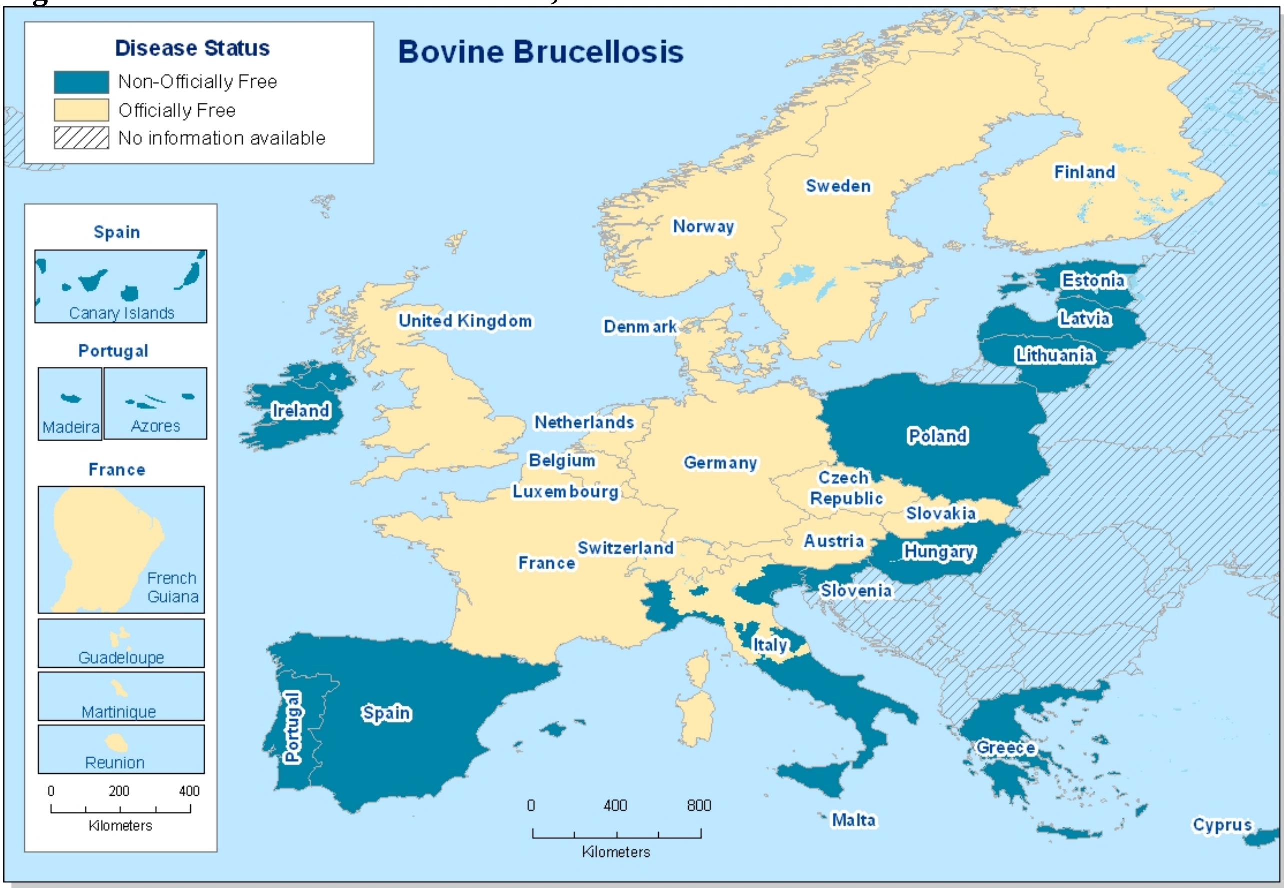
Note: Data are only presented
for sample size ≥25
1. Intended for manufacture of pasteurised/UHT products
2. Made from raw or low heat-treated milk

3.6.3. *Brucella* in animals

Cattle

The status of bovine brucellosis in the EU and non-MS in 2005 is presented in Figure BR3.

Figure BR3. Status of bovine brucellosis, 2005



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 are used.

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 in 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 over the 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 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 mean 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) MS and non-MS
In 2005, France and Slovakia obtained OBF status, which means that 12 MS and two non-MS are now OBF. In The United Kingdom only Great Britain is OBF. During 2005, bovine brucellosis was not detected in cattle herds in any of the OBF countries (Table BR3).

Table BR3. *Brucella* in cattle herds in OBF MS and OBF non-MS, 2004-2005

	2005				2004	
Officially free MS	**No. of existing herds**	**No. of officially free herds**	**No. of infected herds**	**% existing herds infected**	**No. of infected herds**	**% existing herds infected**
Austria	83,138	83,138	0	0	0	0
Belgium	42,204	42,204	0	0	0	0
Czech Republic	33,648	33,648	0	0	0	0
Denmark	27,748	27,748	0	0	0	0
Finland	21,493	21,493	0	0	0	0
France[1]	264,131	264,131	0	0	1	0
Germany	179,100	-	-	-	-	-
Luxembourg	1,584	-	0	0	0	0
The Netherlands	57,361	57,361	0	0	0	0
Slovakia[1]	11,983	11,983	0	0	0	0
Sweden	27,626	27,626	0	0	0	0
United Kingdom (GB)	87,000	87,000	0	0	0	0
OBF MS Total	837,016	656,332	0	0	0	0
Officially free non-MS						
Norway	21,500	21,500	0	0	0	0
Switzerland	45,433	45,433	0	0	-	-

1. France and Slovakia obtained OBF status in 2005

Non-OBF Member States

In 2005, the 13 non-OBF MS (in The United Kingdom, only Northern Ireland) reported a total of 1,788,519 existing bovine herds, of which 0.26% was found infected or positive for bovine brucellosis. No data was submitted by Hungary.

Five of the non-OBF MS do not have a Community co-financed eradication programme. These MS reported no positive cattle herds in 2005 (Table BR4). Moreover, several of these MS are free of the disease according to OIE standards (Lithuania and Slovenia) or report that no herds have been found infected over several decades. Hungary is also considered free of bovine brucellosis according to OIE standards.

Table BR4. *Brucella* in cattle herds in non co-financed non-OBF MS, 2004-2005

	2005				2004	
Non-officially free	**No. of existing herds**	**No. of officially free herds**	**No. of infected herds**	**% existing herds infected**	**No. of infected herds**	**% existing herds infected**
Estonia	8,149	0	0	0	0	0
Latvia	63,456	0	0	0	0	0
Lithuania	190,373	190,373	0	0	0	0
Malta	158	-	0	0	0	0
Slovenia	44,123	44,123	0	0	0	0
Non-OBF MS Total	**306,259**	**234,496**	**0**	**0**	**0**	**0**

All non-OBF MS with Community co-financed eradication programmes reported positive cattle herds in 2005 (Table BR5). Overall, a small decrease was observed in both indicators, the percentage of positive existing and positive tested herds, when all these countries are taken together. The percentage of positive herds amongst existing herds ranged from less than 0.01% in Poland to 1.57% in Italy.

Table BR5. *Brucella* in cattle herds in co-financed non-OBF MS, 2004-2005

	2005					2004		
Non-officially free MS	**No. of existing herds**	**No. of tested herds**	**No. of positive herds**	**% existing herds positive**	**% tested herds positive**	**No. of positive herds**	**% existing herds positive**	**% tested herds positive**
Cyprus	355	327	5	1.41	1.53	14	2.03	2.03
Greece	33,150	6,578	283	0.85	4.30	440	1.16	4.19
Ireland	123,318	119,963	144	0.12	0.12	68	0.05	0.05
Italy	118,961	85,953	1,864	1.57	2.17	3,271	0.92	1.55
Poland	930,436	226,576	12	<0.01	0.01	14	0	0.01
Portugal	81,491	67,580	535	0.66	0.79	701	0.78	0.98
Spain	166,286	140,823	1,774	1.07	1.26	2,330	1.51	1.54
United Kingdom (N. Ireland)	28,263	25,392	94	0.33	0.37	148	0.53	0.71
Non-OBF MS Total	**1,482,260**	**673,192**	**4,711**	**0.32**	**0.70**	**6,986**	**0.42**	**0.82**

When compared to 2004, Ireland and Italy reported an increase in positive herds for both indicators; Greece reported a slight increase for the proportion of positive tested herds, whereas all other co-financed non-OBF MS reported similar or less positive cattle herds in 2005 compared to 2004.

In most of the co-financed non-OBF MS, the majority (73-100%) of the existing cattle herds were under the control programme in 2005, however in Poland it was only approximately 24%.

An overview of the *Brucella* status of cattle herds in co-financed non-OBF MS, at the end of 2005, is given in Table BR6.

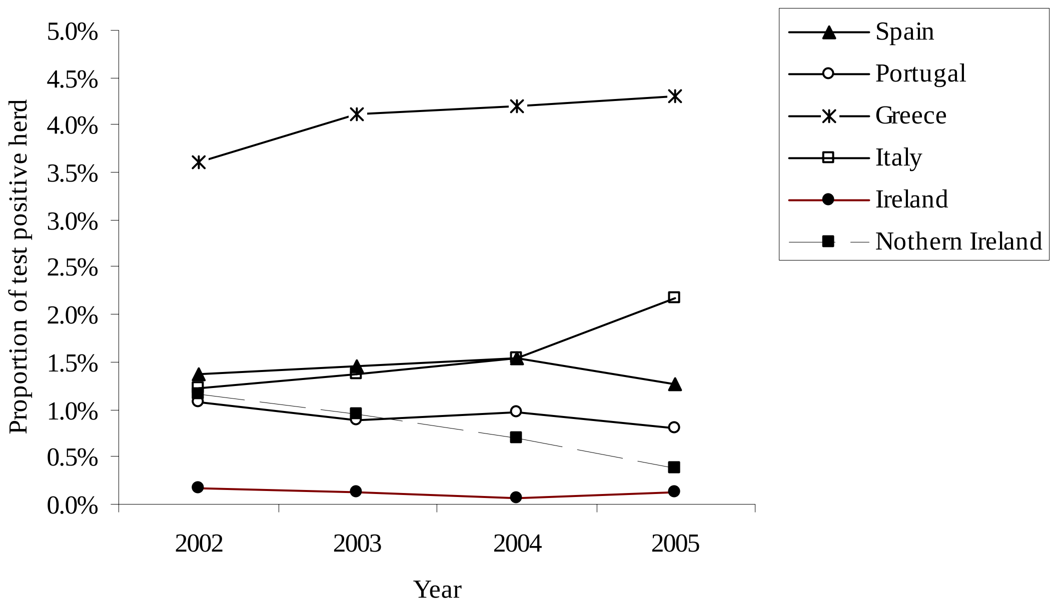
Table BR6. Overview of the *Brucella* status of cattle herds in co-financed non-OBF MS, 2005

Non-officially free MS	No. of existing herds	No. of herds under control[1]	No. of officially free herds
Cyprus	355	334	250
Greece	33,150	25,477	19,113
Italy	123,318	89,473	78,926
Ireland	118,961	123,269	123,269
Poland	930,436	226,576	226,563
Portugal	81,491	61,273	64,924
Spain	166,286	146,405	140,931
United Kingdom (N. Ireland)	28,263	28,263	28,093
Non-OBF MS Total	**1,482,260**	**701,070**	**682,069**

1. Herds under the control programme

The proportion of positive tested cattle herds from selected co-financed non-OBF MS providing data for 2002-2005 are shown in Figure BR4. Greece and Italy have observed a slightly increasing trend during this period, whereas Ireland report a small increase in 2005 compared to 2004.

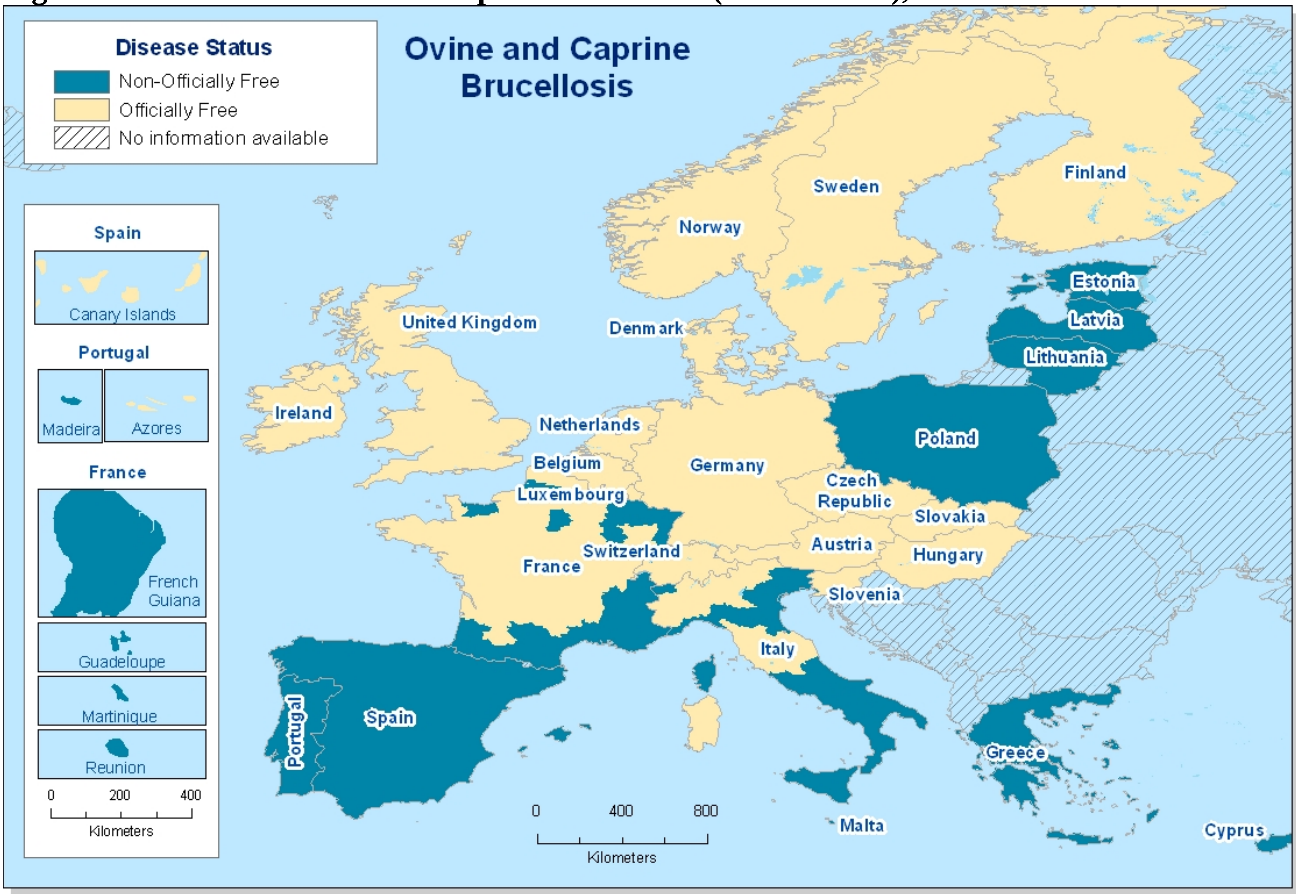
Figure BR4. Cattle herds positive for *Brucella* in selected non-OBF MS year, 2002-2005



Sheep and goats

The status of ovine and caprine brucellosis (*B. melitensis*) in the EU and non-MS in 2005 is presented in Figure BR5.

Figure BR5. Status of ovine and caprine brucellosis (*B. melitensis*), 2005



Officially B. melitensis Free (ObmF) MS and non-MS

In 2005, 14 MS and the two non-MS were officially free of ovine and caprine brucellosis caused by *B. melitensis* (ObmF). Slovenia obtained ObmF status in 2005. Many provinces in Italy and departements in France, some regions in Spain, as well as the region of Azores in Portugal are also ObmF. For further details see Level 3. With the exception of two positive herds detected in Austria, *B. melitensis* was not detected in sheep and goat herds in any of the ObmF countries during 2005, (Table BR7). No data were provided by Hungary and Germany, both of which are ObmF.

Table BR7. *Brucella* in sheep and goat herds in ObmF MS and ObmF non-MS, 2004-2005

Officially free MS	2005 No. of existing herds	2005 No. of officially free herds	2005 No. of infected herds	2005 % existing herds infected	2004 No. of infected herds	2004 % existing herds infected
Austria	26,354	26,354	2	0.01	0	0
Belgium	40,654	40,654	0	0	0	0
Czech Republic	8,350	8,350	0	0	0	0
Denmark	13,634	13,634	0	0	0	0
Finland	2,138	2,138	0	0	0	0
Ireland	43,000	43,000	0	0	0	0
Luxembourg	393	-	-	-	-	-
The Netherlands	51,442	51,442	0	0	0	0
Slovakia	3,949	3,948	0	0	0	0
Slovenia	8,563	8,563	0	0	0	0
Sweden	8,575	8,575	0	0	0	0
United Kingdom	117,000	117,000	0	0	0	0
ObmF MS Total	**324,052**	**323,658**	**2**	**<0.01**	**0**	**0**
Officially Free Non MS						
Norway	18,000	18,000	0	0	0	0
Switzerland	17,940	17,940	0	0	-	-

Non-ObmF MS

In 2005 nine non-ObmF MS reported a total of 478,524 existing sheep and goat herds, of which 2.1% was found infected or positive with *B. melitensis*.

Five of the non-ObmF MS had no Community co-financed eradication programme in 2005, and Lithuania and Malta provided no data. *Brucella* was not detected in any of the non co-financed non-ObmF MS providing data (Table BR8). It should be noted that *B. melitensis* has never been detected in Latvia and Lithuania, and has not been detected since the 1960's in Estonia.

Table BR8. *Brucella* in sheep and goat herds in non-co-financed non-ObmF MS, 2004-2005

Non-officially free MS	2005 No. of existing herds	2005 No. of officially free herds	2005 No. of infected herds	2005 % existing herds infected	2004 No. of infected herds	2004 % existing herds infected
Estonia	747	0	0	0	0	0
Latvia	6,082	0	0	0	0	0
Poland	69,091	1,808	0	0	0	0
Non-ObmF MS Total	**75,920**	**1,808**	**0**	**0**	**0**	**0**

In most MS with Community co-financed eradication programmes, the majority of herds was under the control programme in 2005. Compared to 2004, the percentage of positive herds increased in Italy and Portugal for both indicators. Greece experienced an increase only in one of the indicators, whereas Spain reported a clear decrease. France reported no positive herds (Table BR9).

Table BR9. *Brucella* in sheep and goat herds in co-financed non-ObmF MS, 2004-2005

Non-officially free MS	2005					2004		
	No. of existing herds	No. of tested herds	No. of positive herds	% existing herds positive	% tested herds positive	No. of positive herds	% existing herds positive	% tested herds positive
Cyprus	4,152	3,094	16	0.39	0.52	46	0.57	0.57
Greece[1]	20,268	917	47	0.23	5.13	37	0.18	5.63
France	108,637	11,969	0	0	0	0	0	0
Italy	71,519	63,304	2,367	3.31	3.74	4,839	2.47	3.11
Spain	132,280	120,569	5,342	4.04	4.43	6,171	4.85	5.12
Portugal	65,748	65,452	2,019	3.07	3.08	1,767	2.49	2.68
Non-ObmF MS Total	**402,604**	**265,305**	**9,791**	**2.43**	**3.69**	**12,860**	**2.59**	**3.68**

[1] The 2004 indicator '% of existing herds' based on the No. of herds under control.

An overview of the *Brucella* status of sheep and goat herds in co-financed non-ObmF MS, at the end of 2005, is given in Table BR10. The percentage of OBF herds amongst the existing herds varied from 29% (Greece) to 83% (Italy).

Table BR10. Overview of the *Brucella* status of sheep and goat herds in co-financed non-OmbF MS, 2005

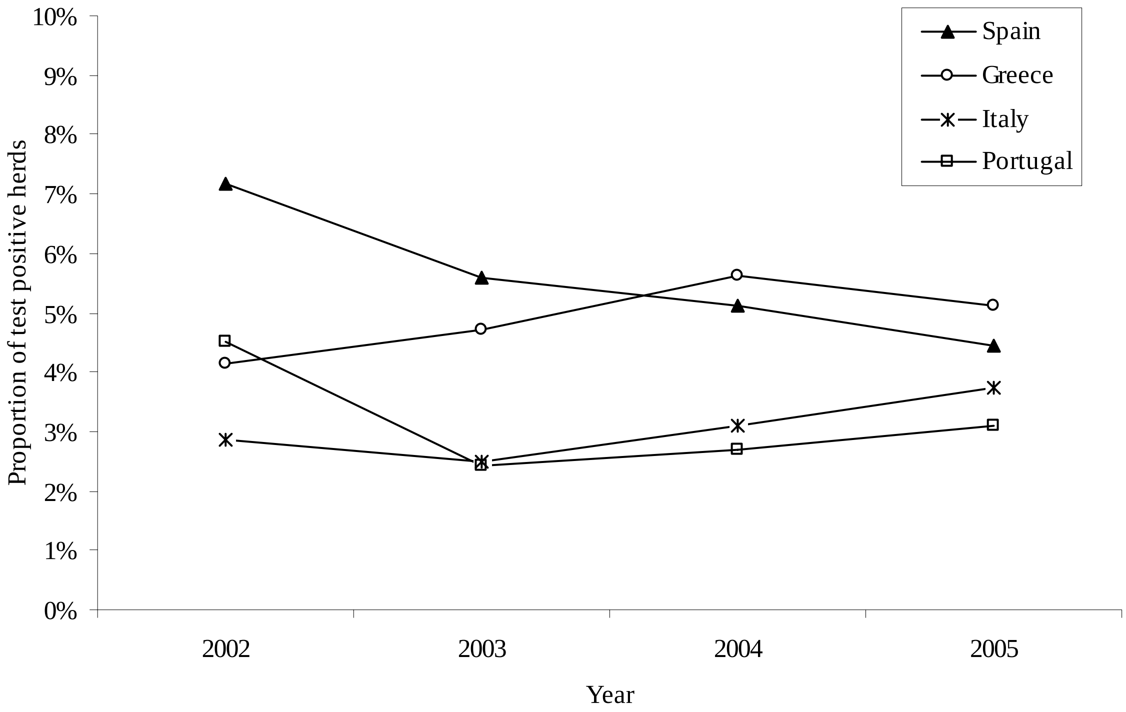
Non-officially free MS	No. of existing herds	No. of herds under control	No. of officially free herds
Cyprus	4,152	4,025	2,196
Greece[1]	20,268	20,268	5,833
France	108,637	-	62,196
Italy	71,519	70,083	59,362
Spain	132,280	128,663	63,823
Portugal	65,748	65,748	51,509
Non-ObmF MS Total	**402,604**	**288,787**	**244,919**

[1] The data from Greece only cover the island zone of Greece: the mainland is not included.

The proportions of positive tested herds from selected co-financed non-ObmF MS providing data from 2002-2005 are shown in Figure BR6.

Spain has, as the only non-ObmF MS, observed a clear decreasing trend in the proportion of test positive herds since 2002. Following an increase from 2002 to 2004, Greece observed a decrease in 2005; Italy reported an increasing trend, whereas Portugal showed an increase after an initial decrease from 2002 to 2003.

Figure BR6. Sheep and goat herds positive for *Brucella* in selected non-ObmF MS, 2001-2005



Pigs and other animals

Porcine brucellosis is a rarely reported disease in the EU Community. Thirteen MS and two non-MS reported testing of 162,715 pigs and 126 pigs were positive for *Brucella* spp. (Table BR11).

Table BR11. *Brucella* spp. in pigs, 2005

	N	Pos	% Pos[1]
Denmark	23,525	0	0
Estonia	1,784	0	0
Finland	15,323	0	0
Germany	34,203	11	0.03
Greece	2	0	0
Ireland	-	0	0
Latvia	8,476	0	0
Lithuania	6,152	0	0
Portugal	1,691	101	5.97
Slovakia	12,387	0	0
Spain	52,795	11	0.02
Sweden	4,920	0	0
United Kingdom	38	0	0
Total	**161,296**	**123**	**0.08**
Norway	839	0	0
Switzerland	580	3	0.52

1: Positive for *Brucella* spp.

B. suis was not isolated from domestic pigs via bacteriological tests in any of the reporting countries, but it was isolated from hares in Czech Republic and from wild boars in Poland. In previous years, *B. suis* was detected in pigs in Austria (2002, 2003, 2004), Denmark (1999), France (2002), Hungary (2004), Portugal (1999-2003) and Spain (2000-2003).

A variety of other animals were also tested for *Brucella*, including alpine chamois, deer, reindeer, solipeds, wild boars, zoo animals and dogs. The majority (94%) of the tested samples was negative. But positive results to *Brucella* spp. were reported in Cantabrian chamois and deer in Spain, in dogs in Italy and Portugal, in wild boars in Italy, Poland and Spain and in marine mammals in The United Kingdom.

For details please refer to Level 3.

3.6.4. Summary

In 2005, a total of 1218 human brucellosis cases was reported in EU. The Community incidence of human brucellosis was 0.2 cases per 100,000 population. This represents a decrease compared to 2004. In recent years, the highest incidences of human brucellosis have been recorded in Greece (no data for 2005), Italy, Portugal and Spain. All these countries are non-OF for bovine and ovine/caprine brucellosis. Overall, the above-mentioned countries have all experienced a general decrease in human incidence, following the implementation of brucellosis eradication programmes. In previous years, *B. melitensis* was primarily the reported cause of human cases, but in 2005 very little information was available on species distribution.

Data on the occurrence of *Brucella* in milk and cheese were provided by Greece, Italy and Belgium, with findings ranging from no positive samples to 6.1% positive in raw cow milk in Greece. The majority of positive samples was samples of sheep milk or products hereof.

With the exception of two infected sheep/goat herds in Austria, *Brucella* spp. was not detected in cattle, sheep or goat herds in any OBF/ObmF MS, or non co-financed non-officially free MS in 2005. Amongst the co-financed non OBF/ObmF MS Italy and Ireland experienced an increase in *Brucella* positive cattle herds and Italy and Portugal in sheep and goat herds. Generally the proportion of positive cattle herds in MS with co-financed eradication programmes were slightly lower compared to 2004. However, there was no clear general trend in the brucellosis positive herds among the co-financed MS over the past years.

3.6.5. Sources of Brucella data

Brucellosis in humans is notifiable in most MS except Denmark (Appendix Table BR1). Information on notification was not provided by Luxembourg, Malta and Switzerland.

By the end of 2005, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Luxembourg, The Netherlands, Slovakia, Sweden and The United Kingdom (Great Britain) - as well as 41 provinces in Italy and the Azores in Portugal were officially free of brucellosis in cattle (OBF) (Appendix Table TB-BR1).

Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Luxembourg, The Netherlands, Slovakia, Slovenia, Sweden, The United Kingdom, 64 departments in France, 44 provinces in Italy, two provinces of Canary Islands in Spain and the Azores in Portugal were officially brucellosis free in sheep and goat (Obmf) in 2005 (Appendix Table TB-BR1).

France (Decision 2005/764/EC) and Slovakia (Decision 2005/179/EC) were declared OBF in 2005 and Slovenia was declared Obmf in 2005 (Decision 2005/179/EC). Italy had additional provinces declared OBF or Obmf (decisions 2005/28/EC and decision 2005/764/EC).

Community co-financing of programmes for eradication of bovine, ovine and caprine brucellosis were approved for Cyprus, Greece, Italy, Portugal and Spain. Eradication programmes were also approved for ovine and caprine brucellosis in France, and for bovine brucellosis in Ireland, Poland and The United Kingdom (Commission Decision 2004/840/EC).

The non-MS, Norway and Switzerland, have been declared OBF and Norway is also declared Obmf and monitors brucellosis in cattle, sheep and goat according to the EU directives.

3.7. *Yersinia*

The bacterial genus *Yersinia* comprises three main species causing human infections: *Yersinia enterocolitica*, *Y. pseudotuberculosis* and *Y. pestis* (plague). The last major human outbreak of plague in Europe was in 1720 and today plague is absent from Europe. This chapter deals only with *Y. enterocolitica* and *Y. pseudotuberculosis* infections.

Yersiniosis caused by *Y. enterocolitica* affects mainly young children, and symptoms are dominated by diarrhoea, which may be bloody. Symptoms typically develop four to seven days after exposure and may last one to three weeks or longer. In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms, and is often confused with appendicitis. Complications such as skin rash, joint pains or spread of bacteria to the bloodstream can occur. Infection is most often acquired by eating contaminated food, particularly raw or undercooked pig meat. The ability of this organism to grow at $4^{o}C$ makes refrigerated food with a relatively long shelf life a probable source of infections. Drinking contaminated unpasteurised milk or untreated water can also transmit the infection. On rare occasions, transmission may also 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 from contact with infected animals.

Pigs have so far been considered to be the primary reservoir for the human pathogenic serotypes; 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.

3.7.1. Yersiniosis in humans

In 2005, a total of 9,630 cases of human yersiniosis were reported by 21 MS. The 2 non-MS reported 125 cases. In total, 99.0% of the reported cases were laboratory confirmed. Germany accounted for 58.4% of the total reported cases (Table YE1). In Germany, the number of reported human cases has decreased since 2002 (9% decrease from 2004-2005). An increasing trend is observed in Austria, the Czech Republic and Lithuania. Overall, the total number of cases reported within the EU has decreased slightly from 2002 to 2005.

The EU incidence was 2.6 per 100,000 population, which represents a 8.3% increase compared to 2004 (2.4 cases per 100,000 population). Apart from Malta, Iceland and Cyprus, which reported 0 cases, the incidence of yersiniosis ranged from <0.1 per 100,000 in The United Kingdom and Ireland to 14.6 per 100,000 population in Lithuania.

As in previous years, the majority of cases were not considered related to travel. In 2005, 28% were reported as acquired abroad.

Information regarding species distribution was available for 90% of the reported cases and the majority (89%) was found to be *Yersinia enterocolitica*. Only five countries reported cases of *Y. pseudotuberculosis*, but many countries do not test specifically for this species. The majority (67%) of *Y. pseudotuberculosis* cases were reported by Finland.

Table YE1. Reported cases of yersiniosis in humans, 2001-2005 and confirmed cases and incidence[1] in 2005

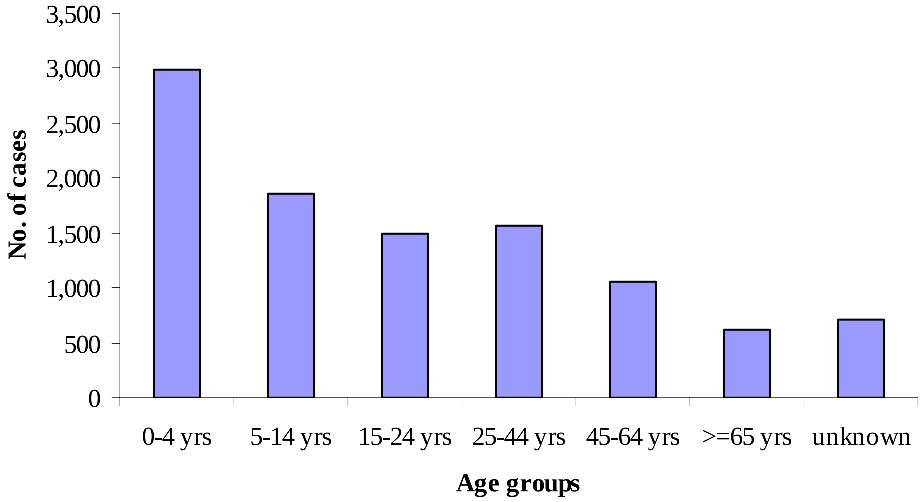
	2005				2004	2003	2002	2001
	Report type[2]	Total cases	Confirmed cases	Confirmed cases/100,000 population	Total cases			
Austria	A	143	143	1.7	110	58	58	116
Belgium	C	328	328	3.1	494	338	330	375
Cyprus	C	0	0	-	-	-	-	-
Czech Republic	C	498	498	4.9	498	372	403	301
Denmark	C	241	241	4.5	227	243	240	286
Estonia	C	31	31	2.3	15	31	20	50
Finland	C	638	638	12.2	686	646	695	728
France	A	171	171	0.3	249	218	-	391
Germany	C	5,624	5,624	6.8	6,184	6,571	7,515	7,186
Greece	-	-	-	-	39	1	-	48
Hungary	A	41	41	0.4	68	-	-	-
Ireland	C	3	3	<0.1	6	6	12	3
Italy	-	-	-	-	0	0	2	-
Latvia	C	56	51	2.2	25	28	63	91
Lithuania	A	501	501	14.6	470	273	214	209
Luxembourg	C	1	1	0.2	-	-	-	11
Malta	0	0	-	0	-	-	-	-
The Netherlands	-	-	-	-	-	-	-	-
Poland	A	136	132	0.4	84	-	-	-
Portugal	-	-	-	-	3	6	-	1
Slovakia	C	63	63	1.2	78	44	53	66
Slovenia	C	28	0	-	38	69	74	52
Spain	A	318	318	0.7	231	417	528	526
Sweden	C	744	684	7.6	804	714	610	519
United Kingdom	C	65	65	<0.1	74	95	43	48
EU-Total	**-**	**9,630**	**9,533**	**2.6**	**10,383**	**10,130**	**10,860**	**11,007**
Iceland	0	0	-	-	-	-	-	-
Norway	C	125	125	2.7	101	86	107	123

1. EU-Total incidence is based on population in reporting countries

2. A: Aggregated, C: Case based, 0: 0 cases reported, -: no report

The age distribution of cases shows that most cases affect the age groups between 0-4 and 5-14 years, with 32% and 20% of the reported cases, respectively (Fig YE1). An exception to this pattern was Finland, where most cases were reported among the 25-44 and 45-64 age groups.

Fig YE1. Distribution of confirmed yersiniosis cases in humans by age group, 2005



For additional information, please refer to Level 3.

3.7.2. *Yersinia enterocolitica* in food

Four MS provided data on *Y. enterocolitica* in meat and products thereof. Most of the investigations concerned pig meat. The following description presents the results from investigations, in which at least 25 samples were tested.

The proportion of positive samples in fresh pig meat at retail ranged from 0 to 16.7%, with the highest proportion reported by Germany. For samples of meat products, the proportion of positive samples ranged from 0% to 5.6%. Italy reported the highest positive proportion in meat products collected at the processing level (Table YE2).

Table YE2. *Y. enterocolitica* in pig meat and products thereof[1], 2005

	Product	N	Pos	% Pos
Slaughter				
Italy	Minced meat (sample 25g)	161	0	0
Spain	Fresh (sample 25g)	64	0	0
Processing plant				
Belgium	Fresh, minced meat (sample 1g)	293	2	0.7
Italy	Meat products (sample 25g)	197	11	5.6
Spain	Fresh, processing plant (sample 25g)	67	0	0
	Meat products (sample 25g)	41	0	0
Retail				
Belgium	Fresh, minced meat (sample 1g)	155	1	0.7
Italy	Fresh (sample 25g)	250	3	1.2
Spain	Fresh (sample 25g)	37	0	0
	Meat products (sample 25g)	116	0	0
Unknown				
Germany	Fresh	48	8	16.7
	Minced meat	71	7	9.9

1. Data are only presented for sample size ≥25

Three MS provided information concerning investigations on *Y. enterocolitica* in bovine meat, cow milk and dairy products (Table YE3). For samples of fresh bovine meat, the proportion of positive samples ranged from 0 to 4.4%. Spain reported the highest proportion of positive samples in fresh bovine meat taken at retail. Only Germany detected *Y. enterocolitica* in a sample of raw milk.

Table YE3. *Y. enterocolitica* in bovine meat, and milk and dairy products[1], 2005

		N	Pos	% Pos
Bovine meat and products thereof				
Slaughter				
Spain	Fresh (sample 25g)	25	0	0
Retail				
Spain	Fresh (sample 25g)	46	2	4.4
	Meat Products (sample 25g)	31	0	0
Unknown				
Italy	Fresh (sample 25g)	207	1	0.5
	Minced meat (sample 25g)	101	0	0
	Meat Products (sample 25g)	79	0	0
Milk and dairy products				
Germany	Raw cow milk	85	1	1.2
Italy	Raw cow milk (sample 25g)	323	0	0
	Raw goat milk (sample 25g)	70	0	0
Spain	Raw cow milk (sample 25g)	318	0	0

1. Data are only presented for sample size ≥25

Two MS provided data on four investigations on *Y. enterocolitica* in poultry meat (Table YE4). In Spain, the proportion of positives findings in fresh poultry meat at retail was 7.6% and 20.5% at processing plant.

Table YE4. *Y. enterocolitica* in poultry meat and products thereof[1], 2005

	Product	N	Pos	% pos
Processing plant				
Spain	Fresh meat from poultry (sample 25g)	39	8	20.5
Retail				
Spain	Fresh meat from poultry (sample 25g)	172	13	7.6
	Meat products from poultry (sample 25g)	116	0	0
Unknown				
Italy	Meat from broilers (sample 25g)	31	0	0

1. Data are only presented for sample size ≥25

Finland reported on testing of vegetables. Out of the 150 samples of pre-cut vegetables at processing 12 (8%) were found positive for *Y. enterocolitica*, whereas 86% (31 out of 36) of non-pre-cut vegetables at retail were positive. However, all the *Y. enterocolitica* isolates were reported to be of non-pathogenic biotype 1A.

Several other types of foodstuffs were tested for *Yersinia*, but, generally, the number of samples was low. For additional information on data reported on *Yersinia* in food, please refer to Level 3.

In most investigations of foodstuffs reported by MS the *Y. enterocolitica* isolates were not serotyped. Therefore it is not possible to assess the pathogenicity of the isolates to humans.

3.7.3. *Yersinia enterocolitica* in animals

Four MS reported data on *Y. enterocolitica* in domestic animals where more than 25 samples or herds were tested. Germany and Italy also provided information on the serotypes isolated. Especially German information covers a large range of different serotypes. Results from these investigations are presented in Table YE5.

Four investigations on pigs were reported by three MS. The reported proportion of positive samples was low (from 0% to 2.8%). However, Germany reported 62.8% of the positive samples as *Y. enterocolitica* O:3, a serotype which has been linked to human infections.

Two MS reported five investigations on cattle. Germany reported the human pathogenic serotypes O:3. O:5 and O:9 and Italy reported the serotype O:9. The human pathogenic serotypes O:3 and O:6 were also reported from investigations on sheep and goats in Germany.

Table YE5. *Y. enterocolitica* in domestic animals[1], animal based data, 2005

	N	*Yersinia* spp.	*Y. enterocolitica* (All serotypes)		Human pathogenic serotypes
		Pos	Pos	% Pos	Pos
Pigs					
Germany	12,266		86	0.7	54 (O:3)
Italy	181	18	5	2.8	-
Switzerland	81	0			-
Cattle					
Germany	7,268		74	1.0	64 (O:3) 1 (O:5) 9 (O:9)
Italy	107	28	13	12.1	14 (O:9)
	109	18	6	5.5	8 (O:9)
	32	2	-	-	-
	30[2]	1	-	-	-
Sheep					
Germany	926		6	0.6	2 (O:3) 4 (O:6)
Italy	37	20	-	-	-
Goats					
Germany	206		4	1.9	4 (O:3)
Solipeds					
Germany	3,985		0	0	0
Poultry					
Germany	4,446		0	0	0

1. Data are only presented for sample size >25
2. In Italy, herd based sampling unit

Dogs and cats are known to carry human pathogenic serotypes of *Yersinia* on occasion. In 2005, one MS provided adequate data from studies in dogs and cats, and the occurrence of *Yersinia* was very low, however the human pathogenic serotype O:3 was detected from both animal species (Table YE6).

Table YE6. *Y. enterocolitica* in dogs and cats[1], 2005

		N	*Y. enterocolitica* (All serotypes)	Human pathogenic types
			Pos	Pos
Germany	Dogs	3,458	10	2 (O:3)
	Cats	2,162	2	1 (O:3)

1. Data are only presented for sample size ≥25

Animal data on *Yersinia* provides interesting information on the occurrence of pathogenic serotypes in different species. However, to assess the importance of different possible animal species as reservoirs for human yersiniosis, additional investigations are necessary. Comparisons of human clinical strains with those found in animal reservoirs using available typing methods are needed.

These comparisons should be performed in various regions of the EU, as the types of *Yersinia* causing human illness vary geographically. For additional information on data provided on *Yersinia* in animals, please, refer to Level 3.

3.7.4. Summary

In 2005, 21 MS, reported a total of 9,630 cases of human yersiniosis. The EU incidence was 2.6 cases per 100,000 population, which makes yersiniosis the third most frequently reported zoonosis. The highest incidences were reported in Lithuania, Finland, Sweden and Germany. The overall trend in the total number of cases reported within the EU has decreased slightly from 2001 to 2005.

Y. enterocolitica was occasionally found from various types of foods, including pig and bovine meat, cow milk and vegetables. In most investigations the *Y. enterocolitica* isolates were not serotyped. Therefore the importance of the findings to human health could not be assessed in a proper way.

Regarding animals, serotypes potentially pathogenic to humans were reported from a number of investigations in pigs, cattle, sheep and goats as well as in dogs and cats. The serotype O:3 was recorded in pigs, cattle, sheep and goats, whereas serotypes O:5 and O:9 were recorded only in cattle. Generally, pigs are documented as the primary reservoir for human infection, however the present results show that other reservoirs might also contribute. Therefore, comparison of animal strains with human clinical isolates using available typing techniques would be helpful to evaluate the importance of these findings. Also, determination of the biotype, as well as the serotype, would be important, as well as the identification of the virulence plasmid.

3.7.5. Sources of *Yersinia* data

In 2005, notification of yersiniosis in humans was mandatory in 17 MS and Norway (Appendix Table YE1). 20 MS, Iceland and Norway reported cases of yersiniosis in 2005 (Iceland and Malta reported 0 cases).

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 5 MS in 2005 (Belgium, Finland, Germany, Italy and Spain). Finland only provided data on *Yersinia* in vegetables.

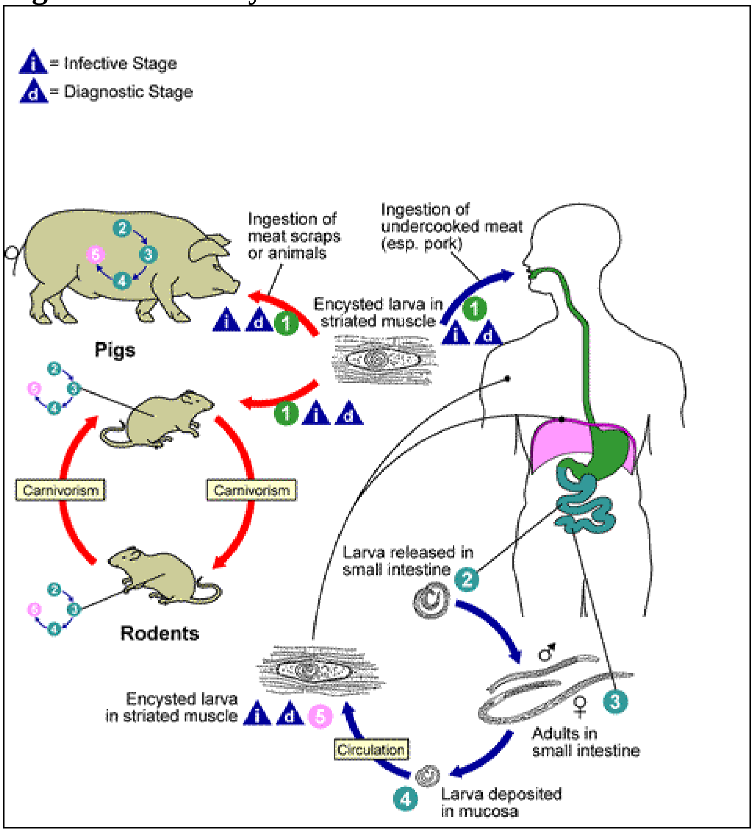
Yersinia infections in animals are notifiable in Belgium, Latvia, Lithuania, The Netherlands, Slovenia and Spain. Only three MS (Germany, Italy, Latvia) and the non-EU MS (Switzerland) reported data on sampling from animals. Substantial numbers of samples from pigs, cattle, solipeds, poultry, dogs and cats were tested in Germany.

Isolation and identification of *Y. enterocolitica* is problematic. Classical cultivation based detection methods have been shown to be considerably less sensitive compared to DNA based methods i.e. PCR and colony hybridisation. 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 method is to verify the presence of the virulence plasmid. In many cases, notifications from MS do not fully provide the information necessary to allow evaluation of the relevance of the results in relation to food safety.

3.8. *Trichinella*

Trichinellosis is a zoonotic disease caused by a parasitic nematode of the genus *Trichinella*. These parasites have a wide range of host species, mostly mammals. The *Trichinella* larvae undergo all stages of the life cycle, from larva to adult, in the body of a single host (see 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. Four species are found: *T. spiralis*, *T. nativa*, *T. britovi* and *T. pseudospiralis.* The majority of human infections are caused by *T. spiralis*, *T. nativa* and *T. britovi*.

Infection is typically acquired by eating raw or inadequately cooked meat of an infected animal. The most common sources of human infection worldwide are pig meat, wild boar meat and other game meat. However, horse, dog and many other animal meats have also transmitted the infection. Freezing of the meat destroys the infectivity of the parasite, even though some *Trichinella* types (*T. nativa*, *T. britovi* and genotype T6) have shown increased cold resistance.

The clinical signs of acute trichinellosis are characterised by two phases. The first symptoms of trichinellosis may include nausea, diarrhoea, vomiting, fatigue, fever and abdominal discomfort. Symptoms such as headaches, fevers, chills, cough, eye swelling, aching joints and muscle pains, itchy skin, diarrhoea or constipation may follow. In more severe cases, difficulties coordinating movements, and heart and breathing problems may develop. In most severe cases, death can occur.

3.8.1. Trichinellosis in humans

In 2005, 21 MS and two non-MS reported data on trichinellosis. In total, six MS reported 175 cases of trichinellosis. This is a 33.0% decrease compared to 2004, but it should be noted that in 2004 Poland reported 5 outbreaks accounting for 163 cases, which had an impact on the number of cases from that year.

In 2005, only 49.1% of the reported cases were laboratory confirmed due to lack of confirmation information from Latvia and Poland and partially from Spain. France and Spain were the only countries to give information about imported cases. In total, 26.7% of the confirmed cases were imported in these countries. The annual number of reported cases is shown in table TR1.

Table TR1. Reported cases of trichinellosis in humans, 2001-2005, and incidence in 2005[1]

		2005			2004	2003	2002	2001
	Report type[2]	Confirmed cases per 100,000 population	No. of cases	Confirmed cases (imported)	No. of cases: Total (imported)			
Austria	0	0	0	0	0	3	1	0
Belgium	0	0	0	0	0	-	-	-
Cyprus	C	0	0	0	0	-	-	-
Czech Republic	0	0	0	0	0	-	-	-
Denmark	-	-	-	-	9 (9)	0	0	0
Estonia	C	<0.1	1	1	0	-	-	-
Finland	C	0	0	0	0	0	0	0
France	C	<0.1	20	20(20)	3 (3)	6	4 (4)	0
Germany	0	0	0	0	5 (4)	3 (3)	10	5
Greece	-	-	-	-	0	0	0	0
Hungary	0	0	0	0	0	-	-	-
Ireland	0	0	0	0	0	0	0	0
Italy	-	-	-	-	0	0	2	0
Latvia	C	2.7	62	-	24	22	20	20
Lithuania	A	0.4	13	13	22	19	-	-
Luxembourg	0	0	0	0	-	-	-	-
Malta	0	0	0	0	-	-	-	-
The Netherlands	-	0	0	0	0	5 (4)	4 (2)	3
Poland	C	0.1	70	47	163	40	42	52
Portugal	0	0	0	0	-	0	1	0
Slovakia	C	0	0	0	1	1	4	16
Slovenia	-	-	-	-	0	-	-	-
Spain	C	<0.1	9	5(3)	33(1)	39	26	44
Sweden	0	0	0	0	1 (1)	0	0	0
United Kingdom	0	0	0	0	0	0	0	1 (1)
EU-Total		**<0.1**	**175**	**86**	**261**	**138**	**115**	**141**
Norway	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	-	-	-	-

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, 0: 0 cases reported, -: no report

The majority, 44.2%, of the human cases were in the age group 45-64 years. In total, 41.9% of the confirmed cases was reported as *Trichinella* spp.. France, Lithuania and Poland were the only MS to report the species distribution. France reported 17 cases as *T. nativa*, the cold resistant *Trichinella* species; no other MS reported findings of this species. Lithuania reported all cases and Poland reported 17 cases as *T. spiralis.*

For additional information on data provided on *Trichinella* in humans, please refer to Level 3.

3.8.2. *Trichinella* in animals

All MS except Hungary, and 2 non-MS reported data on *Trichinella* in animals. In 2005, 13 MS and two non-MS did not report any findings of *Trichinella* in animals (Table TR2). Compared to 2004, an additional four countries did not report any positive findings in 2005 (Table TR3).

The information on *Trichinella* is mainly derived from the obligatory checks for the parasite conducted during meat inspection. *Trichinella* was found in domestic pigs in Italy, Lithuania, Poland and Spain as well as based on serological testing in The Netherlands (see text box),; however, the prevalence was below 0.001% in the slaughtered pigs. *Trichinella* was not detected in horse meat in 2005. Since the large outbreaks in various MS in the middle of the 1990', *Trichinella* has only been detected in 1999 and 2001 in two samples from horses imported to France (Table TR2 and TR3).

In non-farmed wild boars *Trichinella* was found in 0.1% of the samples. Positive samples from these wild boars represented 63.8% of the total number positive samples reported. Poland and Spain reported 83.9% of the positive samples from wild boar (not farmed), although the number of animals examined from these MS represented only 29.4% of the total samples in the Community.

Surveys
In The Netherlands, a survey using serological testing has been carried out in order to test the method for possible future use in monitoring programmes, and to compare seroprevalence in pigs from different housing systems. In total, 366 wild boar, 178 free ranging pigs, 265 organic pigs and 1937 industrialized pigs were tested. One wild boar and one organic pig were found positive using this method only.

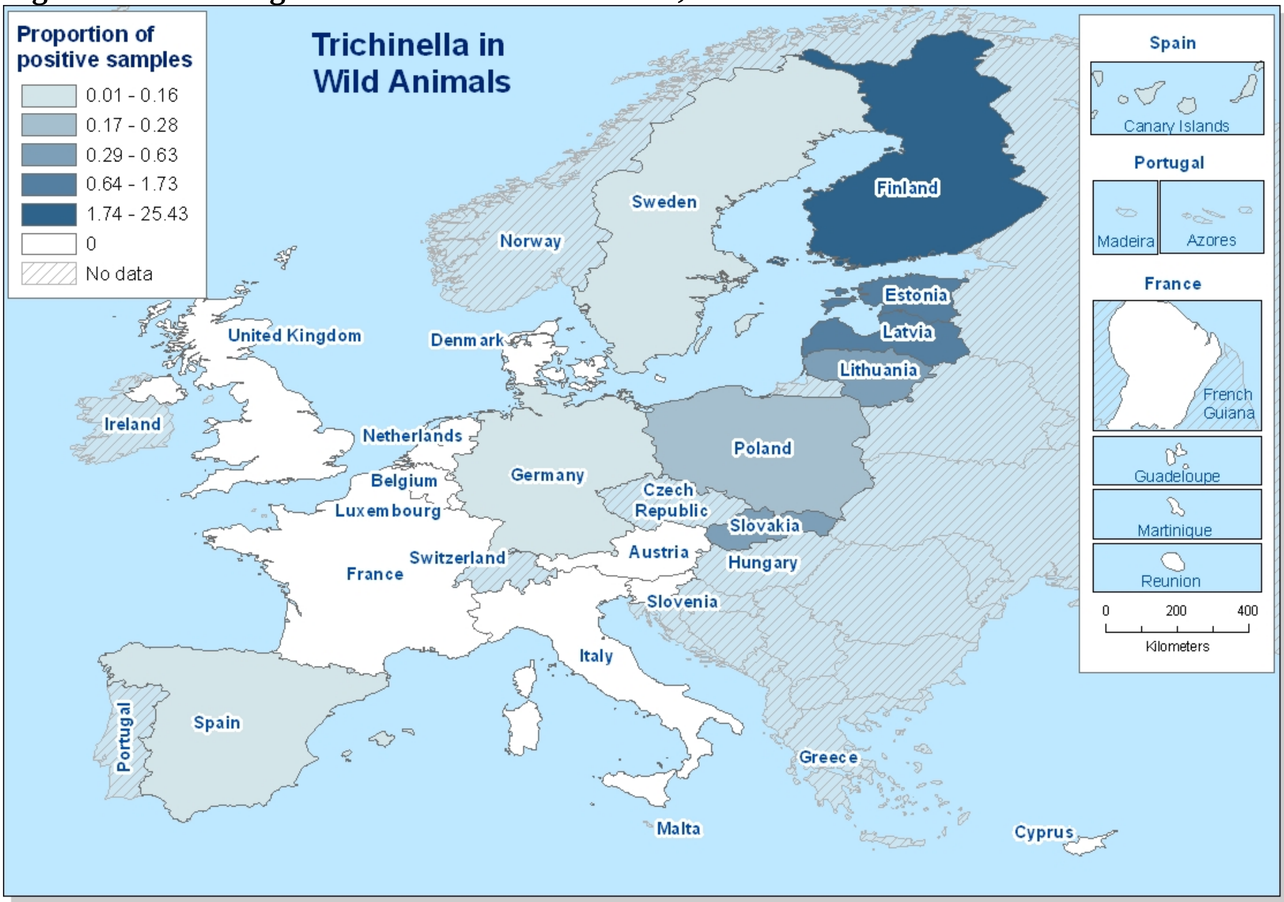
Table TR2. Number of reported *Trichinella* findings in animals, 2005

	Pigs		Wild boar - farmed		Wild boar - not farmed		Foxes		Lynx		Marten		Raccoon dogs		Wolves		Other wildlife	
	N	**Pos**	**N**	**Pos**	**N**	**Pos**	**N**	**Pos**	**N**	**Pos**	**N**	**Pos**	**N**	**Pos**	**N**	**Pos**	**N**	**Pos**
Austria	5,240,966	0	955	0	3,713	0	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	10,549,454	0	-	-	11,128	0	52	0	-	-	44	0	-	-	-	-	76	0
Cyprus	-	-	-	-	60,442	0	3	0	-	-	-	-	-	-	-	-	220	0
Czech Republic	3,906,416	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	22,147,738	0	-	-	1,552	0	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	908,365	0	-	-	1,098	3	-	-	6	5	-	-	-	-	1	1	24	4[1]
Finland	2,405,531	0	486	1	-	-	282	54	57	26	31	4	228	70	17	8	26	1[2]
France	3,155,000	0	1,215	0	5,782	0	60	0	-	-	-	-	-	-	-	-	26	0
Germany	-	-	-	-	390,570	6	4902	15	-	-	-	-	-	-	-	-	-	-
Greece	295,901	0	10	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	3,598	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	4,739,735	1	432	0	20,055	0	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	455,088	0	-	-	982	17	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	952,501	6	-	-	9,011	46	38	11	-	-	-	-	-	-	-	-	-	-
Luxembourg	229	0	-	-	585	0	9	0	-	-	-	-	-	-	-	-	-	-
Malta	3,531	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
The Netherlands[4]	14,133,204	0	-	-	652	0	-	-	-	-	-	-	-	-	-	-	-	-
Poland	20,004,294	36	-	-	91,312	260	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	27,780	0	1,544	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	1,083,724	0	-	-	13,199	16	352	41	-	-	4	2	-	-	2	0	26	2[3]
Slovenia	421,175	0	-	-	1,421	0	-	-	-	-	-	-	-	-	-	-	37	0
Spain	36,922,660	24[5]	-	-	128,608	206	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	3,174,872	0	-	-	6,962	0	121	2	54	6	-	-	-	-	4	1	68	0
United Kingdom[6]	924,845	0	-	-	-	-	666	0	-	-	-	-	-	-	-	-	-	-
EU-Total	131,456,607	43	4,642	1	747,072	554	6488	123	117	37	79	6	228	70	24	10	503	7
Norway	1,473,700	0	-	-	-	-	3	0	-	-	-	-	-	-	-	-	1	0
Switzerland	961,791	0	-	-	2,655	0	-	-	-	-	-	-	-	-	-	-	-	-

1. In Estonia, four bears out of 24 examined
2. In Finland, one badger out of 26 examined
3. In Slovakia, one muskrat out of 10 examined and 1 bear out of 16 examined
4. In The Netherlands, additional surveys using serological methods was carried out. Two samples were found positive (see text box)
5. In Spain, all positive samples are from private slaughtering for own consumption
6. In The United Kingdom, additional pigs were examined and found negative, but these results are not recorded centrally

In the wildlife population other than wild boars, the proportion of *Trichinella* positive samples was also higher than within the domestic animal population (Table TR2). Positive findings were reported from 6 MS, mostly from the eastern and north-eastern part of EU (Fig TR2). As in previous years, Finland reported more than 60% of the positive samples, mainly from foxes, lynx, raccoon dogs and wolves. In Lithuania and Slovakia, 28.9% and 11.6% of samples from foxes were positive for *Trichinella*, respectively. For a total list of wild animal species where *Trichinella* has been isolated and the historical overview of findings see Level 3.

Figure TR2. Findings of Trichinella in all wildlife, 2005



Findings in the following species are included: badgers, bears, falcons, foxes, lynx, marten, mouflons, muskrats, otter, polecats, raccoon dogs, rats, rodents, weasel, wild boars and wolves.
In the map, a natural breaks classification method is used.
N/A: no data available

An overview of the *Trichinella* findings in domestic animals and wildlife since 1999 is given in Table TR3.

Table TR3. Trichinella in animals, 2001-2005

	2005			**2004**			**2003**			**2002**			**2001**		
	Pigs	**Horses**	**Wildlife**	**Pigs**	**Horses**	**Wildlife**	**Pigs**	**Horses**	**Wildlife**	**Pigs**	**Horses**	**Wildlife**	**Pigs**	**Horses**	**Wildlife**
Austria	0	0	0	0	0	0	0	0	+	0	0	+	0	0	+
Belgium	0	0	0	0	0	+	0	0	-	0	0	0	0	0	0
Cyprus	-	-	0	0	-	-	0	0	0						
Czech Republic	0	-	0	0	0	0									
Denmark	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Estonia	0	0	+	0	0	+									
Finland	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+
France	0	0	0	+[3]	0	+	0	0	+	0	0	+	0	+	0
Germany	-	-	+	-	-	+	-	-	+	+	-	+	0	0	0
Greece	0	-	-	0	-	0	0	-	0	0	-	0	0	-	0
Hungary	-	-	-	0	0	+									
Ireland	0	0	-	0	0	0	0	0	-	0	0	+	0	0	-
Italy	+	0	0	0	0	0	0	0	+	0	0	+	0	0	+
Latvia	0	-	+	0	0	+	+	-	+						
Lithuania	+	0	+	+	-	+	+	-	+						
Luxembourg	0	-	0	0	0	0	0	0	0	0	-	0	0	0	0
Malta	0	0	-	0	0	-									
The Netherlands	+	-	+	0	0	+[2]	0	0	+[2]	+	0	+[2]	0	0	+[2]
Poland	+	0	+	+	-	+									
Portugal	0	-	-	0	-	0	0	-	-	0	-	0	-	-	0
Slovakia	0	-	+	+	-	+	0	-	-						
Slovenia	0	0	0	0	0	+	0	0	-						
Spain	+	-	+	+	0	+	+	0	+	+	0	+	+	0	+
Sweden	0	0	+	0	0	+	0	0	+	0	0	+	0	0	+
United Kingdom	0	0	0	0	0	0	-	0	0	0	0	0	0	0	-
Norway	0	0	0	0	0	0	0	0	+	0	0	+	0	0	0
Switzerland	0	-	0												

+*: Trichinella* detected

0: *Trichinella* not detected

-: No data reported

Blank: MS were not EU members at the time and therefore reported no data. Latvia, Lithuania, Slovakia and Slovenia reported on a voluntary basis in 2003.

1. In The Netherlands, low grade infections (1 larva in 16 g muscle tissue)

2. In The Netherlands, positive cases in wildlife refer to serology testing results, only in 2004 was 1 positive sample recorded using digestion method

3. In France, Corsican outdoor pigs

3.8.3. Summary

In 2005, 21 MS reported in total 175 cases of trichinellosis. Generally, few cases of *Trichinella* in humans are reported in MS and non-MS. Unfortunately in 2005, little information was available concerning the origin of the human infections. However, in previous years, several MS have reported the majority of human cases to be a result of consumption of meat not subject to *Trichinella* examination, either domestically, abroad, or due to private import of meat infected with *Trichinella*. According to Community legislation, the carcasses found positive for *Trichinella* in meat inspection are destroyed to avoid the human health risk.

Trichinella was detected only few occasions from slaughter animals in 2005. A much higher prevalence of *Trichinella* is observed in the wildlife population compared to the domestic animals, indicating that the wildlife serves as a reservoir of the parasite. MS from the eastern and north-eastern part of EU have the highest prevalence of *Trichinella* among wildlife.

3.8.4. Sources of *Trichinella* data

All MS except Hungary, and the non-MS included information about *Trichinella* in their report for 2005. All pigs and horses slaughtered for export (Council Directive 64/433/EEC), all farmed game (Council Directive 91/495/EEC) and all wild game (Council Directive 92/45/EEC) slaughtered for human consumption must be tested for *Trichinella* at slaughter or for pig and horse meat alternatively subject to freezing. France, Ireland, Malta, Portugal and Switzerland provided no information whether or not they comply with the Directives. The remaining MS and Norway all comply with the Directives (see the Appendix, Table TR2 for more information).

Trichinella in humans and in animals is notifiable in most MS and non-MS. In Denmark, France 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 and Malta did not report if *Trichinella* is notifiable. *Trichinella* in foodstuffs is notifiable in 13 MS and Norway (see the Appendix, Table TR2 for more information).

In humans, 14 MS and Norway diagnose *Trichinella* infections based on clinical symptoms, serology (ELISA), histopathology and Western Blot. The remaining MS and Switzerland provided no information on diagnostic methods used to detect this pathogen in humans.

Generally, for diagnosis of *Trichinella* in animals, the MS and non-MS use the digestion and compression methods described in Directive 77/96/EEC. Some MS already complied with the new Regulation 2075/2005/EC, which started to apply on 1 January 2006. Ireland and Lithuania provided no information concerning diagnostic methods used in animals (see the Appendix, Table TR1 for more information).

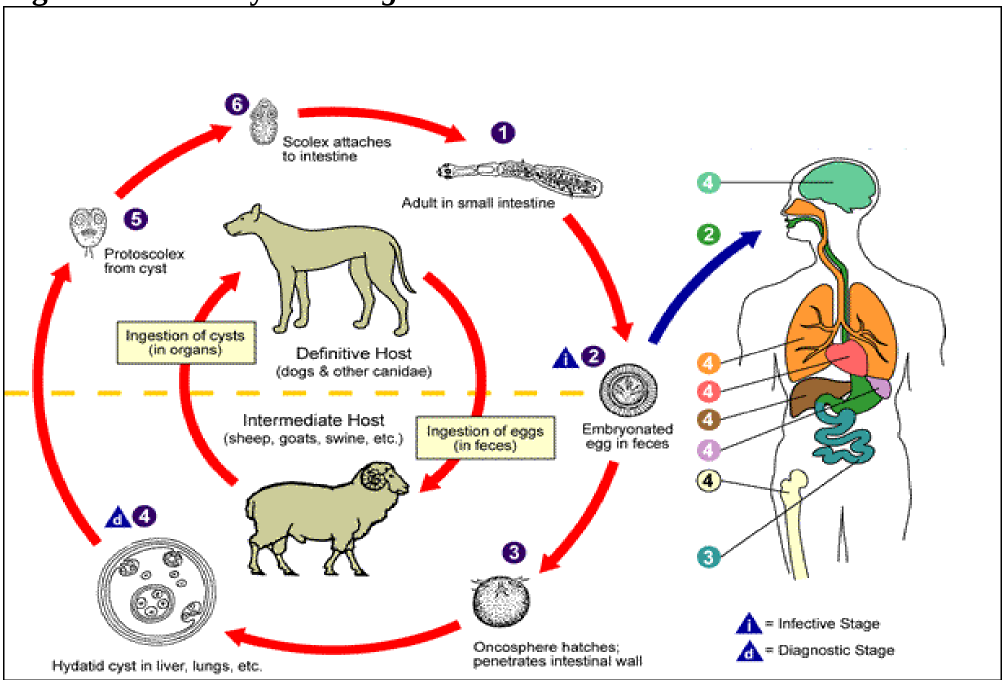
3.9. *Echinococcus*

Human echinococcosis (also known as hydatid disease) is caused by 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 also 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 animals. 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, developing unnoticed over many years, and may ultimately rupture (Figure EH1). Clinical symptoms and signs of the disease (cystic echinococcosis) depend on the localization of the cyst and are similar to those induced by a slowly growing tumour.

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, also humans may acquire *E. multilocularis* infection by ingesting eggs shed by the definitive host.

Figure EH1. Lifecycle of *E. granulosus*



Source: http://www.dpd.cdc.gov/dpdx

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 with considerable public health importance because it is fatal in up to 100% of untreated patients.

3.9.1. Echinococcosis in humans

In 2005, 20 MS and one non-MS reported data on echinococcosis. The total number of reported cases was 320, of which 95% were laboratory confirmed. Most reporting MS had a number of cases similar to previous years. However, in Portugal a large number of cases was recorded in 2004, without any explanation for the increase. Spain reported an increased number of cases in 2005 compared to 2004, however it remained 50% lower than in 2003 (Table EH1).

Table EH1. Table EH1. Reported cases of echinococcosis in humans, 2001-2005, incidence[1] for confirmed cases and distribution on *Echinococcus* species, 2005

	2005							2004	2003	2002	2001
	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	0.1	0	0	9	9	9	25	34	-	-
Belgium	-	0	-	-	-	0	0	1	-	-	-
Cyprus	C	0.1	0	0	1	1	1	0	2	2	2
Czech Republic	-	-	2	0	0	2	2	-	-	-	-
Denmark	-	-	-	-	-	-	-	9	0	0	0
Estonia	-	0	-	-	-	0	0	0	1	0	0
Finland	-	-	-	-	-	-	-	4	2	0	0
France	C	<0.1	0	17	0	17	17	17	6	-	-
Germany	C	0.1	76	20	13	109	109	97	86	-	515
Greece	-	-	-	-	-	-	-	26	17	24	37
Hungary	A	<0.1	1	0	4	5	5	11	-	-	-
Ireland	-	0	-	-	-	0	0	-	-	-	-
Italy	-	-	-	-	-	-	-	-	1	-	-
Latvia	C	0.2	1	1	3	5	5	2	4	6	3
Lithuania	A	0.4	11	4	0	15	15	15	2	-	-
Luxembourg	-	0	-	-	-	0	0	-	-	-	-
Malta	-	0	-	-	-	0	0	-	-	-	-
The Netherlands	-	-	-	-	-	-	-	34	36	32	44
Poland	C	<0.1	14	4	16	34	34	21	34	40	37
Portugal	C	<0.1	0	0	9	9	9	57	10	11	19
Slovakia	C	<0.1	1	1	0	2	2	0	1	10	3
Slovenia	C	-	-	-	-	8	0	1	1	-	-
Spain	A	0.2	0	0	78	78	78	6	167	175	17
Sweden	C	<0.1	0	0	4	12	4	9	4	14	8
United Kingdom	C	<0.1	14	0	0	14	14	8	6	15	8
EU-Total		**<0.1**	**120**	**47**	**137**	**320**	**304**	**343**	**414**	**329**	**693**
Norway	-	<0.1	-	-	-	1	1	0	0	0	0

1. EU-Total incidence is based on population in reporting countries
2. A: Aggregated, C: Case based, 0: 0 cases reported, -: no report
3. *E. granulosus*
4. *E. multilocularis*

The reported incidence ranged from <0.1 to 0.4 per 100,000 population (the highest incidence reported by Lithuania). Germany, Poland and Spain were the three MS with most reported cases in 2005, and they accounted for 72.7% of all confirmed cases. As expected, *E. granulosus* was the most frequently reported species (39.5% of the confirmed cases). *E. multilocularis* was reported in 15.5% of the confirmed cases, and in 45.1% of the cases the species was unknown (Table EH1).

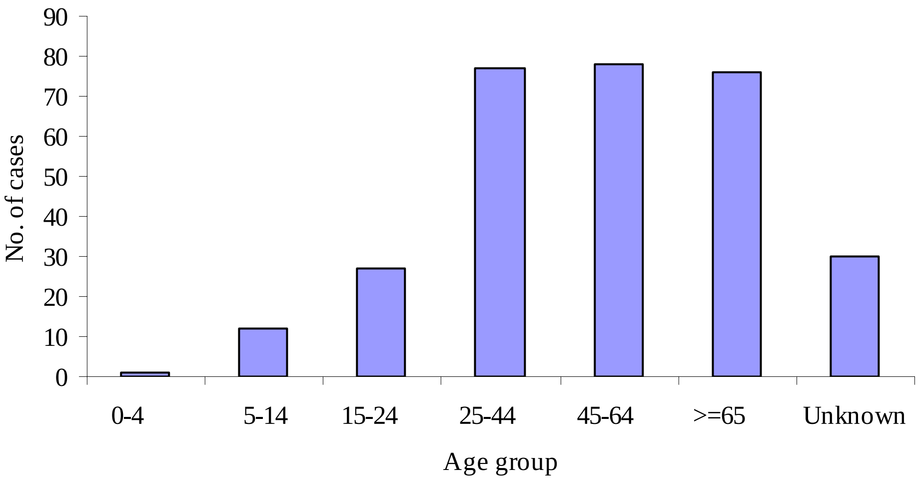
Generally the information concerning the country of origin of the infection is not very good. In 2005, nine countries reported the origin of the cases and Czech Republic, Germany and Sweden were the only MS to report imported cases (Table EH2). In 26.0% of the confirmed cases the origin was unknown.

Table EH2. Distribution of confirmed echinococcosis cases in humans by reporting country and origin of cases (imported/domestic), 2005

	Imported	Domestic	Unknown	Total
Austria	-	-	9	9
Cyprus	0	1	0	1
Czech Republic	2	0	0	2
France	-	-	17	17
Germany	82	27	0	109
Hungary	-	-	5	5
Latvia	0	5	0	5
Lithuania	0	15	0	15
Poland	0	-	34	34
Portugal	0	9	0	9
Slovakia	0	2	0	2
Spain	0	78	0	78
Sweden	4	0	0	4
United Kingdom	-	-	14	14
EU total	**88**	**137**	**79**	**304**
Norway	1	-	-	1

The distribution by age shows that most of the cases were evenly distributed among the age groups 25-44, 45-64 and $\geq$ 65 years (figure EH2). Normally, it takes 10-15 years for the infection to develop clinical symptoms, which explans at least in part, the lower number of cases reported in the younger age groups. No particular seasonality in the distribution of cases was observed in any MS. Overall, cases were equally distributed between men and women. However, in Germany, more cases were reported amongst women, whereas in Spain more cases were reported amongst men. For more information on human echinococcosis data, please refer to Level 3.

Figure EH2. Distribution of confirmed echinococcosis cases in humans by age group, 2005



3.9.2. *Echinococcus* in animals

In 2005, all MS except for Hungary, Ireland and Malta, and 2 non-MS provided information concerning *Echinococcus* in animals (Table EH3). Denmark, Lithuania and Sweden were the only MS reporting no positive findings of *Echinococcus*. The United Kingdom reported data on *Echinococcus* for the first time in many years as the information collected previously at a local level was centralised.

Only Slovenia, Spain and Switzerland reported positive findings both in domestic animals and wildlife. None of the countries specified the *Echinococcus* species. Six countries with positive findings in wildlife reported no positive cases in domestic animals (Table EH3).

Table EH3. ***Echinococcus*** **in animals, 2005**

	Farm animals	Pets	Wildlife
Austria	0	-	+
Belgium	+	-	-
Cyprus	+	0	+
Czech Rep	-	-	+
Denmark	0	-	-
Estonia	0	-	+
Finland	0	0	+
France	-	0	+
Germany	0	0	+
Greece	+	-	-
Italy	+	-	-
Latvia	+	-	-
Lithuania	0	-	-
Luxembourg	-	-	+
The Netherlands	-	-	+
Poland	+	0	-
Portugal	+	0	-
Slovakia	+	0	+
Slovenia	+	-	+
Spain	+	-	+
Sweden	0	0	0
United Kingdom	+	-	-
Norway[1]	0	-	+[1]
Switzerland	+	+	+

+: *Echinococcus* cases registered

0: No registered *Echinococcus* cases

-: No information provided

1. In Norway, wildlife in the archipelago of Svalbard

In total, 11 MS reported positive findings in farm animals (Table EH4). The information was derived from samples taken during meat inspection at slaughterhouses and only data from investigations with sample size $\geq$25 are included. Generally, the prevalence of *Echinococcus* was low. Greece, Italy and Spain were the only three MS to report positive cases both in cattle, goats and sheep. Italy, Spain and The United Kingdom were the only MS to report *Echinococcus* spp. in solipeds.

Table EH4. *Echinococcus* in farm animals, 2005

	Cattle		Goats		Pigs		Sheep		Solipeds	
	N	**Pos.**	**N**	**Pos.**	**N**	**Pos.**	**N**	**Pos.**	**N**	**Pos.**
Belgium	-	-	-	-	-	-	112,771	34[2]	-	-
Cyprus	18,687	1[2]	175,300	1[2]	-	-	118,060	5[2]	-	-
Greece	199,631	1,859	973,598	3,422	928,376	72	2,794,692	45,728	-	-
Italy	719,608	1,745	13,284	204	4,579,728	812	349,529[5]	3,904	42,232	20
Latvia	105,248	15	-	-	455,088	20	-	-	-	-
Poland	1,138,273	46	-	-	17,484,312	484,505	-	-	-	-
Portugal	480,957	66[1]	-	-	5,136,514	36	1,087,034	2	-	-
Slovakia	89,752	21[2]	-	-	1,083,724	537[2]	98,276	16[2]	-	-
Slovenia	131,640	7	251	0	420,417	187	10,663	16	1,645	0
Spain	2,814,926	19,824	-	-	36,922,660	10,585	16,417,345[4]	94,494	33,442	12
United Kingdom[5]	1,924,324	4,568	6,745	1	7,955,197	39	15,874,884	109,187	85,025	15
EU total	**7,623,046**	**28,152**	**1,169,178**	**3,628**	**74,966,016**	**496,256**	**36,863,254**	**253,386**	**162,344**	**47**

1. One *E. granulosus* and 65 *Echinococcus* spp.
2. *E. granulosus*
3. In Spain, sheep and goats reported together
4. In Italy, an additional 147,106 animals reported as "sheep and goats", 2,854 were positive
5. In The United Kingdom, not all cysts classified as *E. granulosus* will be confirmed

As in previous years, several of the Mediterranean MS had the highest prevalence in domestic animals. Fortunately, decreasing trends in the prevalence have generally been observed over the last five years. However, some MS have reported fluctuating prevalence. Only four MS - Belgium, Cyprus, Portugal and Slovakia - provided information on the species distribution in farm animals. All these countries reported only findings of *E. granulosus*. *E. multilocularis* is believed to be absent from The United Kingdom.

Six MS and one non-MS reported information on investigated pets. Only Switzerland reported positive findings of *Echinococcus* in 21 out of the 107 investigated dogs.

In 2005, six MS reported positive findings of *E. multilocularis* in foxes (Table EH5). The largest number of foxes was examined in Germany and 21.7% of them were found positive. This is similar to the reported cases from Germany in 2004. In 2005, the highest percentage of positive foxes was found in Switzerland (39.4%) and Slovakia (37.4%). In Switzerland, the findings were reported as unspecified *Echinococcus*. Finland and Sweden examined 281 and 600 (400 sampled in 2004 and 200 sampled in 2005) foxes, respectively, all of which were found negative. France was the only MS to report positive findings of *E. granulosus* in foxes. Most findings from wildlife were made in the Central European countries FigureEH3.

Over the past ten years, the population of red foxes has increased in EU and these animals are progressing into urban zones. This is of particular importance since the red fox is the most important definitive host of *E. multilocularis* in EU. Increased contact between foxes and humans in urban areas is a concern, since it may increase the risk of humans becoming infected.

Table EH5. *Echinococcus* in foxes, 2001-2005

	2005			2004		2003		2002		2001	
		E. m.[1]	***E. g.***[2]								
	N	**Pos.**	**Pos.**	**N**	**Pos.**	**N**	**Pos.**	**N**	**Pos.**	**N**	**Pos.**
Austria	19	1		86	7	807	45	592	40	-	-
Czech Republic	833	62		-	-						
France	172	-	10	986	75	-	-	-	-	-	-
Germany	7,764	1,682		5,398	1,324	4,483	1,497	7,860	3,323	2,412	391
Luxembourg	329	69		35	0	29	8	58	22	100	20
The Netherlands	45	3		-	-	171	22	-	-	-	-
Slovakia	289	108		490	148						
EU total	**9,732**	**1,925**	**10**	**5,398**	**1554**	**5,490**	**1572**	**8,510**	**3385**	**2,512**	**441**
Switzerland	33	13[3]									

-: No data reported, blank: country not a member of EU

1. *E.m.:E. multilocularis*

2. *E.g.:E. granulosus*

3. In Switzerland, *Echinococcus* spp.. Switzerland reported data to EFSA for the first time in 2005

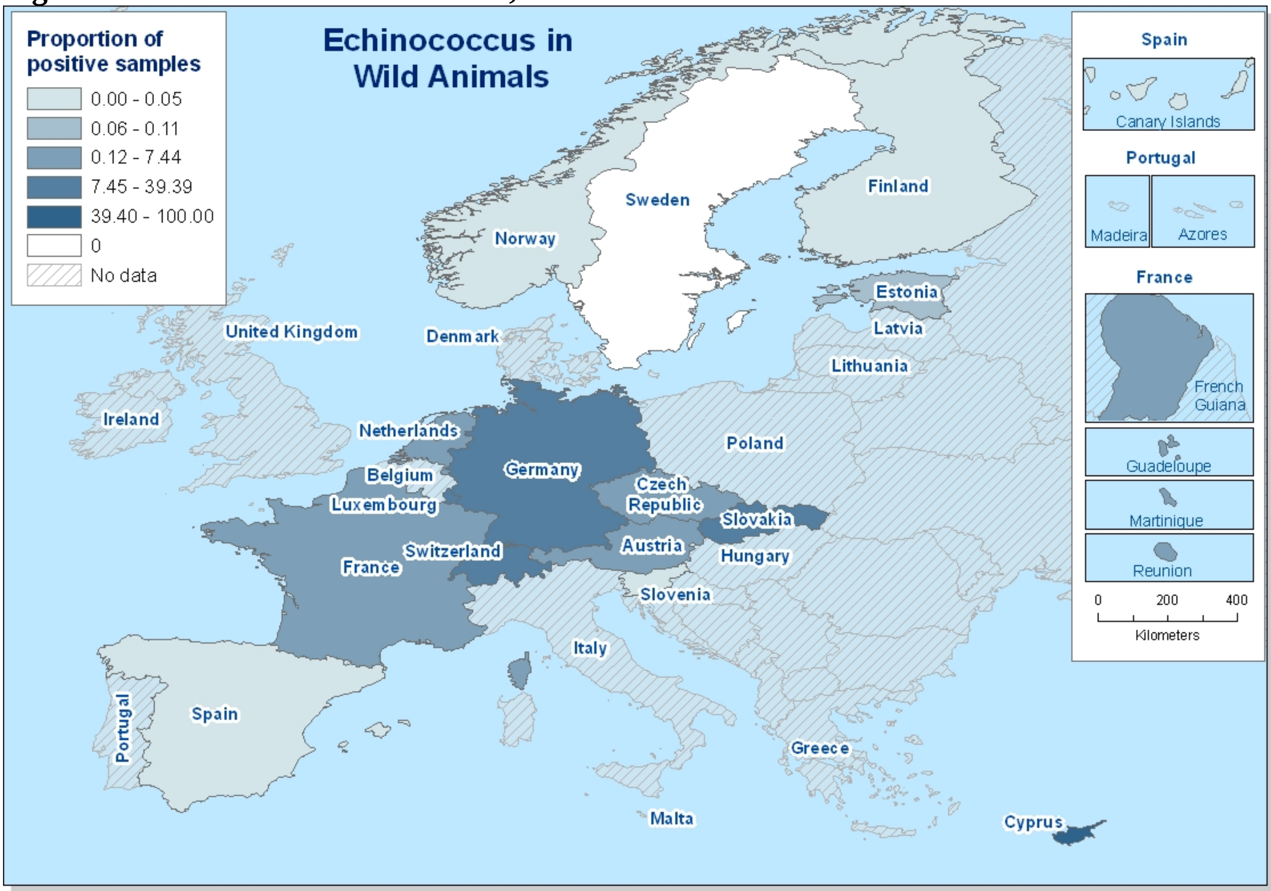
In wildlife other than foxes, *E. granulosus* was reported in mouflons from Cyprus and wolves from Finland. *E. multilocularis* was reported in voles from Norway (Archipelago of Svalbard). Spain and Slovenia reported 54 positive unspecified *Echinococcus* findings in wild boars (Table EH6).

Table EH6. *Echinococcus* in wildlife other than foxes, 2005

	E. granulosus		*E. multilocularis*		*Echinococcus* spp.	
	N	Positive	N	Positive	N	Positive
Badgers	21	0	-	-	1	0
Bears	-	-	-	-	39	0
Marten	13	0	-	-	3	0
Moose	-	-	-	-	1,229	0
Mouflons	2	2	-	-	204	0
Raccoon dogs	-	-	-	-	218	0
Voles	-	-	81	26	3,000	0
Wild boars	-	-	-	-	130,121	54
Wolves	23	2	-	-	4	0
Total	**66**	**4**	**81**	**26**	**134,821**	**54**

Figure EH3 gives an overview of the proportion of positive cases in the wildlife including foxes from the MS and non-MS.

Figure EH3. *Echinococcus* in wildlife, 2005



Data included for the following animal species: alpine chamois, badgers, bears, deer, foxes, lynx, marten, moose, mouflons, polecats, raccoon dogs, reindeers, voles, weasel, wild boars and wolves.
In the map, a natural breaks classification method is used.
N/A: no data available

Research project and monitoring programme

In Norway, a research project is running in the archipelago of Svalbard. In 2005, *E. multilocularis* was isolated from 26 of 81 sibling voles tested. Twenty-four of the positive animals were wintered voles.

In Czech Republic, a monitoring programme for *Echinococcus* in red foxes was introduced in 2005. Samples are taken from foxes hunted for Rabies efficiency control. In the framework of the programme 833 samples from foxes were tested for echinococcosis. Out of these 62 samples were positive for *E. multilocularis.*

As a part of the strategy to control the spread of *Echinococcus*, Cyprus, Finland and Greece reported treating dogs with antihelmintic drugs. In 2005, Cyprus had an antihelmintic strategy where praziquantel baits were spread in areas where stray dogs were reported and in a buffer zone around the area. Belgium has an information campaign running in the parks and woodlands where consumption of berries is discouraged by warning messages.

In Finland, *E. granulosus* was endemic in the reindeer husbandry in the past (the reindeer-herding dog cycle), but disappeared due to control actions taken by authorities and because rendering of reindeer changed, thereby reducing the exposure of herding dogs. In the early 1990's, echinococcosis started to re-emerge in the south-eastern part of the Finnish reindeer husbandry area. The cycle involves reindeer, elk (moose) and wolves. Hitherto, no other definitive hosts have been identified although dogs, red foxes and raccoon dogs have been examined by hundreds during the last few years. *E. multilocularis* has never been diagnosed in Finland.

For additional information on data provided on *Echinococcus* in animals please refer to Level 3.

3.9.3. Summary

In 2005, the total number of reported human echinococcosis cases was 320. The number of human cases decreased by approximately 8% compared to 2004. In 50% of the cases the species was verified, and *E. granulosus* accounted for 2/3 of these cases. Age distribution shows that most diagnosed cases are adults more than 25 years old, which is to be expected since clinical signs take 10-15 years to develop.

In domestic animals, the majority of positive findings were reported in the Mediterranean MS. However, findings were also reported in some Central European countries. In the Mediterranean countries, a general decreasing trend in the number of positive findings in domestic animals has been reported over the last six years.

E. multilocularis, the cause of alveolar echinococcosis in humans which may be fatal in untreated patients, was detected in foxes in six MS, and in voles the archipelago of Svalbard (Norway). The highest prevalence was found in Central European countries. *E. granulosus* was recorded from foxes, mouflons and wolves. 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.

3.9.4. Sources of *Echinococcus* data

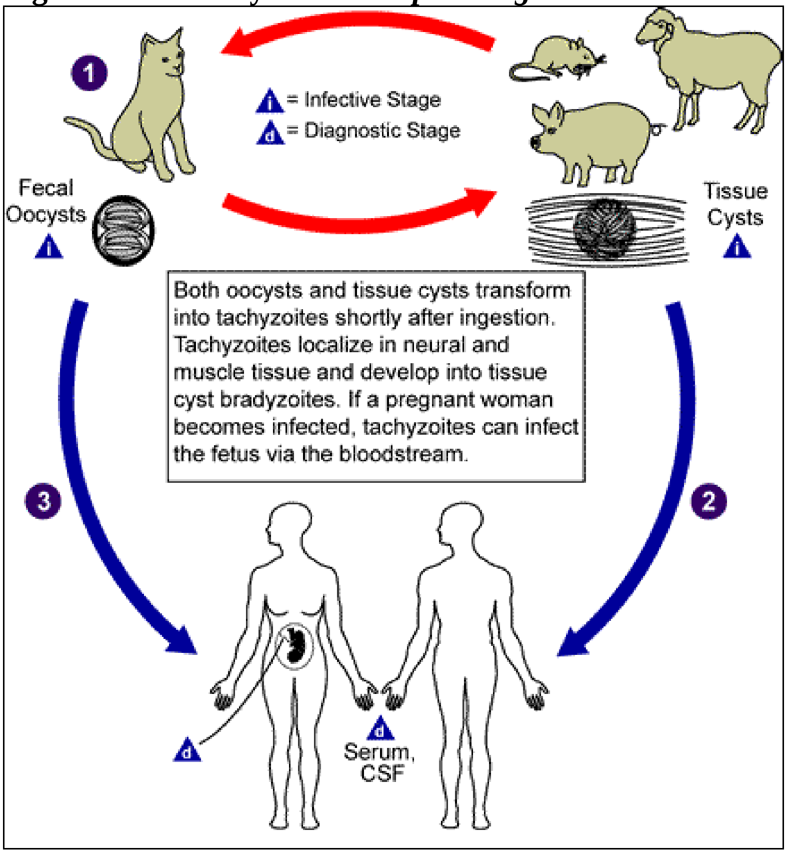
Echinococcosis is notifiable in humans in all MS except for Denmark, France, The Netherlands, Switzerland and The United Kingdom, and non-MS. Cyprus, Luxembourg, Malta and Poland provided no information whether echinococcosis is notifiable in humans. In animals, *Echinococcus* detection is notifiable in most MS except for Czech Republic, Hungary and The United Kingdom, and non-MS. Cyprus, France, Germany, Luxembourg, Malta and Poland provided no information. (Appendix, Table EH2).

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.

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*. Nearly all warm-blooded animals can act as intermediate hosts, and seemingly all animals may be carriers of tissue cysts of this parasite. However, the parasite only matures in domestic and wild cats, which are the definite hosts. 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).

Figure TO1. Lifecycle of *Toxoplasma gondii*



Source: Center for Disease Control and Prevention – U.S.A. - http://www.dpd.cdc.gov/dpdx

In humans, the majority of infections is 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.

In animals, *Toxoplasma* is an important cause of abortion in sheep, but may be controlled by proper management practices and vaccination. In previous years, the detection of this parasite was most frequently reported in cats, dogs, sheep and pigs.

3.10.1. Toxoplasmosis in humans

In 2005, no data on human cases was available through the Network on communicable disease epidemiological surveillance and control. However, some MS may have included information on human infections in the national reports. In 2004 a total of 1,736 cases were reported by 18 MS in accordance with the Zoonoses Directive 92/117/EEC. These reported cases were mostly laboratory confirmed clinical cases. For more information please see Appendix, Table TO1.

3.10.2. *Toxoplasma* in animals

Data on toxoplasmosis in animals were provided from ten MS and two non-MS. Many of the samples collected are examined based on clinical suspicion, and therefore results do not always reflect the general prevalence in animal populations. Results are not readily comparable between MS due to differences in the sampling and testing schemes. Italy and Finland were the only two MS indicating that some data were derived through monitoring. The information from investigations covering 25 or more samples are summarised in Table TO1.

In 2005, five countries provided data on *Toxoplasma* in sheep and 0% to 52.5% of the samples were found positive. Three MS reported investigations in goats finding 10.4% to 45.5% positive samples. Cattle were tested in four MS, and only one of them reported few samples positive for *Toxoplasma*. The same applies for samples from pigs, where positive findings were made only in one MS.

Dogs and cats were tested in eight MS and one non-MS. Proportions of positive samples up to 50% were reported. Occasional findings of *Toxoplasma* were also recorded from hares, rabbits, pigeons and fur animals. All the reported data are available in Level 3.

In 2005, The Netherlands investigated occurrence of *Toxoplasma* in different types of husbandry systems for pigs. The prevalence of *Toxoplasma* was 5.6% in free range pigs (N=178), 2.7% in organic farmed pigs (N=402) and 0.3% in industrialised raised pigs (N=265). The ELISA method was used in testing.

Table TO1. *Toxoplasma* in animals, 2005[1]

	Description	N	Pos	% Pos
Farm animals				
Finland	Cattle	396	0	0
	Pigs	852	0	0
	Sheep	76	0	0
Germany	Cattle	562	6	1.1
	Pigs	1257	0	0
	Sheep	595	146	24.5
	Goats	48	5	10.4
	Solipeds, domestic	71	0	0
Italy	Cattle, monitoring	47	17	36.2
	Pigs, monitoring	31	0	0
	Sheep, monitoring	2016	859	42.6
	Goats, monitoring	531	102	19.2
Norway	Sheep	44	18	40.9
Poland	Cattle	31	0	0
Portugal	Sheep	40	21	52.5
	Goats	33	15	45.5
The Netherlands	Pigs	845	22	2.6
Slovakia	Goats	32	10	31.3
Pet animals				
Finland	Dogs	470	0	0
	Cats	240	6	2.5
Germany	Dogs	206	0	0
	Cats	928	12	1.3
Italy	Dogs	171	76	44.4
	Cats	72	16	22.2
Latvia	Dogs	98	49	50.0
	Cats	32	2	6.3
Lithuania	Cats	51	0	0
Poland	Dogs	154	0	0
	Cats	145	0	0
Slovakia	Dogs	92	41	44.6
	Cats	142	45	31.7
Sweden	Cats	49	16	32.7
Switzerland	Dogs	137	21	15.3
	Cats	261	5	1.9
Other animals				
Finland	Hares, monitoring	131	23	17.6
Italy	Rabbits	85	3	3.5
	Pigeons	311	198	63.7
Latvia	Fur animals	59	8	13.6

1. Data are only presented for sample size ≥25, animal based data

3.10.3. Summary

Over 2005, no human data on toxoplasmosis was available. However, some MS may have included information on human infections in the national reports.

Data on several animal species were reported in 2005. Many of the results may derive from diagnostics submissions. In general, the focus of toxoplasmosis in animals is placed upon *T. gondii,* as an agent of abortions in sheep and goats. However, a substantial number of investigations of dogs and cats as well as cattle and pigs were reported. *Toxoplasma* was detected in several animal species, the highest proportion of positive findings coming from sheep, goats, dogs, cats and pigeons. Information on type and method for detection of *Toxoplasma* in animals is lacking from several MS.

Since toxoplasmosis is recognised as an important zoonotic disease in humans, there is a need to improve existing monitoring and surveillance systems both in the public health and the food and veterinary sector. This is important to enable collection of representative information, which would allow a better evaluation of the situation in the Community.

3.10.4. Sources of *Toxoplasma* data

Human infections with *T. gondii* are notifiable in 14 MS. Germany, Greece and Lithuania notifies only congenital cases. In The United Kingdom, *T. gondii* is only notifiable in Scotland. No information on notification procedures was provided from Luxembourg, Malta, Poland and Portugal (Appendix, Table TO2).

Toxoplasmosis in animals was notifiable in eight MS: Belgium, Finland, Germany, Latvia, Lithuania, Slovenia, Spain and The Netherlands, and Norway (Appendix, Table TO2).

Monitoring programmes are presented in Appendix, Table TO1.

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. Two sub-types of rabies virus, *Lyssavirus* genotypes 5 and 6, also known as European Bat *Lyssavirus* (EBLV-1 and -2, respectively), are normally seen in bats. In rare cases, the infection from bats can be transferred to other mammals, including humans.

Symptoms in humans include a sense of apprehension, headache and fever. This is followed by a nervous system dysfunction, which eventually leads to the death of the affected person. Human cases are extremely rare in industrialised countries. However, those working with bats and other wildlife are encouraged to seek advice on 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 and apathy and increasing paralysis of lower jaw and hindparts. Animals may excrete the virus during the incubation period, prior to the onset of clinical symptoms.

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. In 2005, a total of four cases were registered. One person from Germany was infected while travelling in India and another three people became infected in Germany following organ transplants from this rabies-infected person (Table RA1).

Table RA1. Human rabies cases, 2001-2005

Year	Country	Case
2001	United Kingdom	1 visitor from Philippines
2002	United Kingdom	1 registered bat handler died from EBL[1]
2003	France	1 visitor from Gabon
2004	Austria	1 case imported from Morocco
	Germany	1 imported case
2005	Germany	4 cases in total. 3 patients became ill after receiving organs from a rabies infected donor. The donor was infected during a trip to India.

1. EBL = European Bat *Lyssavirus*

3.11.2. Rabies in animals

In 2005, rabies was reported in various animal species by 12 MS (Table RA2 and RA3). Estonia, Latvia, Lithuania and Poland reported cases both in domestic animals, pets and wildlife. Spain reported rabies in one dog imported from Morocco, only. All MS with domestic cases of classical rabies (not the EBL form) have implemented rabies eradication programmes in the wildlife population, mainly focusing on foxes. Austria, Czech Republic, Finland (along the south eastern border), Germany, Latvia, Poland, Slovakia and Slovenia all run programmes approved and co-financed by the European Commission (Decision 2004/840/EC). Furthermore, Estonia, Italy (Region Friuli-Venezia-Giulia) and Lithuania had similar types of eradication programmes in 2005. See the Appendix, Table RA1 for more information.

Vaccination of carnivorous pets is compulsory in Belgium (in some regions), Czech Republic, Estonia, Greece, Hungary, Lithuania, Poland, Portugal, Slovakia and Slovenia. In Finland vaccination is recommended. See the Appendix, Table RA1 for more information.

Table RA2. Reported rabies cases in farm animals and pets, 2005

	Farm animals[1]		Pets			
			Cats		Dogs	
	N	**Pos**	**N**	**Pos**	**N**	**Pos**
Austria	16	0	115	0	87	0
Belgium	338	0	10	0	10	0
Czech Republic	7	0	426	0	304	0
Denmark	-	-	4	0	1	0
Estonia	73	23[2]	147	8	81	6
Finland	4	0	13	0	19	0
France	21	0	662	0	1,018	0
Germany	306	1[3]	496	0	161	0
Greece	-	-	1	0	5	0
Italy	-	-	218	0	369	0
Latvia	53	19[4]	170	29	157	20
Lithuania	293	156[5]	270	92	361	92
Luxembourg	-	-	8	0	-	-
The Netherlands	-	-	5	0	4	0
Poland	153	24[7]	1,137	7	949	5
Slovakia	18	0	268	1	386	3
Slovenia	47	0	97	0	60	0
Spain	-	-	-	-	-	1[7]
Sweden	-	-	4	0	9	0
EU-Total	**1,329**	**223**	**4,051**	**137**	**3,981**	**127**
Norway	-	-	-	-	2	0
Switzerland	3	0	24	0	27	0

1. Include cattle (70.6% of the samples), sheep and goats (20.6%), horses (7.8%) and pigs (1.1%)

2. In Estonia, 19 cattle, 1 sheep and 3 solipeds positive

3. In Germany, 1 soliped positive

4. In Latvia, 17 cattle, 1 goat and 1 soliped positive

5. In Lithuania, 146 cattle, 1 sheep, 1 pig and 8 solipeds positive

6. In Poland, 23 cattle and 1 soliped positive

7. In Spain, one positive dog imported from Morocco to the North African territory Melilla

Table RA3. Reported rabies cases in wildlife, 2005

	Foxes		Raccoon dogs		Marten		Polecats		Badgers		Bats		Other	
	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos	N	Pos
Austria	8,706	0	-	-	883	0	-	-	160	0	2	0	76	0
Belgium	117	0	-	-	5	0	-	-	3	0	32	0	6	0
Czech Republic	8,242	0	6	0	121	0	-	-	31	0	34	1	232	0
Denmark	-	-	-	-	-	-	-	-	-	-	15	2[1]	1	0
Estonia	202	95	195	126	9	1	-	-	6	3	-	-	50	4
Finland	216	0	200	0	12	0	-	-	18	0	1	0	27	0
France	616	0	-	-	25	0	-	-	1	0	202	4[1]	38	0
Germany	20,867	39	365	0	331	0	-	-	151	0	71	17[1]	902	2
Greece	-	-	-	-	-	-	-	-	-	-	1	0	0	0
Italy	2,857	0	-	-	195	0	-	-	144	0	7	0	183	0
Latvia	402	176	-	-	-	-	-	-	-	-	-	-	359	177[2]
Lithuania	778	533	750	599	225	114	134	43	10	8	-	-	71	8
Luxembourg	333	0	-	-	-	-	-	-	-	-	-	-	1	0
The Netherlands	2	0	-	-	-	-	1	0	-	-	94	4[1]	2	0
Poland	1,685	84	175	10	213	1	-	-	53	3	73	4	725	0
Portugal	42	0	-	-	-	-	-	-	-	-	-	-	0	0
Slovakia	1,767	42	-	-	-	-	-	-	-	-	2	0	0	0
Slovenia	1,248	3	-	-	-	-	-	-	-	-	2	0	149	0
Sweden	1	0	-	-	-	-	-	-	-	-	41	0	2	0
United Kingdom	1	0	-	-	-	-	-	-	-	-	28	0	0	0
EU-Total	**48,082**	**972**	**1,691**	**735**	**2,019**	**116**	**135**	**43**	**577**	**14**	**605**	**32**	**2,824**	**191**
Norway	51	0	-	-	-	-	-	-	-	-	1	0	0	0
Switzerland	56	0	-	-	7	0	1	0	5	0	11	0	4	0

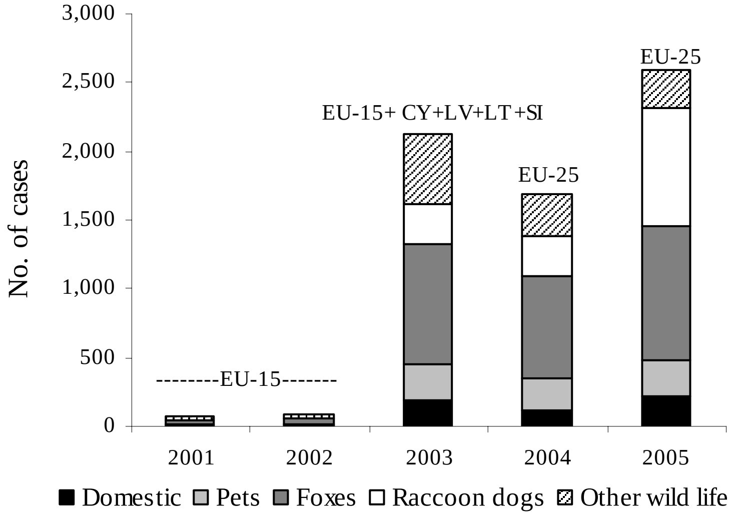
1. European Bat *Lyssavirus*
2. In Latvia, 126 raccoon dogs positive

At least since 2001, eight MS - Belgium, Finland, Greece, Ireland, Italy, Luxembourg, Portugal and Sweden - and Norway (mainland) have had no reports of rabies. Malta has been free from rabies since 1911. Other countries have not reported cases of classical rabies for many years, but EBL has been reported. In 2005, Denmark, France, Germany and The Netherlands reported EBL in bats (see Level 3).

Since 2003, the number of reported cases of rabies in animals within the EU has increased remarkably from 85 to 2,241 cases, mainly due to the cases reported by eastern European MS: Lithuania (64% of the total positive cases in 2005), Latvia (16%), Estonia (10%), Poland (5%) and Slovakia (2%). The majority of the cases were reported in foxes (37%) and raccoon dogs (28%) (Figure RA1). Furthermore, 2% of the positive cases were reported from Germany and 2/3 of the cases were caused by the classical *Lyssavirus*, the remaining was EBL in bats. Findings of rabies in domestic and pets are also shown in Figure RA2.

In Latvia, an outbreak of rabies has been observed over the last 5 years with a peak in 2003, where 471 foxes and 285 raccoon dogs were reported positive for rabies. The outbreak coincided with an increased density of foxes and raccoon dogs. Since 1998, a vaccination programme for wildlife with distribution of oral vaccines by flight has been carried out and, in 2005, Latvia reported 176 positive foxes and 177 positive cases on wildlife species, including raccoon dogs.

Figure RA1. Number of reported rabies cases in animals, 2000-2005



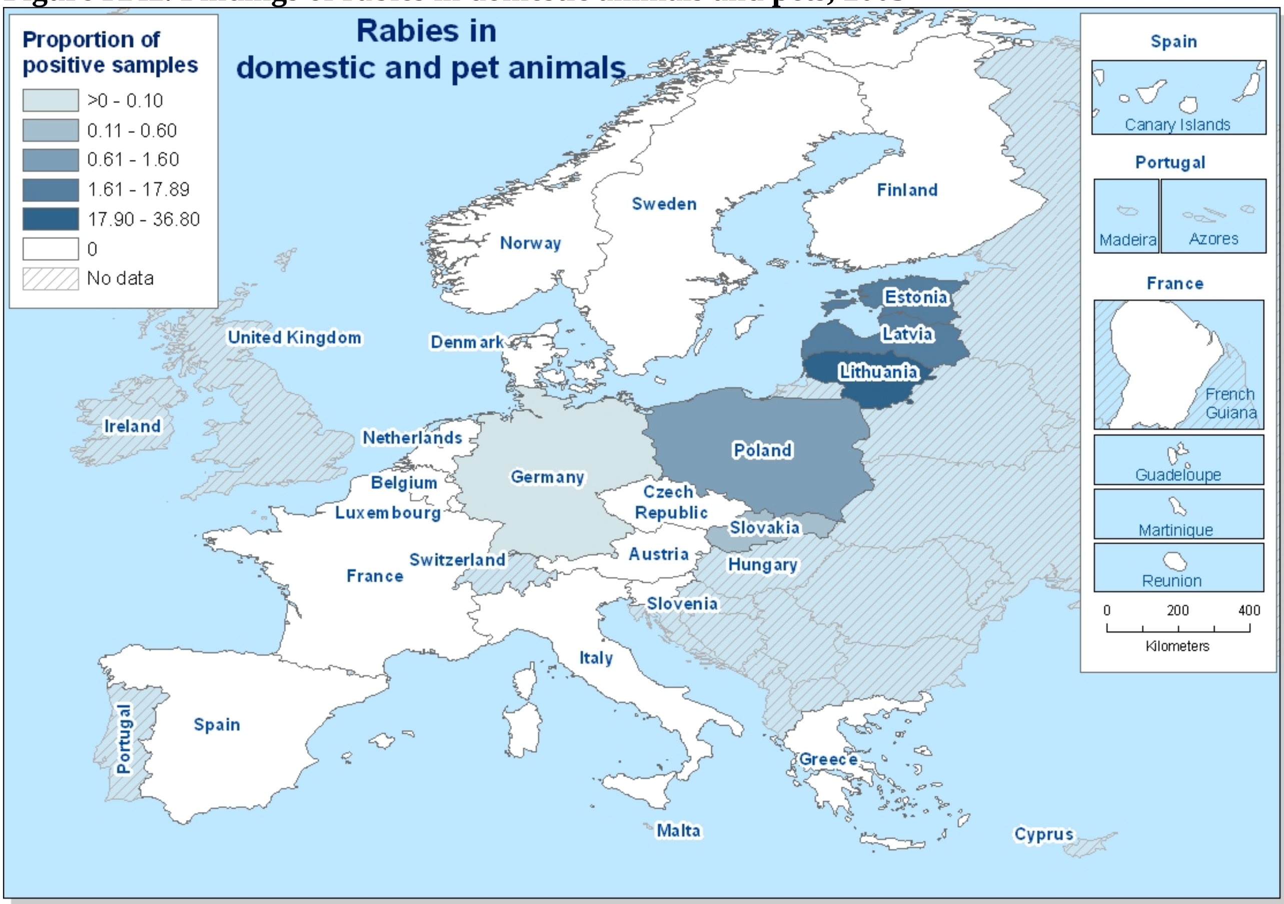
Surveys and monitoring programme

In the archipelago of Svalbard (Norway), a survey was carried out in 2005. A total of 130 foxes killed or found dead in 1998 and 2002-2005 were investigated and all samples were negative for rabies.

In Austria, a continuous monitoring programme is in place. Eight foxes per 100 km^2 are collected in rabies infested and rabies endangered areas and 4 foxes per 100 km^2 are collected in not endangered and free areas.

For additional information on data provided on rabies in animals and the historical overview of findings, please, refer to Level 3.

Figure RA2. Findings of rabies in domestic animals and pets, 2005



Note - Findings in the following species are included: Cattle (bovine animals), pigs, sheep, goats, solipeds, pets, cats, dogs, hamsters, and farmed foxes and rabbits
In the map, a natural breaks classification method is used.

3.11.3. Summary

In 2005, unfortunately four related human cases of rabies were reported in the EU. One person was infected while travelling abroad and three persons were infected after receiving organs transplanted from this infected donor. Usually, persons known or suspected of being infected with rabies are immediately treated with prophylactic vaccinations, in order to prevent the disease from developing.

In most MS, rabies infections in animals are very rare or have been absent for many years. In those countries where the wild carnivore population carries the infection, vaccination programmes to control the disease have proven effective. All MS with positive findings have eradication programmes in action. In order to eradicate rabies throughout the EU, and to avoid reintroduction of rabies from countries east of the EU, continuous vaccination programmes are important in high risk areas.

The majority of rabies cases in animals were reported by the eastern European MS, where wildlife (especially foxes and raccoon dogs) is frequently infected. These wild animals form a source of infection for domestic animals, pets and humans. The number of reported cases both in domestic animals, pets and wildlife had increased compared to year 2004.

3.11.4. Sources of rabies data

In 2005, information concerning rabies was submitted from all MS and non-MS.

Rabies is notifiable in humans in most MS, and Norway and Switzerland. No information was provided by Luxembourg, Malta and Portugal. In most MS and Norway, examination of human cases is 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.

In accordance with Council Directive 64/432/EEC, rabies is notifiable in animals in all MS and Norway and Switzerland; in The Netherlands only notifiable in dogs. No information on notification was provided by Ireland, Luxembourg and Malta.

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 MS and Norway examine clinically suspected animals by testing samples of the central nervous system. Identification is mostly carried out using the fluorescent antibody test (FAT), which is recommended by both WHO[1] and OIE[2] and the mouse inoculation test. However, ELISA, PCR and histology are also used. France, Greece, Ireland, Luxembourg, Portugal, Slovenia, Switzerland and The Netherlands provided no information on the diagnostics used. See Appendix, Table RA2 for more information.

[1] WHO Laboratory techniques in rabies
[2] O.I.E. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals

3.12. Other zoonoses

3.12.1. Bovine Transmissible Spongiform Encephalopathy

Transmissible Spongiform Encephalopathies (TSEs) are a family of diseases that occur in man and animals that are characterised by a degeneration of brain tissue resulting in a sponge-like appearance of the brain. This family 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 on the basis of the available data is neither considered to be transmissible to humans nor to pose a risk to man.

3.12.1.2. 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 2005, published by the European Commission, Health and Consumer Protection Directorate General (http://ec.europa.eu/food/food/biosafety/bse/annual_reps_en.htm).

In 2005, a total of 10,113,559 bovine, 349,340 ovine and 265,489 caprine animals were tested in the EU in the framework of the TSE monitoring programme. In total, 561 bovine, 2,906 ovine and 989 caprine animals were found positive (Table TSE1).

Related to the testing in bovine animals, 1,489,988 risk bovine animals and 8,607,051 healthy animals slaughtered for human consumption were tested by rapid tests. In addition, 2,971 bovine animals were tested in the framework of passive surveillance (animals reported as BSE suspects by the farmer or the veterinary practitioner and subject to laboratory examination). Furthermore, 13,549 animals were tested in the framework of culling of animals with an epidemiological connection to a BSE case. In total, 87 % of positive cases were detected by the active monitoring (testing of risk animals, healthy slaughtered and culled cattle) and 13 % were detected by passive surveillance. BSE cases were found in all MS except Cyprus, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Finland and Sweden. The number of BSE cases decreased by 35 % in 2005 compared to 2004. The decrease was similar in both risk and healthy animals. These reductions and the increasing age of positive cases indicate that measures to combat TSE taken in the past are having effect.

Related to the testing in sheep and goats, in total 346,916 ovine animals were tested by active monitoring, while 2,424 were ovine animals reported as TSE suspects and therefore subjected to laboratory examination. In caprine animals, the numbers of tests in the respective groups were 263,929 (active monitoring) and 1,560 (TSE suspects). In total, 806 and 153 TSE cases, in respectively sheep and goats, were confirmed in 2005, and subjected to discriminatory testing. The finding of a TSE infection in a goat's brain on 28 October 2004 by a French research group that could not be distinguished from BSE was confirmed on 28 January 2005. Apart from this, no new BSE cases in small ruminants were confirmed in 2005. Only two sheep cases required further analyses, since BSE could not be excluded by the primary discriminatory test. In addition to the MS, Bulgaria and Norway forwarded information on the TSE testing of bovine, ovine and caprine animals.

Table BSE1: BSE positive cases in bovine animals, 2005

Country	Total number of BSE tests performed in 2005	Number of BSE positive cases in 2005
Austria	201,642	2
Belgium	367,281	2
Cyprus	9,093	0
Czech Republic	170,823	8
Denmark	254,962	1
Estonia	31,109	0
Finland	117,046	0
France	2,593,594	31
Germany	2,073,273	32
Greece	31,684	0
Hungary	83,553	0
Ireland	775,840	69
Italy	690,993	8
Latvia	36,963	0
Lithuania	86,195	0
Luxemburg	14,748	1
Malta	2,843	0
The Netherlands	517,203	3
Poland	515,976	20
Portugal	113,332	51
Slovakia	69,222	3
Slovenia	36,784	1
Spain	621,818	103
Sweden	35,277	0
United Kingdom	662,305	226
EU 25	**10,113,559**	**561**
Norway	21,298	0

Source: European Commission: The Monitoring and Testing of Ruminants for the Presence of Transmissible Spongiform Encephalopathy (TSE) in the EU in 2005

3.12.2. Avian Influenza

Avian Influenza (AI) is a serious disease of poultry. Two groups of viruses are recognised on the basis of their ability to cause disease in poultry: highly pathogenic and low pathogenic avian influenza. Humans are not commonly affected by avian influenza. However, the large epidemics of highly pathogenic avian influenza that currently affect poultry in Asia, and the widespread presence of the virus in the environment there increase opportunities for human exposure and infection.

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3.12.2.1. Avian Influenza in poultry

The following information was derived from a Report on Surveys for Avian Influenza in Poultry in Member States during 2005, published by the European Commission, Health and Consumer Protection Directorate General. (The report is available at http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/index_en.htm).

Experience has shown that some strains of H5 and H7 subtype of avian influenza viruses have the ability to mutate to highly pathogenic strains after having circulated in the poultry population for some time. This situation is liable to lead to high mortality in poultry and severe economic losses to the poultry industry that could be reduced by implementing a screening system in the Member States to allow earlier detection and control of such precursor strains.

Surveys for avian influenza in poultry in Member States undertaken in 2005 were carried out under Commission Decision 2004/111/EC. The objectives were: (1) to detect the prevalence of infections with avian influenza virus subtypes H5 and H7 in different species of poultry by repeating the screening exercise of 2003/04 in a modified, more targeted manner; (2) to contribute to knowledge of the threats to animal health from wildlife; (3) maintain the connection and integration of human and veterinary networks for influenza surveillance. The survey design was based upon examination of all categories of poultry in each Member State using a statistical design. The number of birds sampled from each farm was defined to ensure 95% probability of identifying at least one positive bird if the prevalence of seropositive birds was over 30%. All 25 Member States participated in the survey testing all categories of poultry subject to regional variation including: laying hens, broilers, chicken breeders, fattening turkeys, turkey breeders, backyard flocks, ducks, geese, farmed game birds (including quail), ratites and miscellaneous categories, such as free range poultry and ready-to-lay pullets.

A total of 78 holdings were serologically positive for influenza A viruses of which 74 holdings were confirmed as positive for H5 or H7 subtypes (69 and 5 respectively). The majority (68/78) of serologically positive holdings were ducks and geese and of these 58 were located in one MS. No H5 or H7 positive holdings were reported for broilers, fattening turkeys, turkey breeders, farmed game birds or backyard flocks (only three MS tested backyard flocks). Six MS reported H5 positive holdings from five different poultry categories. Three MS reported H7 positive holdings from three different poultry categories. The upper limits for prevalence at the 95% confidence limit ranged from 0.11% to 19.38% in MS where no positive holdings were detected and from 0.2% to 6.77% in MS reporting H5 or H7 positive holdings. It should be noted, however, that for MS with relatively high upper 95% confidence limits, the assessment was based upon a small number of holdings and the data should therefore be treated with caution.

3.12.3. Cysticerci

Cysticercus infections in animals are caused by two parasite species, the larval forms of the tapeworms *Taenia saginata* and *Taenia solium*. The related disease in humans is taeniosis, due to the adult form of *T. saginata* or *T. solium*, and cysticercosis, due to the larval form of *T. solium* only. Cattle become infected mostly through the ingestion of vegetation contaminated with the *T. saginata* eggs shed in human faeces, while pigs may also become infected when they directly ingest human waste. The eggs 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 their intestine Figure OZ1. Symptoms are mild abdominal discomfort and effective drug treatments exist.

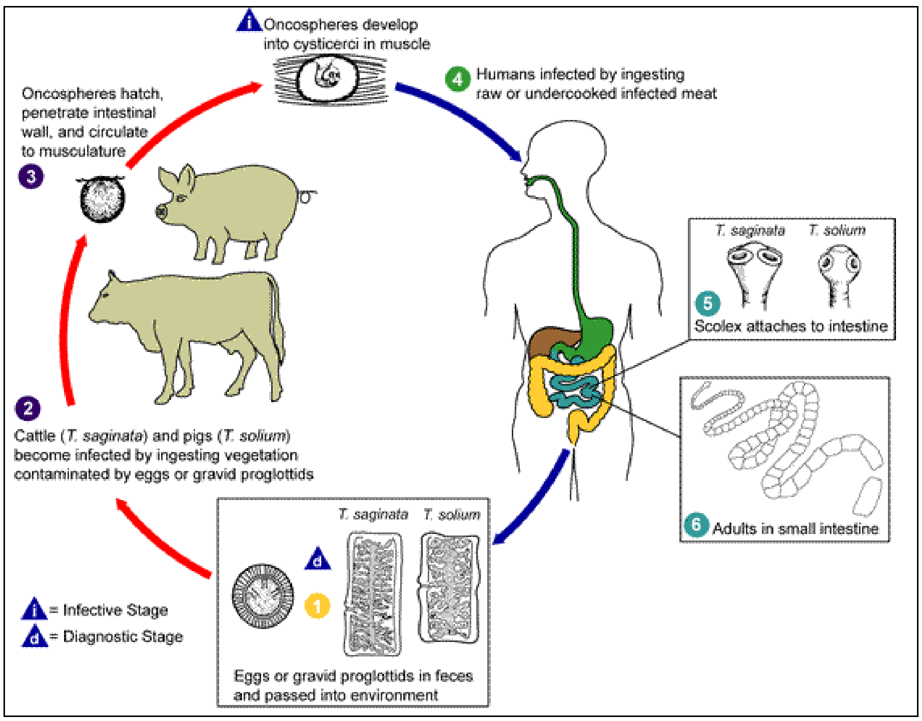


Figure OZ1. Lifecycle of *Taenia saginata* and *T. solium*
Source: http://www.dpd.cdc.gov/dpdx

Only Belgium reported data on the presence of cysticercus observed at post-mortem visual inspection of bovine carcasses at slaughterhouses. Of the 836,910 carcasses screened in 2005, a total of 2,392 (0.29%) tested positive. Only three of these were recorded in calves, while the rest were recorded in cattle more than two years old. The majority (99%) of carcasses were infected with low parasitic loads and these were treated by freezing prior to human consumption. The remaining 16 carcasses were heavily contaminated and destroyed. This represents a 20% decrease in the number of positive carcasses compared to 2004 and the number has decreased consistently since 2003 when 3,859 carcasses were found positive.

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. Humans become infected through the ingestion of infected meat or excreted oocysts and develop symptoms including diarrhoea, headache, but abortion and congenital disorders can occur as well Figure OZ2.

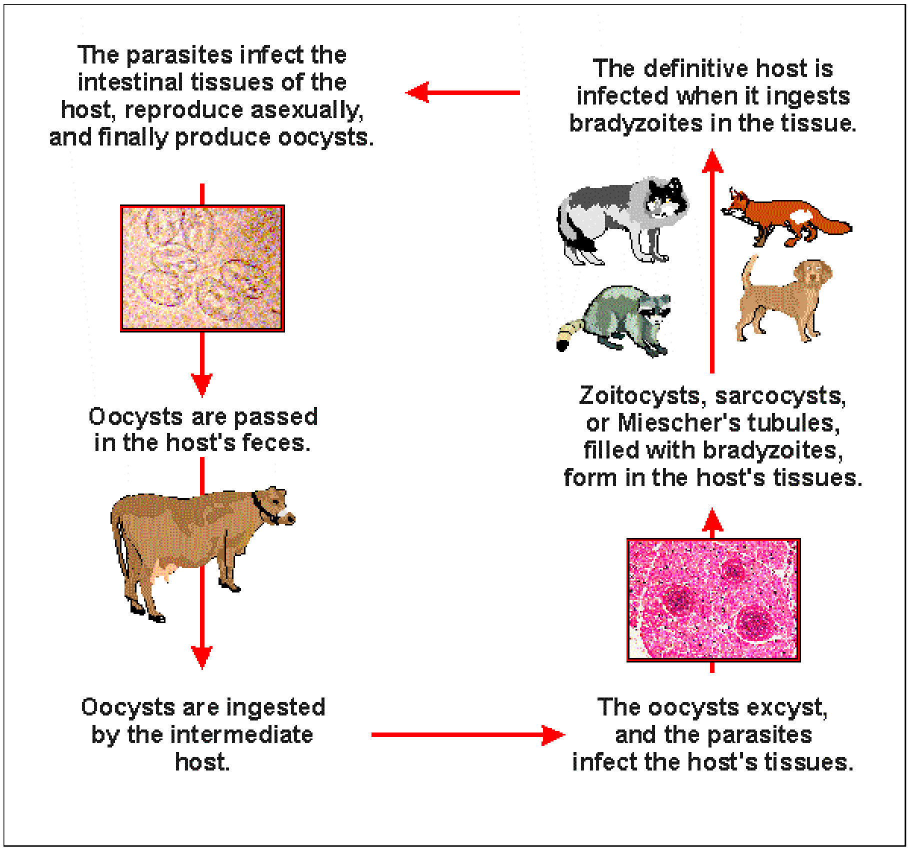


Figure OZ2. Lifecycle of *Sarcocystis*
Source: http://www.biosci.ohio-state.edu/~parasite/sarcocystis.html

Belgium reported findings from post-mortem inspection of bovine carcasses at slaughterhouses for the presence of sarcosporidiosis lesions. In 2005, of the 836,910 carcasses inspected, 14 (0.002%) tested positive for S*arcocystis*. Infected carcasses were destroyed. This is a similar infection level as in previous years.

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 reservoirs, and the bacteria are excreted in milk, urine, faeces of infected animals and, in high numbers, in the amniotic fluids and the placenta during birth. Clinical disease in these animals is rare, although abortion in goats and sheep has 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 but is less common.

Only about 50% of people infected with *C. burnetii* show clinical signs. During an acute case of 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 and up to 65% of the persons may die of the disease.

In 2005, only Belgium and Portugal reported findings on *C. burnetii*, and only data on animals was reported. Samples were examined using serology. Belgium tested 241 selected bulls of artificial insemination centres, and in addition 7 sheep and 1 goat due to increased abortions. All samples were negative. Portugal tested 225 cattle and 2 sheep and found one cow positive.

3.12.6. Summary

According to the Zoonoses Directive 2003/99/EC, also other data provided in the framework of Community legislation on zoonoses may be taken into consideration in the Community Summary Report. For the year 2005, the European Commission kindly provided information on two relevant zoonoses, where the data is collected under other Community provisions. These zoonoses are Bovine Transmissible Spongiform Encephalopathy (BSE) and Avian Influenza (AI). This information complements the overall picture of zoonoses in the Community during year 2005.

A high number of samples were tested for BSEs in all the MS with only few positive findings. Regarding Avian Influenza, information was received also from all MS, and 78 poultry holdings were reported positive for avian influenza.

The zoonoses Directive 2003/99/EC provides a framework for monitoring and reporting of information on all zoonoses except TSE/BSEs. The zoonoses, which are not to be monitored on a mandatory basis, should be included in the monitoring if the epidemiological situation in the Member State so warrants. From the Community perspective it is interesting to widen the reporting to other zoonoses of public health importance.

Q fever and the parasitic infections, cysticercosis and sarcocystis, are relevant zoonoses from human health point of view and all of them are known to be more prevalent in the Community than what could be concluded on the basis of the few countries providing information on them in 2005. In order to have a better picture of the situation in the Community, it would be fortunate if other MS would also report their monitoring activities in these fields.

No information on human cases of the above mentioned zoonoses was available from ECDC from 2005, as the current data collection networks do not cover these zoonoses. However, further extension of the networks to cover these diseases will be examined.

4. INFORMATION ON ANTIMICROBIAL RESISTANCE IN SPECIFIC INDICATORS

Data on the occurrence of antimicrobial resistance in indicator bacteria allows following trends in the occurrence of antimicrobial resistance where the prevalence of zoonotic bacteria is low. *E. coli* and *Enterococci* are used as indicators for Gram-negative and Gram-positive bacteria, respectively.

4.1. *Enterococcus faecium* and *Enterococcus faecalis* indicators

The only country reporting antimicrobial resistance data for *Enterococci* was Finland.108 *E. faecium* and 239 *E. faecalis* isolates collected from healthy broilers at slaughterhouse were tested for antimicrobial resistance to eight and seven antimicrobials, respectively. The highest proportion of resistance was observed for oxytetracycline 40.6% for *E. faecalis* and 26.9% for *E. faecium*. The proportion of isolates resistant to erythromycin was 21.8% in *E. faecalis* and 12.0% in *E. faecium*. Resistance to vancomycin was observed in *E. faecium* (2.8%). For additional data, please refer to Level 3.

4.2. *Escherichia coli* indicators

In 2005, only data on the occurrence of antimicrobial resistance from countries reporting more than ten isolates are included in this summary report. Resistance to the following antimicrobials is presented in the tables: ampicillin, cefotaxime, chloramphenicol, gentamicin, nalidixic acid, sulphonamides, tetracycline and trimethoprim. Furthermore, information on resistance to two fluoroquinolones (ciprofloxacin and enrofloxacin), is given in the text. Data are presented in tables only if the sample size was 10 isolates or more. Data for specific sample categories are shown in tables only if five or more countries reported for this specific category. For additional data not included in this chapter, please refer to Level 3.

4.2.1. *E. coli* indicators in food

Data on antimicrobial resistance in *E. coli* indicators from bovine meat, pig meat, and from broiler meat was provided by Belgium. Germany provided data on mixed meat and bovine meat, and Norway provided data on bovine meat. Data on antimicrobial resistance in cheeses were provided by Portugal. In general, the lowest proportions of antimicrobial resistance in meat were reported by Germany and Norway. The proportion of isolates resistant to nalidixic acid ranged from 0%-27.8%. The highest proportion of resistance to nalidixic acid was found in broiler meat from Belgium (27.8%) and in cheese from Portugal (14.7%). Belgium also reported resistance to ciprofloxacin in broiler meat, pig meat and bovine meat (2.7%, 1.2% and 0.8% respectively). For additional data not included in this chapter, please refer to Level 3.

4.2.2. *E. coli* indicators in animals

Data on the occurrence of antimicrobial resistance in *E. coli* indicators from animals (cattle, pigs, poultry, sheep, goats and turkeys) were provided by 16 MS and one non-MS: Austria, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Latvia, Poland, Portugal, Slovakia, Spain, Sweden, The Netherlands, The United Kingdom and Norway (Table AB EC1-EC3 and Level 3).

Cattle

In 2005, 13 countries reported data on antimicrobial resistance in *E. coli* indicators from cattle (Table AB EC1). The highest level of resistance was reported for ampicillin, tetracycline and sulphonamide-trimethoprim, whereas the level of resistance to the other antimicrobials tested was generally moderate or low. Greece reported the highest proportions of resistant isolates (49.0%-96.0%) and all (100%) of these isolates were resistant to >4 antimicrobials. Also Portugal (7.7%-96.9%) and The United Kingdom (28.0%-56.0%) were among those reporting the highest proportions. The lowest proportions were reported by Austria (0%-14.8%), Denmark (0%-8.9%), Estonia (0%-14.3%), Poland (0%-6.8%) and Norway (0%-2.0%). In general, resistance to gentamicin and nalidixic acid was low (up to 7.9% and 14.1%, respectively), except for proportions reported by Greece (86.0% and 49.0%, respectively), and Slovakia 53.3% for gentamicin. Only Germany reported of resistance to ciprofloxacin in cattle (1.4%).

Table AB EC1. Antimicrobial resistance in *E. coli* from cattle, 2005

	Monitoring programme		Antimicrobial										
			Ampicillin	Cefotaxime	Chloramphenicol	Gentamicin	Nalidixic acid	Sulphonamides	Tetracycline	Trimethoprim	Trimethoprim + sulphonamides	Fully sensitive	Resistant to >4 antimicrobials
Country	Yes/No	N	%R	%R	%R	%R	%R	%R	%R	%R	%R	%	%R
Austria	Yes	284	6.0	-	1.1	0	1.1	-	14.8	4.6	-	78.2	4.6
Denmark	Yes	101	3.0	-	1.0	0	1.0	8.9	5.9	1.0	-	85.1	2.0
Estonia	Yes	49	8.2	0	2.0	0	0	12.2	14.3	4.1	4.1	77.6	4.1
France	No	100	14.0	-	14.0	5.0	9.0	-	26.0	12.0	-	71.0	12.0
Germany	No	20	35.0	-	5.0	5.0	10.0	45.0	50.0	10.0	10.0	45.0	30.0
Greece[1]	No	50	96.0	-	-	86.0	49.0	-	70.0	-	70.0	-	100
Italy[2]	Yes	368	28.7	0.5	24.2	7.9	13.0	-	42.4	-	26.9	44.8	19.8
The Netherlands	Yes	304	26.3	0.7	18.1	5.9	14.1	29.9	50.3	24.3	-	54.9	18.4
Norway	Yes	98	2.0	-	0	0	0	1.0	1.0	0	-	90.8	0
Poland	Yes	220	6.8	-	0.9	0	1.8	3.6	7.3	2.7	3.6	82.7	0.5
Portugal	No	18	96.9	-	-	7.7	-	-	-	-	66.2	-	-
Slovakia[3]	No	96	85.7	-	-	53.3	-	-	49.0	-	27.3	-	-
United Kingdom	Yes	3,106	53.0	-	-	-	-	-	56.0	-	28.0	-	-

Only countries reporting more than 10 isolates were included in this table. Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. For data not included in this table, see Level 3.

1. For Greece: N=49 for nalidixic acid and resistant to>4 antimicrobials
2. For Italy: N= 341 for ampicillin, N= 345 for nalidixic acid
3. For Slovakia: N=42 for ampicillin, N=15 for gentamicin, N=44 for trimethoprim-sulphonamides

Sheep and Goats

Data on antimicrobial resistance in *E. coli* indicators from sheep and goats was provided by Greece, Italy, The United Kingdom and Norway. The proportion of nalidixic acid resistant isolates from sheep reported by Italy and Norway was 0%, while Greece reported 40% in sheep and goats. For additional data not included in this chapter, please refer to Level 3.

Pigs

Data on antimicrobial resistance in *E. coli* indicators from pigs was reported by 13 MS (Table AB EC2). As seen in 2004, the highest level of resistance was reported for tetracycline. Large variation was observed in the proportion of tetracycline resistant isolates, ranging from 8.7% (Sweden) up to 100% (Latvia).

In general, the highest proportion of resistance was reported by Germany, Italy, Spain and The United Kingdom. Resistance to nalidixic acid was generally at a low level, with the exception of Germany, Latvia and Spain reporting 23.3%, 50.0% and 16.7%, respectively. In general, the lowest proportion of resistance was reported by Estonia (0%-25.0%), Poland (2.3%-20.8%) and Sweden (0%-10.5%). The United Kingdom and Sweden reported enrofloxacin resistance in pigs (4.9% and 0.3% respectively) and Austria found 1.3% of their isolates resistant to ciprofloxacin. The highest proportion of fully sensitive isolates was reported by Sweden (78.2%).

Table AB EC2. Antimicrobial resistance in *E. coli* from pigs, 2005

			Antimicrobial										
	Monitoring programme		**Ampicillin**	**Cefotaxime**	**Chloramphenicol**	**Gentamicin**	**Nalidixic acid**	**Sulphonamides**	**Tetracyclines**	**Trimethoprim**	**Trimethoprim + sulphonamides**	**Fully sensitive**	**Resistant to >4 antimicrobials**
Country	**Yes/No**	**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	226	10.2	-	2.7	0	3.5	-	59.7	12.8	-	27.0	14.6
Denmark	Yes	136	17.7	-	1.5	0	0.7	30.2	27.9	14	-	44.9	15.4
Estonia	Yes	40	10	0	2.5	0	0	10.0	25.0	7.5	2.5	55.0	0
France	No	100	22	-	14.0	0	3.0	-	86.0	44	-	10.0	7.0
Germany	No	30	40	-	33.3	13.3	23.3	76.7	56.7	43.3	43.3	20.0	66.7
Italy	Yes	73	56.2	0	31.5	4.1	11.0	-	79.5	-	60.3	16.4	21.9
Latvia	No	14	81.8	-	0	38.5	50.0	-	100	100	0	-	-
The Netherlands	Yes	299	30.4	0.3	8.7	0.3	0	-	62.2	41.5	-	28.1	6.0
Poland[1]	Yes	344	9	-	4.1	2.0	6.1	19.5	20.8	6.4	12.5	51.7	2.3
Slovakia[2]	No	83	100	-	-	40.0	-	-	74.7	-	35.2	-	-
Spain	No	192		0.5	31.3	4.7	16.7	67.2	90.1	68.2	-	-	-
Sweden	Yes	390	6.4	0	3.3	0	0.3	10.5	8.7	6.4	-	78.2	2.1
United Kingdom	Yes	263	49	-	-	-	-	-	79.8	-	52.1	-	43.3

Only countries reporting more than 10 isolates were included in this table. Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. For data not included in this table, see Level 3.

1. For Poland: N=342 for tetracycline, N=343 for trimethoprim

2. For Slovakia: N=10 for ampicillin and gentamicin, N=71 for trimethoprim-sulphonamide

Gallus gallus

The occurrence of antimicrobial resistance in *E. coli* indicator isolates from *Gallus gallus* was reported by 14 countries (Table AB EC3). In general, a large variation in the proportion of resistant isolates was observed among the reporting countries. In 2005, as well as in the previous year, several countries reported a high level of resistance to ampicillin, nalidixic acid and tetracycline.

Germany reported resistance to ciprofloxacin (2.3%) and Slovakia reported resistance to enrofloxacin (0.3%). The highest proportions of fully sensitive isolates were reported by Denmark, Estonia and Finland (58.3%, 66.7% and 66.3%, respectively).

Table AB EC3. Antimicrobial resistance in *E.coli* from *Gallus gallus*, 2005

	Monitoring programme		Antimicrobial										
			Ampicillin	Cefotaxime	Chloramphenicol	Gentamicin	Nalidixic acid	Sulphonamides	Tetracycline	Trimethoprim	Trimethoprim + sulphonamides	Fully sensitive	Resistant to >4 antimicrobials
Country	**Yes/No**	**N**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%R**	**%**	**%R**
Austria	Yes	128	18.8	-	3.1	-	38.3	23.4	32.8	14.1	-	34.4	12.5
Denmark	Yes	132	15.9	-	0	-	9.9	12.1	8.3	3.8	-	58.3	6.1
Estonia	Yes	21	9.5	-	0	-	4.8	4.8	23.8	4.8	4.8	66.7	4.8
Finland	Yes	380	15.8	-	0.3	0	1.1	12.9	16.8	5.3	-	66.3	2.6
France	No	100	37	-	8.0	1.0	26.0	-	73.0	38.0	-	14.0	14.0
Germany	No	42	42.9	-	2.4	4.7	47.6	52.4	57.1	9.5	7.1	31.0	19.1
Greece[1]	No	20	41.7	-	40.0	10.0	100	57.1	65.0	-	60.0	-	-
Italy[2]	Yes	121	59.7	0	21.5	0	39.7	-	68.6	-	24.0	20.7	17.4
The Netherlands[3]	Yes	304	63.2	14.1	18.1	3.3	52.0	71.6	60.9	63.2	-	12.2	38.8
Poland	Yes	73	54.8	-	5.5	1.4	56.9	31.9	46.6	15.3	30.6	20.5	-
Portugal	No	51	80.4	-	-	-	70.6	-	-	52.9	-	-	-
Slovakia[4]	No	401	99.0	-	-	58.0	-	-	86.8	-	18.2	-	-
Spain	No	74	-	23.0	18.9	10.8	89.2	54.1	67.6	37.8	-	-	-
United Kingdom	Yes	64	40.6	-	-	-	-	-	56.3	-	25.0	-	-

Only countries reporting more than 10 isolates were included in this table. Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. For data not included in this table, see Level 3.

1. For Greece: N=12 for ampicillin, N=15 for chloramphenicol, N=10 for gentamicin, nalidixic acid and trimethoprim-sulphonamide, N=14 for sulphonamide
2. For Italy: N=77 for ampicillin
3. For The Netherlands: N=303 for sulphonamide
4. For Slovakia: N=390 for gentamicin, N=11 for trimethoprim-sulphonamides

Turkeys

Data on antimicrobial resistance in *E. coli* indicators from turkeys were provided only by The United Kingdom and Germany. The proportion of isolates resistant to tetracycline and ampicillin was 64.7%, and 29.4%, respectively, whereas none of the isolates (0%) were resistant to enrofloxacin.

4.3. Summary

Monitoring of antimicrobial resistance in indicator (commensal) bacteria, such as *E. coli* and *Enterococci*, enables the following of trends in resistance in animal and food products also in cases where there is no or low presence of zoonotic bacteria.

For *E. coli* isolates from food the level of antimicrobial resistance was generally lower than in animals. The same trend was observed in 2004. In general, large variation in the proportion of resistant *E. coli* indicator isolates was observed especially for ampicillin, nalidixic acid, tetracycline and trimethoprim, whereas less variation was seen in the proportion of isolates resistant to the other antimicrobials tested.

In animals, the proportions of resistance isolates reported for *Gallus gallus*, were generally higher than for pigs and cattle. Similar observations were made in 2004. In *E. coli* isolates from cattle and pigs the highest level of resistance was reported for ampicillin (up to 100%) and tetracycline (up to 100%), whereas for poultry high level of resistance to nalidixic acid was also observed (up to 100% and several countries reporting more than 50% prevalence).

The largest proportions of fully sensitive isolates for *E. coli* overall, was reported by Austria, Denmark and Estonia, Poland and Finland. The differences in the levels of resistance between the countries are likely to be attributed to differences in the usage of antimicrobials in animals. Typically the resistance is common against the antimicrobials, which are or have been frequently used.

The nalidixic acid resistance is indicative of a developing resistance to fluoroquinolones, an important group of antimicrobial used in human therapy. Some, relatively low, resistance rates to fluoroquinolones in *E. coli* isolates from food and animals were reported by some countries.

Information on antimicrobial resistance in *Enterococci* was only reported by one MS. Therefore no conclusions at the Community level can be drawn.

The findings of antimicrobial resistance in indicator bacteria demonstrate that there is a reservoir of resistance in food producing animals.

4.4. Sources of *E. coli* and Enterococci indicators data

Results of antimicrobial resistance in resistant isolates were analysed as proportions, 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 provided by 15 countries were included. The countries reported results for antimicrobial susceptibility testing of isolates of *E. coli* indicators from various animal species and from various foods. All countries provided data on the occurrence of antimicrobial resistance in isolates from one or more of the following animal species: Cattle, pigs and *Gallus gallus*, except for Belgium, that reported results only from meat. More than half of the countries providing data on antimicrobial resistance in *E. coli* indicators in 2005, generated the data through monitoring programmes. The majority of reporting countries used dilution (MIC) method for antimicrobial susceptibility testing of *E. coli* isolates. Exceptions were Estonia, Greece, Italy, Poland, Portugal, The United Kingdom and Slovakia using disc diffusion methods. Breakpoints applied in individual countries for antimicrobial susceptibility testing by dilution methods are presented in Level 3. Isolates from different MS may originate from different classes or ages of animals, and this presents a further source of variation in the results, because the prevalence of antimicrobial resistance in indicator bacteria can differ markedly in different ages or classes of animals.

5. FOODBORNE OUTBREAKS

5.1. General overview

Reporting of foodborne outbreaks was chosen as the focus of the year for the 2005 Community summary report since foodborne outbreaks are included as a new field by the Zoonoses Directive 2003/99/EC. In 2005, reporting of foodborne outbreaks was mandatory for MS for the first time. However, since the foodborne outbreak reporting systems are not harmonised in the EU, differences in the number and type of reported outbreaks between MS cannot be regarded to reflect different levels of food safety in the countries. All foodborne outbreaks reported by the MS are incorporated in the analyses; including confirmed and suspected outbreaks as well as those outbreaks where evidence for an implicated source was not provided.

In 2005, 23 MS reported 5,311 foodborne outbreaks involving a total of 47,251 people, resulting in 5,330 hospitalisations (11%) and 24 deaths (0.05%) (Table OUT1). No outbreak data was received from Cyprus and Hungary. One non-MS, Norway, reported 44 outbreaks involving 532 cases of which 9 were admitted to hospital. The total number of reported outbreaks decreased by 22% compared to 2004, where 20 MS plus Norway reported a total of 6,860 foodborne outbreaks. However, the total number of human cases reported in connection with foodborne outbreaks increased with 10% compared to 2004. In general, reporting of foodborne outbreaks may have gained more attention in the MS with the new Zoonoses Directive coming into force. Therefore, the observed increase is likely due to an increasing number of MS reporting, the inclusion of more causative agents species by a number of MS, as well as to improved reporting procedures and/or systems.

The MS were requested to provide any outbreak data available. Data received were generally complete and of high quality. However, data completeness differed between the MS and some MS, such as the Czech Republic, Germany, France, Italy and Spain, provided almost exclusively aggregated data for outbreaks. Since these five MS are among the most populous countries in the EU, details on locations and sources of outbreaks were not available for the majority of outbreaks reported by the MS in 2005.

Outbreaks are reported as either general outbreak, affecting members of more than one private household or as family outbreaks, affecting only members of a single household. In 2005, a total of 3,073 general outbreaks and 2,282 family outbreaks were reported. Germany and Sweden do not distinguish between general and family outbreaks and all their outbreaks are reported as general outbreaks. A number of MS only reported outbreaks in which the causative agent has been identified (i.e. outbreaks with known aetiology).

Table OUT1. Number of reported foodborne outbreaks in EU, 2005

	Outbreaks						Human cases		
	N	% of total	General	Family	% with aetiology[1]	Reporting rate per 100,000	N	No. admitted to hospital	No. of deaths
Austria	606	11.4	65	541	100	7.38	1,910	368	1
Belgium	105	2.0	94	11	30	1.01	673	51	0
Czech Republic	79	1.5	79	-	100	0.77	1,635	167	1
Denmark	98	1.8	65	33	76	1.81	2,048	45	-
Estonia	20	0.4	2	18	100	1.48	115	59	-
Finland	58	1.1	49	9	57	1.11	2,164	16	1
France[2]	646	12.2	428	218	79	1.04	7,323	766	6
Germany[3]	1,281	24.1	1,281	-	99	1.55	6,279	767	3
Greece	44	0.8	27	17	82	0.40	1,441	408	-
Ireland	19	0.4	6	13	95	0.46	194	14	0
Italy	96	1.8	96	-	100	0.16	394	-	-
Latvia	85	1.6	46	39	78	3.69	488	5	0
Lithuania	38	0.7	23	15	89	1.11	442	267	0
Luxembourg	1	<0.1	1	0	0	0.22	18	1	0
Malta	21	0.4	5	16	100	5.22	127	22	-
Netherlands	44	0.8	32	12	64	0.27	321	12	0
Poland	605	11.4	206	399	100	1.58	6,401	2,065	2
Portugal	3	<0.1	2	1	100	0.03	166	26	-
Slovakia	745	14.0	43	702	100	13.84	3,474	137	0
Slovenia	50	0.9	44	6	94	2.50	1,407	49	0
Spain	460	8.7	237	223	100	1.07	7,682	23	7
Sweden[3]	139	2.6	139	-	35	1.54	1,314	14	-
United Kingdom	68	1.3	68	-	91	0.11	1,235	48	3
EU-Total	**5,311**	**-**	**3,038**	**2,273**	**92**	**1.18**	**47,251**	**5,330**	**24**
Norway	44	-	35	9	75	0.96	532	9	-

1. Percent of outbreaks where the causative agent has been identified and reported
2. In France, 4 outbreaks with unknown location were added to general outbreaks
3. No distinction between general outbreaks and family outbreaks.

Six MS (Austria, France, Germany, Poland, Slovakia and Spain) reported 81% of all reported foodborne outbreaks in 2005. As Germany and Sweden reported all recorded outbreaks under general outbreaks, , the total number of family outbreaks reported is likely to be underestimated. The EU reporting rate for 2005 was 1.2 foodborne outbreaks per 100,000 population, and ranged from 0.03 in Portugal to 13.8 in Slovakia. The reporting rate is highly dependent on the sensitivity and completeness of reporting systems in the MS and may therefore not reflect the actual incidence of human cases involved in foodborne outbreaks. However, if no major changes are introduced to a reporting system, the reporting rates can be followed over time for individual MS. More detailed foodborne outbreak data are presented in Level 3.

Causative Agents

As in previous years, the most common agent responsible for foodborne outbreaks in 2005 was *Salmonella*, which was responsible for 63.6% of all reported outbreaks (Table OUT2). In 9.2% of all reported outbreaks, *Campylobacter* was indicated as the causative agent. Foodborne viruses were reported to cause 5.8% of all reported outbreaks. Several MS did not report outbreaks caused by foodborne viruses, so the number of foodborne virus outbreaks is underestimated. On average, an outbreak caused by viruses involved 22 human cases, which was almost three times more people than an outbreak caused by *Salmonella* (8 cases) and four times more than *Campylobacter* (5 cases). However, when comparing the proportion of cases admitted to hospital out of number of cases, approximately twice as many *Salmonella* cases were admitted to hospital compared to cases infected with *Campylobacter* and almost four times more compared to foodborne viruses. In total, 16 deaths were reported due to foodborne outbreaks caused by *Salmonella*, one died of *Campylobacter* infection and none died of foodborne viruses. Ninety percent of foodborne virus outbreaks were reported as general outbreaks. In three outbreaks with Flavivirus in Estonia, almost 75% of the patients were hospitalised.

On average, *Cryptosporidium* was the pathogen involving most people per outbreak (28 cases). *Clostridium spp.* affected on average 21 people per outbreak, mainly due to one large outbreak in Sweden where 200 people were diagnosed with *C. perfringens*. Although the disease due to *C. perfringens* is generally mild and of short duration (only 2.3% hospitalised), one death was reported in a general outbreak involving 35 cases in The United Kingdom. Multiple causative agents involving 276 people, of which 16% were admitted to hospital, were reported in 12 outbreaks. In these outbreaks, several combinations of *S.* Enteritidis, *E. coli*, *C. jejuni*, *S. aureus*, *B. cereus*, *Y. enterocolitica* and *C. perfringens* were found.

Table OUT 2. Causative agents reported for foodborne outbreaks, 2005

	Outbreaks				**Human cases**		
	N	**% of total**	**General**	**Family**	**N**	**No. admitted to hospital**	**No. of deaths**
Bacillus spp.	74	1.4	62	12	1,180	28	-
Brucella spp.	2	<0.1	1	1	15	-	-
Campylobacter spp.	494	9.2	338	156	2,478	150	1
Clostridium spp.	79	1.5	60	19	1,633	38	1
Cryptosporidium spp.	7	0.1	7	-	195	0	0
Flavivirus	3	0.1	1	2	46	33	-
Foodborne viruses	312	5.8	280	32	6,812	255	0
Giardia	16	0.3	14	2	34	0	-
Histamine	40	0.7	34	6	326	28	-
Listeria	5	0.1	5	-	26	3	0
Pathogenic *Escherichia coli*	60	1.1	44	16	796	125	0
Salmonella spp.	3,406	63.6	1,577	1,829	25,760	3,554	16
Scrombrotoxin	10	0.2	7	3	69	2	-
Shigella spp.	47	0.9	29	18	322	82	1
Staphylococcus spp.	164	3.1	106	58	1,692	365	1
Trichinella spp.	12	0.2	5	7	142	62	-
Yersinia spp.	9	0.2	5	4	22	7	-
Multiple agents	12	0.2	9	3	276	43	0
Other[2]	30	0.6	22	8	260	7	2
Unknown	573	10.7	467	106	5,699	557	2
Total	**5,355**	**100**	**3,073**	**2,282**	**47,783**	**5,339**	**24**

1. Including all outbreaks from Germany and Sweden with no distinction on type (general or family outbreak).
2. Include *Aeromonas* and *Francisella*

A relatively large proportion of cases were hospitalised in outbreaks caused by Flavivirus (72%), *Trichinella* spp. (44%), *Yersinia* spp. (32%) and *Shigella* spp. (26%).

The causative agent was unknown in 11% of reported outbreaks. This proportion was higher for general outbreaks (15%) than for family outbreaks (5%). Some MS did not report information on outbreaks where the causative agent was unknown, so the proportion of outbreaks with unknown origin reported here is underestimated.

5.2. Foodborne outbreaks caused by *Salmonella* spp.

Twenty-two MS and one non-MS reported 3,406 outbreaks of human salmonellosis, which is 63.6% of the total number of reported outbreaks. These outbreaks affected 25,760 persons of which 14% were hospitalised and 16 people died (Table OUT2). The *Salmonella* serovar was not specified in 38% of the outbreaks, multiple serovars were detected in four outbreaks and 15 serovars caused one outbreak each. In general, MS reported more detailed information on serovars than in previous years probably due to the improved reporting system.

Table OUT3. *Salmonella* serovars reported for foodborne outbreaks[1], 2005

	Outbreaks		Human cases		
***Salmonella* serovar**	**N**	**% of total**	**N**	**No. admitted to hospital**	**No. of deaths**
Salmonella spp.[2]	1,239	23.14	11,172	980	7
S. Enteritidis	1,913	35.72	12,618	2,297	4
S. Typhimurium	136	2.54	1,267	158	5
S. Group D	30	0.56	138	7	0
S. Group B	28	0.52	100	0	0
S. Virchow	10	0.19	56	26	0
S. Group C	9	0.17	41	0	0
S. Infantis	8	0.15	71	10	0
S. Hadar	4	0.07	13	9	0
S. Agona	4	0.07	150	51	0
S. Stourbridge	4	0.07	41	5	0
S. Corvallis	3	0.06	15	1	0
S. Kottbus	2	0.04	27	6	0
S. Goldcoast	2	0.04	16	-	-
S. Paratyphi A	2	0.04	7	0	0
S. Saintpaul	2	0.04	7	0	0
S. Montevideo	2	0.04	5	1	0
S. Thompson	2	0.04	5	0	0
S. Typhi	2	0.04	4	3	0
S. Group E	2	0.04	4	0	0
S. Stanley	2	0.04	3	0	0
Total	**3,406**	**64**	**25,760**	**3,554**	**16**

1. Only serovars causing two or more outbreaks are presented

2. Including 2,759 cases of *S.* Hadar in a single Spanish outbreak

Germany (798 outbreaks), Slovakia (745), Austria (467), Spain (444) and Poland (383) accounted for 83% of the 3,406 reported *Salmonella* outbreaks in 2005. The majority of *Salmonella* outbreaks in Slovakia (94%), Austria (89%) and Poland (78%) was small family outbreaks. Spain reported 230 general and 214 family *Salmonella* outbreaks, involving 7,415 persons of which seven died. The remaining 18 MS and Norway reported 370 general outbreaks and 199 family outbreaks involving *Salmonella*.

S. Enteritidis was associated with 19% of all reported outbreaks in 2005, corresponding to 56% of all *Salmonella* outbreaks and 88% of all *Salmonella* outbreaks where the specific serovar was identified (Table OUT3). In outbreaks caused by *S.* Hadar, *S.* Virchow and *S.* Agona relatively large proportions of cases required hospitalisation (69%, 46% and 34% respectively). In two German outbreaks, three out of four *S.* Typhi cases required hospitalisation.

Salmonella phage types

Phage type data were provided for 21% of all *S.* Enteritidis outbreaks. Only Austria, Estonia, Ireland, Slovakia and The United Kingdom provided this information, and not for all the reported outbreaks. Twenty-three different phage types were reported. The five most commonly reported were *S.* Enteritidis PT4 (148 outbreaks), PT8 (95), PT21 (67), PT1 (28) and PT5a (19).

Phage type data were provided for 24% of all *S.* Typhimurium outbreaks. The information was reported for the majority of *S.* Typhimurium outbreaks in Austria, Denmark, Finland, Ireland, Norway and Sweden. Ten different phage types were reported. The most commonly reported were *S.* Typhimurium DT104 (10 outbreaks), DT120 (7), DT41 (5) and DT193 (4).

Location of exposure

For 57% of *Salmonella* outbreaks specific information on the location of exposure was available (Table OUT4). Private homes (42%) and restaurants (4%) were the most commonly reported locations of exposure to *Salmonella*. On average, outbreaks at restaurants affected almost four times more people per outbreak than outbreaks in private homes.

Meals prepared centrally for many persons are known to cause large outbreaks, e.g. a hospital outbreak in Greece caused by dairy products contaminated with *S.* Enteritidis resulted in 133 cases of human salmonellosis. On average, *Salmonella* outbreaks in hospitals affected 29 people per outbreak, institution outbreaks affected 28 people per outbreak whereas catering outbreaks affected 26 persons per outbreak. Poland reported 68% of all catering outbreaks.

Table OUT4. Major categories of exposure locations for *Salmonella* outbreaks, 2005

	Outbreaks	Cases		
Location	**N**	**N**	**No. admitted to hospital**	**No. of deaths**
Private home	1,440	5,361	1,339	3
Restaurant	138	1,845	465	1
Abroad	119	1,619	152	1
Catering	55	1,427	236	-
Institution	44	1,244	167	-
Bakery	16	149	64	-
Take-away	16	113	38	1
Fast food outlet	11	36	4	-
Hospital	9	260	126	-
Camp	9	94	18	-
Community	7	234	71	1
Other	85	1,498	152	1
Not reported	1,350	11,625	669	8
Unknown	107	255	53	-
Total	**3,406**	**25,760**	**3,554**	**16**

In 3% of all reported outbreaks the source was indicated as unknown; 92% of these outbreaks were family outbreaks. In 40% of all reported outbreaks the source was not reported; 83% of these were general outbreaks. Most of these outbreaks were reported in aggregated form. To control or prevent future outbreaks, it is essential that knowledge of sources and transmission routes of infection and contamination be shared among MS.

Sources of infection

Data on sources of infection was provided in 40% of the *Salmonella* outbreaks. For the remaining 2,053 outbreaks the source was either unknown (11%) or not reported (49%), together these outbreaks involved 9,608 people of which 1,206 were admitted to hospital (13%) and five died. No waterborne *Salmonella* outbreaks were reported in 2005 (Table OUT5).

Table OUT 5. Categories of sources implicated in *Salmonella* outbreaks, 2005

	Outbreaks		Human cases	
	General	Family	N	No. admitted to hospital
Eggs and egg products	85	319	2,820	936
Broiler meat	24	48	624	197
Bakery products	24	42	581	192
Meat unspecified	19	33	344	87
Dairy products	11	23	473	235
Poultry meat other	5	16	69	22
Pig meat	14	5	383	160
Seafood	5	12	216	46
Fruit or vegetables	7	2	294	24
Bovine meat	3	3	84	23
Duck meat	0	1	2	1
Carrier person	0	1	-	-
Other food	357	294	10,262	425
Not reported	959	712	7,745	763
Unknown	64	318	1,863	443
Total	**1,577**	**1,829**	**25,760**	**3,554**

Eggs and egg products were most frequently associated with *Salmonella* outbreaks with 404 outbreaks involving 2,820 persons of which 33% were admitted to hospital. However, it seems that dairy products may have caused the most severe *Salmonella* infections, as 50% of the patients were admitted to hospital. A high percentage of hospitalisation was also reported in *Salmonella* infections caused by pig meat (42%), bakery products (33%), broiler meat (32%), poultry meat other than broilers (32%) and bovine meat (27%). The source group 'Other food' is covering different sources of composite foods e.g. buffet, pizza and chocolate mousse.

As some MS reported aggregated data on their outbreaks, information on the different sources of infection was also aggregated. For example Spain reported 211 *S.* Enteritidis outbreaks and identified eggs as the possible source in 114 of these reported outbreaks and meats including poultry were the source of infection in 14 outbreaks. Furthermore, *Salmonella* spp. caused 217 outbreaks in Spain, with eggs as the possible source in 132 outbreaks and poultry in 16 outbreaks. In Belgium, preparations with raw eggs (eggs, chocolate mousse, mashed potatoes prepared with raw eggs, mayonnaise and pastry) were identified as the source of infection in 37% of the reported *Salmonella* outbreaks.

Some relevant *Salmonella* outbreaks

Spain reported the largest *Salmonella* outbreak in recent Spanish history, involving 2,759 patients infected with *S.* Hadar. The epidemiological and microbiological investigation linked the outbreak to a specific brand of pre-cooked, vacuum-packed roast chicken distributed throughout Spain. The product was recalled from the market and new infections were thereby avoided. That outbreak is not reported under *S*. Hadar in Table OUT3 but under *Salmonella* spp., because otherwise *S.* Hadar would appear to be the second most commonly reported serovar due to a single outbreak.

In the western part of France, 24 cases of *S.* Stourbridge were identified. Interviews of the patients did not reveal any source or food item common to all cases, but seven cases had consumed goat cheeses made from raw milk, which were also incriminated in an outbreak in Sweden. The trace back investigation in both outbreaks showed that the suspected goat cheeses were made by the same producer in southern France. In total more than 50 cases with *S.* Stourbridge was reported in nine countries (England and Wales, The Netherlands, Switzerland, Luxemburg, Austria, Germany, Norway, France, Sweden).

Portugal reported a *S.* Enteritidis outbreak in a kindergarten with 140 cases, where 20 patients were admitted to hospital. *S.* Enteritidis was confirmed in a meal with cooked fish, and was due to deficiencies in food preparation.

Greece reported a *S.* Enteritidis outbreak in a hospital affecting 133 people. Case-control studies indicated dairy products to be the source of the outbreak.

Lithuania reported a *S.* Enteritidis outbreak affecting 50 people of which 76% were hospitalised. Inadequate heating of broiler meat and deficiencies in food handling at a restaurant was the cause of the outbreak.

S. Typhimurium DT104 has become an important phage type due to its frequent acquisition of multiresistance to antimicrobials. In Finland, an outbreak caused by a rare multiresistant *S.* Typhimurium DT104B (ACSSuT) was reported, involving ca. 60 laboratory-confirmed cases with a wide geographic distribution. A subgroup of cases consisted of students from an educational facility, and *S.* Typhimurium DT104B with the same resistance pattern as the one isolated from patients, was also isolated from iceberg lettuce imported from Spain. The United Kingdom reported another *S.* Typhimurium outbreak with 71 patients, where the source was also iceberg lettuce.

Germany reported a nation wide outbreak of gastroenteritis due to *S.* Bovismorbificans during the winter of 2004/2005 (a relatively rare serovar in human infections in Germany). A total of 487 cases from all German states was identified and one patient died. Consumption of raw minced pork and short-time fermented raw-pork sausage were strongly associated with infections in a case-control study. The outbreak strain was also identified in isolates from pork products.

In Belgium, contamination at a slaughterhouse resulted in one *S.* Ohio outbreak with 60 known cases. Clinical laboratories reported cases from almost all regions of Belgium to the National Reference Centre for *Salmonella* in Brussels, and a cluster of patients was identified around the city of Brussels. At the same time, an increase of *S*. Ohio was observed among results from the national monitoring programme of pork products. PFGE typing confirmed the clonal relationship between the human isolates and those isolated from pork products. Further epidemiological investigations confirmed the link to the slaughterhouse.

5.3. Foodborne outbreaks caused by *Campylobacter* spp.

Human cases of campylobacteriosis are most often sporadic ones and outbreaks are regarded rare. Fourteen MS and 1 non-MS reported 494 outbreaks of human campylobacteriosis, which is a 40% decrease compared to 2004. *Campylobacter* was identified as the cause in 9% of all reported outbreaks (Table OUT2). In most outbreaks further speciation of the *Campylobacter* isolate was not performed (15%) or not reported (68%).

Germany (269 outbreaks) and Austria (133) reported 81% of the reported *Campylobacter* outbreaks in 2005. In Austria, *C. jejuni* was reported as the causative agent in 16% of *Campylobacter* outbreaks and *C. coli* in two family outbreaks.

Location of exposure
Information on the location of exposure was available for 36% of the 494 reported *Campylobacter* outbreaks. Of these, the most commonly reported locations were private homes (52%) and restaurants (10%). In 6% of the outbreaks the location of exposure was not identified and in 58% the location was not reported.

Source of infection
The source of infection was reported in 22% of the outbreaks (Table OUT6) and broiler meat the most common source of infected. Even though 289 people were affected by *Campylobacter* from broiler meat, the proportion of cases requiring hospitalisation (5%) was much lower than that for e.g. dairy products (43%).

Table OUT6. Categories of sources implicated in *Campylobacter* outbreaks, 2005

	Outbreaks	Human cases	
	N	N	No. admitted to hospital
Broiler meat	35	289	14
Dairy products	5	14	6
Meat unspecified	5	13	6
Poultry meat other	4	34	1
Water	2	712	5
Eggs and egg products	2	6	1
Bakery products	1	9	0
Fruit or vegetables	1	2	0
Other food	52	297	41
Not reported	287	868	41
Unknown	100	234	35
Total	**494**	**2,478**	**150**

Denmark reported a *Campylobacter* outbreak affecting 58 persons, of which one was hospitalised. Epidemiological investigations and laboratory results identified chicken of French origin, served from a canteen at a private company, as the source of the outbreak. *Campylobacter* was isolated from four patients and the epitype was subsequently isolated from another batch of imported French chicken coming from the same supplier. The United Kingdom reported a *Campylobacter* outbreak involving 86 cases and one person was hospitalised. Epidemiological investigation identified chicken liver pâté, from a catering company, that had been inadequately heat treated and where cross-contamination had taken place.

Campylobacter is a common causative agent of waterborne outbreaks. Finland reported two waterborne outbreaks in 2005. *C. jejuni* caused an outbreak affecting 600 people, where four patients were hospitalised. The source was a contaminated water supply in a municipality. *C. jejuni* was isolated from cases, the environment and water supply. In another outbreak, seepage of sewage contaminated the water supply of a hospital causing infection with *Campylobacter* in 112 people.

5.4. Foodborne outbreaks caused by pathogenic *E. coli*

Ten MS reported 60 outbreaks with pathogenic *E. coli* in 2005 (Table OUT2), which is 1.1% of the total number of reported outbreaks. This was a 31% decrease compared to 2004. The *E. coli* outbreaks involved 796 persons of which 16% required hospitalisation. No deaths were reported. Eighteen outbreaks were due to Verotoxigenic *E. coli* (VTEC) and involved 180 cases, causing seven hospitalisations. In 25% of all reported *E. coli* outbreaks the source of infection was not identified and for 43% the source was not reported. In three outbreaks the source was dairy products and in one outbreak it was bovine meat.

Sweden reported an outbreak with VTEC O157 affecting 135 people. The source was vegetables (lettuce) and the location of exposure was both restaurants and private households. This was the largest outbreak with VTEC reported by a MS in 2005.

France reported two general outbreaks of Shiga toxin-producing *E. coli* (STEC) infections. In one outbreak, 69 cases of E. coli O157 infections were identified in southwest France of which 17 developed HUS; none died. All cases reported having eaten minced bovine meat, produced by a same manufacturer. This community-wide outbreak is the first documented outbreak linked to the consumption of minced meat in France. The other outbreak was caused by E. coli O26 in cheeses made from unpasteurised cow milk.

Finland reported a pathogenic *E. coli* outbreak with 70 patients. The source was home made cheese from a catering and the agent was confirmed by a laboratory results.

Germany (20) and Poland (14) reported 57% of the pathogenic *E. coli* outbreaks. Water was indicated as the source for two of the *E. coli* outbreaks reported by Poland.

Spain reported three general outbreaks and four family outbreaks caused by pathogenic *E. coli*, resulting in 227 cases and 23 hospitalisations. One of the outbreaks caused by enterotoxigenic *E. coli* (ETEC) involved 20 cases and two hospitalisations.

5.5. Foodborne outbreaks caused by *Yersinia* spp.

Four MS reported a total of 9 outbreaks caused by *Yersinia* spp. (0.2% of all outbreaks) (Table OUT2). This is an 82% decrease compared to 51 outbreaks reported in 2004. Outbreaks with *Yersinia* spp. affected 22 people and 32% were hospitalised. Only in two outbreaks was the source of infection reported.

In Lithuania, fresh vegetables were the cause of a family outbreak with *Yersinia* resulting in three patients, who were all, admitted to hospital.

In Austria, contaminated raw milk was found to be the cause of a family outbreak involving four people, of whom one was admitted to hospital.

5.6. Foodborne outbreaks caused by other bacterial agents

Shigella

Eight MS reported *Shigella* outbreaks. In total, 47 outbreaks (0.9% of all outbreaks) involved 322 persons and 25% were admitted to hospital (Table OUT2). Seventeen outbreaks were at private homes, affecting 86 people of which 23% were hospitalised. Dairy products were the source of infection in four outbreaks (three from unpasteurised milk) involving 72 people of which 57% were admitted to hospital. The source of infection was not identified in 38% of *Shigella* outbreaks and no source was reported for 34% of outbreaks.

Lithuania reported the largest *Shigella* outbreak (*S. sonnei*), with 53 cases of which 60% were hospitalised. Consumption of unpasteurised milk products, contamination by infected persons and deficiency in food handling were identified as the sources in a case control study.

Germany reported 14 unspecified *Shigella* outbreaks, with 56 cases of whom one patient was hospitalised and one died. Latvia reported nine *S. sonnei* and three *S. flexneri* outbreaks involving a total of 70 people and none were hospitalised.

Brucella

Spain was the only MS to report *Brucella* outbreaks in 2005. Spain reported two foodborne outbreaks of brucellosis with 15 cases. Cheese was identified as the source in both outbreaks.

Listeria

Three MS and Norway reported a total of five *Listeria* outbreaks. Spain reported two outbreaks from unspecified meat. In Poland, one *L. monocytogenes* outbreak, in a sanatorium, involved 9 cases of which one was hospitalised. Norway reported one outbreak, where sliced meat (unspecified) was the identified source. Germany reported one outbreak of *Listeria*.

Bacterial toxins

Eleven MS and Norway reported 317 outbreaks caused by bacterial toxins, including 164 outbreaks due to Staphylococcal enterotoxins, 79 outbreaks due to *Clostridium* spp. and 74 due to *Bacillus* spp. (Table OUT2). *Staphylococcus* spp. and *S. aureus* were responsible for 1,692 reported cases of which 22% were hospitalised and *Clostridium* spp. involved 1,633 cases where 94% of all *C. botulinum* cases were hospitalised (Table OUT7).

Table OUT7. Outbreaks caused by bacterial toxins, 2005

	Outbreaks		Cases		
	General	Family	N	No. admitted to hospital	No. of deaths
Bacillus spp.	1	0	3	0	-
Bacillus cereus	61	12	1,177	28	-
Clostridium spp.	11	0	278	0	1
Clostridium botulinum	3	10	32	30	-
Clostridium perfringens	46	9	1,323	8	-
Staphylococcus spp.	12	8	282	51	1
Staphylococcus aureus	94	50	1,410	314	-
Total	**228**	**89**	**4,505**	**431**	**2**

The largest single outbreak of *C. perfringens* was reported by Sweden and involved 200 pupils at a school. Mixed meat and deficiencies in food handling were implicated. *C. perfringens* was laboratory confirmed both in human cases and in foodstuffs. In total, Sweden reported five *C. perfringens*, three *Staphylococcus aureus* outbreaks and one where both *B. cereus* and *S. aureus* was isolated.

Finland reported eight toxin outbreaks. The largest outbreak was caused by *B. cereus* in ham (pig meat) and involved 20 cases.

Norway reported five *B. cereus* outbreaks. The largest outbreak involved 22 people at a private party. A stew was identified as the source of infection.

Denmark reported three outbreaks attributed to *B. cereus*. The largest outbreak of *B. cereus* involved 21 persons. A buffet meal at a restaurant was identified and confirmed by laboratory and epidemiological evidence.

Sources of intoxication

In total, 5% of all bacterial toxin outbreaks was laboratory confirmed, 5% of the outbreaks was confirmed with both epidemiological and laboratory evidence, and 3% of the outbreaks was confirmed by epidemiological evidence. The source was unknown in 5% of the outbreaks and not reported for 75% of the outbreaks.

Meat was identified as the source in 22 of bacterial toxin outbreaks, involving 506 people of which 23 were hospitalised and one died. Fruit and vegetables were identified as the source in 5 outbreaks, dairy products in 4, seafood in 4 and eggs and egg products in 3. In total, these 16 outbreaks involved 155 people, where 40 cases required hospitalisation but none died.

5.7. Foodborne outbreaks caused by viruses

Fifteen countries reported outbreaks caused by viruses (Table OUT8). Foodborne viruses (adenovirus, calicivirus including norovirus, enterovirus, hepatitis A and rotavirus) caused 6% of all outbreaks and affected 6,812 people and 4% were admitted to hospital (Table OUT2). Since fewer than half of the MS reported outbreaks caused by foodborne viruses, the number is likely to be critically underestimated.

Table OUT8. Outbreaks caused by foodborne viruses, 2005

	Foodborne virus not specified	Tickborne encephalitis virus (TBE)	adenovirus	calicivirus (including norovirus)	enterovirus	hepatitis A virus	rotavirus	Total
Austria	-	-	-	1	-	-	-	**1**
Denmark	-	-	-	12	-	-	-	**12**
Estonia	-	3	-	-	-	-	-	**3**
Finland	-	-	-	16	-	-	-	**16**
France	10	-	-	9	-	-	-	**19**
Germany	-	-	-	94	-	8	35	**137**
Greece	-	-	-	2	-	1	-	**3**
Ireland	-	-	-	2	-	-	-	**2**
Latvia	-	-	-	5	-	-	28	**33**
The Netherlands	-	-	-	3	-	-	-	**3**
Norway	-	-	-	11	-	-	-	**11**
Poland[1]	1	-	4	2	-	-	16	**23**
Slovenia	-	-	-	26	1	-	7	**34**
Sweden	-	-	-	13	-	1	-	**14**
United Kingdom	4	-	-	-	-	-	-	**4**
Total	**15**	**3**	**4**	**196**	**1**	**10**	**86**	**315**

1. One multiple causative agent outbreak with adenovirus, rotavirus and norovirus is included under 'foodborne virus not specified'

Calicivirus including norovirus

Sixty-three percent of the foodborne virus outbreaks (not including TBE) were caused by caliciviruses, including norovirus, and were the most common source of non-bacterial foodborne outbreaks. Attack rates of calicivirus infections are high but illness is usually mild and short-lived.

Germany reported 94 calicivirus outbreaks involving 1,245 persons where 85 required hospitalisations.

Slovenia was the only MS to report calicivirus outbreaks caused by person-to-person transmission. In total 23 outbreaks were recorded with 968 human cases. The largest outbreak affected 95 persons at a school.

Four waterborne calicivirus outbreaks were reported by Greece (2) and Slovenia (2). In Greece, inadequate water treatment resulted in an outbreak with 702 cases. Slovenia reported a waterborne outbreak due to a breakdown in HACCP, involving 142 people at an institution.

Denmark reported a series of six norovirus outbreaks caused by imported frozen raspberries. Five outbreaks were caused by the same batch of berries, not fully withdrawn from the market. Five outbreaks were confirmed by laboratory and epidemiological evidence. In total 1,041 people were affected and 15 people were hospitalised. One of the outbreaks affected 450 patients in a hospital. Another large raspberry outbreak affected 400 elderly people receiving home-meal service from the same catering company.

Sources of infection

In 13% of the calicivirus outbreaks the source of illness was unknown and in 48% of the outbreaks the source was not reported. Among known exposures, person-to-person spread of infection was the most frequently reported cause of calicivirus outbreaks. Given the low infectious dose of caliciviruses, especially norovirus, person-to-person transmission is common. It is difficult to identify whether the food has been contaminated at the primary source (e.g. oysters), by an infected foodhandler, or whether person-to-person transmission has occurred. Also, it is difficult to confirm the presence of caliciviruses, including norovirus, in food items.

Fruit and vegetables (mainly raspberries) caused illness in eight outbreaks. In Finland, infected food handlers' contact with layer cakes caused three outbreaks, affecting 145 people in private homes. All outbreaks were confirmed by laboratory results and by epidemiological evidence. A cream cake with berries served at a company canteen in Norway caused illness in 84 people.

Table OUT9. Number of reported human calicivirus cases by source, 2005

	Outbreaks		Human cases	
	General	Family	N	No. admitted to hospital
Person-to-person	23	0	753	6
Fruit or vegetables	8	0	1130	15
Water	4	0	946	41
Bakery products	2	3	239	0
Seafood	1	1	23	1
Broiler meat	1	0	9	0
Meat unspecified	1	0	9	0
Other food	29	0	1055	1
Not reported	94	0	1245	85
Unknown	26	3	597	3
Total	**189**	**7**	**6,006**	**152**

Location of exposure

Locations were reported in 87 of the 196 calicivirus outbreaks. In 49% of the 87 outbreaks restaurants (36) and catering services (7) were indicated as the location. Institutions, including schools and age care facilities, were the location in 30% outbreaks. In 9% of outbreaks with a reported location, private homes were the setting.

Tick-borne encephalitis virus (TBE)

Estonia was the only MS to report outbreaks with Tick-borne encephalitis, all attributed to unpasteurised goat milk. One outbreak (37 cases and 25 hospitalisations) was traced to consumption of milk, served for tasting in a supermarket. The other two outbreaks were family outbreaks, involving nine persons where eight were admitted to hospital.

Other viral outbreaks

Germany, Greece and Sweden reported 10 hepatitis A virus outbreaks. As most MS did not report any information on hepatitis A virus outbreaks the number of outbreaks could be underestimated in the Community.

In Germany, eight general outbreaks involved 23 people of which 35% required hospitalisation. In Sweden, hepatitis A was laboratory-confirmed in patients and through epidemiological studies as an causative agent in one outbreak. The suspected source was pointed out to be a buffet with shellfish. In Greece, all seven cases from the reported hepatitis A virus outbreak were hospitalised but the source was not reported.

Poland reported three general and one family outbreak with adenovirus, affecting 43 people of which four required hospitalisation. A carrier person caused an enterovirus outbreak at a hotel restaurant in Slovenia, affecting 34 persons and requiring one hospitalisation. Epidemiological studies were conducted.

Czech Republic observed a general increase in foodborne virus outbreaks but the outbreaks were not reported. In Norway, foodborne outbreaks of norovirus caused by infected food handlers have become more common.

Germany, Latvia, Poland and Slovenia reported 86 rotavirus outbreaks involving 455 people of which 15% were admitted to hospital. In Slovenia, in all rotavirus outbreaks the mode of transmission was believed to be person-to-person spread. All rotavirus outbreaks reported by Poland and Latvia had an unknown source, with the exception of one rotavirus outbreak associated to meat consumed in a dormitory in Poland. Germany did not report any source or location for the 35 rotavirus outbreaks.

5.8. Foodborne outbreaks caused by parasites

Trichinella

Twelve outbreaks caused by *Trichinella* spp. were reported by France (2 outbreaks), Latvia (5), Lithuania (1), Poland (3) and Spain (1), involving 142 people, of whom 62 people were hospitalised. Similar to 2004, these represent 0.2% of all reported foodborne outbreaks in 2005. None of the *Trichinella* outbreaks was linked to public places and all were connected to consumption of meat. Four outbreaks were connected with pig meat (1 wild boar), one with black bear meat and seven outbreaks with unspecified meat.

Cryptosporidium

Seven *Cryptosporidium parvum* outbreaks were reported by Denmark (1 outbreak), Germany (4) and Slovenia (2) in 2005. Denmark reported a *C. hominis* outbreak at a large company with 99 cases, of which twelve cases were laboratory confirmed. *Cryptosporidium* outbreaks are extremely rare in Denmark and this was the first outbreak outside of a hospital setting. Epidemiological studies pointed at the ingestion of carrots and other salad bar ingredients from the company canteen. The hypothesis was that a human carrier had contaminated the water in the bowl where the carrots were stored. Slovenia had two hospital outbreaks with *C. parvum* involving 77 persons.

Giardia

Sixteen Giardia outbreaks were reported by Belgium (1 outbreak), Germany (13) and Malta (2) with 34 persons affected and none hospitalised. The source of the Belgian and German outbreaks was not reported. Malta reported 2 small family outbreaks acquired while travelling in Ethiopia.

5.9. Foodborne outbreaks caused by marine biotoxins and other toxins

Finland (1 outbreak), France (36), The Netherlands (1), Norway (1) and Sweden (1) reported 40 histamine poisoning outbreaks in 2005. Three outbreaks were reported as related to seafood. France (2 outbreaks), Malta (3) and The United Kingdom (4) reported nine scombrotoxin outbreaks. Five outbreaks were due to tuna, two to 'lampuki' (dorado) and for two outbreaks the source was not reported. In Malta, an outbreak at a restaurant involved 15 people and 'lampuki' was laboratory-confirmed as the source of poisoning. Six out of the seven outbreaks were traced to restaurants or take-away establishments.

5.10. Waterborne outbreaks

Waterborne outbreaks are potentially large, especially if public drinking water is contaminated. Hospitals and institutions hosting small kids or elderly citizens are most vulnerable for infections. Since it was not made clear to the MS which types of outbreaks they were expected to report on, not all MS reported waterborne outbreaks that occurred in 2005 (e.g. Germany, Ireland).

Finland (5 outbreaks), Greece (2), Norway (1), Slovenia (2) and Poland (3) reported 13 waterborne outbreaks. Overall, 1,756 persons became ill after drinking contaminated water and 53 were admitted to hospital. Two outbreaks were due to *Campylobacter* (712 cases, 5 hospitalisations), four outbreaks were due to calicivirus including norovirus (946 cases, 41 hospitalisations), one outbreak with seven cases had multiple causative agents (i.e. *S. aureus* and *E. coli*) and in three outbreaks (78 cases) the causative agent was unknown. Two outbreaks, one general and one family, were due to E. coli (11 cases, 7 hospitalisations). Norway had one family outbreak (2 cases) with *Francisella tularensis* from a private drinking water supply. Eight out of ten outbreaks were laboratory confirmed, for three outbreaks no information was provided.

5.11. Control measures or other actions taken to improve the situation

Different tools have improved both national and international outbreak investigations, e.g. new coordinated reporting systems, improved co-operation between regions and/or MS and implementation of surveillance and monitoring programmes. These measures make outbreak detection and control more efficient, and improve the possibility of identifying the source of infection. Six MS specified different measures for preventing outbreaks or improving of the reporting systems at their national level.

In 2005, Belgium applied logistic slaughtering for *Salmonella*-free poultry in order to prevent cross contaminations at slaughterhouses.

In Denmark, a new database for foodborne outbreaks (FUD) was introduced towards the end of 2005. The database replaces the different parallel reporting systems for outbreaks. The system provides rapid exchange of information between regions, medical health officers and the national surveillance laboratories.

Estonia has taken action to e.g. improve the administrative supervision, establish obligatory case reporting, and collaboration and information exchange between the Health Protection Inspectorate and the Veterinary Food Board.

In Finland, since January 2005, all food handlers whose work entails special risks related to food hygiene, or who handle unpacked foodstuffs, have to be certified. New control programmes were established and other measures were taken in order to control epidemics caused by the most significant zoonoses.

In Slovenia, control of HACCP systems and general hygienic measures in kindergartens, homes for elderly and kitchens were implemented.

In Spain, the health authorities of the autonomous regions carried out outbreak investigations and control measures.

5.12. Summary

2005 was the second year for which data on foodborne outbreaks was summarised at the Community level. However, it was the first year that reporting of these data was mandatory. Twenty-three MS reported 5,311 foodborne outbreaks involving a total of 47,251 people. These outbreaks resulted in 5,330 hospitalisations and 24 died. The total number of reported outbreaks decreased by 22% compared to 2004. However, the number of reported human cases increased with 10% from 2004 to 2005 due to the inclusion of more causative agent species by a number of MS as well as improved reporting following the coming into force of the new Zoonoses Directive with is reporting obligations.

As in 2004, the most common cause of reported outbreaks in the EU in 2005 was *Salmonella*. Eggs and egg products were most frequently associated with *Salmonella* outbreaks; but broiler meat and meat products were also reported as common sources. Private homes and restaurants were the most commonly reported locations of exposure to *Salmonella*.

The second most common cause of outbreaks in 2005 was *Campylobacter*. For the *Campylobacter* outbreaks broiler meat remained the major source of infection. However, *Campylobacter* outbreaks involving the most cases were caused by contaminated drinking water.

Other important causes of foodborne outbreaks were foodborne viruses (6% of all outbreaks), bacterial toxins (i.e. *Staphylococcus* spp. (3%), *Clostridium* spp. (2%) and *Bacillus* spp. (1%)), pathogenic *E. coli* (1%), *Shigella* (1%) and *Giardia* (1%).

Only 12 MS reported data on foodborne virus outbreaks and therefore the numbers could be underestimated. Caliciviruses (including norovirus) are the most common source of non-bacterial foodborne outbreaks and responsible for the majority of cases and hospitalisations. The most commonly reported locations of these outbreaks were restaurants, catering services and institutions such as schools and care facilities for elderly. It is often difficult to determine whether food was contaminated at the primary source or by an infected food handler, or whether the infection spread by person-to-person transmission. Reported sources in 2005 included water, fruit and vegetables, and layer cake (contaminated by infected food handlers).

Eleven MS reported outbreaks caused by bacterial toxins. The main source identified was meat (unspecified), but fruit and vegetables, dairy products, seafood and eggs and egg products were also reported.

The number of *E. coli* outbreaks decreased by 31% from 2004 to 2005. The source of infection was reported for 32% of the reported outbreaks and the main sources were dairy products, bovine meat, fruit and vegetables and water.

Dairy products were the main source of infection for the reported *Shigella* outbreaks.

Also outbreaks caused by *Listeria*, *Yersinia*, foodborne parasites, scrombrotoxin and histamine were reported in 2005. Reports of special interest included three foodborne outbreaks of tick borne encephalitis in Estonia. All of these were caused by unpasteurised goat milk.

5.13. Sources of 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'.

Data was received from 23 MS and Norway. No data were available from Cyprus and Hungary. Data quality varied between countries. Some countries reported individual outbreaks, while others reported aggregated data. Some MS only reported outbreaks where the causative agent is known or laboratory confirmed. For these reasons, detailed analysis at Community level is limited.

Sixteen MS and Norway provided information on their outbreak reporting systems. All these countries reported the existence of centralised national data collection systems.

6. ANIMAL POPULATIONS

6.1. Distribution of farm animals within the EU

In 2005, 24 MS and two non-MS reported data on farm animal populations. The distributions of the most important farm animal categories (cattle, pigs, sheep, and fowl "*Gallus gallus*") are presented in this chapter. The majority of these countries reported the total populations, however not all countries reported data on subgroups within the different categories.

For further information and data on other animal categories please refer to Appendix Table PO2 and PO3, and Level 3.

6.1.1. *Gallus gallus (fowl)*

The *Gallus gallus* populations in 21 reporting MS and two non-MS including data on specific subgroups (broilers and laying hens) are shown in Table PO1. The largest population of *Gallus gallus* in 2005 was reported by Poland. The Polish *Gallus gallus* population accounted for just below 20% of the total reported EU population. However, the Czech Republic, Germany, Greece, The Netherlands, Portugal, Spain and The United Kingdom also reported high populations (> 91.5 millions of birds per MS). In countries reporting subgroup data, broilers accounted for 24.3-95.3% of the total *Gallus gallus* population and laying hens accounted for 0.7-75.7%. Luxembourg was the MS most different from other countries in relation to distribution between subgroups, with the lowest percentage of broilers as well as the highest percentage of laying hens.

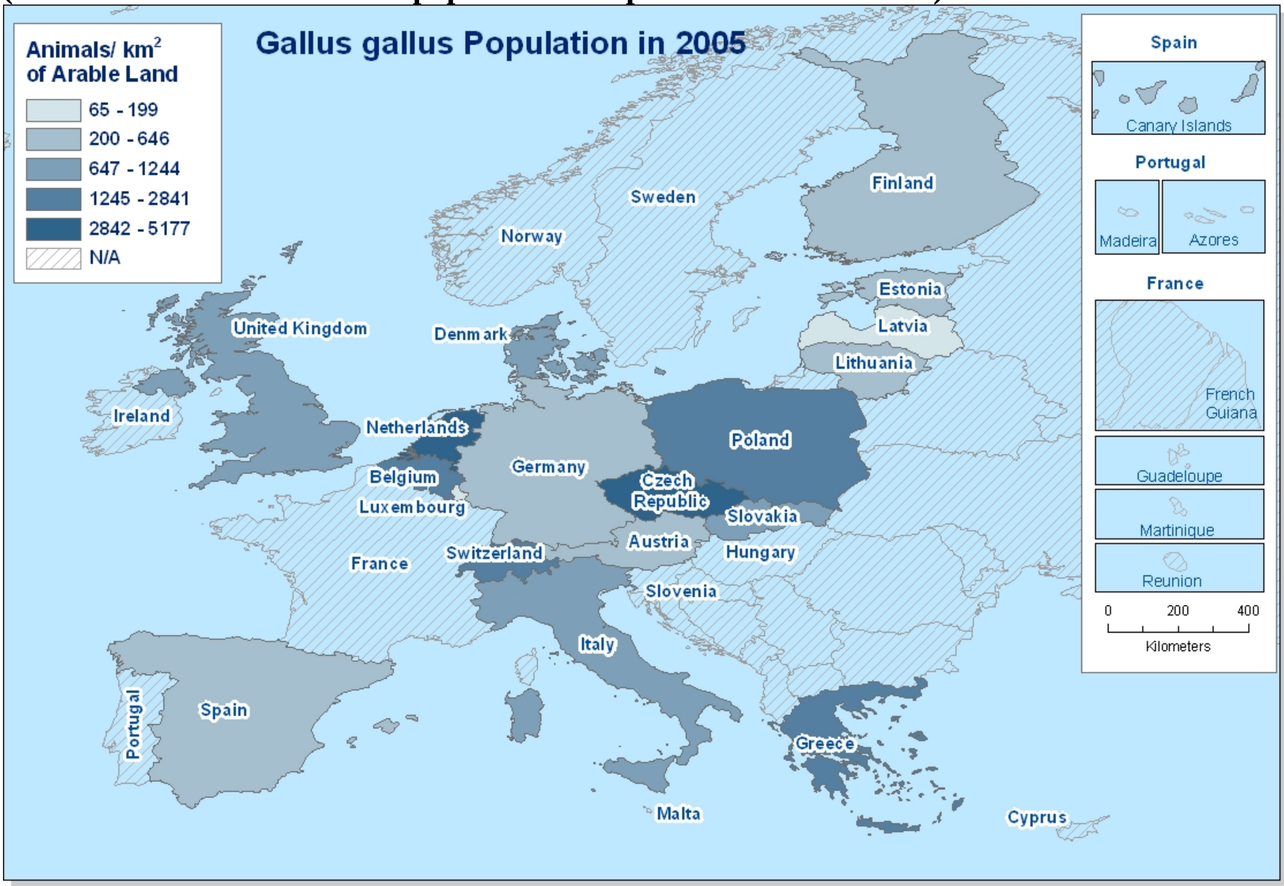
Table PO1. Gallus Gallus populations (livestock numbers), 2005

	Total *Gallus gallus*	Broiler N	Broiler % of total	Laying hens N	Laying hens % of total
Austria[4]	12,354,358	5,828,735	47.2	-	-
Belgium	39,461,851	26,754,817	67.8	10,562,160	26.8
Cyprus	17,446,970	16,771,700	96.1	445,545	2.6
Czech Republic	190,279,000	180,000,000	94.6	8,000,000	4.2
Denmark	22,864,509	19,365,755	84.7	3,498,754	15.3
Estonia	2,497,512	1,401,896	56.1	1,095,616	43.9
Finland	10,022,779	5,472,291	54.6	3,127,569	31.2
Germany[4]	109,793,471	38,964,768	35.5	-	-
Greece	128,499,080	120,000,000	93.4	7,227,260	5.6
Latvia	3,194,025	1,323,126	41.4	1,743,757	54.6
Lithuania	8,489,698	3,466,929	40.8	4,219,300	49.7
Luxembourg	83,400	20,300	24.3	63,100	75.7
Malta	1,218,007	584,585	48.0	633,422	52.0
The Netherlands	91,850,912	42,679,183	46.5	29,932,149	32.6
Poland	273,600,000	246,500,000	90.1	7,800,000	2.9
Portugal[5]	181,901,000	181,901,000	100	-	-
Slovakia	27,817,000	22,300,000	80.2	3,100,000	11.1
Slovenia[4]	3,991,712	2,604,304	65.2	1,387,408	34.8
Spain[3]	99,347,000	49,607,000	49.9	49,740,000	50.1
Sweden[1]	77,563,616	73,457,981	94.7	3,406,114	4.4
United Kingdom	160,528,000	111,487,000	69.5	29,550,000	18.4
EU-total	1,462,803,900	1,150,491,370	78.6	165,532,154	11.3
Norway	46,523,300[1]	44,327,600[1]	95.3	3,285,500	0.7
Switzerland	7,983,417	5,028,122	63.0	2,829,272	35.4

1. Number of slaughtered animals
2. Breeding flocks only
3. 2004 data
4. 2003 data
5. Broilers only

The density of *Gallus gallus* populations in the EU in 2005 (per km^2 of arable land) were highest in The Netherlands and in the Czech Republic followed by Greece. The smallest population per km^2 were in Latvia (Figure PO1).

Figure PO1. ***Gallus gallus*** **populations in the EU, 2005.**
(the colour scale indicates the population size per km² of arable land)



In the map, a natural breaks classification method is used.
N/A: No data available

6.1.2. Cattle

In 2005, 23 MS and two non-MS reported data on cattle populations. The total number of livestock and numbers in the specified groups (calves < 1 year, meat production animals and dairy cows and heifers) are summarised in Table PO2. France, Germany and The United Kingdom reported the largest populations of cattle in total, accounting for 26.7%, 18.2%, and 14.7% of the total reported EU cattle population, respectively. Not all countries reported data on subgroups, but amongst those who did, calves < 1 year accounted for approximately one third of the total populations except in Poland and The Netherlands where the populations of calves < 1 year were approximately 10% and 15%, respectively. Meat production animals accounted for 3.2-55% and dairy cows and heifers for 14.6-89.8% of the total cattle population in the respective countries. Amongst the reporting countries, the highest proportion of meat production animals was in The United Kingdom and that of dairy cows in Germany.

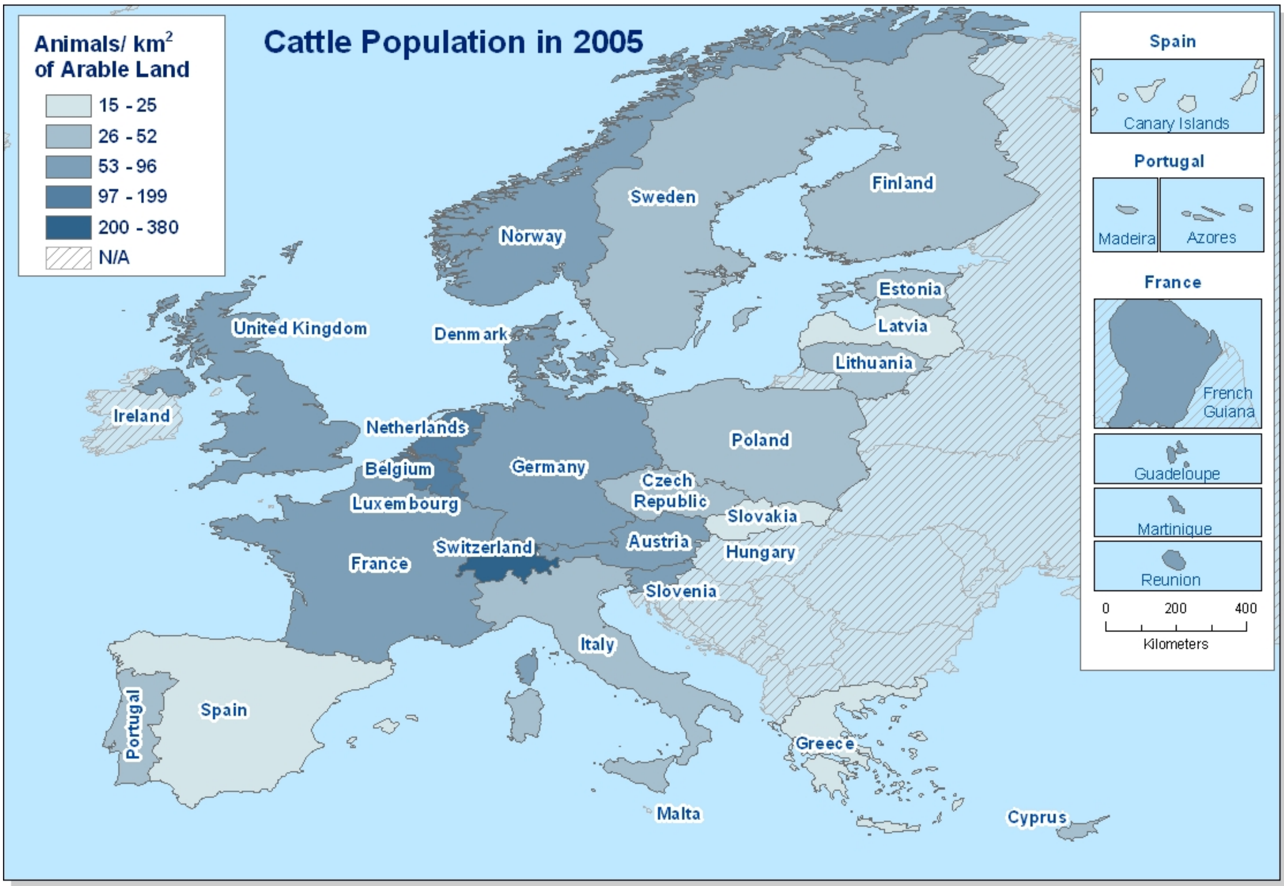
Table PO2. Cattle populations (livestock numbers), 2005

	Cattle, in total	Calves < 1 year	% of total	Meat production animals	% of total	Dairy cows and heifers	% of total
Austria	2,010,680	628,426	31.3	230,614	11.5	881,175	43.8
Belgium	2,492,757	-	-	-	-	-	-
Cyprus	61,432	19,511	31.8	-	-	41,921	68.2
Czech Republic	1,461,916	445,152	30.4	803,531	55.0	213,233	14.6
Denmark	1,628,017	-	-	-	-	-	-
Estonia	256,185	71,748	28.0	7,538	2.9	164,336	64.1
Finland	958,925	328,968	34.3	167,713	17.5	462,244	48.2
France	18,930,400	5,056,200	26.7	-	-	-	-
Germany	12,918,600	4,021,900	31.1	-	-	4,163,600	32.2
Greece	837,956	-	-	231,630	27.6	310,796	37.1
Italy	6,203,212	1,913,952	30.9	-	-	3,918,010	63.2
Latvia	395,168	-	-	-	-	201,497	51.0
Lithuania	902,362	-	-	-	-	416,500	46.2
Luxembourg	185,235	49,195	26.6	79,407	42.9	56,633	30.6
Malta			-	2,098	-	18,498	-
The Netherlands	3,798,804	533,715	14.0	382,455	10.1	1,433,202	37.7
Poland	5,506,836	526,028	9.6	178,013	3.2	1,429,796	26.0
Portugal	1,359,360	-	-	-	-	-	-
Slovakia	537,208	-	-	-	-	-	-
Slovenia[3]	478,331	139,962	29.3	-	-	-	-
Spain[1]	6,311,477	-	-	-	-	-	-
Sweden[2]	1,628,464	513,607	31.5	171,730	10.5	403,702	24.8
United Kingdom	10,414,000	2,732,000	26.2	1,768,000	17.0	2,065,000	19.8
EU-total	70,859,053	16,326,795	23.0	4,022,729	5.7	16,180,143	22.8
Norway	930,100	-	-	46,900	5.0	242,300	26.1
Switzerland	1,552,703	-	-	-	-	-	-

1. 2006 data
2. 2004 data
3. 2003 data

In Figure PO2 the cattle populations in the reporting countries in the EU are shown. The population density was highest in The Netherlands followed by Germany and Norway, while the less dense populations were found in Greece, Latvia, Slovakia and Spain.

Figure PO2. Cattle populations in the EU, 2005
(the colour scale indicates the population size per km^2 of arable land)



In the map, a natural breaks classification method is used.
N/A: no data available

6.1.3. Pigs

In 2005, 22 MS and two non-MS reported data on pig populations. The total number of livestock and numbers in the subgroups fattening pigs and breeding animals are summarised in Table PO3. The largest populations were reported in Germany (19.2% of the EU-total) and Spain (17.7% of the reported EU-total), but also Denmark, France, The Netherlands and Poland reported high numbers of pigs (together accounting for 43.1%). Amongst countries that reported data on the subgroups, the fattening pigs accounted for 34.8-93.9% of the total population and the breeding animals amounted in 1.5-33.8%.

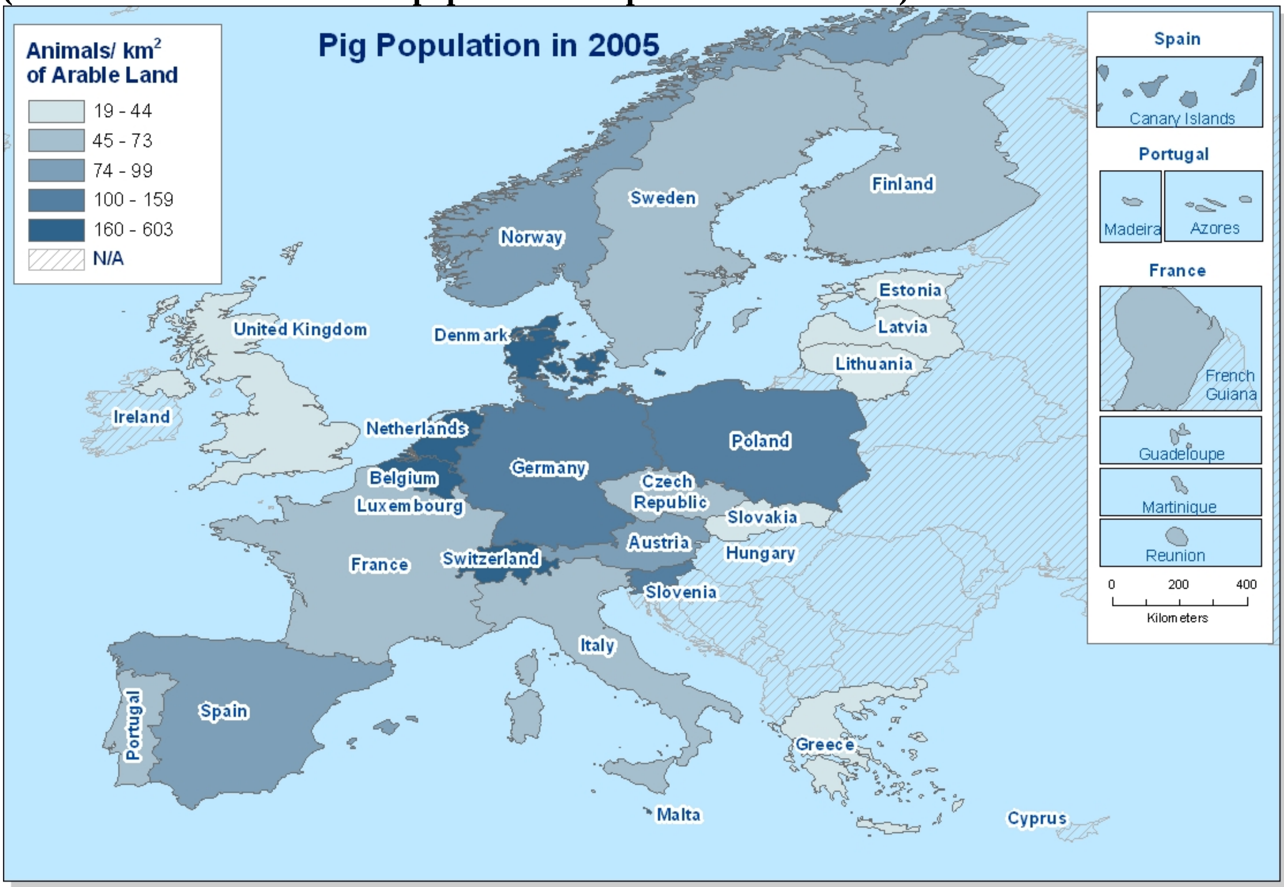
Table PO3. Pig populations (livestock numbers), 2005

	Pigs, in total	Fattening pigs	% of total	Breeding animals	% of total
Austria	3,169,541	1,224,053	38.6	-	-
Belgium	5,647,014	4,989,016	88.3	657,998	11.7
Cyprus	859,752	416,563	48.5	13,313	1.5
Czech Republic	2,689,514	935113	34.8	778,755	29.0
Denmark	14,457,972	-	-	-	-
Estonia	309,714	135,967	43.9	30,879	10.0
Finland	1,401,071	941,406	67.2	459,665	32.8
France	14,761,500	5,780,900	39.2	-	-
Germany	26,989,100	10,825,700	40.1	2,503,600	9.3
Greece	2,017,385	1,894,721	93.9	122,664	6.1
Latvia	307,651	-	-	-	-
Lithuania	1,114,100	-	-	-	-
Luxembourg	90,147	81,824	90.8	8,323	9.2
Malta	66,000	-	-	-	-
The Netherlands	11,311,558	5,504,295	48.7	1,244,272	11.0
Poland	19,970,000	-	-	-	-
Portugal[2]	2,117,511	-	-	-	-
Slovakia	927,294	-	-	-	-
Slovenia[2]	607,881	228,456	37.6	68,566	11.3
Spain[1]	24,894,956	9,949,697	40.0	2,684,961	10.8
Sweden[1]	1,818,037	1,094,537	60.2	195,054	10.7
United Kingdom	4,864,000	-	-	554,000	11.4
EU-total	140,391,698	44,002,248	31.3	9,322,050	6.6
Norway	802,800	432,500	53.9	61,400	7.6
Switzerland	1,566,298	-	-	-	-

1. 2004 data
2. 2003 data

In Figure PO3 the 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 Denmark and The Netherlands followed by Germany, Poland and Slovenia. The lowest densities were reported in Estonia, Greece, Latvia, Lithuania and The United Kingdom.

Figure PO3. Pig populations in the EU, 2005
(the colour scale indicates the population size per km^2 arable land)



In the map, a natural breaks classification method is used.
N/A: no data available

6.1.4. Sheep

The total sheep populations in 21 reporting MS and two non-MS are shown in Table PO4. The largest populations in 2005 were reported in Spain and The United Kingdom. These two countries together accounted for almost 74% of the entire reported EU-total. In countries, which reported subgroup specific data, animals under one year accounted for 16.7-52.7% of the populations. Animals above one year accounted for 38.8-76.1%, except in Spain, where the population in this group only amounted for approximately 2.3%. Furthermore, milk ewes accounted for 4-14.9% of the total sheep population in the Czech Republic, France and Spain, and meat production animals in the Czech Republic, Finland, Luxembourg, and Spain amounted for 36%, 20.5%, 100%, and 57.7%, respectively (see Level 3 for more detailed information).

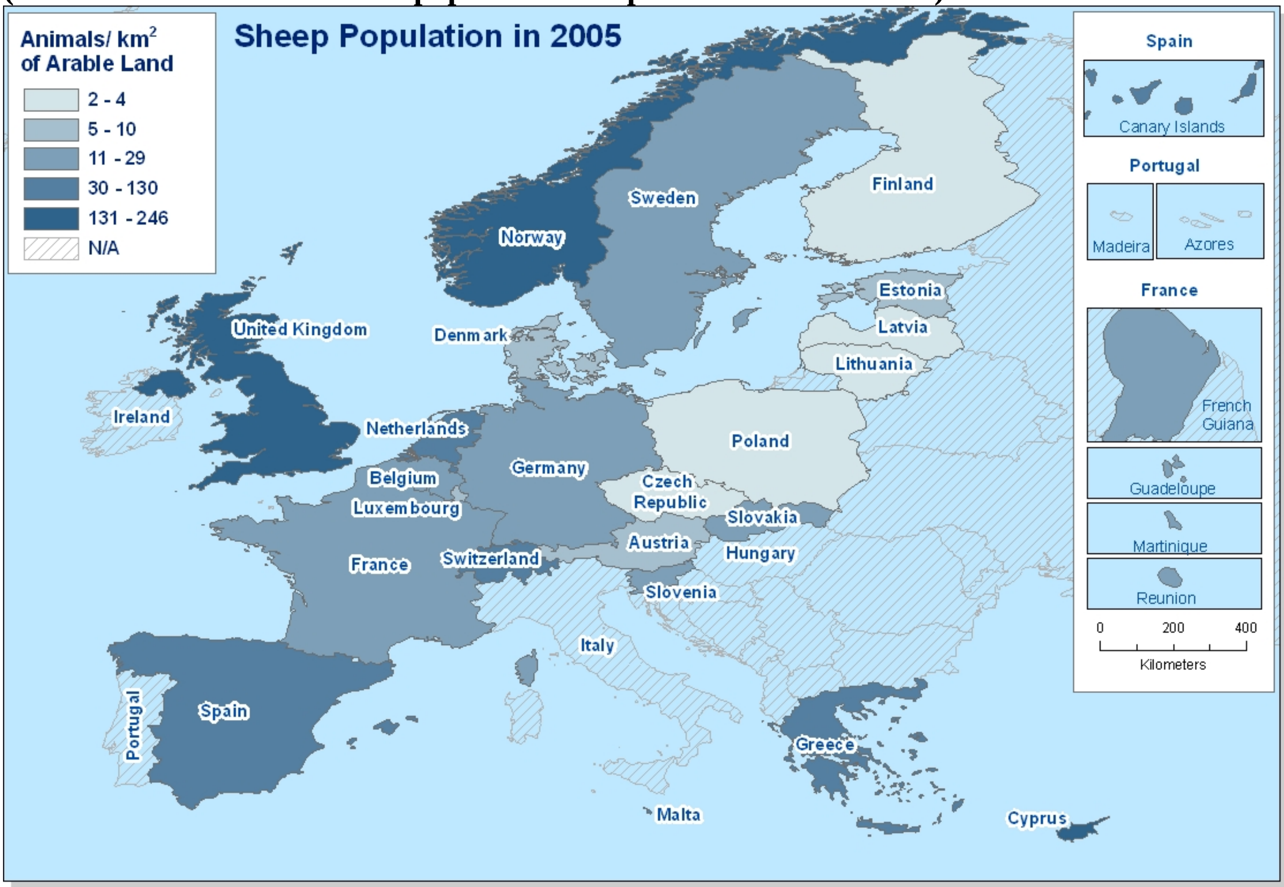
Table PO4. Sheep populations (livestock numbers), 2005

	Sheep, in total	Animals < 1 year	% of total	Animals > 1 year	% of total
Austria	325,728	-	-	-	-
Belgium	266,278	-	-	-	-
Cyprus	264,554	61,214	23.1	201,340	76.1
Czech Republic	156,952	40841	26.0	116,117	74.0
Denmark	196,619	-	-	-	-
Estonia	47,816	15,553	32.5	32,263	67.5
Finland	89,737	18,846	21.0	52,514	58.5
France	8,759,900	2,780,500	31.7	5,979,300	68.3
Germany	2,642,400	956,500	36.2	1,685,900	63.8
Greece	5,325,223	-	-	-	-
Latvia	44,057	-	-	-	-
Lithuania	39,375	-	-	-	-
Luxembourg	10,277	-	-	-	-
Malta	14,236	-	-	-	-
The Netherlands	1,362,523	685,646	50.3	-	-
Poland	317,000	-	-	-	-
Slovakia	330,287	-	-	-	-
Slovenia[2]	119,631	-	-	-	-
Spain[1]	22,735,551	3,796,296	16.7	526,048	2.3
Sweden[1]	465,561	245,533	52.7	220,028	47.3
United Kingdom	35,517,000	-	-	-	-
EU-total	79,030,705	8,600,929	10.9		0.0
Norway	2,393,200	-	-	927,400	38.8
Switzerland	441,024	-	-	-	-

1. 2004 data
2. 2003 data

The sheep populations per km^2 arable land were highest in Norway and The United Kingdom. The lowest populations per km^2 were in the Czech Republic, Finland, Latvia, Lithuania, and Poland (Figure PO4).

Figure PO4. Sheep populations in the EU, 2005
(the colour scale indicates the population size per km^2 of arable land)



In the map, a natural breaks classification method is used.
N/A: no data available

6.2. Summary

In 2005, 23 MS and two non-MS reported data on animal populations within the four most important animal categories: cattle, pigs, sheep and fowl "*Gallus gallus*". Most of the countries reported data on the total number of livestock, while fewer reported data on the specific subgroups within the categories. Since not all MS provided the data, it should be noted that the total figures calculated in this text do not represent the real total number of animals in the EU.

The total *Gallus gallus* population in the 21 reporting MS was 1,169,944,771 birds. The largest population was in Poland accounting for approximately 20% of the reported total EU population. The densest population was in The Netherlands and Czech Republic.

In 2005, the reported total cattle population in the 23 reporting MS was 70,879,649 animals. France, Germany and The United Kingdom accounted for about 60% of this population. In general, calves < 1 year accounted for approximately one third of the total populations. The shares of meat production animals and dairy cows and heifers were more widespread within the reporting countries. The densest population was reported in The Netherlands and Germany.

The reported total pig population in the 22 reporting MS was 140,391,698 animals. Germany, Spain, Denmark, France, The Netherlands and Poland accounted for 80% of the total EU population. Fattening pigs and breeding animals accounted for > 34.8% and < 33.8% in the reporting countries, respectively. Denmark and the Netherlands had the highest density of pigs.

The 21 reporting MS has in total 79,030,705 sheep. The largest populations by far were reported in Spain and The United Kingdom, accounting for approximately 74% of the total reported EU population. United Kingdom together with Norway had also the highest density of sheep population.

The size and density of the animal populations are important factors influencing the epidemiology of zoonoses in animals in the countries.

Appendix 1. List of Abbreviations

-	No information available
% Pos	Percent Positive
BSN	Basic Surveillance Network
BfR	Bundesinstitut fur Risikobewertungen
DT	Definite Type
DSN	Dedicated Surveillance Network
EBL	European Bat Lyssavirus
ECDC	European Centre for Disease Prevention and Control
EEC	European Economic Committee
EHEC	Enterohemorrhagic *Escherichia coli*
ELISA	Enzyme-Linked Immunosorbent Assay
EU	European Union
FAT	Fluorescent Antibody Test
MS	Member States
N	Number of cases or Number of samples tested
n.a.	Not available
Pos	Positive samples
PT	Phage Type
OBF	Officially Brucellosis Free
ObmF	Officially *Brucella melitensis* Free
O.I.E.	Organization Mondiale de la Santé Animale (World Organization for Animal Health)
ORF	Officially Rabies Free
OTF	Officially Tuberculosis Free
PCR	Polymerase Chain Reaction

Member States of the European Union

Country	ISO Country Abbreviations 2005 Report	Country Abbreviations 2004 Report
Austria	AT	A
Belgium	BE	B
Cyprus	CY	CY
Czech Republic	CZ	CZ
Denmark	DK	DK
Estonia	EE	EST
Finland	FI	FIN
France	FR	F
Germany	DE	D
Greece	GR	GR
Hungary	HU	H
Ireland	IE	IRL
Italy	IT	I
Latvia	LV	LV
Lithuania	LT	LT
Luxembourg	LU	L
Malta	MT	M
The Netherlands	NL	NL
Poland	PL	PL
Portugal	PT	P
Slovakia	SK	SK
Slovenia	SI	SLO
Spain	ES	ES
Sweden	SE	S
United Kingdom	GB	UK

Non Member States reporting in 2005

Country	ISO Country Abbreviations 2005 Report	Country Abbreviations 2004 Report
Norway	NO	N
Switzerland	CH	-