

3. INFORMATION ON SPECIFIC ZOOSES AND ZONOTIC AGENTS

3.1. *Salmonella*

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

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

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

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

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

Table SA1 presents the countries reporting data for 2011.

Table SA1. Overview of countries reporting data for Salmonella, 2011

Data	Total number of reporting MSs	Countries
Human	27	All MSs Non-MSs: CH, IS, NO
Food	26	All MSs except MT Non-MSs: CH, IS, NO
Animal	27	All MSs Non-MSs: CH, IS, NO
Feed	24	All MSs except BG, CY, LT Non-MSs: CH, NO
Serovars (food and animals)	26	All MSs except MT Non-MSs: IS, NO

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

3.1.1. Salmonellosis in humans

Salmonellosis continued to decrease in 2011. A total of 97,897 salmonellosis cases were reported by the 27 EU MSs, with 95,548 confirmed cases (EU notification rate 20.7 cases per 100,000 population) (Table SA2). This was a 5.4 % decrease in confirmed cases compared to 2010. The highest notification rates in 2011 were reported in the Czech Republic, Slovakia and Lithuania (≥ 70 per 100,000), while the lowest were reported in Portugal, Greece and Romania (≤ 5 per 100,000). It should be noted that the proportion of travel-related cases was as usual very high, >70 %, in the Nordic countries Finland, Sweden and Norway. The proportion of travel-related cases and domestic cases by country can be found in the earlier report.¹⁰

There was a statistically significant ($p < 0.001$) decreasing EU trend in confirmed salmonellosis cases in 2008-2011 (Figure SA1). There was also a clear seasonal trend (Figure SA1). Significant decreasing trends by country were observed in 10 MSs: Austria, Denmark, Finland, Germany, Greece, Italy, Portugal, Slovakia, Slovenia and Sweden. Only one country, France, had a significant increasing trend in salmonellosis cases, which could be explained by an increased proportion of *Salmonella* isolates sent to the national reference centre for *Salmonella* from 2008 and onwards and two very large outbreaks of the monophasic variant of *S. Typhimurium* (see further details in the *Salmonella* serovar section).

Data on hospitalisation for salmonellosis have been collected in the case-based reporting in TESSy for the last two years. Nine MSs provided this information for some or all of their cases (Figure SA2). On average, 45.7 % of the confirmed salmonellosis cases were hospitalised; hospitalisation status was, however, only provided for 10.4 % of all confirmed cases. The highest hospitalisation rates were reported in Greece, Romania and Portugal (>85 % of cases hospitalised), which were also the countries reporting the lowest notification rates of salmonellosis. This indicates that the surveillance systems in these countries primarily capture the more severe cases.

Fourteen MSs provided data on the outcome of their cases and among them 11 MSs reported a total of 56 fatal cases. This gives an EU case-fatality rate of 0.12 % among the 46,757 confirmed cases for which this information was reported (49.0 % of all confirmed cases).

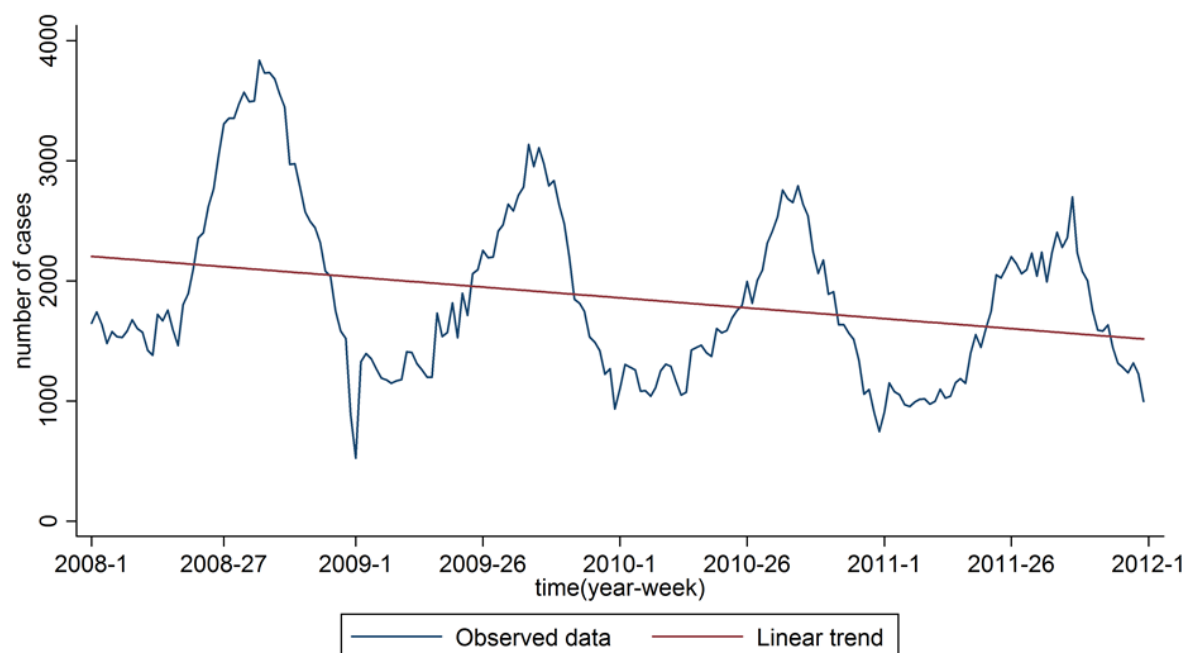
¹⁰ EFSA (European Food Safety Authority), ECDC (European Centre for Disease Prevention and Control), 2012. The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2010; EFSA Journal 2012; 10(3):2597. [442pp.]. Available online: www.efsa.europa.eu/efsajournal

Table SA2. Reported cases of human salmonellosis in 2007–2011 and notification rate for confirmed cases in the EU, 2011

Country	2011				2010	2009	2008	2007
	Report Type ¹	Cases	Confirmed cases	Confirmed cases/100,000	Confirmed cases			
Austria	C	2,010	1,433	17.1	2,179	2,775	2,312	3,386
Belgium	C	3,177	3,177	29.0	3,169	3,113	3,831	3,930
Bulgaria	A	932	924	12.3	1,154	1,247	1,516	1,136
Cyprus	C	110	110	13.7	136	134	169	158
Czech Republic	C	8,641	8,499	80.7	8,209	10,480	10,707	17,655
Denmark	C	1,170	1,170	21.0	1,608	2,130	3,669	1,648
Estonia	C	385	375	28.0	381	261	647	428
Finland	C	2,082	2,082	38.7	2,422	2,329	3,126	2,738
France	C	8,685	8,685	13.4	7,184	7,153	7,186	5,313
Germany	C	24,511	23,982	29.3	24,833	31,395	42,885	55,399
Greece	C	472	469	4.1	297	403	792	706
Hungary	C	6,446	6,169	61.8	5,953	5,873	6,637	6,578
Ireland	C	311	311	6.9	349	335	447	440
Italy	C	3,344	3,344	5.5	4,752	5,715	6,662	6,731
Latvia	C	1,088	998	44.8	877	795	1,229	619
Lithuania	C	2,294	2,294	70.7	1,962	2,063	3,308	2,270
Luxembourg	C	125	125	24.4	211	162	153	163
Malta	C	129	129	30.9	160	125	161	85
Netherlands ²	C	1,284	1,284	12.0	1,447	1,204	1,627	1,224
Poland	A	8,813	8,400	22.0	9,257	8,529	9,149	11,155
Portugal	C	174	174	1.6	205	220	332	438
Romania	C	1,055	989	4.6	1,285	1,105	624	620
Slovakia	C	4,131	3,897	71.7	4,942	4,182	6,849	8,367
Slovenia	C	400	400	19.5	363	616	1,033	1,336
Spain ³	C	3,786	3,786	32.8	4,420	4,304	3,833	3,842
Sweden	C	2,887	2,887	30.7	3,612	3,054	4,185	3,930
United Kingdom	C	9,455	9,455	15.1	9,670	10,479	11,511	13,557
EU Total		97,897	95,548	20.7	101,037	110,181	134,580	153,852
Iceland	C	45	45	14.1	34	35	134	93
Norway	C	1,290	1,290	26.2	1,370	1,235	1,941	1,649
Switzerland ⁴	C	1,300	1,300	16.4	1,179	1,298	2,031	1,778

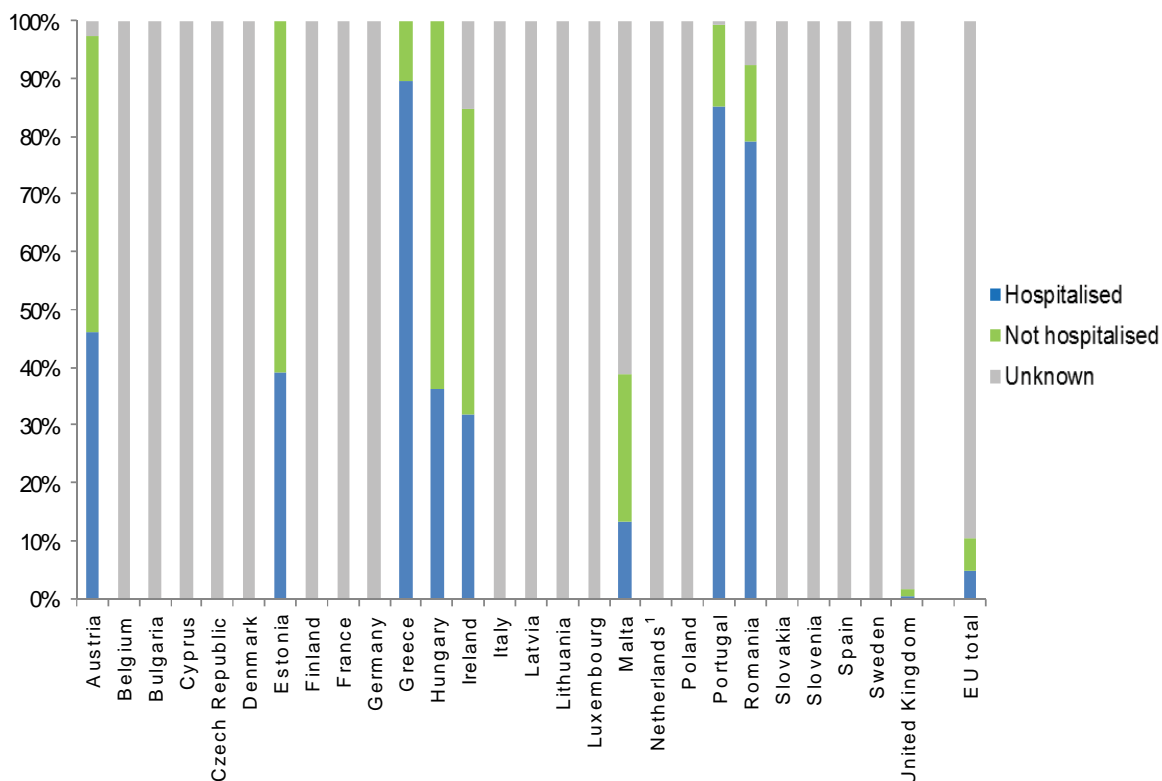
1. A: aggregated data report; C: case-based report.
2. Sentinel system; notification rates calculated with an estimated population coverage of 64 %.
3. Notification rates calculated with an estimated population coverage of 25 %.
4. Switzerland provided data directly to EFSA.

Figure SA1. Trend in reported confirmed cases of human salmonellosis in the EU, 2008–2011



Source: TESSy data from 25 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria and Poland are excluded as they reported only monthly data.

Figure SA2. Proportion of reported confirmed cases of human salmonellosis hospitalised in the EU, 2011



1. In the Netherlands, hospitalisation data are collected in a special register which cannot be linked to the case-based data. In 2011, 23 % of laboratory-confirmed cases were hospitalised.

3.1.2. *Salmonella* in food

Twenty six MSs and three non-MSs provided data on *Salmonella* in various foodstuffs. Most MSs reported data on *Salmonella* in food of animal origin, primarily broiler meat, pig meat and bovine meat (Table SA3).

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

Table SA3. Overview of countries reporting data for *Salmonella* in food, 2011

Data	Total number of reporting MSs	Countries
Broiler meat	25	All MSs except MT, SI Non-MSs: CH, IS
Turkey meat	20	All MSs except DK, ES, FR, LT, MT, SI, UK Non-MSs: CH, IS
Eggs and egg products	20	All MSs except DK, FI, FR, MT, NL, SI, UK
Pig meat	25	All MSs except MT, UK Non-MSs: IS, NO
Bovine meat	25	All MSs except MT, UK Non-MSs: CH, NO
Milk and dairy products	20	All MSs except DK, FI, FR, LT, LU, MT, UK
Fruit and vegetables	20	All MSs except CY, GR, LT, LU, MT, PL, UK
Fish and other fishery products ¹	20	All MSs except DK, FI, FR, LT, LU, MT, UK Non-MSs: CH, NO

Note: The overview table includes all data reported by MSs. In the following sections, data reported as HACCP or own control are not included in the detailed tables, and, unless stated, data from suspect sampling, selective sampling and outbreak investigations are also excluded. Also, only countries reporting 25 samples or more have been included for analysis, with the exception of the section on compliance with microbiological criteria, in which investigations with fewer than 25 units tested are also included.

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

Compliance with microbiological criteria

The *Salmonella* criteria laid down by Regulation (EC) No 2073/2005¹¹ have been in force since 1 January 2006. The criteria were modified by Regulation (EC) No 1441/2007¹², which came into force in December 2007. The Regulations prescribe rules for sampling and testing, and set limits for the presence of *Salmonella* in specific food categories and in samples from food processing. The food safety criteria for *Salmonella* apply to products placed on the market within their shelf-life. According to these criteria, *Salmonella* must be absent in the food categories listed in Table SA4. Absence is defined by testing five or 30 samples of 25 g per batch depending on the food category. In official controls, often only single samples are taken to verify compliance with the criteria.

In 2011, as in previous years, the highest levels of non-compliance with *Salmonella* criteria generally occurred in foods of meat origin (Figure SA3). Minced meat and meat preparations from poultry intended to be eaten cooked had the highest level of non-compliance (category 1.5; 6.8 % of single samples and 2.4 % of batches).

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

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

A high proportion of non-compliance was also reported for minced meat and meat preparations from animal species other than poultry intended to be eaten cooked (category 1.6, 1.1 % of single samples and 1.4 % of batches positive for *Salmonella*), as well as for meat products from poultry meat intended to be eaten cooked (category 1.9, 1.1 % of single samples and 0.7 % of batches being positive).

The occurrence of *Salmonella* in RTE foods such as minced meat and meat preparations intended to be eaten raw (food category 1.4), for which 1.4 % of non-compliant single samples were reported, is of particular relevance because of the risk such foods pose to human health.

Non compliance was also observed in live bivalve molluscs and live echinoderms, tunicates and gastropods (category 1.17), where 1.6 % and 0.8 % of single samples and batches were not compliant.

In addition, a very low proportion of samples not complying with *Salmonella* criteria was observed in batches of cheeses, butter and cream made from raw or low heat-treated milk (category 1.11, 0.1 %).

All samples of egg products (food category 1.14) and RTE sprouted seeds (food category 1.18) were compliant with the criteria in 2011.

Table SA4. Compliance with the food safety Salmonella criteria laid down by EU Regulations (EC) 2073/2005 and (EC) 1441/2007, 2011

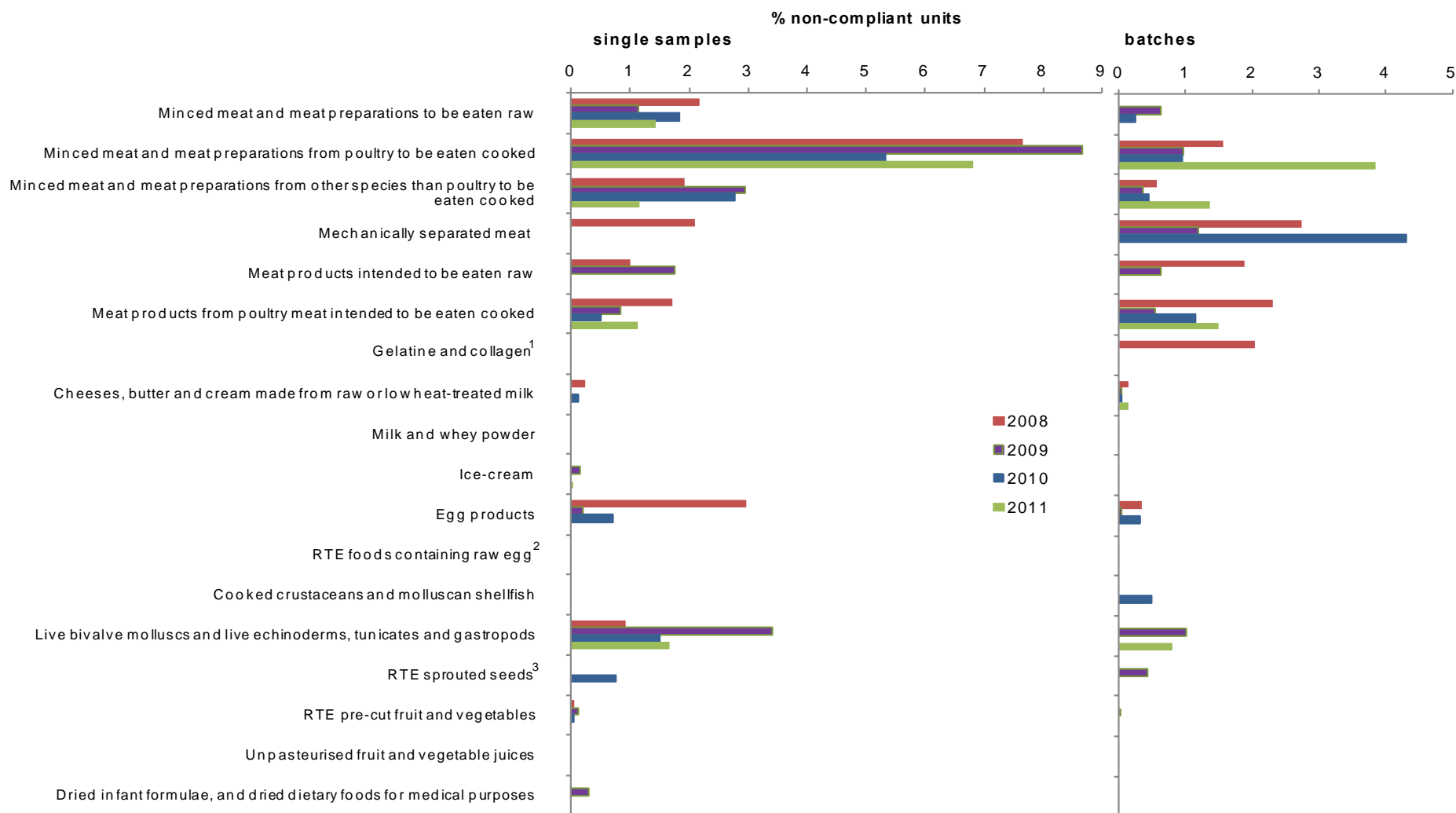
Food categories ¹		Total single samples			Total batches		
		Sample weight	N	% non-compliant	Sample weight	N	% non-compliant
1.4	Minced meat and meat preparations intended to be eaten raw	25 g	280	1.4	25 g or 100 g or 150 g	614	0
1.5	Minced meat and meat preparations from poultry intended to be eaten cooked	10 g or 25 g	1,466	6.8	10 g or 25 g or 150 g	553	2.4
1.6	Minced meat and meat preparations from other species than poultry intended to be eaten cooked	10 g or 25 g	5,406	1.1	10 g or 25 g or 100 g	1,552	1.4
1.7	Mechanically separated meat	-	-	-	10 g	1	0
1.8	Meat products intended to be eaten raw	25 or 50 g	9	0	25 g	1	0
1.9	Meat products from poultry meat intended to be eaten cooked	25 g	887	1.1	25 g or 100 g or 150 g	410	0.7
1.10	Gelatine and collagen	25 g	51	0	not stated	87	0
1.11	Cheeses, butter and cream made from raw or low heat-treated milk	25 g or 50 g or not stated	305	0	25 g or 200 g	2,198	0.1
1.12	Milk and whey powder	25 g or not stated	153	0	25 g or 25 ml	32	0
1.13	Ice cream	25 g	6,556	<0.1	25 g	541	0
1.14	Egg products	25 g or 25 ml	552	0	100 g	20	0
1.15	RTE foods containing raw eggs	25 g	48	0	-	-	-
1.16	Cooked crustaceans and molluscan shellfish	25 g or 150 g	32	0	25 g or 100 g	131	0
1.17	Live bivalve molluscs and live echinoderms, tunicates and gastropods	25 g	185	1.6	25 g or not stated	252	0.8
1.18	Sprouted seeds (RTE)	25 g	70	0	25 g or 500 g	49	0
1.19	Pre-cut fruit and vegetables (RTE)	25 g	1,606	0	25 g	548	0
1.20	Unpasteurised fruit and vegetable juices (RTE)	25 g or 25 ml	123	0	25 g, 25 ml or not stated	255	0
1.22-23	Dried infant formulae, dried dietary foods for medical purposes ² and dried follow-on formulae	25 g	864	0	25 g, 200 g or not stated	275	0

Note: RTE: ready-to-eat products.

Data presented include only investigations at retail and at catering.

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

Figure SA3. Proportion of units not complying with EU Salmonella criteria, 2008–2011



Note: For 2011 investigations covering fewer than 25 samples are also included. For previous years, data are presented only for samples sizes ≥ 25 .

1. No investigations with 25 or more batches of gelatine and collagen in 2009.

2. No investigations with 25 or more samples of RTE foods containing raw egg in 2009 and 2010, and batches in 2009 and 2010.

3. No investigations with 25 or more batches of RTE sprouted seeds in 2010.

Broiler meat and products thereof

In 2011, 21 MSs and one non-MS reported data on *Salmonella* in fresh broiler meat from investigations with 25 or more samples. The occurrence of *Salmonella* in these food samples at different levels of the production chain is presented in Table SA5.

Salmonella was detected in most of the reported investigations, with only four MSs (Estonia, Denmark, Finland and Sweden) reporting no positive findings. Overall, 25,611 fresh broiler meat units (single or batch) were tested within the EU and 5.9 % of them were positive. The majority of the samples (69.5 %) were single samples (17,799 units tested) with a proportion of positive findings of 6.7 %. Out of the 7,812 batch samples investigated, 4.0 % were positive for *Salmonella*.

At single sample level, Poland and Sweden reported the largest investigations on neck skin samples at slaughterhouse; Poland found 7.6 % of samples positive, whereas Sweden did not detect *Salmonella*. A substantial number of samples was also tested by the other countries, with the highest proportion of positive results reported by Hungary (36.3 %). In most investigations the sample was carcass neck skin and mainly 25 g of sample were tested. Spain reported testing of carcass surface samples (swabs) and found 17.3 % of samples positive out of 347 samples tested. At the processing plant, Poland reported the largest investigation on fresh broiler meat with 6.9 % of samples positive. Finland and Hungary also carried out investigations with a high number of samples taken at processing plants; and only Hungary detected *Salmonella* at a level of 42.5 %, the highest proportion observed at this stage. At retail the Netherlands, Latvia and Ireland tested a substantial number of broiler meat samples and reported 3.0 %, 2.6 % and 0.7 % of positive findings, respectively. Germany also carried out large investigations and found 4.2 % and 6.3 % of samples positive in the context of their surveillance and monitoring programmes, respectively. However, the largest proportion of positive samples came from a smaller number of units (156) reported by Hungary (40.4 %).

Bulgaria reported the largest investigation on batches of carcasses at the slaughterhouse with 0.6 % of positive findings. Germany found a moderate proportion (17.8 %) of positive batches by using neck skin samples. The highest proportion of positive batches at the slaughterhouse was reported by Romania in an investigation on meat samples (22.6 %), but with a small number of units tested (31). At the processing and cutting plant, Bulgaria reported the largest investigation on fresh meat samples with 0.1 % of positive results. Sweden and Belgium also reported testing on a substantial number of fresh meat scrapings and fresh meat samples, respectively; and only Belgium detected *Salmonella* at a level of 5.6 %. The Czech Republic reported the highest proportion of positive batches at processing (13.3 %), but only 30 samples were tested. At the retail level, Belgium tested 337 batches of fresh meat and reported that 11.3 % of samples were positive.

Iceland tested a large number of batches of carcasses at slaughterhouse and detected *Salmonella* at a low level (1.2 %).

For further information see Level 3 Tables.

Table SA5. Salmonella in fresh broiler meat at slaughter, processing/cutting level and retail, 2011

Country	Description	Sample unit	Sample weight	2011		
				N	N pos	% pos
At slaughterhouse						
Belgium	Carcase - neck skin	Batch	1 g	458	18	3.9
Bulgaria	Carcase - neck skin	Batch	25 g	1,782	10	0.6
Cyprus	Carcase - neck skin	Batch	25 g	245	30	12.2
Czech Republic	Carcase - neck skin	Batch	25 g	750	69	9.2
Denmark	Carcase - neck skin	Batch	300 g	306	0	0
Estonia	Carcase - neck skin	Batch	25 g	51	0	0
Germany	Carcase - neck skin, domestic production	Batch	25 g	337	60	17.8
Hungary	Carcase - neck skin	Single	25 g	397	144	36.3
Ireland ¹	Carcase	Single	25 g	239	6	2.5
Latvia	Carcase - neck skin	Single	25 g	100	1	1.0
Poland	Carcase - neck skin	Single	200 g	290	0	0
	Carcase - neck skin	Single	25 g	6,515	494	7.6
Romania	Carcase - neck skin	Batch	25 g	358	38	10.6
	Carcase - meat	Batch	25 g	31	7	22.6
Spain	Carcase - carcase swab	Single	25 g	347	60	17.3
Sweden	Carcase - neck skin	Single	-	3,089	0	0
Iceland	Carcase - neck skin	Batch	25 g	695	8	1.2
At processing or cutting plant						
Belgium	Fresh meat, at processing plant	Batch	25 g	430	24	5.6
Bulgaria	Fresh meat, at processing plant	Batch	25 g	1,636	1	0.1
Cyprus	Fresh meat, at processing plant	Batch	25 g	130	10	7.7
Czech Republic	Fresh meat, at processing plant	Batch	25 g	30	4	13.3
Estonia	Fresh neck skin, at cutting plant, domestic production	Batch	25 g	47	0	0
Finland	Fresh meat, at cutting plant	Single	25 g	791	0	0
Greece	Fresh meat, at processing plant	Single	25 g	45	7	15.6
Hungary	Fresh meat, at processing plant	Single	25 g	334	142	42.5
Luxembourg	Fresh meat, at processing plant	Single	25 g	28	1	3.6
Poland	Fresh meat, at processing plant	Single	25 g	2,523	174	6.9
Portugal	Fresh meat, at processing plant	Single	25 g	81	1	1.2
Spain	Fresh meat, at processing plant	Single	25 g	66	2	3.0
Sweden	Fresh meat scrapings, at cutting plant	Batch	-	819	0	0
At retail						
Austria	Fresh meat, domestic production	Single	25 g	55	3	5.5
Belgium	Fresh meat	Batch	200 g	337	38	11.3
Czech Republic	Fresh meat	Batch	25 g	30	3	10.0
Germany	Fresh meat, surveillance	Single	25 g	693	29	4.2
	Fresh meat, monitoring	Single	25 g	398	25	6.3
Greece	Fresh meat	Single	25 g	30	0	0
Hungary	Fresh meat	Single	25 g	156	63	40.4
Ireland ¹	Fresh meat	Single	25 g	299	2	0.7
Latvia	Fresh meat	Single	25 g	350	9	2.6
Lithuania	Fresh meat, chilled	Batch	25 g	35	2	5.7
Luxembourg	Fresh meat	Single	25 g	36	0	0
Netherlands	Fresh meat	Single	25 g	539	16	3.0
Spain	Fresh meat	Single	25 g	118	2	1.7
Sampling level not stated						
Austria	Fresh meat, domestic production	Single	25 g	280	20	7.1
EU Total	Total			25,611	1,515	5.9
	Single			17,799	1,201	6.7
	Batch			7,812	314	4.0

Note: Data presented include only investigations with sample size ≥25.

1. Sample weight is most usually 25 g but occasionally there are other sample weights reported (range from 10 g - 25.99 g)

Pig meat and products thereof

Many of the national monitoring programmes for *Salmonella* in pig meat and products thereof are based on sampling at the slaughterhouse and meat-cutting plants. At the slaughterhouse, sampling is carried out by means of carcase swabbing or sampling of meat.

In 2011, 19 MSs and two non-MSs reported data on *Salmonella* in fresh pig meat from investigations with 25 or more samples. The occurrence of *Salmonella* in these food samples at different levels in the production line is presented in Table SA6. *Salmonella* was detected in 26 of these 39 investigations. Overall, a total of 52,868 fresh pig meat units (single or batch) were tested within the EU and 0.7 % of them were positive. The majority were single carcase samples (43,010 units tested or 81.4 % of total units tested) with 0.6 % of *Salmonella* positive carcasses. Out of the 9,858 batches investigated, 0.9 % were positive for *Salmonella*.

As regards single samples, Denmark reported the largest investigation at slaughterhouse, and Finland and Sweden also tested high numbers of single pig meat samples (about 6,000). Out of these three countries only Denmark detected *Salmonella*-positive samples at a level of 0.7 %. Most of the single samples tested at slaughterhouse were carcase swabs and the area swabbed varied from 400 cm² to 1,400 cm². Although it would be expected that MSs swabbing larger areas would be more likely to detect *Salmonella*, the highest proportion of positive carcase swabs was observed in an investigation in Germany where 400 cm² were sampled (4.0 % of positive results). Spain reported testing of meat samples at the slaughterhouse with 7.5 % of positive samples.

At processing plants, Finland reported the largest investigation with no positive findings, whereas the highest proportion of positive samples at this stage was reported by Portugal in a smaller investigation (5.0 % out of 60 tested samples). At retail, the Netherlands and Germany tested a substantial number of single samples and reported a low proportion of positive findings (1.4 % and 1.9 %, respectively). The highest proportion of positive samples at this stage was reported by Spain (5.2 %). In addition Poland reported a large investigation in which *Salmonella* was found at a very low level (0.1 %); in this investigation the sampling level was not defined.

Fewer pig meat batches were tested for *Salmonella*. At the slaughterhouse, Bulgaria and the Czech Republic reported very large investigations on meat samples and carcase swabs, respectively; and only the Czech Republic detected *Salmonella* at a very low level (0.4 %). Belgium reported the highest proportion of positive batches at the slaughterhouse (6.8 %). At processing plants, Belgium and Bulgaria reported investigations on a substantial number of batch samples with a low to very low proportion of positive findings (2.1 % and 0.3 %, respectively). At retail, Bulgaria reported 3.4 % of positive batches out of 203 samples tested.

The two non-MSs Iceland and Norway conducted large investigations on single samples at the slaughterhouse, and Iceland also tested a large number of batches of carcase swabs at the slaughterhouse; only Iceland detected *Salmonella* at a low to very low level (0.6 % of single samples and 2.3 % of batches).

For further information see Level 3 Tables.

Table SA6. Salmonella in fresh pig meat, at slaughter, cutting/processing level and retail, 2011

Country	Description	Sample unit	Sample weight	2011		
				N	N pos	% pos
At slaughterhouse						
Belgium	Carcase swabs	Batch	-	649	44	6.8
Bulgaria	Meat	Batch	25 g	1,521	0	0
Czech Republic	Carcase swabs	Batch	100 cm ²	5,577	23	0.4
Denmark ¹	Carcase swabs	Single	400 cm ²	22,025	155	0.7
Estonia	Carcase swabs	Single	1400 cm ²	635	13	2.0
Finland	Carcase swabs	Single	1400 cm ²	6,282	0	0
Germany	Carcase swabs, domestic production	Single	400 cm ²	249	10	4.0
Hungary	Carcase swabs	Single	400 cm ²	272	1	0.4
Romania	Carcase swabs	Batch	-	381	3	0.8
	Meat	Batch	25 g	125	0	0
Slovakia	Meat	Batch	25 g	91	3	3.3
Spain	Meat	Single	25 g	268	20	7.5
Sweden ²	Carcase swabs	Single	-	5,765	0	0
Iceland	Carcase swabs	Batch	-	998	23	2.3
	Carcase swabs	Single	-	1,524	9	0.6
Norway	Carcase swabs	Single	-	2,212	0	0
At processing or cutting plant						
Belgium	At processing plant	Batch	25 g	292	6	2.1
Bulgaria	At processing plant	Batch	25 g	705	2	0.3
Cyprus	At processing plant	Batch	10 g	95	0	0
Estonia	At cutting plant, domestic production	Single	25 g	242	1	0.4
	At processing plant	Single	25 g	109	1	0.9
Finland	At cutting plant	Single	25 g	1,395	0	0
Hungary	At processing plant	Single	25 g	169	5	3.0
Italy	At processing plant, domestic production	Single	25 g	152	1	0.7
Portugal	At processing plant	Single	25 g	60	3	5.0
Romania	At processing plant	Batch	25 g	78	0	0
At retail						
Bulgaria		Batch	25 g	203	7	3.4
Germany	Fresh meat, surveillance	Single	25 g	1,931	37	1.9
Greece		Single	25 g	135	0	0
Hungary		Single	25 g	47	0	0
Italy	Domestic production	Single	25 g	57	1	1.8
Netherlands		Single	25 g	886	12	1.4
Romania		Batch	25 g	40	0	0
Spain		Single	25 g	116	6	5.2
Sampling level not stated						
Austria	Domestic production	Single	10 g	178	1	0.6
Cyprus	Meat	Batch	25 g	101	0	0
Italy	Domestic production	Single	25 g	49	1	2.0
Poland	Carcase swabs	Single	-	1,960	1	0.1
Sweden	Meat	Single	-	28	0	0
Total (19 MSs)	Total			52,868	357	0.7
	Single			43,010	269	0.6
	Batch			9,858	88	0.9

Note: Data presented include only investigations with sample size ≥ 25 .

1. 4x100 cm² from four different areas of the pig are analysed. The samples are analysed in pools of five carcass swabs. Prevalence of *Salmonella* in single swab samples is calculated using a conversion factor estimated in a Danish research project.
2. 2,336 carcass swabs from breeding pigs and 3,429 carcass swabs from fattening pigs.

Eggs and egg products

According to the EU legislation, starting from 1 January 2009, eggs shall not be used for direct human consumption as table eggs unless they originate from a commercial flock of laying hens subject to a national *Salmonella* control programme. Eggs originating from flocks with unknown health status that are suspected of being infected or known to be infected with *S. Enteritidis* or *S. Typhimurium* may be placed on the market only if treated in a manner that guarantees the elimination of all *Salmonella* serovars with public health significance and marked in a way that easily distinguishes them from table eggs before being placed on the market (Regulation (EC) No 1237/2007).¹³ These provisions, together with the mandatory *Salmonella* control programmes in flocks of laying hens, are believed to have contributed to the reduction in *Salmonella* contaminated laying hens in the EU.

In 2011, 13 MSs reported data from investigations in table eggs with 25 or more samples and the findings are presented in Table SA7. *Salmonella* was detected in eight of these 26 investigations. Overall, a total of 25,619 sample units (single samples or batch samples) were tested and 0.1 % were positive for *Salmonella*. Most of the investigations (about 80 %) were carried out on single samples, with 20,567 units tested and 0.1 % of findings positive. The same proportion of positive results (0.1 %) was reported for the 5,052 batches tested.

At single sample and packing centre level, Germany reported the largest investigation on table eggs with rare detection of *Salmonella* (<0.1 %). In the other countries' investigations a smaller number of samples were analysed and *Salmonella* was either detected at a very low level (Spain, 0.2 % of single samples) or not detected at all (Poland and Portugal). Also, at the retail level, Germany carried out the largest investigations and reported very low to rare proportions of positive samples (between <0.1 % and 0.2 %). A substantial number of samples at retail was also tested by Spain and this revealed the highest proportion of positive samples (1.8 %). The other reporting countries did not detect *Salmonella*-positive samples, although these MSs mainly tested a small number of samples.

Fewer data were reported by MSs on batches. At the packing centre, the only investigation with a substantial number of samples was carried out by Bulgaria, which reported detecting *Salmonella* rarely (<0.1 %). The largest proportion of positive findings came from a small number of sample units reported by Romania (1.7 % out of 120 batch samples). At retail only three investigations were carried out on batches and *Salmonella* was not detected in any sample.

Germany reported data separately for the different egg components (shell, white and yolk) and showed that the highest contamination is at shell level (0.7 % and 0.2 % of positive samples at the processing plant and at retail, respectively), while *Salmonella* was not detected either in the egg white or in the yolk. Ireland also tested the egg shell in retail samples and, conversely, no positive results were reported, although in this investigation only 32 single samples were tested.

Austria tested at retail a bigger sample weight (300g) and did not find any positive results; however, only a limited number of samples (29) was tested.

It should be noted that what constituted a batch or single sample varied in terms of weight and content among the MSs, and this may impact comparison between investigations.

For further information see Level 3 Tables.

¹³ Commission Regulation (EC) No 1237/2007 of 23 October 2007 amending Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Decision 2006/696/EC as regards the placing on the market of eggs from *Salmonella* infected flocks of laying hens. OJ L 280, 24.10.2007, pp 5-9.

Table SA7. Salmonella in table egg samples, 2011

Country	Description	Sample unit	Sample weight	2011		
				N	N pos	% pos
At packing center/ processing plant						
Bulgaria	At packing center	Batch	25 g	3,646	1	<0.1
Czech Republic	At packing center	Batch	25 g	31	0	0
Germany	Shell, at processing plant, domestic production	Single	25 g	148	1	0.7
	White, at processing plant, domestic production	Single	25 g	34	0	0
	Yolk, at processing plant, domestic production	Single	25 g	132	0	0
	At processing plant, domestic production	Single	25 g	2,612	1	<0.1
Poland	At packing center	Batch	25 g	146	0	0
	At packing center	Single	-	50	0	0
	At packing center	Single	25 g	209	0	0
Portugal	At packing center	Single	25 g	49	0	0
Romania	At packing center	Batch	25 g	120	2	1.7
Spain	At packing center	Single	25 g	560	1	0.2
At retail						
Austria	Domestic production	Single	300 g	29	0	0
Belgium		Batch	25 g	118	0	0
Bulgaria		Batch	25 g	720	0	0
Czech Republic		Single	25 g	120	0	0
Germany	Shell, domestic production	Single	25 g	1,191	2	0.2
	White, domestic production	Single	25 g	100	0	0
	Yolk, domestic production	Single	25 g	1,196	0	0
	Domestic production	Single	25 g	13,110	2	<0.1
Hungary		Batch	-	233	0	0
Ireland ¹	Shell	Single	25 g	32	0	0
		Single	25 g	58	0	0
Italy	At catering, domestic production	Single	25 g	26	0	0
Lithuania		Batch	25 g	38	0	0
Spain		Single	25 g	911	16	1.8
Total (13 MSs)	Total			25,619	26	0.1
	Single			20,567	23	0.1
	Batch			5,052	3	0.1

Note: Data presented include only investigations with sample size ≥ 25 .

1. Sample weight is most usually 25 g but occasionally there are other sample weights reported (range from 10 g – 25.99 g).

Other food

In 2011 *Salmonella* was also detected in turkey meat (by eight MSs and one non-MS), bovine meat (by 15 MSs), milk and dairy products (by six MSs), fruits and vegetables (by three MSs), and fish and other fishery products (by seven MSs).

For detailed information see the Level 3 Tables.

3.1.3. *Salmonella* in animals

EU MSs have compulsory or voluntary *Salmonella* control or monitoring programmes in place for a number of farm animal species. An overview of the countries that reported data on *Salmonella* in animals for 2011 is presented in Table SA8. All MSs reported data on flocks of laying hens or broilers and 25 MSs reported data on *Gallus gallus* breeding flocks and on turkeys. In the following chapter, data on breeders of *Gallus gallus*, laying hens, broilers, breeding turkeys and fattening turkeys also include results based on sample sizes below 25; for other animal species, only results based on 25 or more units tested are presented. Results from industry own-check programmes and HACCP sampling as well as specified suspect sampling and clinical investigations have been excluded owing to difficulties in interpreting the data. These data are, however, presented in the Level 3 Tables.

Table SA8. Overview of countries reporting data for *Salmonella* in animals, 2011

Data	Total number of reporting MSs	Countries
<i>Gallus gallus</i> (no further sampling level)	3	MSs: IT, PT, RO Non-MS: NO
Breeders of <i>Gallus gallus</i>	25	All MSs except LU, MT Non-MSs: CH, IS, NO
Laying hens	27	All MSs Non-MSs: CH, IS, NO
Broilers	27	All MSs Non-MSs: CH, IS, NO
Turkeys	25	All MSs except LU, MT Non-MSs: CH, IS, NO
Ducks	11	MSs: BE, CY, DE, DK, IT, LV, PL, PT, SE, SK, UK Non-MSs: IS, NO
Geese	6	MSs: DE, IT, LV, PL, SE, SK Non-MS: NO
Other poultry ¹	14	MSs: BE, BG, CY, DK, EE, ES, IE, IT, LV, PL, PT, RO, SK, UK
Pigs	18	All MSs except AT, BE, CY, CZ, FR, LT, LU, MT, SI Non-MSs: CH, IS, NO
Cattle	18	All MSs except AT, BE, CZ, DK, FR, LT, MT, RO, SI Non-MSs: CH, NO
Sheep and goats	13	MSs: BG, DE, EE, GR, IE, IT, LV, NL, PT, RO, SE, SK, UK Non-MSs: CH, NO
Other animal species	18	MSs: except AT, BE, CZ, FI, FR, HU, LU, MT, SI Non-MSs: CH, NO

Note: The overview table includes all data reported by MSs and non-MSs. In the following chapter, data reported as HACCP or own control are not included in the detailed tables, and, unless stated otherwise, data from suspect sampling and outbreak or clinical investigations are also excluded. Also, only countries reporting investigations with 25 samples or more have been included for analysis, except for the data on *Salmonella* control programmes, where also investigations with less than 25 units tested are included.

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

To protect human health against *Salmonella* infections transmissible between animals and humans, EU Regulation (EC) No 2160/2003¹⁴ obliges MSs to set up national control programmes for *Salmonella* serovars in poultry and pigs deemed to be of particular importance for public health. The animal populations that are currently targeted include breeding flocks, laying hens, broilers of *Gallus gallus* and breeding and fattening turkeys. The national control programmes are established to achieve EU reduction targets to reduce *Salmonella* prevalence in those animal populations at the primary production level.

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

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

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

Breeding flocks of *Gallus gallus*

The year 2011 was the fifth year in which MSs were obliged to implement *Salmonella* control programmes in breeding flocks of *Gallus gallus* in accordance with Regulation (EC) No 2160/2003 and Regulation (EC) No 200/2010.¹⁵ The control programmes for breeding flocks aim at meeting a reduction target of 1 % or less of positive flocks for the following serovars: *S. Enteritidis*, *S. Typhimurium*, *S. Infantis*, *S. Virchow* and *S. Hadar*, including monophasic *S. Typhimurium*, according to Regulation (EC) No 200/2010. The target was set for all commercial-scale adult breeding flocks, during the production period, comprising at least 250 birds. However, MSs with fewer than 100 breeding flocks would attain the target if only one adult breeding flock remained positive.

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

In 2011, control programmes approved by the Commission were implemented in all MSs. In total, 25 MSs and three non-MSs reported 2011 data within the framework of the programme. This is because two MSs, Luxembourg and Malta, do not have breeding flocks of *Gallus gallus*.

The total *Salmonella* prevalence data for *Gallus gallus* breeding flocks during the production period in 2011 is presented in Table SA9. The prevalence of the five serovars (*S. Enteritidis*, *S. Typhimurium*, *S. Infantis*, *S. Virchow* and *S. Hadar*) targeted in the control programmes is presented in Table SA9 and Figures SA4, SA5, and SA6. The geographical distribution of the target serovars is shown in Figure SA7. Monophasic *S. Typhimurium*, which is counted as a target serovar, was not reported in breeding flocks of *Gallus gallus* in 2011.

¹⁴ Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Regulation of 17 November 2003 on the control of *Salmonella* and other specified food-borne zoonotic agents. OJ L 325, 12.12.2003, pp. 1–15.

¹⁵ Commission Regulation (EC) No 200/2010 of 10 March 2010 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Union target for the reduction of the prevalence of *Salmonella* serotypes in adult breeding flocks of *Gallus gallus*. OJ L 61, 11.3.2010, pp. 1–9.

Overall during 2011, *Salmonella* was found in 1.9 % of breeding flocks in the EU at some stage during the production period. The prevalence of the five targeted *Salmonella* serovars in adult breeding flocks tested under the mandatory *Salmonella* control programmes was 0.6 % in 2011. This was a decrease compared to 2010 (0.7 %) and 2009 (1.2 %) at the EU level (Table SA9 and Figure SA4).

In total, 20 MSs and three non-MSs met the target of 1 % set for 2011. The MSs that failed to meet the target were Cyprus, Hungary, Italy, Poland and Slovenia, with the highest flock prevalence of 10.0 % reported by Cyprus (Figure SA6). A total of 10 MSs and three non-MSs reported no positive flocks for the target serovars.

Figure SA5 presents the trends in prevalence of the five target serovars for the 23 MSs and two non-MSs that reported data for all five years. The results show that 14 MSs and the two non-MSs maintained a prevalence below the 1 % threshold in the last three, four or five years. Out of these, four MSs (Estonia, Finland, Latvia, and Lithuania), plus Norway and Switzerland, did not report any positive results in all five years. Besides the fluctuations between prevalence increases and decreases in past reporting years, Greece, Slovakia and Spain maintained their prevalence below the 1 % threshold in the last two years. In addition, three MSs that did not meet the EU target in 2010 (the Czech Republic, Denmark and Ireland), reported a decrease in their prevalence below the 1 % threshold in 2011.

The most commonly reported target serovar in breeding flocks of *Gallus gallus* in 2011 was *S. Enteritidis* (0.4 %), which was the most common serovar in most MSs. *S. Typhimurium* was the most frequently reported target serovar in Belgium, Bulgaria, France, Slovenia and the United Kingdom. *S. Infantis* was the predominant serovar in Greece and *S. Hadar* in Spain. Monophasic *S. Typhimurium* was not detected in any breeding flock in Europe. A total of 15 MSs reported findings of *Salmonella* serovars other than the five target ones, generally at low levels. Cyprus and Romania reported the highest prevalence (10.0 % and 6.8 %, respectively) of flocks testing positive for serovars other than the targeted ones, and in nine MSs the prevalence of non-targeted serovars was higher than that of the target serovars (Table SA9).

Table SA9. Salmonella in breeding flocks of *Gallus gallus* during the production period (all types of breeding flocks, flock-based data) in countries running control programmes in accordance with Regulation (EC) No 2160/2003, 2011

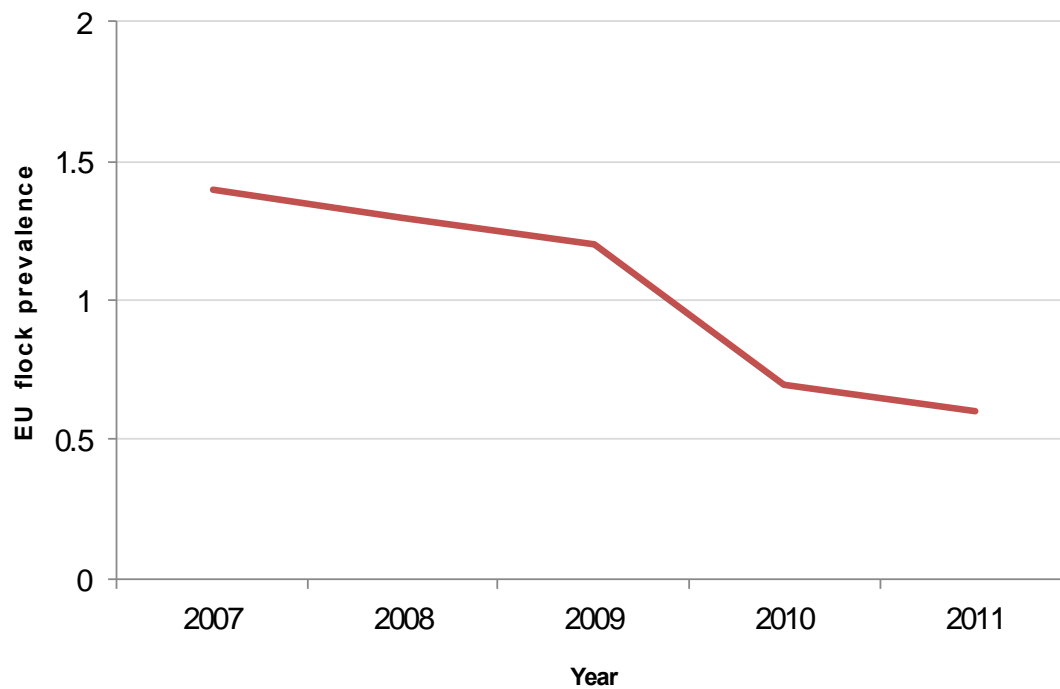
Country	N	% positive							
		pos (all)	5 target serovars ¹	S. Enteritidis	S. Typhimurium	S. Infantis	S. Virchow	S. Hadar	Other serovars, non-typeable, and unspecified
Austria	127	1.6	0.8	0.8	0	0	0	0	0.8
Belgium	581	2.9	0.2	0	0.2	0	0	0	2.8
Bulgaria	127	1.6	0.8	0	0.8	0	0	0	0.8
Cyprus	50	20.0	10.0	10.0	0	0	0	0	10.0
Czech Republic	650	1.8	0.6	0.6	0	0	0	0	1.2
Denmark	228	0	0	0	0	0	0	0	0
Estonia	16	0	0	0	0	0	0	0	0
Finland	177	0	0	0	0	0	0	0	0
France	1,661	0.3	0.3	0	0.3	0	0	0	0
Germany	762	0.7	0.3	0.3	0	0	0	0	0.4
Greece	240	3.8	0.8	0	0	0.8	0	0	2.9
Hungary	914	2.5	1.4	1.4	0	0	0	0	1.1
Ireland	139	0.7	0	0	0	0	0	0	0.7
Italy	1,062	3.0	1.1	0.5	0.5	0	0	0.2	1.9
Latvia	20	0	0	0	0	0	0	0	0
Lithuania	65	0	0	0	0	0	0	0	0
Netherlands	819	0	0	0	0	0	0	0	0
Poland	1,498	2.0	1.7	1.7	0	0	<0.1	0	0.3
Portugal	245	1.6	0.8	0.4	0.4	0	0	0	0.8
Romania	396	6.8	0	0	0	0	0	0	6.8
Slovakia	86	0	0	0	0	0	0	0	0
Slovenia	160	1.3	1.3	0	1.3	0	0	0	0
Spain ²	2,123	2.7	0.3	0.1	<0.1	<0.1	0	0.2	2.4
Sweden	153	0	0	0	0	0	0	0	0
United Kingdom	1,382	1.2	<0.1	0	<0.1	0	0	0	1.1
EU Total	13,681	1.9	0.6	0.4	0.1	<0.1	<0.1	<0.1	1.2
Iceland	42	0	0	0	0	0	0	0	0
Norway	163	0	0	0	0	0	0	0	0
Switzerland	82	0	0	0	0	0	0	0	0

Note: Luxembourg and Malta do not have breeding flocks of *Gallus gallus*.

1. S. Enteritidis, S. Typhimurium including monophasic S. Typhimurium, S. Infantis, S. Virchow, S. Hadar.

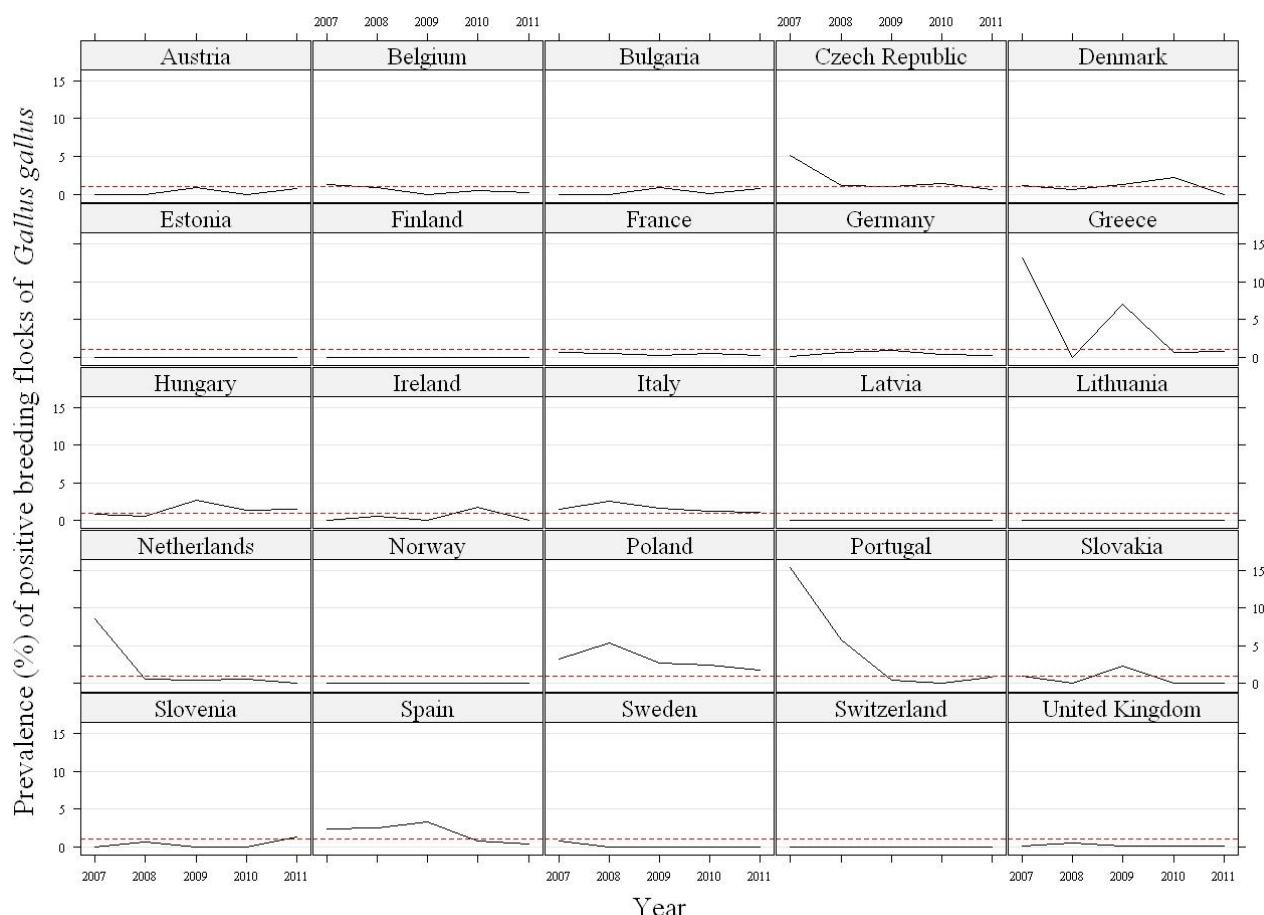
2. Spain: more than one target serovar isolated in some flocks.

Figure SA4. Prevalence of *S. Enteritidis*, *S. Typhimurium*, *S. Infantis*, *S. Virchow* and *S. Hadar*-positive breeding flocks of *Gallus gallus* during production in the EU,¹ 2007–2011



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

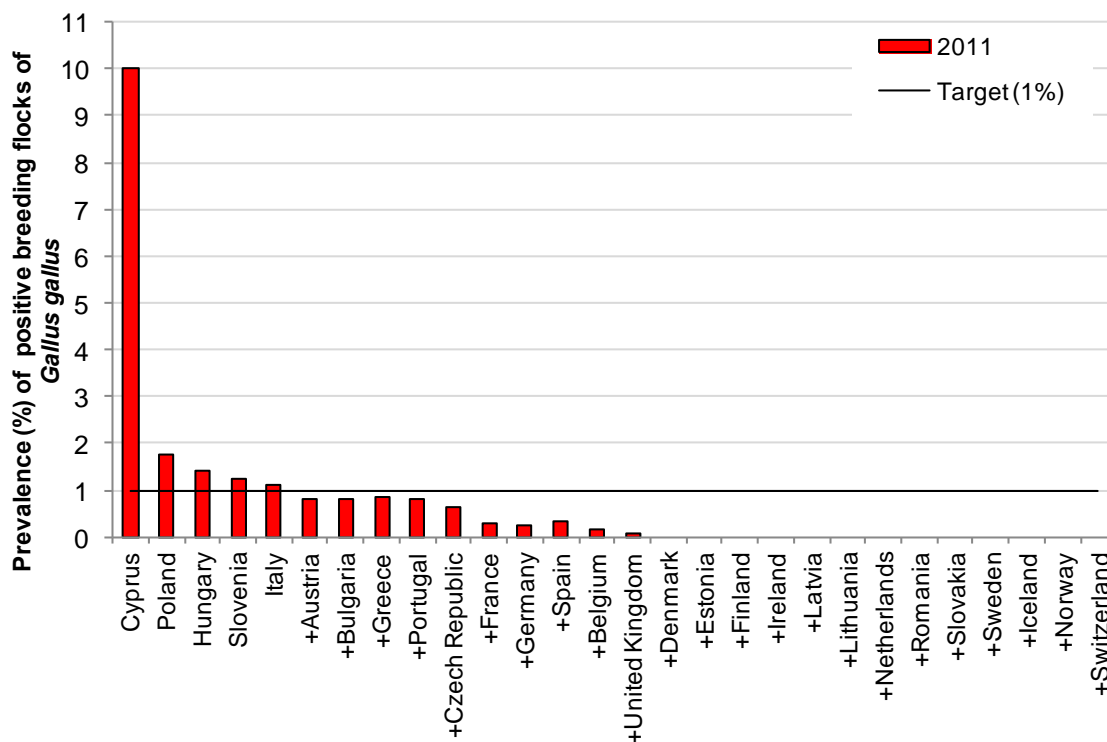
Figure SA5. Prevalence of *S. Enteritidis*, *S. Typhimurium*, *S. Infantis*, *S. Virchow* and *S. Hadar*-positive breeding flocks of *Gallus gallus* during the production period in 23 Member States,¹ Norway and Switzerland, 2007–2011



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

1. No data from Luxembourg and Malta are presented as they have no breeding flocks of *Gallus gallus*. Cyprus and Romania were not included because for some years they tested less than 100 adult flocks and reported only one positive flock leading to a proportion of positives higher than 1 %. Based on the Regulation (EC) No 1003/2005 17 (Art. 1, point 1), these MSs met the EU target in all five years (except in 2011 for Cyprus). Specifically, Cyprus tested less than 100 breeding flocks and reported one or 0 positive flocks in all the years, except in 2011, where five flocks were positive out of 50 flocks tested. In 2007 and 2008, Romania tested less than 100 adult flocks and reported only one positive flock. In 2009 and 2010 Romania reported, respectively, 325 and 304 adult breeding flocks, and, of these, only two (0.62 %) and one (0.33 %) were positive, respectively. In 2011, Romania reported no positive flocks out of the 396 flocks tested. Iceland was not included because it reported data for the first time in 2011.

Figure SA6. Prevalence of *S. Enteritidis*, *S. Typhimurium*, *S. Infantis*, *S. Virchow* and *S. Hadar*-positive breeding flocks of *Gallus gallus* during the production period for MSs,¹ Iceland, Norway and Switzerland, 2011



1. No data from Luxembourg and Malta as they have no breeding flocks of *Gallus gallus*. Twenty MSs and three non-MSs met the target in 2011, indicated with a '+' symbol.

Figure SA7. Prevalence of the five target serovars (*S. Enteritidis*, *S. Typhimurium*, *S. Infantis*, *S. Virchow* and *S. Hadar*)-positive breeding flocks of *Gallus gallus* during the production period,¹ 2011



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

Laying hen flocks

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

In 2011 a final annual *Salmonella* reduction target for laying hen flocks of *Gallus gallus* came into force. This target was the extension of the transitional target implemented in the period 2008-2010. The EU definitive target for laying hens is defined in Regulation (EC) No 517/2011¹⁶ as an annual minimum percentage of reduction in the number of adult laying hen flocks (i.e. in the production period) remaining positive for *S. Enteritidis* and/or *S. Typhimurium* by the end of the previous year. The annual targets are proportionate, depending on the prevalence in the preceding year, and the final EU target is defined as a maximum percentage of flocks remaining positive of 2 %. However, MSs with fewer than 50 flocks of adult laying hens would attain the target if only one adult flock remained positive.

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

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

In 2011 all MSs had control programmes approved by the EC. In total, 27 MSs and three non-MSs reported data within the framework of the laying hen flock programme for 2011. The prevalence of *Salmonella* spp. and of the two serovars (*S. Enteritidis* and *S. Typhimurium*) targeted in the control programmes for laying hen flocks during the production period are presented in Table SA10. The prevalence of *S. Enteritidis* and *S. Typhimurium* and the target for production flocks of laying hens for MSs and non-MSs in 2011 are shown in Figures SA8 and SA10, and the trend in prevalence of the two target serovars at MS level is shown in Figure SA9. The geographical distribution of prevalence by MS is presented in Figure SA11, which shows that the Nordic countries reported no positive samples, apart from Denmark. Table SA10 shows that Austria, France, Germany, Poland, Spain and the United Kingdom had large (>2,000) numbers of flocks under their control programmes.

Overall, 22 MSs and three non-MSs met their 2011 reduction targets. Five MSs did not achieve the reduction in *Salmonella* prevalence, although it should be noted that two of them (Cyprus and Estonia) reported relatively few flocks tested (69 and 35, respectively) and all these countries reported low prevalences.

The prevalence of the two target serovars in laying hen flocks tested under the mandatory control programmes was 1.5 % (Table SA10). The most common of the target serovars in laying hen flocks was *S. Enteritidis* (1.3 % compared to 0.2 % of *S. Typhimurium*), which was the most common serovar in all MSs

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

reporting positive findings for the target serovars, except for Denmark, which reported one isolate each for the two serovars.

The MSs reported between 0 % and 8.8 % flocks positive with *S. Enteritidis* and/or *S. Typhimurium* (Table SA10). Ten MSs and three non-MSs reported no positive flocks or very low prevalence, whereas Malta and Estonia reported the highest prevalence (8.8 % and 8.6 %, respectively). Monophasic *S. Typhimurium* was detected only in France in a single flock.

The reported *S. Enteritidis* and *S. Typhimurium* prevalence at the EU level has continued to decline from 3.5 % in 2008 and was more than halved in 2011 (1.5 %) (Figure SA8) and prevalence declined in the majority of MSs (Figure SA9). In most MSs the prevalence of the two target serovars fell markedly over these four years. However, seven MSs (Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, the Netherlands, and Romania) reported an increase in their prevalence from 2010 to 2011 (Figure SA9). In particular, the prevalence of the two target serovars increased notably in Estonia from 0 % in 2010 to 8.6 % in 2011. Nevertheless, the EU decreasing trend in the prevalence of *S. Enteritidis* and *S. Typhimurium* has continued and indicates that progress is still been made in combating these *Salmonella* serovars.

In 2011, the prevalence of *Salmonella* spp. in laying hens was 4.2 %. Finland, Slovakia and Sweden were the only MSs reporting no positive flocks, and Ireland, Luxembourg and Slovenia detected only serovars other than the two targeted ones. The highest prevalence of *Salmonella*-positive flocks was reported by Romania (29.2 %) where mainly other serovars (27.3 %) were detected. Cyprus also reported high prevalences of *Salmonella*-positive productive laying hen flocks (23.2 %). Eighteen MSs reported flocks positive for serovars other than the two target ones at very low to high levels, and in 13 of them the prevalence of these serovars was higher than the prevalence of the target serovars. As for the non-MSs, Iceland reported no positive flocks, Norway reported only positive flocks for serovars other than the two targeted ones, and Switzerland reported few flocks positive for the target serovars and for serovars other than those targeted.

Table SA10. Salmonella in laying hen flocks of Gallus gallus during the production period (flock-based data) in countries running control programmes, 2011

Country	N	Target (production period)	% positive				
			pos (all)	S. Enteritidis and/or S. Typhimurium ¹	S. Enteritidis	S. Typhimurium ¹	Other serovars, non-typeable, and unspecified
Austria	2,843	2.0	2.3	1.2	1.1	0.1	1.1
Belgium	750	2.9	5.2	2.1	1.7	0.4	3.1
Bulgaria	228	2.0	6.6	1.8	1.8	0	4.8
Cyprus	69	4.3	23.2	5.8	5.8	0	17.4
Czech Republic	444	2.1	3.2	2.7	2.3	0.5	0.5
Denmark	410	2.0	0.5	0.5	0.2	0.2	0
Estonia	35	2.0	8.6	8.6	8.6	0	0
Finland	818	2.0	0	0	0	0	0
France	4,000	2.0	1.5	1.5	1.0	0.5	0
Germany	4,993	2.0	2.2	1.2	0.9	0.3	1.0
Greece	578	2.0	3.8	0.5	0.5	0	3.3
Hungary	867	2.0	15.7	3.0	2.7	0.3	12.7
Ireland	193	2.0	0.5	0	0	0	0.5
Italy	1,122	2.3	9.7	2.0	1.4	0.6	8.4
Latvia	370	2.6	2.4	1.6	1.1	0.5	0.8
Lithuania	127	5.7	0.8	0.8	0.8	0	0
Luxembourg	226	2.0	0.9	0	0	0	0.9
Malta	102	10.6	8.8	8.8	6.9	2.0	0
Netherlands	1,839	2.0	2.2	2.2	2.0	0.2	0
Poland	2,235	4.1	5.5	3.7	3.6	0.1	1.8
Portugal	332	2.1	9.3	1.8	1.8	0	7.5
Romania	411	2.0	29.2	1.9	1.9	0	27.3
Slovakia	290	2.0	0	0	0	0	0
Slovenia	185	2.0	0.5	0	0	0	0.5
Spain	2,500	5.3	13.6	2.8	2.5	0.3	10.8
Sweden	629	2.0	0	0	0	0	0
United Kingdom	4,195	2.0	0.7	0.2	0.1	<0.1	0.6
EU Total	30,791		4.2	1.5	1.3	0.2	2.7
Iceland	22	2.0	0	0	0	0	0
Norway	828	2.0	0.1	0	0	0	0.1
Switzerland	841	2.0	0.2	0.1	0.1	0	0.1

Note: Target (production period) is calculated from the prevalence rate reported in 2010.

1. S. Typhimurium includes monophasic S. Typhimurium.

Figure SA8. Prevalence of *S. Enteritidis* and *S. Typhimurium*-positive laying hen flocks of *Gallus gallus* during the production period in the EU, 2008–2011

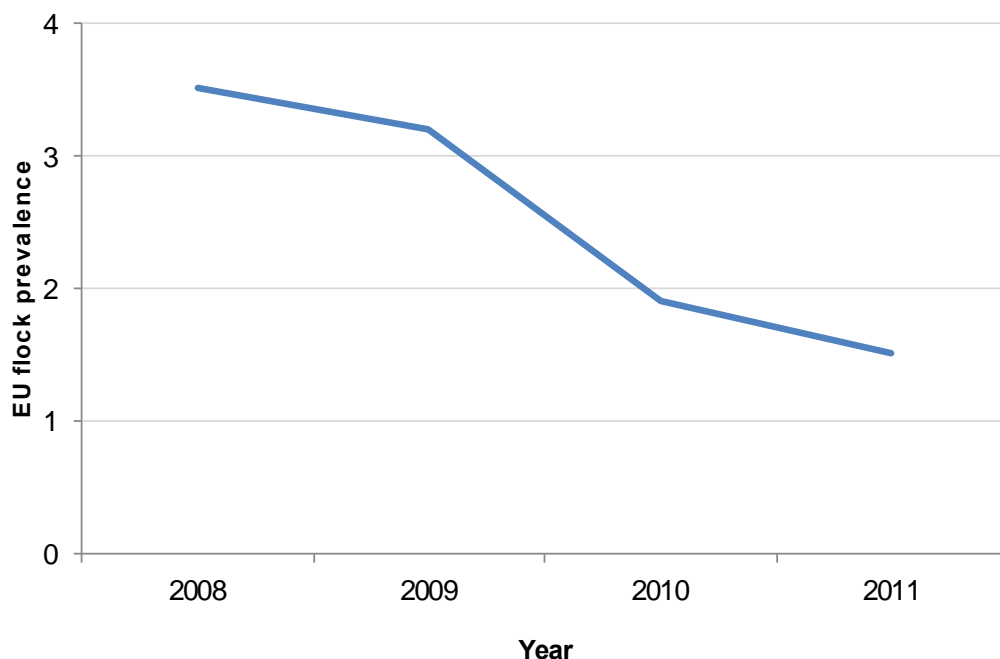
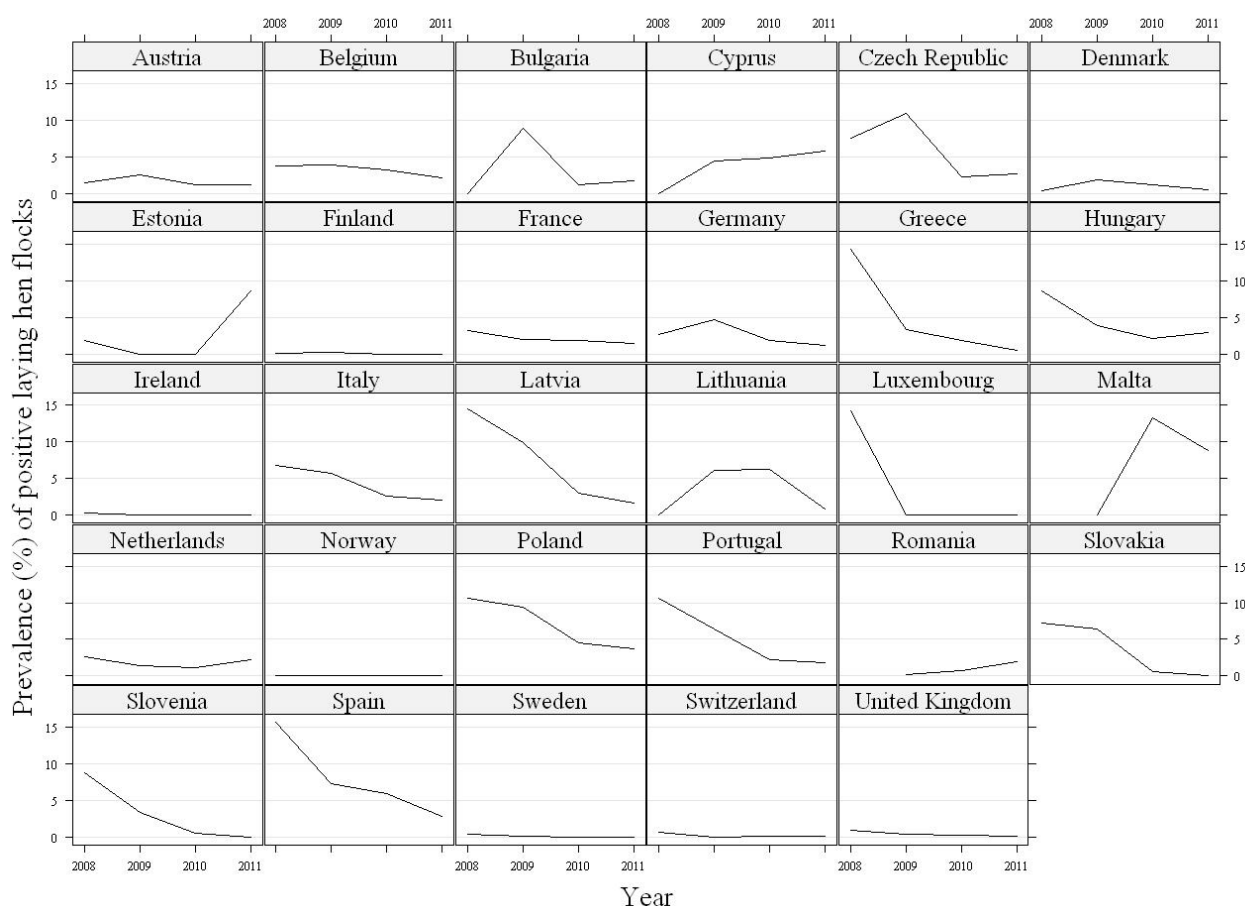


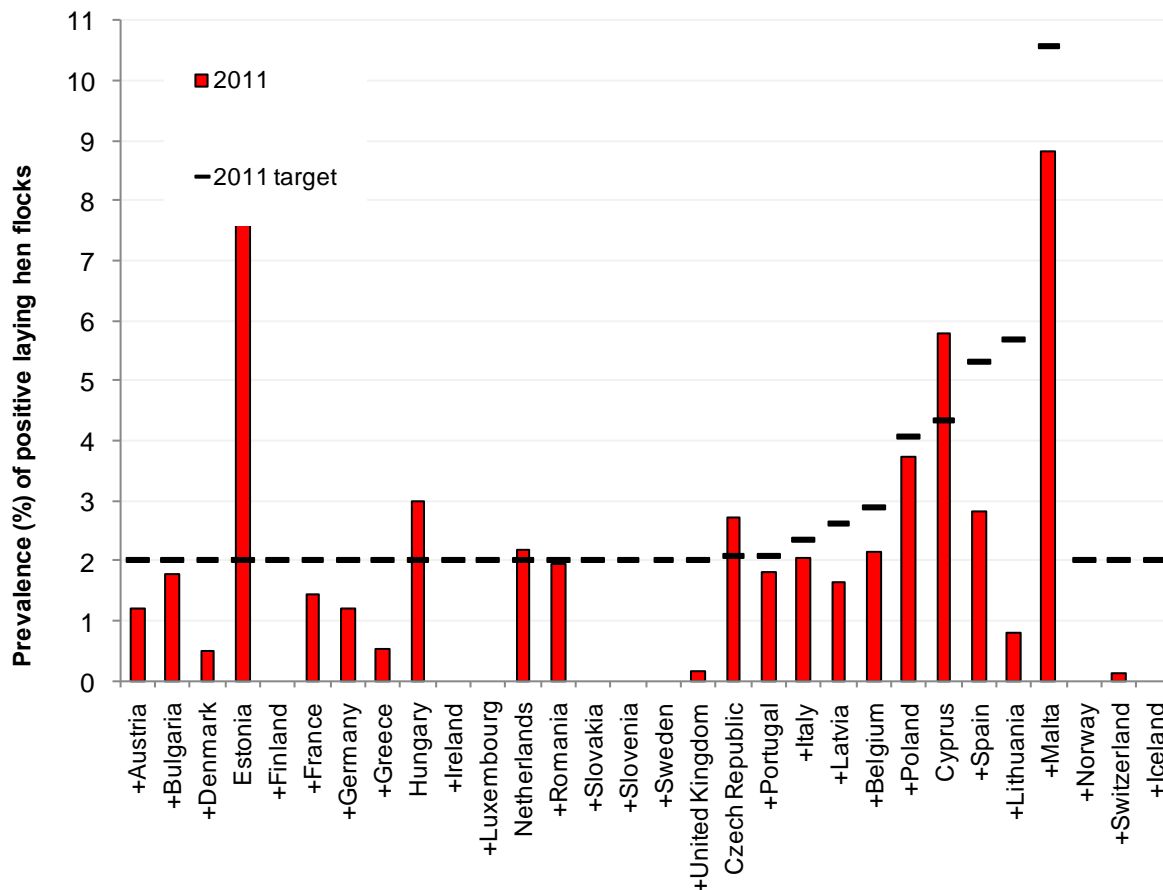
Figure SA9. Prevalence of *S. Enteritidis* and *S. Typhimurium*-positive laying hen flocks of *Gallus gallus* during the production period in Member States, Norway and Switzerland,¹ 2008–2011



Note: According to Regulation (EC) No 517/2011 (Art. 1, point 1), Lithuania and Luxembourg met the EU target in 2010 and 2008, respectively, as they tested less than 50 adult flocks and reported only one positive result.

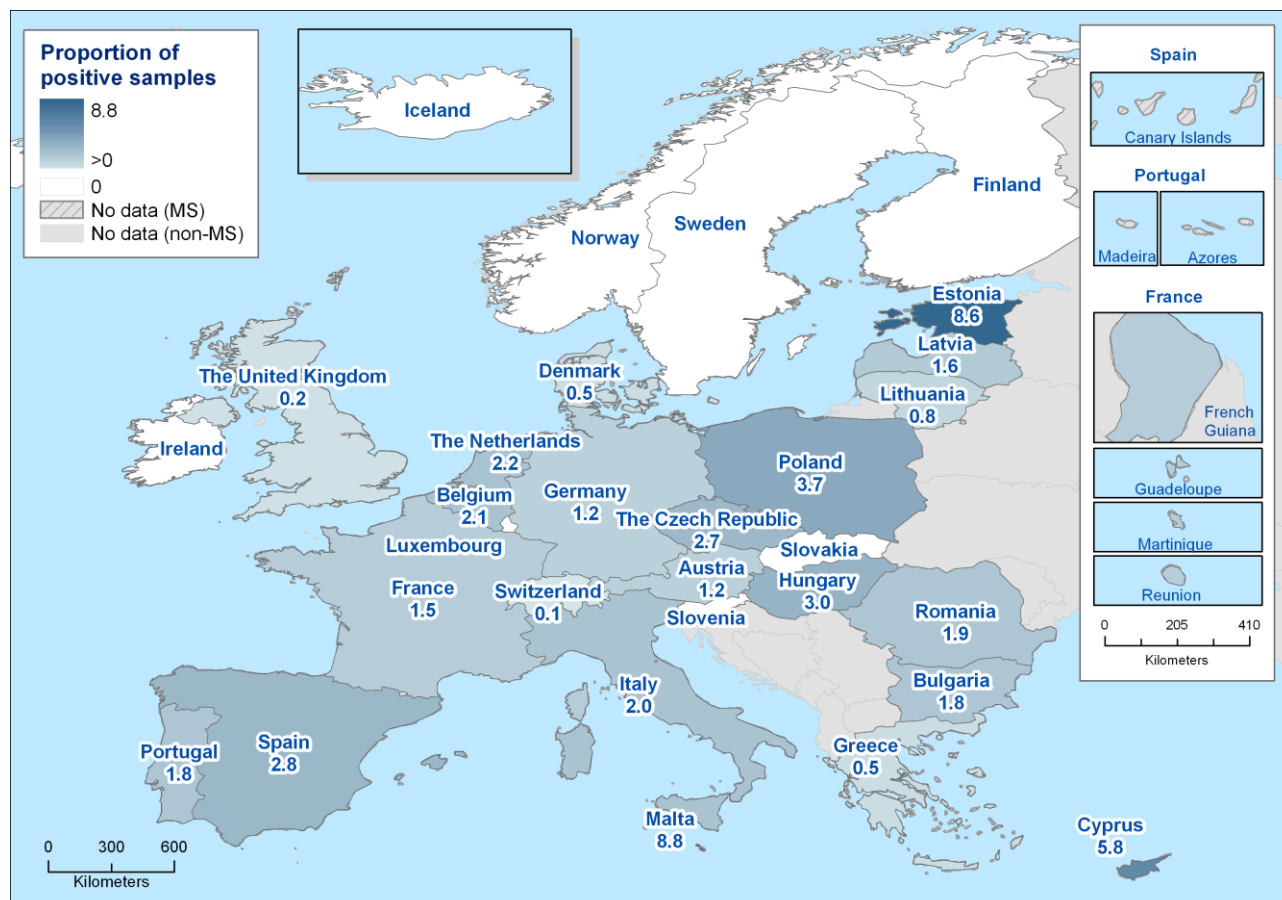
1. Iceland was not included because it reported data for the first time in 2011.

Figure SA10. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive laying hen flocks of *Gallus gallus* during the production period and targets for Member States, Iceland, Norway and Switzerland, 2011



Note: MSs are ordered by target level. Twenty two MSs and three non-MSs have met the 2011 targets, indicated with a '+'.

Figure SA11. Prevalence of the two target serovars, *S. Enteritidis* and *S. Typhimurium*-positive laying hen flocks of *Gallus gallus* during the production period, 2011



Broiler flocks

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

Minimum detection requirements in broiler flocks laid down in the Regulation include the sampling of flocks within the three weeks before the birds are moved to the slaughterhouse, taking at least two pairs of boot/sock swabs per flock. Test results have to be reported as Food Chain Information to slaughterhouses and to EFSA and EC, along with any relevant additional information, on a yearly basis as part of the annual report on trends in and sources of zoonoses and zoonotic agents. Positive flocks have to be counted and reported once only (flock level prevalence), irrespective of the number of sampling and testing operations.

The EU target for broiler flocks, referred to in Regulation (EC) No 160/2003, was set in Regulation (EC) No 646/2007¹⁷ as a maximum percentage of broiler flocks remaining positive for *S. Enteritidis* and/or *S. Typhimurium* of 1 % or less by 31 December 2011. A flock was reported as positive if one or more samples were positive. However, only flocks testing positive for *S. Typhimurium* and/or *S. Enteritidis* within the three weeks before slaughter are taken into consideration when assessing whether MSs meet the target. Any reporting of monophasic *S. Typhimurium* was included within the *S. Typhimurium* total and was counted as a target serovar.

In 2011 all MSs had control programmes approved by the EC. Twenty-seven MSs and three non-MSs reported data on broiler flocks before slaughter. The prevalences of *Salmonella* spp. and of the two serovars (*S. Enteritidis* and *S. Typhimurium*) targeted in the national control programmes for broilers are presented in Table SA11 and in Figures SA14 and SA15. The trends at EU and MS level are shown in Figures SA12 and SA13, respectively.

In 2011, 24 MSs and three non-MSs met the target of 1 % or less of the broiler flocks positive for *S. Enteritidis* and/or *S. Typhimurium* (Figure SA14), which was an improvement for two MSs compared to 2010. Three MSs did not achieve the 2011 *Salmonella* reduction target, although it should be noted that two of them (the Czech Republic and Latvia) reported low prevalences (≤ 2.3 %). Cyprus reported a higher prevalence (11.1 %), but tested only a small number of flocks (nine).

Overall in 2011, the MSs reported 0.3 % of positive flocks for the two target serovars (Table SA11). Six MSs and one non-MS reported no findings for the two target serovars, while 21 MSs and two non-MSs reported prevalence of the two serovars ranging from <0.1 % to 11.1 %. Monophasic *S. Typhimurium* was detected in France, Spain, the United Kingdom and Norway in 19, two, one and one flock, respectively.

The reported prevalence of *S. Enteritidis* and *S. Typhimurium* in the EU has continued to decline from 0.7 % in 2009 and 0.4 % in 2010 to 0.3 % in 2011 (Figure SA12). A decreasing trend in the reported prevalence has been observed in most MSs (Figure SA13). A number of MSs reported large reductions in the prevalence of the target serovars, in particular the Czech Republic, Malta, and Slovakia (Figure SA13). In particular, Slovakia reported a notable decrease in the prevalence of the two target serovars from 7.7 % in 2009 and 1.6 % in 2010 to 0.1 % in 2011. Compared to 2010, the prevalence has increased in Cyprus and Latvia. In particular, Cyprus reported a marked increase in the prevalence, from 0 % in 2009 and 2010 to 11.1 % in 2011, although only nine broiler flocks were tested in 2011 (against 239 and 643 flocks tested in 2009 and 2010, respectively), out of which one was positive. A fluctuating trend in the prevalence of the two target serovars has been observed for Latvia and Malta.

In 2011, the prevalence of *Salmonella* spp. in broiler flocks at the EU level was 3.2 %. Bulgaria, Estonia and Lithuania were the only MSs reporting no positive flocks, and Finland, Ireland, Luxembourg and Iceland reported only serovars other than the two targeted ones at rare to low level. The highest prevalence for all serovars was detected in Romania (36.5 %), although most of the positive findings were for serovars other

¹⁷ Commission Regulation (EC) No 646/2007 of 12 June 2007 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Community target for the reduction of the prevalence of *Salmonella* Enteritidis and *Salmonella* Typhimurium in broilers and repealing Regulation (EC) No 1091/2005. OJ L 151, 13.6.2007, p. 21–25.

than the targeted ones (35.8 %). Twenty-two MSs reported positive findings for serovars other than *S. Enteritidis* and *S. Typhimurium* with a prevalence that was in most of cases higher than the prevalence for the target serovars.

Table SA11. *Salmonella* in broiler flocks of *Gallus gallus* before slaughter (flock-based data) in countries running control programmes, 2011

Country	N	% positive				
		pos (all)	<i>S. Enteritidis</i> and/or <i>S. Typhimurium</i> ¹	<i>S. Enteritidis</i>	<i>S. Typhimurium</i> ¹	Other serovars, non-typeable, and unspecified
Austria	3,500	2.4	0.4	0.3	<0.1	2.0
Belgium	8,682	3.3	0.2	0	0.2	3.1
Bulgaria	513	0	0	0	0	0
Cyprus	9	22.2	11.1	11.1	0	11.1
Czech Republic	5,087	5.5	2.3	2.2	<0.1	3.3
Denmark	3,795	1.2	0.2	<0.1	0.1	1.1
Estonia	452	0	0	0	0	0
Finland	3,223	<0.1	0	0	0	<0.1
France	57,182	3.4	0.5	0.1	0.3	2.9
Germany	14,696	2.7	0.2	0.1	0.1	2.5
Greece	7,810	0.4	0.2	0.1	<0.1	0.3
Hungary	6,146	22.9	0.4	0.2	0.1	22.6
Ireland	33	3.0	0	0	0	3.0
Italy	14,620	9.2	<0.1	<0.1	0	9.1
Latvia	185	2.7	2.2	1.6	0.5	0.5
Lithuania	165	0	0	0	0	0
Luxembourg	99	4.0	0	0	0	4.0
Malta	561	0.7	0.7	0.5	0.2	0
Netherlands	19,578	2.8	0.1	<0.1	0.1	2.7
Poland	29,343	0.7	0.5	0.5	<0.1	0.2
Portugal	8,785	1.1	0.4	0.3	<0.1	0.7
Romania	1,535	36.5	0.7	0.7	0	35.8
Slovakia	1,443	0.1	0.1	0.1	0	0
Slovenia	2,226	1.2	0.1	0	0.1	1.1
Spain	23,464	2.2	0.1	<0.1	<0.1	2.0
Sweden	3,413	0.1	<0.1	0	<0.1	<0.1
United Kingdom	39,648	1.3	<0.1	0	<0.1	1.3
EU Total	256,193	3.2	0.3	0.2	0.1	2.9
Iceland	637	2.2	0	0	0	2.2
Norway	4,675	<0.1	<0.1	0	<0.1	0
Switzerland	415	1.2	0.2	0.2	0	1.0

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

Figure SA12. Prevalence of *S. Enteritidis* and *S. Typhimurium*-positive broiler flocks of *Gallus gallus* during the production period in the EU, 2009–2011

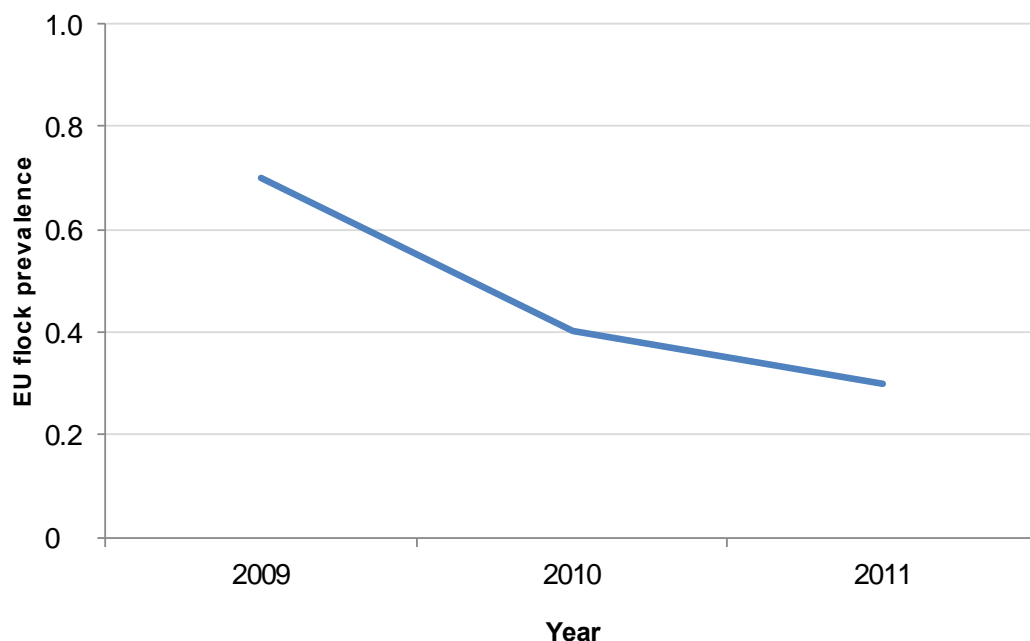
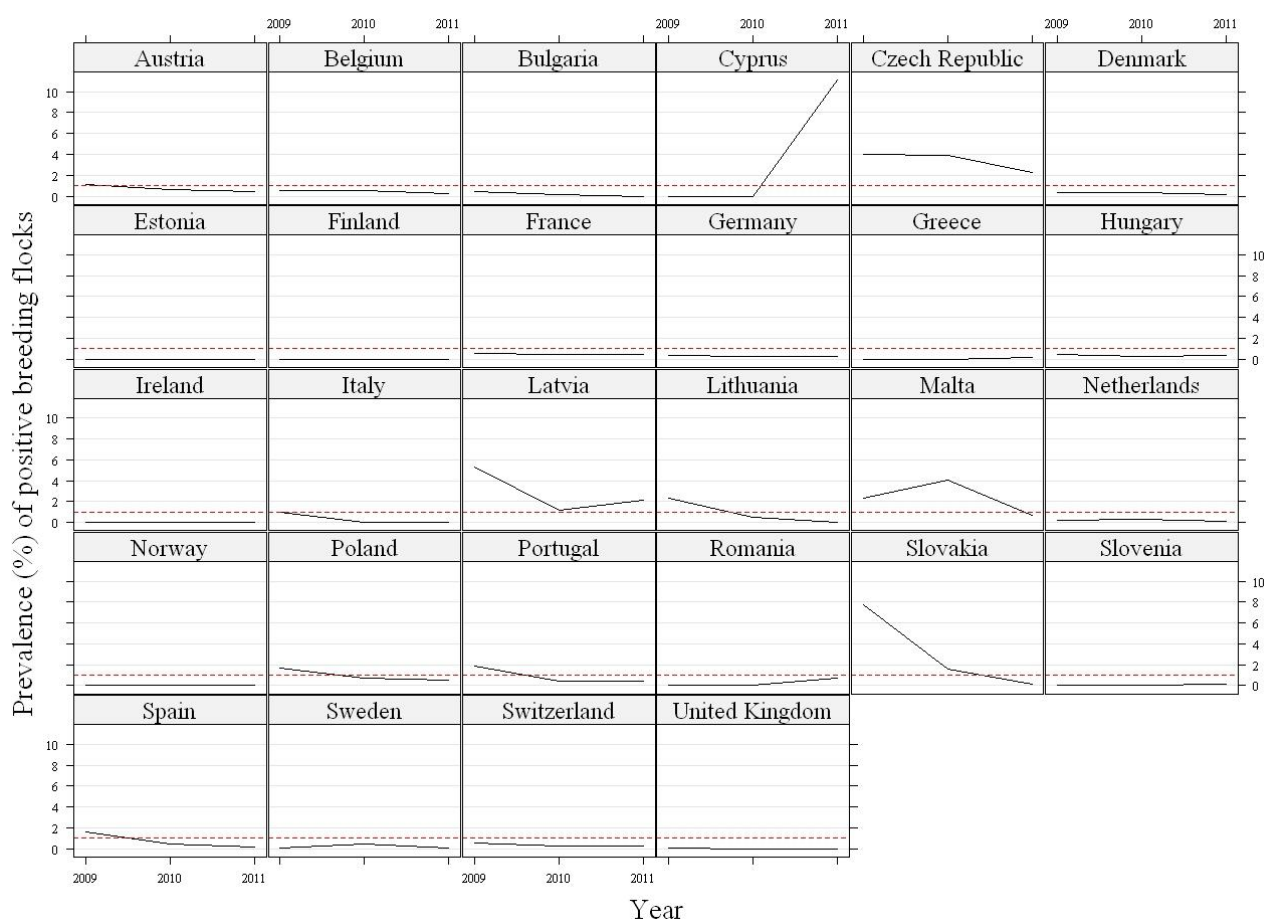


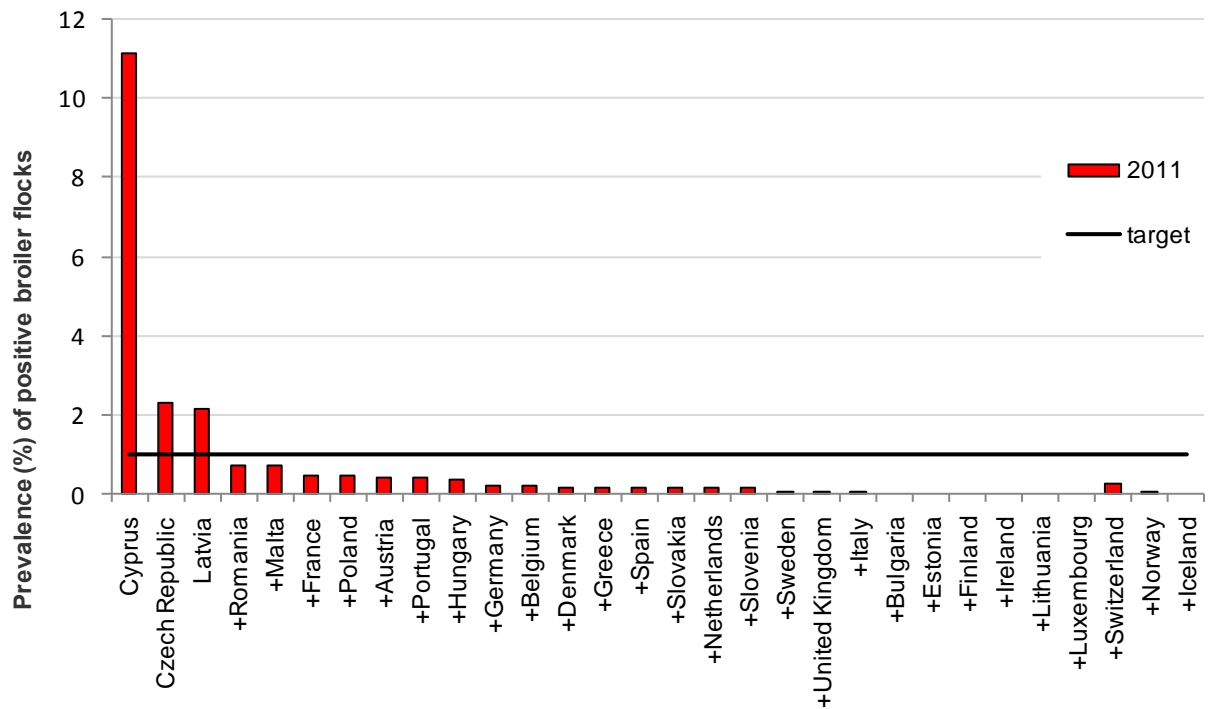
Figure SA13. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive broiler flocks of *Gallus gallus* before slaughter in 24 Member States,¹ Norway and Switzerland, 2009–2011



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

1. Luxembourg was not included because data were only reported in 2009 (4 tested flocks, 0 positive) and 2011 (99 tested flocks, 0 positive). Iceland was not included because it reported data for the first time in 2011.

Figure SA14. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive broiler flocks of *Gallus gallus* before slaughter for Member States, Iceland, Norway and Switzerland, 2011



Note: In 2011, 24 MSs and three non-MSs met the target, indicated with a '+'.

Figure SA15. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive broiler flocks of *Gallus gallus* before slaughter, 2011



Breeding and fattening turkeys

The mandatory national control programme for *Salmonella* in breeding and fattening turkeys came into effect on 1 January 2010 and has been implemented to comply with Regulation (EC) No 2160/2003 and Regulations (EC) No 584/2008¹⁸ and 213/2009.¹⁹ All flocks of 250 or more breeding turkeys and 500 or more fattening turkeys are to be included in the national control programme unless exempted in Regulation (EC) No 2160/2003 under Article 1.3, that is birds produced for private domestic consumption, or where there is a direct supply of small quantities of products to the final consumer or to local retail establishments directly supplying the primary products to the final consumer. A target for the reduction of *S. Enteritidis* and/or *S. Typhimurium* in turkey flocks is set by Regulation (EC) No 584/2008, according to which no more than 1 % of adult breeding turkey flocks and fattening turkey flocks are to remain positive for *S. Enteritidis* and/or *S. Typhimurium* by 31 December 2012. For MSs with fewer than 100 flocks of adult breeding or fattening turkeys, the EU target is that no more than one flock of adult breeding or fattening turkeys may remain positive by 31 December 2012.

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

¹⁸ Commission Regulation (EC) No 584/2008 of 20 June 2008 implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards a Community target for the reduction of the prevalence of *Salmonella* Enteritidis and *Salmonella* Typhimurium in turkeys. OJ L 162, 21.6.2008, pp. 3-8.

¹⁹ Commission Regulation (EC) No 213/2009 of 18 March 2009 amending Regulation (EC) No 2160/2003 of the European Parliament and of the Council and Regulation (EC) No 1003/2005 as regards the control and testing of *Salmonella* in breeding flocks of *Gallus gallus* and turkeys. OJ L73, 19.3.2009, pp. 5-11.

at the hatchery, shall be taken in accordance with the provisions laid down in point 2.2.2 of the Annex to Regulation (EC) No 1003/2005.²⁰ Official control samples are required to be taken from all flocks on 10 % of holdings with at least 250 adult breeding turkeys between 30 and 45 weeks of age but including in any case all holdings in which *S. Enteritidis* or *S. Typhimurium* was detected during the previous 12 months and all holdings with elite, great grandparent and grandparent breeding turkeys; this sampling may also take place at the hatchery.

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

Any reporting of monophasic *S. Typhimurium* was included within the *S. Typhimurium* total and was counted as a target serovar. The prevalence of *Salmonella* spp. and of the two serovars targeted in the control programmes are presented in Tables SA12 and SA13 for breeding and fattening flocks, respectively. The prevalence of target serovars (*S. Enteritidis* and *S. Typhimurium*), and the comparison between the prevalence of target serovars for MSs and non-MSs in 2010-2011 are presented in Figures SA16 and SA17 for breeding turkey flocks and in Figures SA18 and SA19 for fattening turkey flocks. All results are presented at flock level. A flock was reported as positive if one or more samples were positive for *S. Typhimurium* and/or *S. Enteritidis*.

Fourteen MSs and two non-MSs reported data from *Salmonella* testing in adult **turkey breeding flocks** in 2011 (Table SA12) compared to 13 MSs and one non-MS in 2010. Data show that only France and the United Kingdom had a relatively high number of flocks under their control programmes, whereas few flocks were reported by the other countries.

In total, 14 MSs and two non-MSs met the target prevalence of *S. Enteritidis* and/or *S. Typhimurium* set for adult turkey breeding flocks in 2011 (Figures SA16 and SA17), which is similar to 2010 when 13 MSs and one non-MS met their 2010 target. With the exception of France and Hungary, where a prevalence of 0.3 % and 0.8 % was reported, respectively, the other countries did not detect the two target serovars. Compared to 2010, an increase was observed for Hungary (0 % in 2010 to 0.8 % in 2011), while for Spain the prevalence decreased from 5.9 % in 2010 to 0 % in 2011 (Figure SA16). Overall, the prevalence for the target serovars was 0.2 %, which is slightly lower compared with 2010 (0.3 %). Monophasic *S. Typhimurium* was not detected in any flock.

Seven MSs reported *Salmonella* spp. in their turkey breeding flocks, the prevalence ranging from 0.3 % (France) to 50.0 % (the Czech Republic), and the overall EU prevalence of *Salmonella* was 3.5 %, which was at a lower level than in 2010 (6.9 %). The Czech Republic, Germany, Italy, Poland and the United Kingdom reported only serovars other than the two targeted ones. However, it should be noted that the number of flocks tested by each MS varied considerably and therefore the average figure was more influenced by MSs that reported larger numbers of flocks.

In addition, 23 MSs and three non-MSs provided data from **turkey fattening flocks** before slaughter (Table SA13) compared to 21 MSs and two non-MSs in 2010. The table shows that France, Germany, Hungary, Poland and the United Kingdom had large (>2,500) numbers of flocks under their programmes.

In 2011, 22 MSs and three non-MSs met their 2011 reduction targets set for fattening turkeys (Figures SA18 and SA19), compared to 20 MSs and two non-MSs in 2010. Denmark and Ireland met the target in 2011, although they reported a prevalence higher than 1 % because these countries tested fewer than 100 flocks (38 and 17 flocks, respectively) and detected only one flock positive for the target serovars.

Twelve MSs reported *S. Enteritidis* and/or *S. Typhimurium* infection; the overall prevalence at EU level was 0.5 %, which is the same prevalence as in 2010. Denmark, Ireland and Spain were the only countries reporting prevalence above 1 %, but at relatively low levels (2.6 %, 5.9 % and 1.1 %, respectively).

²⁰ Commission Regulation (EC) No 1003/2005 of 30 June 2005 implementing Regulation (EC) No 2160/2003 as regards a Community target for the reduction of the prevalence of certain *Salmonella* serotypes in breeding flocks of *Gallus gallus* and amending Regulation (EC) No 2160/2003. OJ L 170, 1.7.2005, pp. 12–17.

Compared with 2010, a decrease in the prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive flocks was observed in the Czech Republic, Germany, Italy, Poland and Spain, whereas an increase was reported in Austria, Denmark, Finland, France, Hungary, Ireland, Portugal and the United Kingdom (Figure SA18). Monophasic *S. Typhimurium* was detected only in the United Kingdom in five flocks.

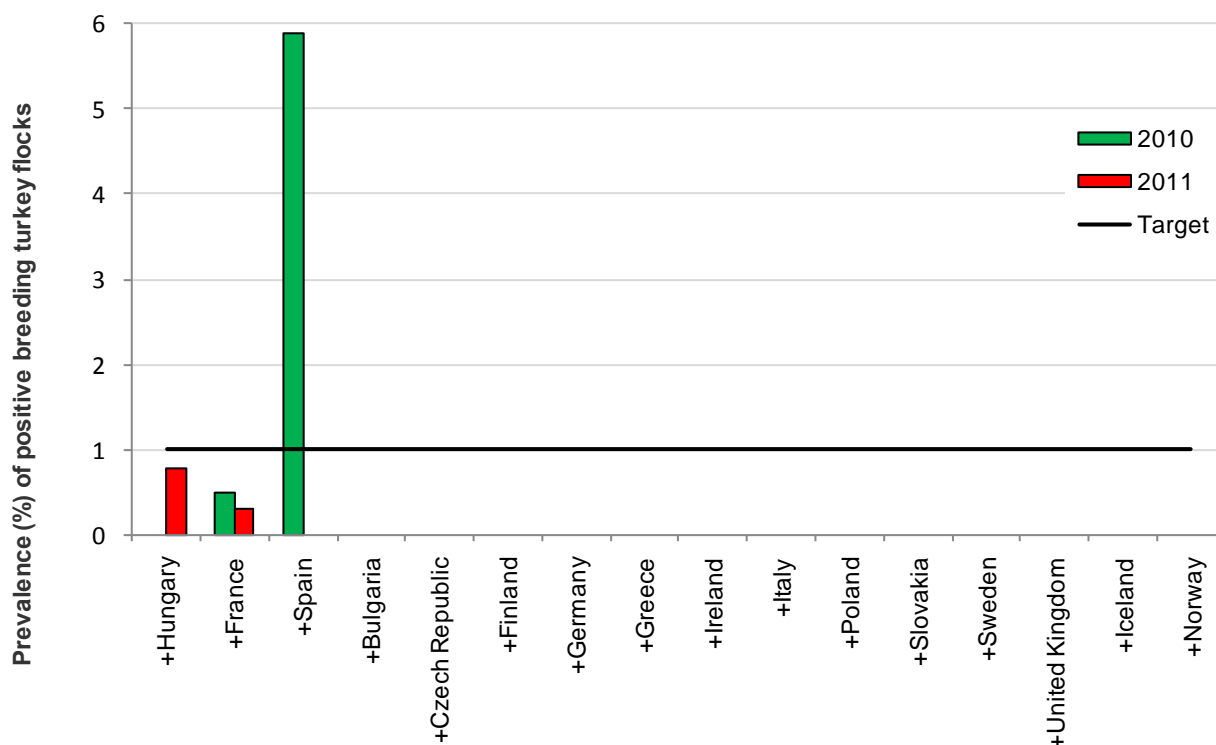
The prevalence of *Salmonella* spp. in turkey fattening flocks was 10.1 % at the EU level, which is a reduction compared to 2010, when it was 12.1 %. The highest prevalence was reported by Romania and Hungary (37.5 % and 37.3 %, respectively). In 2011, Belgium, Latvia, Lithuania, Slovakia and Sweden were the only MSs reporting no positive flocks. Cyprus, Greece, Italy, the Netherlands, Romania and Slovenia reported only serovars other than the targeted ones as well as Norway and Switzerland. In addition, 10 MSs reported serovars other than the targeted ones with a prevalence higher than the prevalence reported for the target serovars.

Table SA12. *Salmonella* in breeding flocks of turkeys (adults, flock-based data) in countries running control programmes, 2011

Country	N	% positive				
		pos (all)	<i>S. Enteritidis</i> and/or <i>S. Typhimurium</i> ¹	<i>S. Enteritidis</i>	<i>S. Typhimurium</i> ¹	Other serovars, non-typeable, and unspecified
Bulgaria	2	0	0	0	0	0
Czech Republic	12	50.0	0	0	0	50.0
Finland	10	0	0	0	0	0
France	687	0.3	0.3	0	0.3	0
Germany	166	0.6	0	0	0	0.6
Greece	1	0	0	0	0	0
Hungary	129	10.9	0.8	0.8	0	10.1
Ireland	5	0	0	0	0	0
Italy	55	5.5	0	0	0	5.5
Poland	79	1.3	0	0	0	1.3
Slovakia	32	0	0	0	0	0
Spain	44	0	0	0	0	0
Sweden	4	0	0	0	0	0
United Kingdom	356	8.1	0	0	0	8.1
Total (14 MSs)	1,582	3.5	0.2	<0.1	0.1	3.4
Norway	17	0	0	0	0	0
Iceland	3	0	0	0	0	0

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

Figure SA16. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive breeding flocks of turkeys (all age groups) and targets for Member States, Iceland and Norway, 2011



Note: In 2011, 14 MSs and two non-MSs met the target, indicated with a '+'.
 No data were supplied by Bulgaria in 2010. Iceland reported data for the first time in 2011.

Figure SA17. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive breeding flocks of turkeys during the production period,¹ 2011



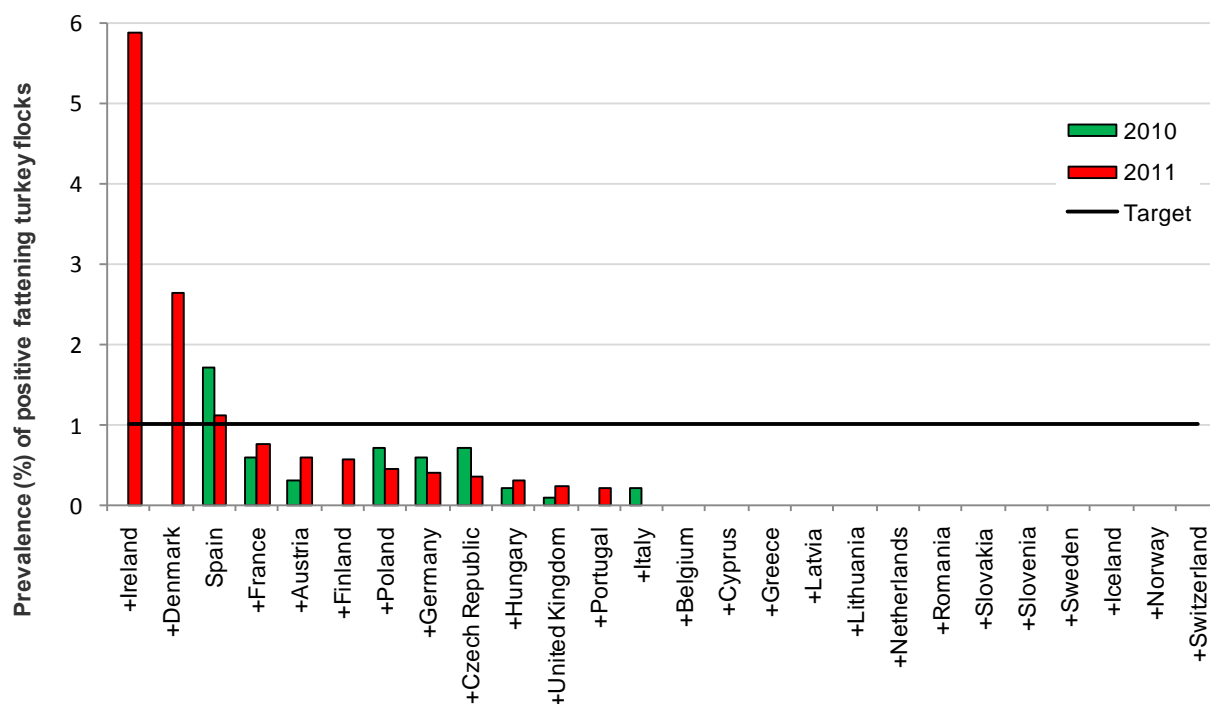
- No breeding flocks of turkeys in Austria, Belgium, Cyprus, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania and Slovenia. These MSs are marked with 'No data (MS)'. No breeding flocks of turkeys in Switzerland. This country is marked with 'No data (non-MS)'.

Table SA13. Salmonella in fattening flocks of turkeys before slaughter (flock-based data) in countries running control programmes, 2011

Country	N	% positive				
		pos (all)	S. Enteritidis and/or S. Typhimurium ¹	S. Enteritidis	S. Typhimurium ¹	Other serovars, non-typeable, and unspecified
Austria	340	5.9	0.6	0.6	0	5.3
Belgium	167	0	0	0	0	0
Cyprus	11	9.1	0	0	0	9.1
Czech Republic	292	14.4	0.3	0.3	0	14.0
Denmark	38	2.6	2.6	0	2.6	0
Finland	352	0.6	0.6	0	0.6	0
France	8,046	7.1	0.8	0.2	0.6	6.3
Germany	2,723	1.0	0.4	0	0.4	0.6
Greece	53	17.0	0	0	0	17.0
Hungary	2,702	37.3	0.3	0.1	0.2	37.0
Ireland	17	17.6	5.9	0	5.9	11.8
Italy	1,816	7.7	0	0	0	7.7
Latvia	2	0	0	0	0	0
Lithuania	24	0	0	0	0	0
Netherlands	173	3.5	0	0	0	3.5
Poland	4,648	3.2	0.5	0.2	0.3	2.7
Portugal	504	2.0	0.2	0.2	0	1.8
Romania	40	37.5	0	0	0	37.5
Slovakia	52	0	0	0	0	0
Slovenia	122	3.3	0	0	0	3.3
Spain	1,604	15.1	1.1	0	1.1	14.0
Sweden	174	0	0	0	0	0
United Kingdom	3,078	15.7	0.2	0	0.2	15.5
EU Total	26,978	10.1	0.5	0.1	0.4	9.6
Iceland	22	0	0	0	0	0
Norway	208	0.5	0	0	0	0.5
Switzerland	42	2.4	0	0	0	2.4

1. S. Typhimurium includes monophasic S. Typhimurium.

Figure SA18. Prevalence of *S. Enteritidis* and/or *S. Typhimurium*-positive fattening flocks of turkeys and targets for Member States, Iceland, Norway and Switzerland, 2011



Note: In 2011, 22 MSs and three non-MSs met the target, indicated with a '+'. Ireland and Denmark met the target as they tested less than 100 flocks (17 and 38 flocks, respectively) and detected only one flock positive for the target serovars. No data were supplied by Cyprus in 2010. Iceland reported data for the first time in 2011.

Figure SA19. Prevalence *S. Enteritidis* and/or *S. Typhimurium*-positive fattening flocks of turkeys during the production period, 2011



Other animal species

Salmonella was also detected in ducks (three MSs), geese (one MS), other poultry species (four MSs), pigs (12 MSs and two non-MSs), cattle (seven MSs and one non-MS), sheep and goats (three MSs) and other animals (five MSs).

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

3.1.4. *Salmonella* in feedingstuffs

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

Table SA14 presents the EU proportion of *Salmonella*-positive samples in animal- and vegetable-derived feed material reported by MSs in 2011. In feed material derived from land animals results have been described according to origin. In feed material from fish meal, *Salmonella* was detected in 1.5 % batches tested, which is less than in 2010, when overall 9.1 % positive samples were reported. The highest level of *Salmonella* contamination (4.0 %) was reported for feed other than meat and bone meal, or dairy products, while the lowest contamination (0 % in single samples and 0.2 % in batches) was detected in feed material of dairy origin. In meat and bone meal *Salmonella* was found in 1.0 % in single samples and 3.4 % in batches. This feed contamination is to be considered only an indicator, and it does not pose any risk to animals because meat and bone meal is still prohibited for feeding food-producing animals. In cereals, 1.3 % of batch samples were positive for *Salmonella*. As for oil seeds and products thereof, 1.7 % of batches and 2.7 % of single units were reported to be contaminated with *Salmonella*.

In compound feedingstuffs, the finished feed for animals, the proportion of *Salmonella*-positive findings in 2011 ranged among the reporting MSs from no positive findings to 2.3 % in cattle feed when single samples were tested, and was 0.3 % in one MS sampling cattle feed at batch level. In compound pig feed *Salmonella* findings ranged from no positive findings to 1.2 % in single samples, and from no positive findings to 1.9 % at batch level. In poultry compound feed no *Salmonella* contamination was detected in single samples, whereas the proportion varied from 0.2 % findings to 1.7 % in batch sampling in three MSs (Table SA15).

As in the previous years, the Netherlands reported large numbers of units tested at batch level for all three categories of compound feedingstuffs and very low proportions of contamination were reported for feed for pigs and poultry (0.2 %) and for cattle (0.3 %).

Among the reporting MSs, Hungary accounted for the highest proportion of *Salmonella*-contaminated compound feedingstuff for cattle (2.3 %) and pigs (1.2 %) at the single sample level. Belgium reported the highest contamination of pig feed and poultry feed batches, 1.9 % and 1.7 %, respectively.

It should be highlighted that the reported proportions of positive samples might not always be representative of feedingstuffs on the national markets, as reports might reflect intensive sampling of high-risk products.

There were few reports on the occurrence of *S. Enteritidis* and *S. Typhimurium* in feedingstuffs. *S. Enteritidis* was detected in compound feedingstuffs for poultry (six isolations from the final product for laying hens), feed material of cereal origin (one isolation from wheat), in feed material of oil seed (18 isolations from soya bean), in compound feedingstuffs for pigs (two isolations) and in pet food - dog snacks (two isolations from pig ears, chewing bones). *S. Typhimurium* was detected in feedingstuffs for cattle - final product (one isolation); in compound feedingstuffs for pigs - final product (15 isolations); in pet food - dog snacks (12 isolations from pig ears, chewing bones); in feed material of land animal origin (one isolation from blood meal) and in feed material of oil seed or fruit origin (one isolation from rape seed). Monophasic *S. Typhimurium* was reported in one sample of pet food - dog snacks (pig ears, chewing bones).

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

Table SA14. Salmonella in animal and vegetable derived feed material, 2011

EU Totals		2011		
		Sample unit	N	% pos
Fish meal		Batch	201	1.5
		Single	68	0
Feed material of land animal origin	Meat and bone meal	Batch	1,276	3.4
		Single	9,554	1.0
	Dairy product	Batch	600	0.2
		Single	36	0
	Other ¹	Batch	1,357	0.2
		Single	551	4.0
	Cereals	Batch	1,746	1.3
		Single	2,876	0
Oil seeds and products		Batch	9,312	1.7
		Single	3,644	2.7

Note: Data presented include only investigations with sample size ≥ 25 .

1. Includes: animal fat, blood meal, blood products, feather meal, greaves, offals.

Table SA15. Salmonella in compound feedingstuffs, 2011

Feedingstuff	2011		
	Sample unit	N	% pos
Cattle feed			
Finland	Single	156	0
Germany	Single	406	0.5
Hungary	Single	44	2.3
Ireland	Single	65	0
Netherlands	Batch	1,770	0.3
Portugal	Single	63	0
Total cattle feed (6 MSs)	Single	734	0.4
	Batch	1,770	0.3
Pig feed			
Belgium	Batch	105	1.9
Finland	Single	101	0
France	Single	86	0
Germany	Single	741	0.9
Hungary	Single	166	1.2
Latvia	Batch	50	0
Netherlands	Batch	2,531	0.2
Portugal	Single	61	0
Spain	Batch	26	0
Total pig feed (9 MSs)	Single	1,155	0.8
	Batch	2,712	0.3
Poultry feed			
Belgium	Batch	354	1.7
Hungary	Single	119	0
Latvia	Batch	140	0.7
Netherlands	Batch	3,829	0.2
Portugal	Single	35	0
Total poultry feed (5 MSs)	Single	154	0
	Batch	4,323	0.3

Note: Data presented include only investigations with sample size ≥ 25 . They include results from final products, at process control and unspecified.

3.1.5. Evaluation of the impact of *Salmonella* control programmes in poultry

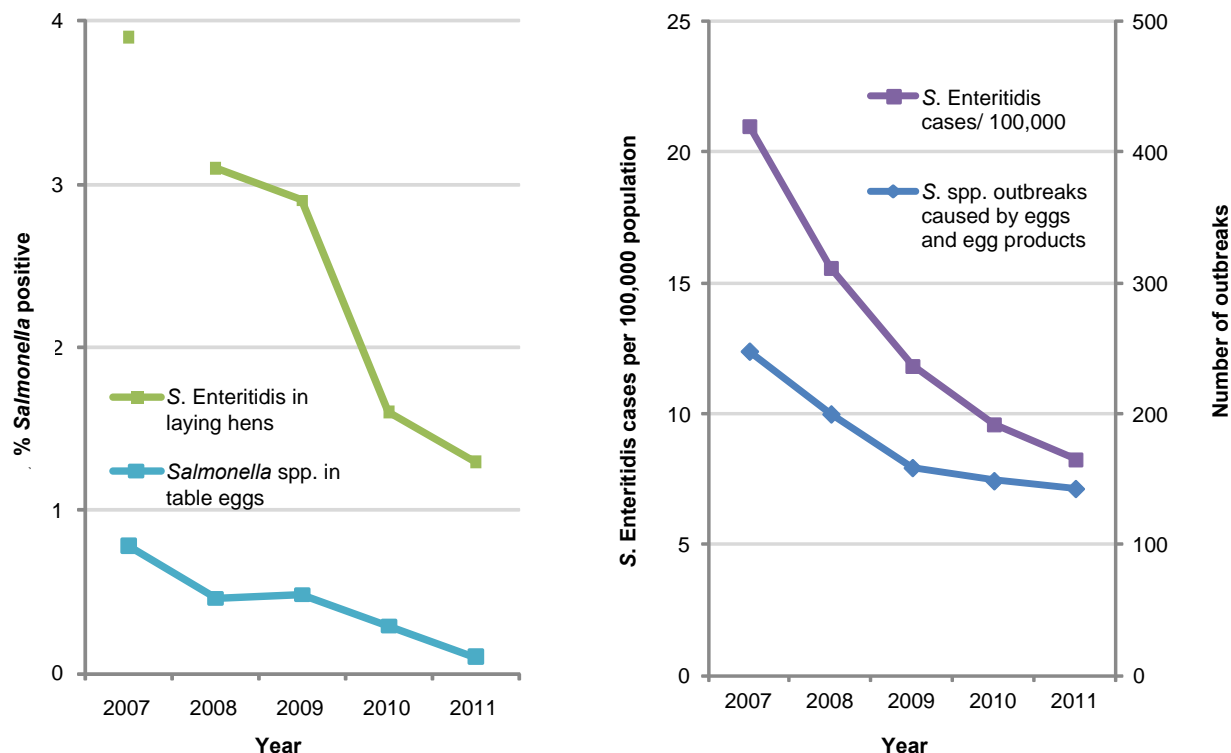
The legal obligations for the MSs to implement *Salmonella* control programmes and their results are presented earlier in this report in Chapter 3.1.3.

Eggs have been considered to be the most important source of human salmonellosis cases in the EU, particularly of those caused by *S. Enteritidis*, which is the most frequently occurring serovar in the EU and in most MSs. Therefore, in order to evaluate the impact of these control programmes on public health, the incidence of human salmonellosis cases caused by *S. Enteritidis*, the numbers of *Salmonella* food-borne outbreaks caused by eggs and egg products and the prevalence of *S. Enteritidis* in laying hen flocks were examined. It should be noted that the *Salmonella* control programmes now in place in MSs are intended to have an impact on the whole food chain from farm-to-fork and that a reduction in *Salmonella* at the farm level is expected to reduce the risk of salmonellosis in humans. Still, other control measures along the food chain, during slaughter, processing, distribution, retail and food preparation, are also important in reducing the risk.

At the EU level, the proportion of *S. Enteritidis*-infected laying hen flocks during the production period decreased steadily from 3.9 % in 2007 (19 reporting MSs) to 1.3 % in 2011 (27 reporting MSs). During the same period the proportion of *Salmonella* spp.-positive table eggs decreased from 0.8 % in 2007 (16 reporting MSs) to 0.1 % in 2011 (13 reporting MSs) (Figure SA20). In the same period, a 60.5 % drop in the notification rate of human *S. Enteritidis* cases per 100,000 population was observed (from 21.0 to 8.3). A corresponding 42.3 % reduction in the number of *Salmonella* spp. food-borne outbreaks caused by eggs and egg products was reported in the EU from 2007 to 2011 (a decrease from 248 to 143 outbreaks) (Figure SA20). The decline in the occurrence of *S. Enteritidis* continued in 2011 both in laying hens and their eggs and in the human cases.

The results above indicate that the reduction of *S. Enteritidis* in laying hen flocks and of *Salmonella* spp. in table eggs is likely to have contributed to the decline of *S. Enteritidis* cases in humans.

Figure SA20. *Salmonella* in human cases, eggs and laying hens and the number of *Salmonella* outbreaks caused by eggs within the EU, 2007–2011



Note: Data for table eggs are only presented for sample size ≥ 25 . For laying hens only data from sampling during the production period were included. The mandatory *Salmonella* control programme for flocks of laying hens has been implemented since 2008. The discontinued trend line for *S. Enteritidis* in laying hens indicates that monitoring data from 2007 were underpinned by non-harmonized sampling schemes.

3.1.6. *Salmonella* serovars

As in previous years, in 2011 the information available on the distribution of *Salmonella* serovars along the food chain varied greatly between countries. In all MSs, the serotyping of *Salmonella* isolates from food, animals and feed is carried out according to the White–Kauffmann–Le Minor scheme, but in some MSs only a proportion of isolates are fully serotyped and are just reported to species or group level after initial screening to identify possible target serovars.

In the following paragraphs, data relating to the 10 most frequently reported serovars among isolates from humans, food and animal species are presented.

Serovars in humans

Information on *Salmonella* serovars in humans was available from 25 MSs (Bulgaria and Poland reported no case-based serovar data). The distribution of the 10 most common serovars in humans in the EU is shown in Table SA16 and in Figure SA21. The reporting of monophasic *S. Typhimurium* 1,4,[5],12:i:- was harmonised in 2010 when six countries started to report cases according to the new agreed serovar code. In 2011, 10 countries reported this type, placing the monophasic *S. Typhimurium* 1,4,[5],12:i:- as the top third serovar in the EU.

As in previous years, the two most commonly reported *Salmonella* serovars in 2011 were *S. Enteritidis* and *S. Typhimurium*, representing 44.4 % and 24.9 %, respectively, of all reported serovars in human-confirmed cases (N = 77,421) (Table SA16). The decrease in *S. Enteritidis* continued with 2,081 fewer cases (5.7 %) reported in the EU in 2011 than in 2010. Cases of *S. Typhimurium* remained constant between 2010 and 2011 or even increased by 1.2 % if the monophasic *S. Typhimurium* were added to the group.

Salmonella Infantis has been the third most common serovar in the EU since 2006, with the relative proportion steadily increasing from 1.0 % in 2006 to 2.2 % in 2010, surpassed, however, by monophasic *S. Typhimurium* in 2011. Cases of both *S. Kentucky* and *S. Virchow* decreased by around 30 % from 2010 to 2011. New on the top 10 serovar list was *S. Poona* with 548 cases reported in 2011 (Table SA16). A large proportion of these cases were from an outbreak of *S. Poona* in infants in Spain due to contaminated milk formula.²¹

21 Centre National de Epidemiologia. Brote supracomunitario de gastroenteritis por *Salmonella* Poona en 2010–2011. Boletín epidemiológico semanal, 19, jan. 2012. Disponible en: <http://revista.isciii.es/index.php/bes/article/view/339/362>.

Figure SA21. Distribution of the 10 most common Salmonella serovars in humans in the EU, 2011

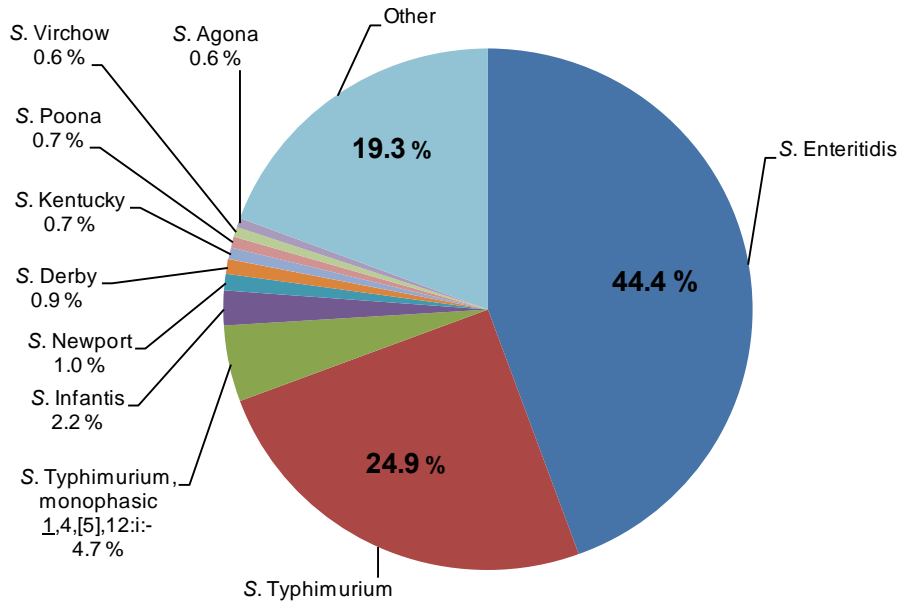


Table SA16. Distribution of reported confirmed cases of human salmonellosis by serovar (10 most frequent serovars) in the EU, 2010–2011

2011			2010		
Serovars	N	%	Serovars	N	%
S. Enteritidis	34,385	44.4	S. Enteritidis	36,466	44.2
S. Typhimurium	19,250	24.9	S. Typhimurium	21,223	25.7
S. Typhimurium, monophasic 1,4,[5],12:i:-	3,666	4.7	S. Infantis	1,793	2.2
S. Infantis	1,676	2.2	S. Typhimurium, monophasic 1,4,[5],12:i:-	1,426	1.7
S. Newport	771	1.0	S. Newport	839	1.0
S. Derby	704	0.9	S. Kentucky	783	0.9
S. Kentucky	559	0.7	S. Virchow	689	0.8
S. Poona	548	0.7	S. Derby	665	0.8
S. Virchow	467	0.6	S. Mbandaka	471	0.6
S. Agona	459	0.6	S. Agona	445	0.5
Other	14,936	19.3	Other	17,657	21.4
Total	77,421	100	Total	82,457	100

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

Trend analysis was performed on the top four serovars in humans in 2011, plus the two additional serovars included in the *Salmonella* reduction targets for breeding flocks of *Gallus gallus*. Significant decreasing trends were observed for *S. Enteritidis*, *S. Typhimurium*, *S. Virchow* and *S. Hadar* during 2008–2011 (Figure SA22); however, most of the decrease in *S. Typhimurium* in 2010 and 2011 could be explained by the introduction of a separate code in TESSy for reporting of monophasic *S. Typhimurium* 1,4,[5],12:i:- in 2010 (Figure SA23). A significant increasing trend was observed for *S. Infantis*. No trend was observed for *S. Newport*.

Six countries started to use the separate code for reporting cases of *S. Typhimurium* 1,4,[5],12:i:- in 2010 and 10 countries in 2011. In the four countries that reported over the whole two-year period, an increase in cases of 83.0 % was observed in 2011 compared to 2010. This was primarily due to two large outbreaks in France with 682 and 337 cases, respectively, which can be seen in the peaks in August–September and November–December in 2011 (Figure SA23). The first outbreak was of unknown source and the second linked to consumption of dried pork sausages.²²

Figure SA22. Trend in reported confirmed cases of human salmonellosis in the EU by selected serovars, 2008–2011

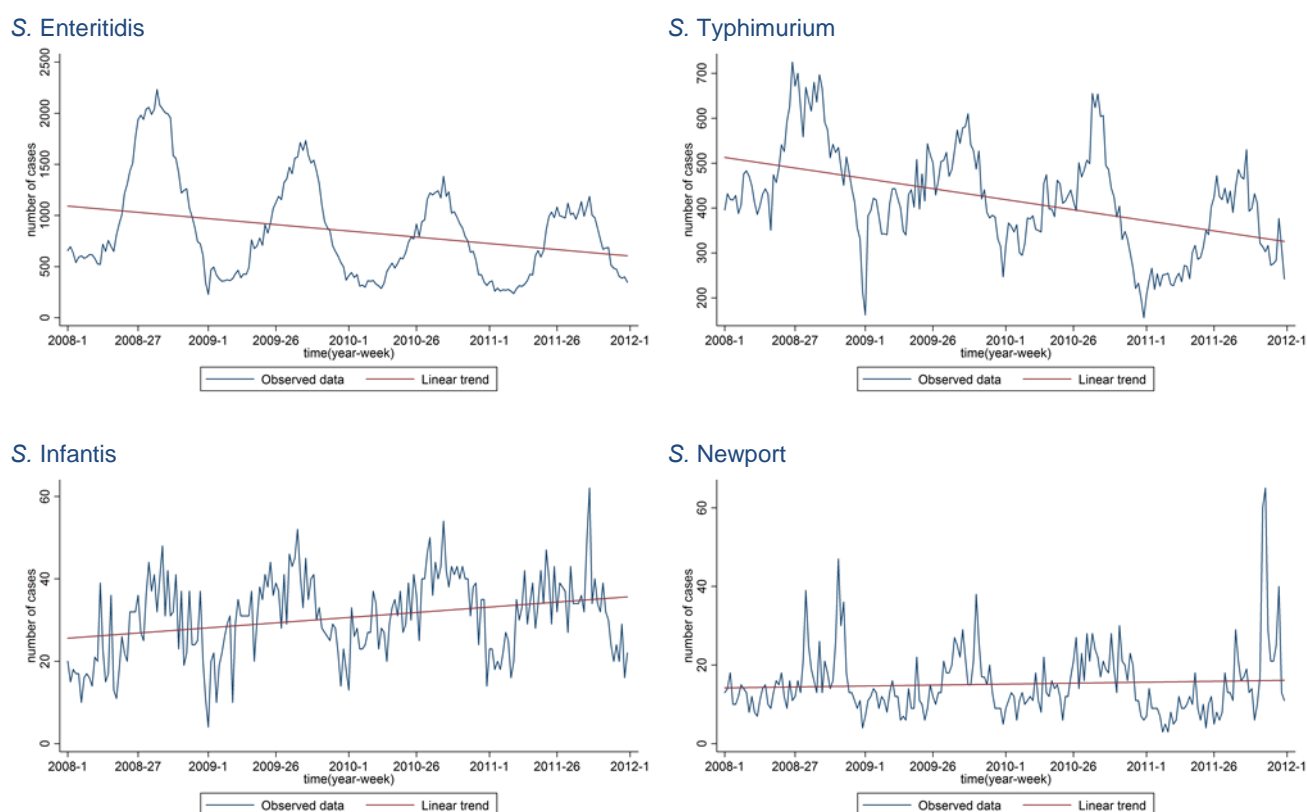
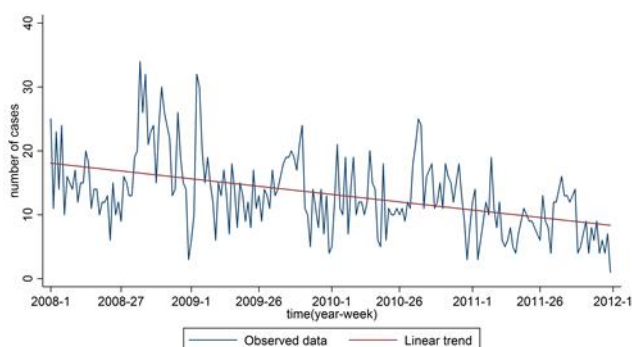


Figure continued overleaf.

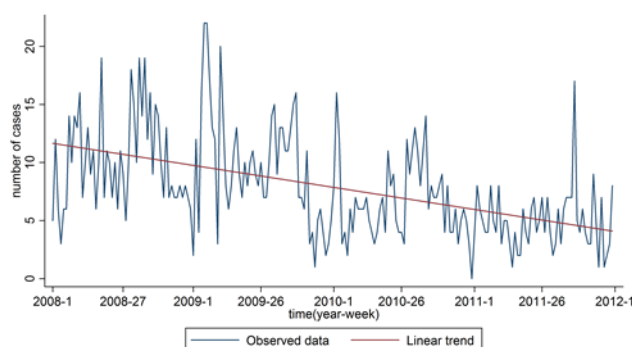
22 Gossner C M, van Cauteren D, Le Hello S, Weill F X, Terrien E, Tessier S, Janin C, Brisabois A, Dusch V, Vaillant V and Jourdan-da Silva N. Nationwide outbreak of *Salmonella enterica* serotype 4,[5],12:i:- infection associated with consumption of dried pork sausage, France, November to December 2011. Euro Surveillance 2012;17(5):pii=20071. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20071>

Figure SA22 (continued). Trend in reported confirmed cases of human salmonellosis in the EU by selected serovars, 2008–2011

S. Virchow

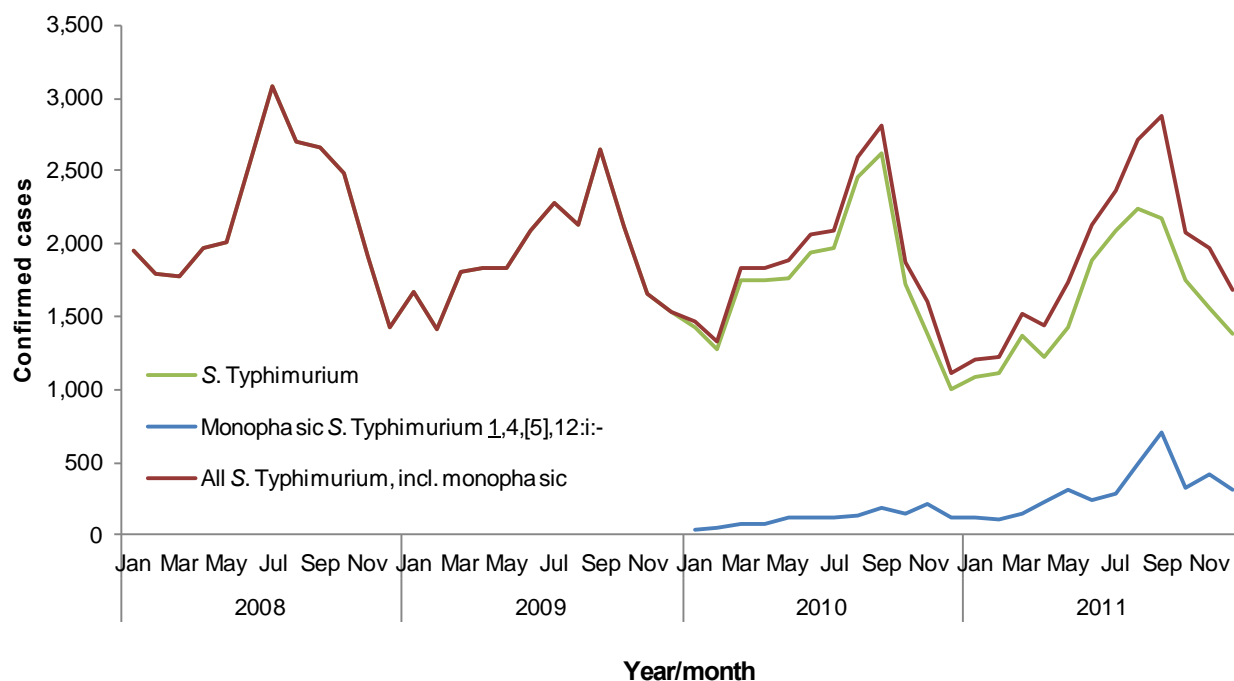


S. Hadar



Source: TESSy data from 25 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria and Poland excluded as they reported only monthly data.

Figure SA23. Number of reported confirmed cases of human salmonellosis by month for *S. Typhimurium*, monophasic *S. Typhimurium* and all *S. Typhimurium* including monophasic variant, 2008–2011



Source: TESSy data from 25 MSs (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom). Bulgaria and Poland excluded as they reported in an aggregated format.

Serovars in animals and food

For food and animals, information on serovar distribution is presented for the main food-producing animal species (poultry (*Gallus gallus*), pigs and bovines) and food thereof over the period 2004–2011. As the reported serovars often originate from different sampling schemes, and as there are differences between the MSs in the way in which reports are made and the numbers of serovars reported, the tables and graphs presented are to be regarded only as indicative. However, as most MSs have not changed fundamentally their way of reporting over the years, the changes in the top 10 serovars reported at EU level may provide interesting information on the trends in the occurrence of these serovars in food and animal populations.

S. Infantis and *S. Enteritidis* were by far the most frequently reported serovars from poultry (*Gallus gallus*), and eggs and meat from *Gallus gallus* in the EU over the period 2004–2011 (Table SA17 and Figure SA24). In the last three-year period *S. Infantis* was more commonly reported, and in 2011 it was the most frequently reported serovar. The numbers of *S. Enteritidis* isolations have been declining over the years. Both these results are in line with the trends observed in the human cases in the same years. Monophasic *S. Typhimurium* was detected in poultry and meat from broilers, but it has never been reported among the *Salmonella* isolates from eggs over the period 2004–2011.

In pigs and meat from pigs *S. Typhimurium* was by far the most frequently reported serovar over the period 2004–2011 (Table SA18 and Figure SA25). During the last two reporting years monophasic *S. Typhimurium* either become more prevalent or was reported separately from *S. Typhimurium*. In 2011 it was the third most frequently reported serovar in pigs and meat from pigs.

In bovine animals and meat from bovine *S. Typhimurium* and *S. Dublin* were the two most reported serovars over the period 2004–2011 (Table SA19 and Figure SA26). Monophasic *S. Typhimurium* was also detected in bovine animals and bovine meat and was, in 2011, the eighth most frequently reported serovar.

For detailed data on serovars in foodstuffs, animals, and feedingstuffs, refer to the Level 3 Tables.

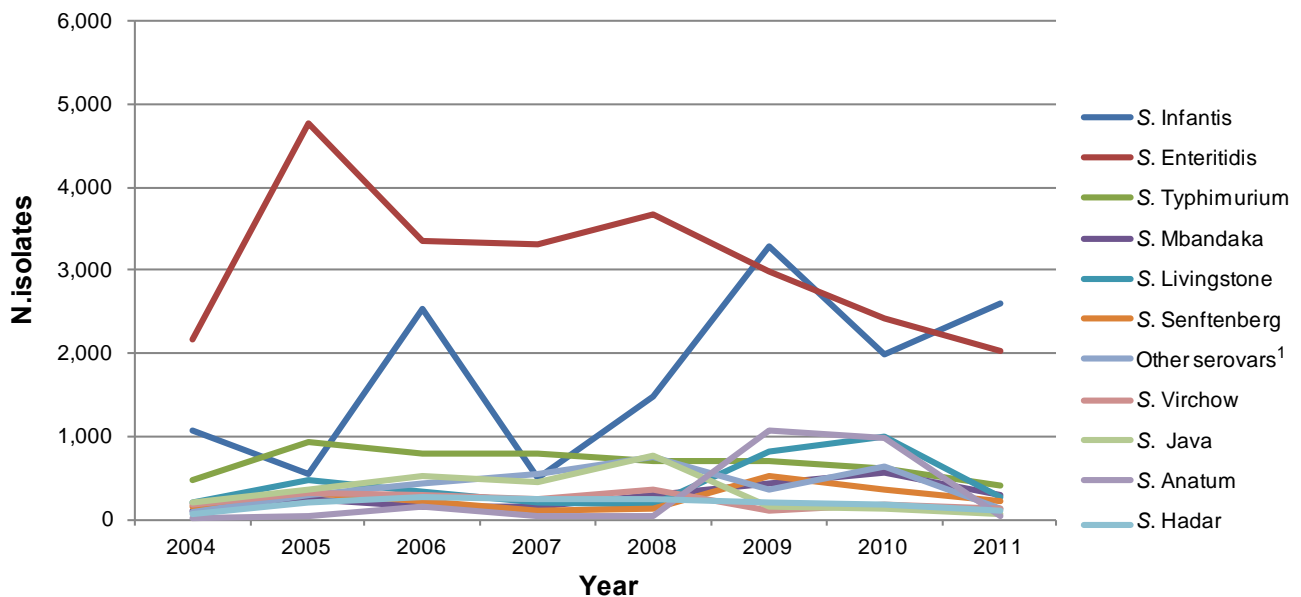
Table SA17. Distribution of number of *Salmonella* isolates from *Gallus gallus*, meat from *Gallus gallus* and eggs, by serovar (10 most frequent serovars) in the EU and non-MSs, 2004–2011

<i>Salmonella</i> Serovars	2004	2005	2006	2007	2008	2009	2010	2011	Total
<i>S. Infantis</i>	1,069	536	2,526	490	1,469	3,273	1,980	2,589	13,932
<i>S. Enteritidis</i>	2,160	4,768	3,360	3,297	3,666	2,986	2,422	2,031	24,690
<i>S. Typhimurium</i>	482	938	795	803	689	702	616	408	5,433
<i>S. Mbandaka</i>	106	234	144	142	281	417	566	295	2,185
<i>S. Livingstone</i>	192	482	337	195	183	819	991	275	3,474
<i>S. Senftenberg</i>	143	322	229	105	125	507	363	216	2,010
Other serovars ¹	74	283	434	547	740	364	627	132	3,201
<i>S. Virchow</i>	168	318	289	253	362	110	175	128	1,803
<i>S. Java</i>	188	365	507	443	766	145	134	64	2,612
<i>S. Anatum</i>	13	41	142	31	31	1,064	986	28	2,336
<i>S. Hadar</i>	53	186	276	252	249	208	183	117	1,524
Total number MSs	18	17	22	22	22	21	23	24	
Total number non-MSs	-	-	2	1	-	1	1	1	

Note: The table is ranked according to the number reported *Salmonella* serovar isolates in 2011.

1. 'Other *Salmonella* serovars' were reported as 'other *Salmonella* serotypes' from 2004 to 2009.

Figure SA24. Number of *Salmonella* isolates from *Gallus gallus*, meat from *Gallus gallus* and eggs, by serovar (10 most frequent serovars) in the EU and non-MSs, 2004–2011



Note: The legend is ranked according to the number reported *Salmonella* serovar isolates in 2011.

1. 'Other *Salmonella* serovars' were reported as 'other *Salmonella* serotypes' from 2004 to 2009.

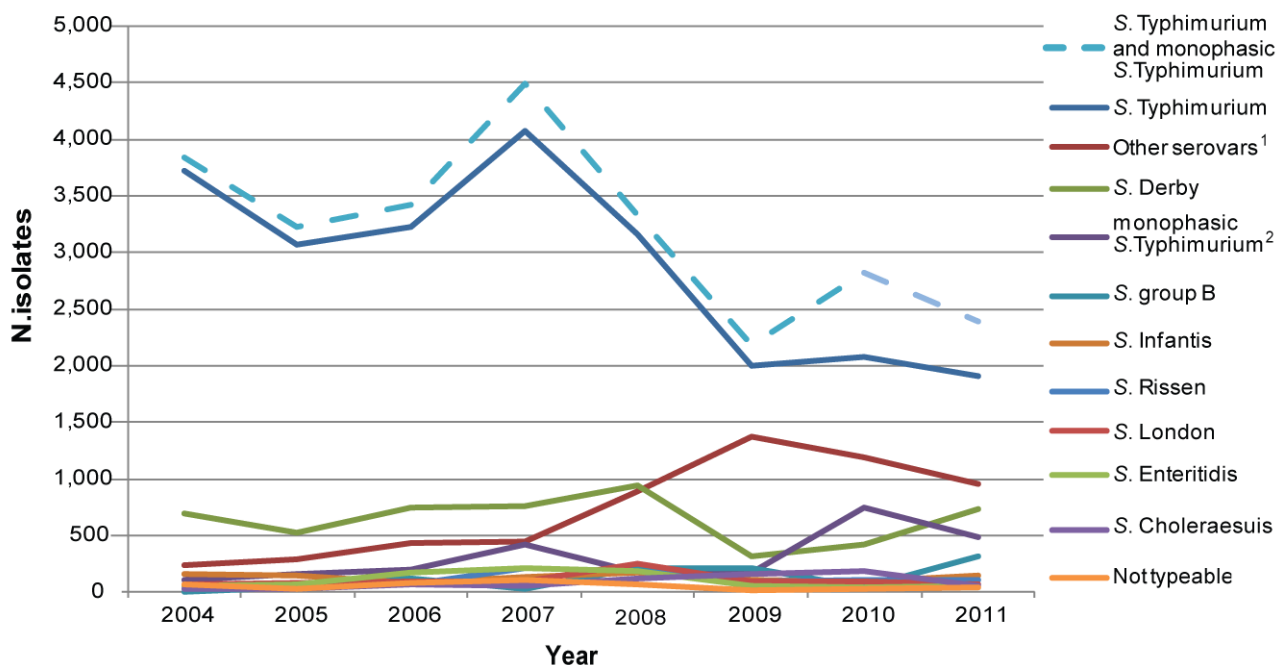
Table SA18. Distribution of number of *Salmonella* isolates from pigs and pig meat, by serovar (10 most frequent serovars) in the EU and non-MSs, 2004–2011

<i>Salmonella</i> Serovars	2004	2005	2006	2007	2008	2009	2010	2011	Total
S. Typhimurium	3,726	3,069	3,220	4,068	3,156	2,002	2,077	1,907	23,225
Other serovars ¹	242	290	440	451	896	1,371	1,188	960	5,838
S. Derby	691	525	741	760	947	320	417	734	5,135
monophasic S.Typhimurium ²	107	157	198	420	175	179	748	489	2,473
S. group B	1	40	118	32	210	214	39	318	972
S. Infantis	166	151	85	135	168	109	97	148	1,059
S. Rissen	58	46	69	207	181	97	107	105	870
S. London	69	86	94	97	253	94	90	69	852
S. Enteritidis	53	71	176	210	184	58	41	61	854
S. Choleraesuis	32	35	63	51	119	162	181	53	696
Not typeable	71	25	76	114	69	15	31	42	443
Total number MSs	16	18	21	22	21	20	20	23	
Total number non-MSs	0	0	2	1	0	0	1	1	

Note: The table is ranked according to the number reported *Salmonella* serovar isolates in 2011.

1. 'Other *Salmonella* serovars' were reported as 'other *Salmonella* serotypes' from 2004 to 2009. In 2009 'other serovars' includes '*Salmonella* spp.' reported data.
2. Monophasic S.Typhimurium includes S. 1,4,[5],12:i:-, S. 1,4,5,12:i:-, S. 4,12:i:-, S. 4,12:i:-, S. 1,4,12:i:-, S. 4,5,12:i:-.

Figure SA25. Number of *Salmonella* isolates from pigs and pig meat, by serovar (10 most frequent serovars) in the EU and non-MSs, 2004–2011.



Note: The legend is ranked according to the number reported *Salmonella* serovar isolates in 2011.

1. 'Other *Salmonella* serovars' were reported as 'other *Salmonella* serotypes' from 2004 to 2009. In 2009 'other serovars' includes '*Salmonella* spp.' reported data.
2. Monophasic S.Typhimurium includes S. 1,4,[5],12:i:-, S. 1,4,5,12:i:-, S. 4,12:i:-, S. 4,12:i:-, S. 1,4,12:i:-, S. 4,5,12:i:-.

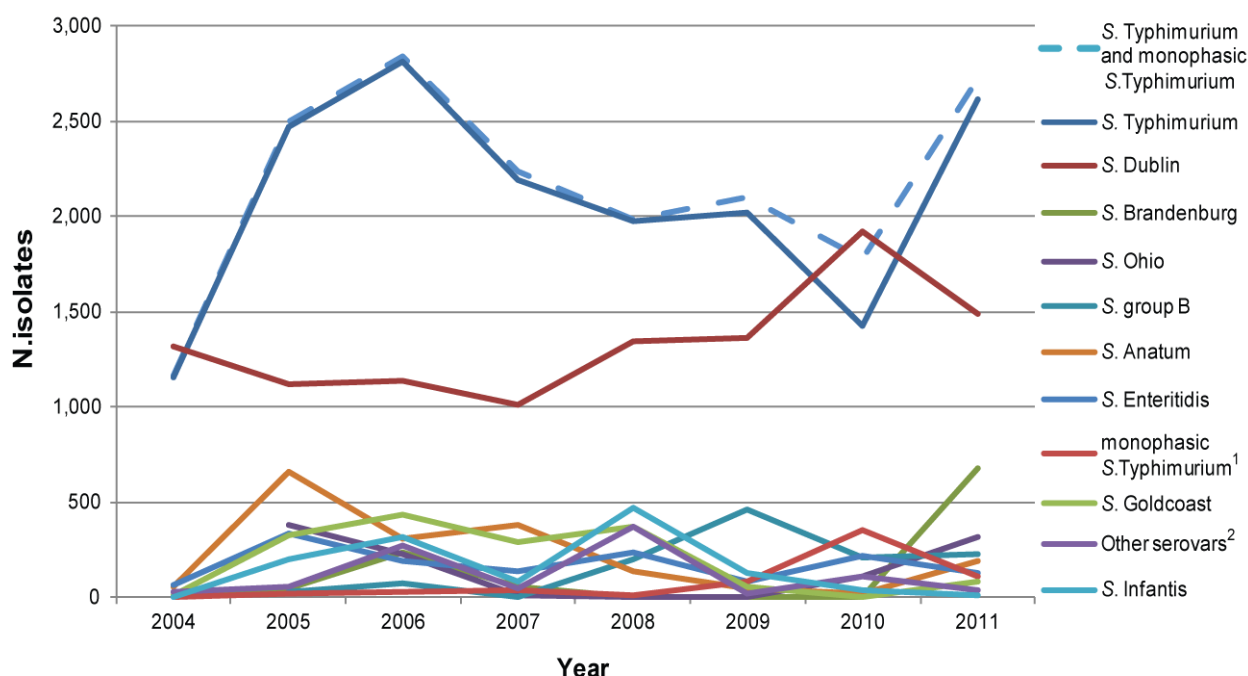
Table SA19. Distribution of number of *Salmonella* isolates from bovine animals and bovine meat, by serovar (10 most frequent serovars) in the EU and non-MSs, 2004–2011

<i>Salmonella</i> Serovars	2004	2005	2006	2007	2008	2009	2010	2011	Total
S. Typhimurium	1,160	2,474	2,812	2,190	1,973	2,021	1,423	2,612	16,665
S. Dublin	1,320	1,119	1,135	1,010	1,347	1,360	1,919	1,485	10,695
S. Brandenburg	5	51	235	54	4	3	1	675	1,028
S. Ohio	0	379	228	9	4	6	107	318	1,051
S. group B	0	28	79	0	204	462	214	232	1,219
S. Anatum	54	660	309	385	142	46	22	196	1,814
S. Enteritidis	70	332	192	139	241	80	222	128	1,404
monophasic S.Typhimurium ¹	4	23	28	43	8	85	354	108	653
S. Goldcoast	7	326	431	293	376	54	2	85	1,574
Other serovars ²	34	56	276	50	373	20	115	36	960
S. Infantis	5	202	317	83	473	126	40	14	1,260
Total number MSs	17	16	20	20	20	18	18	21	
Total number non-MSs	0	0	2	1	1	1	1	1	

Note: The table is ranked according to the number reported *Salmonella* serovar isolates in 2011.

1. Monophasic S.Typhimurium includes S. 1,4,[5],12:i:-, S. 1,4,5,12:i:-, S. 4,12:i:-, S. 4,12:i:-, S. 1,4,12:i:-, S. 4,5,12:i:-.
2. 'Other *Salmonella* serovars' were reported as 'other *Salmonella* serotypes' from 2004 to 2009.

Figure SA26. Number of *Salmonella* isolates from bovine animals and bovine meat, by serovar (10 most frequent serovars) in the EU and non-MSs, 2004–2011.



Note: The legend is ranked according to the number reported *Salmonella* serovar isolates in 2011.

1. Monophasic S.Typhimurium includes S. 1,4,[5],12:i:-, S. 1,4,5,12:i:-, S. 4,12:i:-, S. 4,12:i:-, S. 1,4,12:i:-, S. 4,5,12:i:-.
2. 'Other *Salmonella* serovars' were reported as 'other *Salmonella* serotypes' from 2004 to 2009.

3.1.7. Discussion

Although salmonellosis in humans was still the second most commonly reported zoonotic disease, a significant decrease has been observed in recent years, representing a decrease of 58,000 cases (38 %) in 2011 when compared to the case numbers reported in 2007.

The reduction in salmonellosis was most evident among cases of *S. Enteritidis*. The decrease observed in *S. Typhimurium* could to a large extent be explained by the introduction of a separate code for the reporting of monophasic *S. Typhimurium*. Of the top five serovars in humans and the additional two covered in the *Salmonella* reduction targets for breeding flocks of *Gallus gallus*, *S. Infantis* was the only serovar for which a significant increasing trend could be observed. This is in accordance with the finding in poultry (*Gallus gallus*) and eggs and meat from poultry, wherein *S. Infantis* was more commonly reported during the last three-year period. The number of cases in humans of monophasic *S. Typhimurium* 1,4,[5],12:i:- increased in 2011, moving it from the fourth to the third most commonly reported serovar in humans. This increase could be explained by more countries reporting the now harmonised serovar code and two large outbreaks of food-borne salmonellosis in France.

Slightly less than half of the confirmed salmonellosis cases were hospitalised, which was more than expected if it is taken into account that the symptoms often are relatively mild. Information on hospitalisation status was, however, provided for only a tenth of the cases, with a possible bias towards the information being provided for a larger proportion of hospitalised cases than for non-hospitalised cases. It was also noticeable that the countries reporting the lowest notification rate for salmonellosis had the highest proportion of hospitalisation. This may reflect the detection of only the most severe cases by the surveillance systems in these countries. It could potentially also reflect differences between countries on when and for which diseases hospital admission is recommended. A total of 56 deaths due to non-typhoidal salmonellosis were reported in the EU in 2011, resulting in an EU case-fatality rate of 0.12 %.

The continuing decrease in the numbers of salmonellosis cases in humans is likely mainly related to the successful *Salmonella* control programmes in poultry populations. The majority of MSs met their *Salmonella* reduction targets for breeding flocks, laying hens and broilers of *Gallus gallus* and for turkey flocks in 2011, and the prevalence of the target serovars, including *S. Enteritidis*, continued to decline at the EU level, although more slowly than in the previous year. All these results indicate that MSs have invested in *Salmonella* control and this work is yielding positive results.

These results are in line with the most recent source attribution estimation by the BIOHAZ Panel,²³ in which the contribution of laying hens and eggs to the human cases was estimated to be lower and that of pigs higher than in the previous source attribution studies by the Panel. In this most recent BIOHAZ study, the model estimated that around 56.8 % of the human salmonellosis cases could be attributable to pigs, while the contributions of total reservoirs associated with laying hens (eggs), broilers and turkeys were 17.0 %, 10.6 % and 2.6 %, respectively. However, when considering the risk related to the different sources weighted according to the tonnage of food available for consumption, the risk of infection is highest when consuming table eggs closely followed by pig meat, whereas the risks associated with broiler and turkey meat are similar and approximately two-fold lower.

The reported food-borne outbreaks caused by *Salmonella* within the EU have also decreased, and this decline was noticed in outbreaks caused by egg and egg products, bakery products, mixed food and different types of meats.

An interesting development in 2011 was that monophasic *S. Typhimurium* appeared in third place on the top ten list of the most commonly reported serovars in human cases. In 2011, monophasic *S. Typhimurium* was reported less frequently than in 2010, yet it fell within the top ten *Salmonella* serovars from pigs and pig meat and from bovine animals and bovine meat. Monophasic *S. Typhimurium* was detected in poultry and meat from broilers, but it has never been reported among the *Salmonella* isolates from eggs over the period 2004–2011. The BIOHAZ Panel concluded in its recent opinion²⁴ that monophasic *S. Typhimurium* appears to be

23 EFSA Panel on Biological Hazards (BIOHAZ), 2012. Scientific Opinion on an estimation of the public health impact of setting a new target for the reduction of *Salmonella* in turkeys. EFSA Journal, 10(4):2616, 89 pp.

24 EFSA Panel on Biological Hazards (BIOHAZ), 2010. Scientific Opinion on monitoring and assessment of the public health risk of 'Salmonella Typhimurium-like' strains. EFSA Journal, 8(10):1826, 48 pp.

of increasing importance in many MSs and has caused a substantial number of infections in both humans and animals bred for food. However, the recently agreed reporting guidelines for these strains may have partly contributed to these increased reports in 2011.

There were also some indications that the importance of *S. Infantis* was increasing in both human cases and in poultry populations. In poultry (*Gallus gallus*) and eggs and meat from poultry *S. Infantis* was the most commonly reported serovar in 2011.

As regards the findings in food, *Salmonella* was often detected in fresh broiler meat, less often in pig meat and rarely in table eggs. The highest levels of non-compliance with *Salmonella* criteria generally occurred once again in foods of meat origin. The findings of the occurrence of *Salmonella* in minced meat and meat preparations intended to be eaten raw are of particular relevance because of the risk such foods pose to human health.

3. INFORMATION ON SPECIFIC ZONOSSES AND ZONOTIC AGENTS

3.2. *Campylobacter*

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

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

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

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

Table CA1 presents the countries reporting data for 2011.

Table CA1. Overview of countries reporting data for *Campylobacter*, 2011

Data	Total number of reporting MSs	Countries
Human	25	All MSs except GR, PT Non-MSs: CH, IS, NO
Food	21	All MSs except BG, FI, FR, GR, LV, MT Non-MS: CH
Animal	19	All MSs except BE, BG, CY, FR, GR, HU, LT, MT Non-MSs: CH, IS, NO
Feed	1	MS: IT
Species ¹	23	All MSs except BG, FR, GR, MT Non-MSs: CH, IS, NO

1. Species includes the list of countries that reported the species level (for example *C. jejuni*, *C. coli*, etc.)

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

3.2.1. Campylobacteriosis in humans

In 2011, *Campylobacter* continued to be the most commonly reported gastrointestinal bacterial pathogen in humans in the EU since 2005. The number of reported confirmed cases of human campylobacteriosis in the EU in 2011 was 220,209, which was an increase of 2.2 % compared to 2010. The EU notification rate was 50.28 per 100,000 population in 2011 (Table CA2).

The EU trend in confirmed cases of campylobacteriosis showed a statistically significant ($p < 0.001$) increase in the last four years (2008–2011) (Figure CA1). There was a clear seasonal trend (Figure CA1). The highest country-specific notification rates were observed in the Czech Republic and Luxembourg (178 and 138 cases per 100,000 population, respectively). In individual MSs, statistically significant increasing trends in campylobacteriosis from 2008 to 2011 were observed in 13 MSs: Belgium, Cyprus, Denmark, Estonia, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta and the Netherlands. A significant decreasing trend was observed in only one country, Austria.

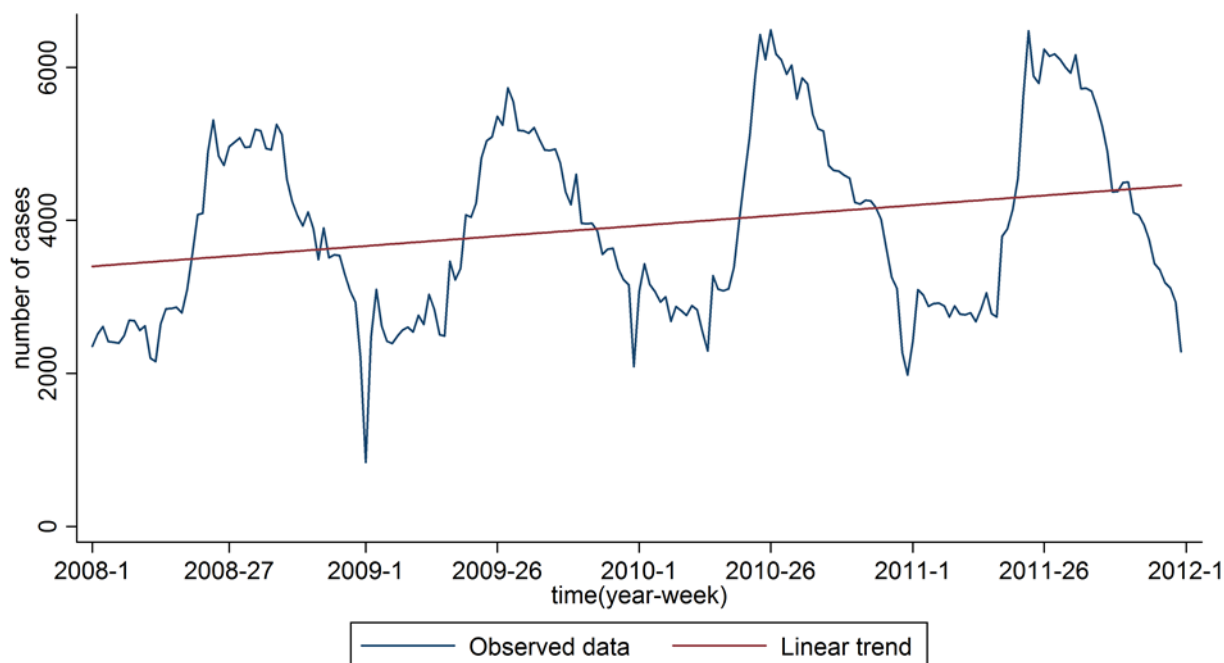
Data on hospitalisation rates for campylobacteriosis have been collected in the case-based reporting in TESSy since 2010. Information on hospitalisation was provided for only 7.7 % of the confirmed campylobacteriosis cases in 2011, reported by nine MSs (Figure CA2). Of these, on average 47.9 % of cases were hospitalised, ranging from 22 % to 60 % in different MSs, except the United Kingdom where 83.7 % of cases for which this information was provided (only 7.9 % of the United Kingdom cases) were hospitalised. In 2011, 43 deaths due to campylobacteriosis were reported by thirteen MSs, with the United Kingdom accounting for 34 of these. This results in an EU case fatality rate of 0.04 % among the 114,793 confirmed cases for which this information was provided (52.1 % of all reported cases).

Table CA2. Reported cases of human campylobacteriosis in 2007–2011 and notification rates for confirmed cases in the EU, 2011

Country	2011				2010	2009	2008	2007
	Report Type ¹	Cases	Confirmed Cases	Confirmed cases/100,000	Confirmed cases			
Austria	C	5,130 ²	1,345	16.00	4,404	1,516 ³	4,280	5,822
Belgium	C	7,716	7,716	70.46	6,047	5,697	5,111	5,895
Bulgaria	A	73	73	0.97	6	26	19	38
Cyprus	C	62	62	7.71	55	37	23	17
Czech Republic	C	18,811	18,743	177.95	21,075	20,259	20,067	24,137
Denmark	C	4,060	4,060	73.01	4,037	3,353	3,470	3,868
Estonia	C	214	214	15.97	197	170	154	114
Finland	C	4,262	4,262	79.29	3,944	4,050	4,453	4,107
France	C	5,538	5,538	8.51	4,324	3,956	3,424	3,058
Germany	C	71,307	70,812	86.62	65,110	62,787	64,731	66,107
Greece	- ⁵	-	-	-	-	-	-	-
Hungary	C	6,135	6,121	61.30	7,180	6,579	5,516	5,809
Ireland	C	2,435	2,433	54.30	1,660	1,810	1,752	1,885
Italy	C	468	468	0.77	457	531	265	676
Latvia	C	7	7	0.31	1	0	0	0
Lithuania	C	1,124	1,124	34.64	1,095	812	762	564
Luxembourg	C	704	704	137.54	600	523	439	345
Malta	C	220	220	52.68	204	132	77	91
Netherlands ⁴	C	4,408	4,408	50.89	4,322	3,782	3,341	3,462
Poland	C	354	354	0.93	367	359	270	192
Portugal	- ⁵	-	-	-	-	-	-	-
Romania	C	149	149	0.70	175	254	2	0
Slovakia	C	4,736	4,565	83.99	4,476	3,813	3,064	3,380
Slovenia	C	998	998	48.68	1,022	952	898	1,127
Spain ⁶	C	5,469	5,469	47.40	6,340	5,106	5,160	5,331
Sweden	C	8,214	8,214	87.24	8,001	7,178	7,692	7,106
United Kingdom	C	72,150	72,150	115.44	70,298	65,043	55,609	57,849
EU Total		224,744	220,209	50.28	215,397	198,725	190,579	200,980
Iceland	C	123	123	38.62	55	74	98	93
Norway	C	3,005	3,005	61.07	2,682	2,848	2,875	2,836
Switzerland ⁷	C	7,964	7,964	100.80	6,604	7,795	7,552	5,834

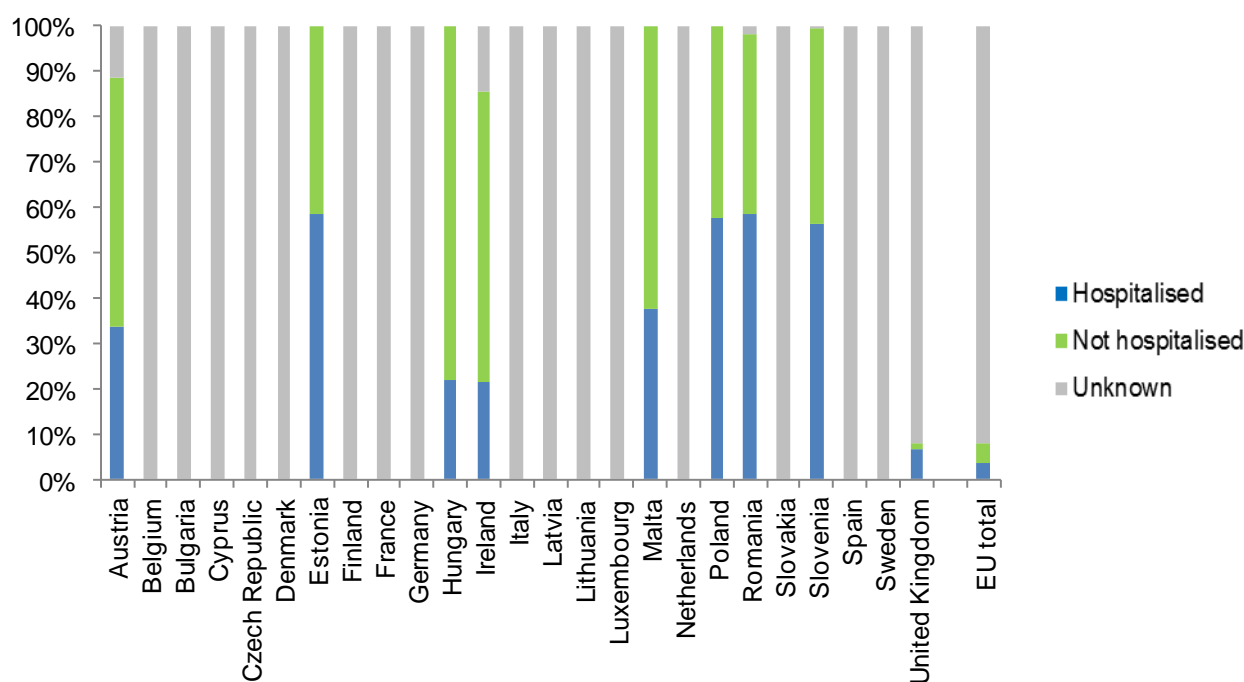
1. A: aggregated data report; C: case-based report; '-': no report.
2. Laboratory confirmed cases.
3. Only reference lab data.
4. Sentinel surveillance; notification rates calculated on estimated coverage 52 %.
5. Sentinel surveillance; notification rates calculated on estimated coverage 25 %.
6. No surveillance system.
7. Switzerland provided data directly to EFSA.

Figure CA1. Trend in reported confirmed cases of human campylobacteriosis in the EU, 2008-2011



Source: Data for EU trend 24 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria is excluded because only monthly data were reported.

Figure CA2. Proportion of reported confirmed cases of human campylobacteriosis hospitalised in the EU, 2011



3.2.2. *Campylobacter* in food

Twenty-one MSs and Switzerland reported data on *Campylobacter* in food in 2011 (Table CA1). The number of samples, within the food categories tested, ranged from a few to more than a thousand. Most of the MSs reported data on food of animal origin (Table CA3), primarily poultry meat, which is considered to be one of the major vehicles of *Campylobacter* infections in humans. In the following sections, only results based on 25 or more units tested are presented. Moreover, results from industry own-check programmes and HACCP sampling, as well as specified suspect sampling, selective sampling and outbreak investigations, have also been excluded owing to difficulties in the interpretation of the data. These data are presented in the Level 3 Tables.

Table CA3. Overview of countries reporting data on foodstuffs, 2011

Data	Total number of reporting MSs	Countries
Poultry meat ¹	19	MSs: AT, BE, DE, DK, EE, ES, HU, IE, IT, LT, LU, NL, PL, PT, RO, SK, SI, SE, UK Non-MS: CH
Pig meat	16	MSs: AT, BE, CZ, DE, ES, HU, IE, IT, LT, LU, NL, PL, PT, RO, SE, SK
Bovine meat	14	MSs: AT, BE, CZ, DE, ES, HU, IE, IT, LU, NL, PL, PT, SE, SK
Other types of meat ²	13	MSs: AT, BE, CY, DE, ES, IE, IT, LT, LU, NL, PL, PT, SE
Milk and dairy products	9	MSs: AT, BE, DE, HU, IE, IT, NL, SE, SK
Other food ³	11	MSs: AT, BE, CZ, DE, DK, ES, IE, IT, LT, SE, SK

Note: The overview table includes all data reported by MSs. In the following sections, data reported as HACCP and industry own-check programmes are not included in the detailed tables, and, unless stated otherwise, suspect sampling, selective sampling, and outbreak investigations are also excluded. Also, only countries reporting 25 samples or more have been included in the analysis.

1. Poultry meat includes broiler meat, turkey meat, and meat from ducks, geese, other poultry or unspecified poultry.
2. Other types of meat includes meat from horse, rabbit, sheep, mixed meat (including "meat from bovine animals and pigs"), red meat (meat from bovines, pigs, goats, sheep, horses, donkeys, bison and water buffalos) and meat from other animal species or unspecified.
3. Other food includes bakery products, non-alcoholic beverages, cereals and meals, confectionery products and pastes, crustaceans, egg products, eggs, fish, fishery products unspecified, fruits and vegetables, infant formula, live bivalve molluscs, molluscan shellfish, other food, other processed food products and prepared dishes, RTE salads, sauce and dressings, sprouted seeds, soups, spices and herbs, vegetables and water.

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

Fresh poultry meat

Broiler meat is considered to be the main food-borne source of human campylobacteriosis. In 2011, 13 MSs reported data on fresh broiler meat from investigations with 25 or more samples. Overall, 31.3 % of the samples (single or batch) were found to be positive in the reporting MSs. The occurrence of *Campylobacter* in fresh broiler meat sampled at slaughter, processing and at retail in 2011 is presented in Table CA4. As in previous years, the proportions of *Campylobacter*-positive broiler meat samples (single or batch), at any sampling level, varied widely among MSs, with the prevalence ranging from 3.2 % to 84.6 %. Notably, four MSs (Ireland, Luxembourg, Poland, and Spain) reported very high (>50 %) or extremely high proportions (>70 %) of positive samples.

At the slaughterhouse, Denmark, Hungary, Ireland, Poland and Spain reported testing of single carcasses, with the proportion of positive samples ranging from 10.6 % in Denmark²⁵ to 72.1 % in Ireland. Belgium, Estonia and Germany reported testing of batches of carcasses at slaughterhouse, with the proportion of positive batches ranging from 6.4 % in Estonia to 40.9 % in Germany.

In the five MSs reporting data on the testing of single samples at processing level, the prevalence of *Campylobacter*-positive samples ranged from 21.0 % in Portugal to 84.6 % in Luxembourg. Only Belgium reported data on batches at processing, with 13.9 % of positive batches out of the 711 tested.

At retail, eight MSs reported data on testing of single samples, with the proportion of *Campylobacter*-positive samples ranging from 22.8 % in the Netherlands to 82.7 % in Poland. Belgium and Romania reported data on the testing of broiler batches at retail, with a prevalence of 17.1 % and 22.9 %, respectively.

In 2011, several MSs also reported *Campylobacter* findings in fresh turkey meat and other poultry meat, excluding broiler meat, sampled at different stages in the production chain. For detailed information on the occurrence of *Campylobacter* in the different fresh meat categories refer to the Level 3 Tables.

²⁵ Prevalence at two major slaughterhouses, representing >98 % of the total Danish production.

Table CA4. *Campylobacter* in fresh broiler meat, 2011

Country	Description	Sample unit	Sample weight	2011		
				N	N pos	% pos
At slaughter						
Belgium	Carcase, neck skin	Batch	1 g	335	130	38.8
Denmark ¹	Fresh - chilled	Single	-	898	95	10.6
Estonia	Carcase, neck skin	Batch	25 g	47	3	6.4
Germany	Carcase, neck skin, domestic production	Batch	25 g	337	138	40.9
Hungary	Carcase, meat	Single	25 g	31	9	29.0
Ireland ²	Carcase	Single	25 g	68	49	72.1
Poland	Carcase, carcass swab	Single	-	405	226	55.8
Spain	Carcase, meat	Single	-	138	76	55.1
At processing plant or cutting plant						
Belgium	Fresh, meat	Batch	1 g	711	99	13.9
Hungary	Fresh, meat	Single	25 g	193	90	46.6
Luxembourg	Fresh, meat	Single	10 g	26	22	84.6
Netherlands	Fresh, meat	Single	25 g	180	62	34.4
Portugal	Fresh	Single	25 g	81	17	21.0
Spain	Fresh, meat	Single	-	69	26	37.7
At retail						
Belgium	Fresh, meat	Batch	-	403	69	17.1
Denmark ¹	Fresh - chilled, domestic production	Single	-	829	279	33.7
	Fresh - frozen, domestic production	Single	-	428	129	30.1
Germany	Fresh meat, surveillance	Single	25 g	1096	343	31.3
	Fresh, meat, monitoring	Single	25 g	402	127	31.6
Hungary	Fresh, meat	Single	25 g	206	85	41.3
Ireland	Fresh, meat	Single	25 g	291	154	52.9
Luxembourg	Fresh, meat	Single	10 g	49	23	46.9
Netherlands	Fresh, meat	Single	25 g	500	114	22.8
Poland	Fresh, meat	Single	10 g	110	91	82.7
Romania	Fresh, meat	Batch	25 g	485	111	22.9
Spain	Fresh, meat	Single	-	260	197	75.8
Sampling level not stated						
Austria	Fresh, domestic production	Single	25 g	279	9	3.2
EU Total (13 Member States)				8,857	2,773	31.3

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

1. Denmark: sample weight is in all cases 10 g or 15 g.

2. Ireland: sample weight is most usually 25 g but occasionally there are other sample weights recorded (range from 10 g – 26 g).

Other findings in food

In 2011, seven and four MSs reported data on the occurrence of *Campylobacter* in pig meat and bovine meat, respectively, sampled at different stages in the production chain. However, *Campylobacter* was only infrequently detected in fresh pig and bovine meat. Positive samples were also infrequently reported from RTE minced meat, meat preparations and meat products.

In addition, several MSs tested other food categories for the presence of *Campylobacter*. Some positive findings were reported by two MSs in samples from cheeses, milk, and other dairy products excluding cheeses. Few MSs have also infrequently reported positive samples from fishery products, fruit and vegetables, spices and herbs, as well as other processed food products and prepared dishes.

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

3.2.3. *Campylobacter* in animals

In 2011, 19 MSs and three non-MSs reported data on *Campylobacter* in animals (Table CA1), primarily in broiler flocks, but also in pigs, cattle and to some extent in goats, sheep and pets (Table CA5). In the following sections, only results based on 25 or more units tested are presented. Moreover, results from industry own-check programmes and HACCP sampling, as well as results from clinical investigations, specified suspect sampling, selective sampling and outbreak investigations, have also been excluded owing to difficulties in the interpretation of the data. These data are, however, presented in the Level 3 Tables.

Table CA5. Overview of countries reporting animal data, 2011

Data	Total number of reporting MSs	Countries
Poultry ¹	16	MSs: AT, CZ, DE, DK, EE, ES, FI, IE, IT, LV, NL, RO, SE, SI, SK, UK Non-MSs: CH, IS, NO
Pigs	9	MSs: DE, ES, IE, IT, LV, NL, RO, SK, UK Non-MS: CH
Cattle	12	MSs: AT, DE, ES, IE, IT, LU, LV, NL, PL, RO, SK, UK Non-MSs: CH, NO
Sheep and goats	7	MSs: DE, IE, IT, NL, RO, SK, UK Non-MSs: CH, NO
Pets ²	8	MSs: DK, EE, IT, LV, NL, RO, SK, UK Non-MSs: CH, NO
Other animals	10	MSs: DE, DK, IE, IT, LV, NL, PL, PT, SK, UK Non-MSs: CH, NO

Note: The overview table includes all data reported by MSs. In the following sections, data reported as HACCP and industry own-check programmes are not included in the detailed tables, and, unless stated otherwise, suspect sampling, selective sampling, and outbreak or clinical investigations are also excluded. Also, only countries reporting 25 samples or more have been included in the analysis.

1. Poultry includes ducks, *Gallus gallus* (fowl), other poultry, pigeons, poultry unspecified, quails and turkeys.
2. Pets include cats, dogs, canaries, birds, ferrets, turtles, and all animals specified as "pet animals".

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

Broilers and other poultry

In 2011, 10 MSs and three non-MSs provided information on the occurrence of *Campylobacter* in broiler flocks, batches or individual animals based on a sample size ≥ 25 (Table CA6). In three of the four MSs reporting flock-based data, the reported prevalence was very high ($\geq 60\%$) to extremely high ($\geq 80\%$). The occurrence of *Campylobacter* varied widely among the six MSs reporting slaughter batch-based data, with prevalence ranging from 0 % to 92.0 %. The only MS reporting animal-based data was Romania, and the prevalence was 96.1 % (out of 102 units tested).

Denmark, Sweden, and Norway reported the highest numbers of broiler flocks tested, while Finland reported the highest number of slaughter batch-based data. These four countries have a *Campylobacter* control or monitoring programme in place. They reported a low to moderate prevalence. In Slovenia, the same number (100) of faecal and skin samples was tested, leading to a prevalence of 77.0 % and 92.0 %, respectively.

Finland provided information on different sampling periods and reported a higher *Campylobacter* prevalence in slaughter animal batches sampled during June–October (3.1 %) than in those sampled during January–May and November–December (2.7 %).

In 2011, a survey of broilers slaughtered in small-scale abattoirs was performed in Sweden using the same sampling strategy as in the Swedish *Campylobacter* official monitoring programme that covers 99 % of slaughtered broilers (from seven abattoirs, all belonging to the Swedish Poultry Meat Association). At the flock level, the occurrence of *Campylobacter* in samples from small-scale abattoirs (60.1 %) was much higher than in samples collected within the framework of the official monitoring programme (12.8 %).

Table CA6. *Campylobacter* in broilers,¹ 2011

Country	Description	2011		
		N	N pos	% pos
Broilers (flock-based data)				
Czech Republic ²	At slaughterhouse, caecum, monitoring, official sampling	145	92	63.4
Denmark ³	At farm (before slaughter), boot swabs, control and eradication programmes	3,379	487	14.4
Ireland	At slaughterhouse, caecum, domestic production, monitoring	201	162	80.6
Sweden	At slaughterhouse, domestic production, monitoring	2,788	357	12.8
	At slaughterhouse, domestic production, small scale slaughterhouses, national survey	143	86	60.1
Total flock-based (4 MSs)		6,656	1,184	17.8
Norway ⁴	At farm (before slaughter), faeces, surveillance	2,282	139	6.1
Iceland ³	At farm, faeces, monitoring	628	33	5.3
Broilers (slaughter batch-based data)				
Austria ⁵	At slaughterhouse, cloacal swab, domestic production, monitoring-active, official sampling	342	165	48.2
Estonia ⁶	At slaughterhouse, caecum, monitoring, official sampling	47	0	0
Finland ⁷	At slaughterhouse, caecum, sampling between June-October, control and eradication programmes, industry sampling	1,486	46	3.1
	At slaughterhouse, caecum, sampling in January-May and November-December, control and eradication programmes, industry sampling	333	9	2.7
Germany	At slaughterhouse, caecum, domestic production, monitoring	331	83	25.1
Slovenia ⁸	At slaughterhouse, faeces, monitoring	100	77	77.0
	At slaughterhouse, neck skin, monitoring	100	92	92.0
Spain	At slaughterhouse, cloacal swab, monitoring	237	162	68.4
Total slaughter batch-based (6 MSs)		2,976	634	21.3
Iceland ⁹	At slaughterhouse, caecum, domestic production, monitoring	695	60	8.6
Switzerland ¹⁰	At slaughterhouse, cloacal swab, monitoring, official sampling	445	166	37.3

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

1. One MS, Romania, also reported animal-based data, with 96.1 % of positive broilers out of 102 birds tested.

2. In the Czech Republic, sampling was carried out once a month.

3. Every flock is sampled.

4. In Norway, sampling was performed between 1 May and 31 October.

5. In Austria, the randomised sampling was carried out throughout the whole year.

6. In Estonia, sampling was distributed evenly throughout the year.

7. In Finland, between June and October, all broiler slaughter batches were sampled and examined for thermophilic *Campylobacter*. Between January and May, as well as in November-December random samples were taken according to a specific sampling plan.

8. In Slovenia, sampling was carried out from May to 31 December 2011.

9. Every batch is sampled.

10. In Switzerland, data originate from the antimicrobial resistance monitoring.

Campylobacter-positive findings were also reported in laying hens of *Gallus gallus*, as well as in other poultry species, including turkeys and ducks. For detailed information on the occurrence of *Campylobacter* in the different poultry species refer to the Level 3 Tables.

Other animals

In 2011, only few countries reported data on animals other than poultry. Two and five MSs reported *Campylobacter*-positive findings in pigs and cattle, respectively. In addition, two MSs reported positive samples in sheep and goats, while only one MS reported positive findings in cats and dogs. *Campylobacter*-positive samples from foxes and other unspecified wild animals were also reported by one MS.

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

3.2.4. Discussion

Campylobacteriosis continued to be the most commonly reported zoonosis in humans in the EU since 2005. In 2011, the number of notified cases of thermotolerant *Campylobacter* in the EU increased by 2.2 % compared with 2010. The EU notification rate of confirmed cases of human campylobacteriosis has shown a statistically significant increasing trend in the last four years (2008–2011). The reasons for this increasing trend are not completely understood at present. One possible explanation might be more focused surveillance and/or greater awareness of human campylobacteriosis because of a decrease in human salmonellosis. Owing to the characteristics of this multi-host pathogen and its prevalence in the environment, where climate factors may play an important role, it is difficult to understand all aspects of its epidemiology and the possible reasons for the increase in human cases.

Considering the high number of campylobacteriosis cases, the severity in terms of fatalities reported was low (0.04 %). The proportion of hospitalised cases was, on the other hand, larger than expected taking into account the fact that the symptoms are often relatively mild. For countries that report on the hospitalisation status for only a small fraction of cases, it is likely that this information is skewed towards hospitalised cases. For some other countries, the reason might be that the surveillance is focused on the diagnosis of severe cases. It should be noted that the surveillance of campylobacteriosis varies between countries and is based on voluntary reporting in seven of 25 reporting MSs. The sources of information (laboratories, physicians, hospitals) also vary between surveillance systems and comparisons of notification rates should therefore be made with caution.

Broiler meat is considered to be a major source of human campylobacteriosis, as a result of undercooking and cross-contamination of RTE foods, as well as through direct hand-to-mouth transfer during food preparation. The EFSA's Panel on Biological Hazards (BIOHAZ) concluded in its scientific opinion²⁶ that handling, preparation and consumption of broiler meat may account for 20 % to 30 % of human campylobacteriosis cases in the EU, while 50 % to 80 % may be attributed to the chicken reservoir as a whole. *Campylobacter* strains from the broiler reservoir may also be transmitted to humans via routes other than food (e.g. via the environment or by direct contact). The principal reservoirs of *Campylobacter* spp. are the alimentary tracts of wild and domesticated birds and mammals. There are multiple pathways of human exposure, and a meta-analysis of case-control studies suggests a variety of risk factors including travelling, animal contact, food, untreated drinking water and surface water.

In 2011, fresh broiler and other poultry meat were again the foodstuffs in which *Campylobacter* was most frequently reported. Overall, about one third of the samples were reported as positive, although there were large differences between the MSs.

The importance of broiler meat as a source of human *Campylobacter* infections was also illustrated by the reported food-borne outbreak data from 2011. Approximately half (17 out of 37) of the *Campylobacter* outbreaks, in which information on the implicated food vehicle was provided, were linked to broiler meat. In five of the outbreaks the implicated food vehicle was milk and, out of these, three outbreaks were attributed to raw or insufficiently heated milk, indicating the importance of risks related to consuming unpasteurised milk. The risk of campylobacteriosis and other diseases associated with the consumption of raw milk has been well documented.^{27,28,29}

As in previous years, most MSs reported a high to extremely high prevalence of *Campylobacter* in broiler flocks. Low to moderate prevalence was reported by the Nordic countries and Estonia.

26 EFSA (European Food Safety Authority), 2010. Scientific Opinion of Panel on Biological Hazards (BIOHAZ) on Quantification of the risk posed by broiler meat to human campylobacteriosis in the EU. EFSA Journal 2010, 8(1):1437, 89 pp.

27 Heuvelink A E, Heerwaarden C van, Zwartkruis-Nahuis A, Tilburg J J H C, Bos M H, Heilmann F G C, Hoffhuis A, Hoekstra T and de Boer E, 2009. Two outbreaks of campylobacteriosis associated with the consumption of raw cow's milk. International Journal of Food Microbiology, 134, 70-74.

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

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