

26th EURL-*Salmonella* workshop
28 May 2021

Update on *Salmonella* in the EU, based on EU One Health 2019 Zoonoses report

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Trusted science for safe food

- **Directive on the monitoring of zoonoses and zoonotic agents (2003/99/EC)**

- Publication of the annual EU Summary Report
- MS have an obligation to report each year

- **Data collection and reporting mandatory**

- **for 8 zoonotic agents**



Salmonella

Campylobacter

Listeria monocytogenes

Brucella

Tuberculosis due to *Mycobacterium bovis* and *M. caprae*

Verotoxigenic *Escherichia coli*

Trichinella

Echinococcus

- **for food-borne outbreaks**

- **for susceptible animal populations**

Subsequent legislation prescribing more detailed reporting requirements, amongst other;

- Commission regulations as regards a Union targets for the reduction of the prevalence of certain *Salmonella* serotypes in poultry populations
- Commission Implementing Regulation (EU) 2019/627 (meat inspection) (*Campylobacter* and *Salmonella* process hygiene criteria)

zoonoses annual data reporting requirements are not affected by the entry into force of the Commission Implementing Regulation (EU) 2020/2002 (AHL)

Zoonoses included in compulsory annual monitoring (Dir. 2003/99 List A)

- A1. *Campylobacter*
- A2. *Salmonella*
- A3. *Listeria*
- A4. Shiga toxin-producing *Escherichia coli*
- A5. Tuberculosis due to *Mycobacterium bovis*
- A6. *Brucella*
- A7. *Trichinella*
- A8. *Echinococcus*

Food- and waterborne outbreaks (according Dir. 2003/99)

Zoonoses monitored according the epidemiological situation (Dir. 2003/99 List B)

- B1. *Yersinia*
- B2. *Toxoplasma gondii*
- B3. Rabies
- B4. Q fever
- B5. West Nile virus
- B6. Tularaemia
- B7. Other zoonoses and zoonotic agents

Microbiological contaminants subject to food safety criteria (Reg. (EC) No 2073/2005)

EU One Health 2019 Zoonoses report



<https://www.efsa.europa.eu/en/efsajournal/pub/6406>

The European Union One Health 2019 Zoonoses Report

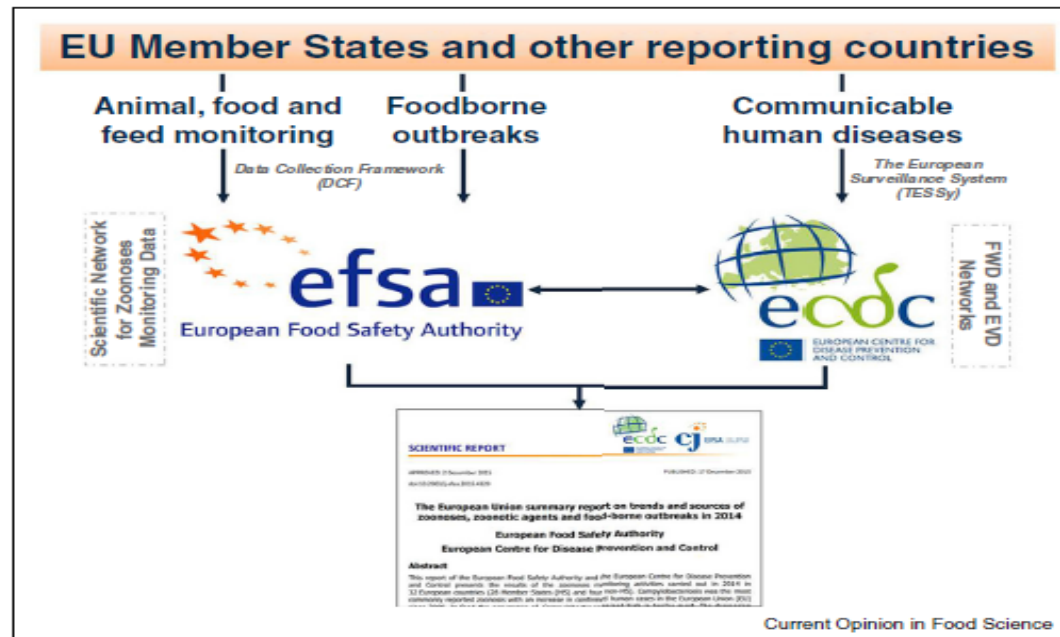
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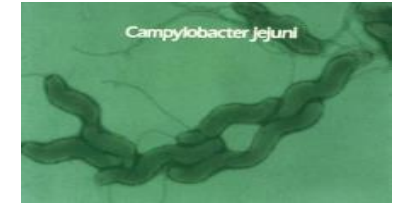
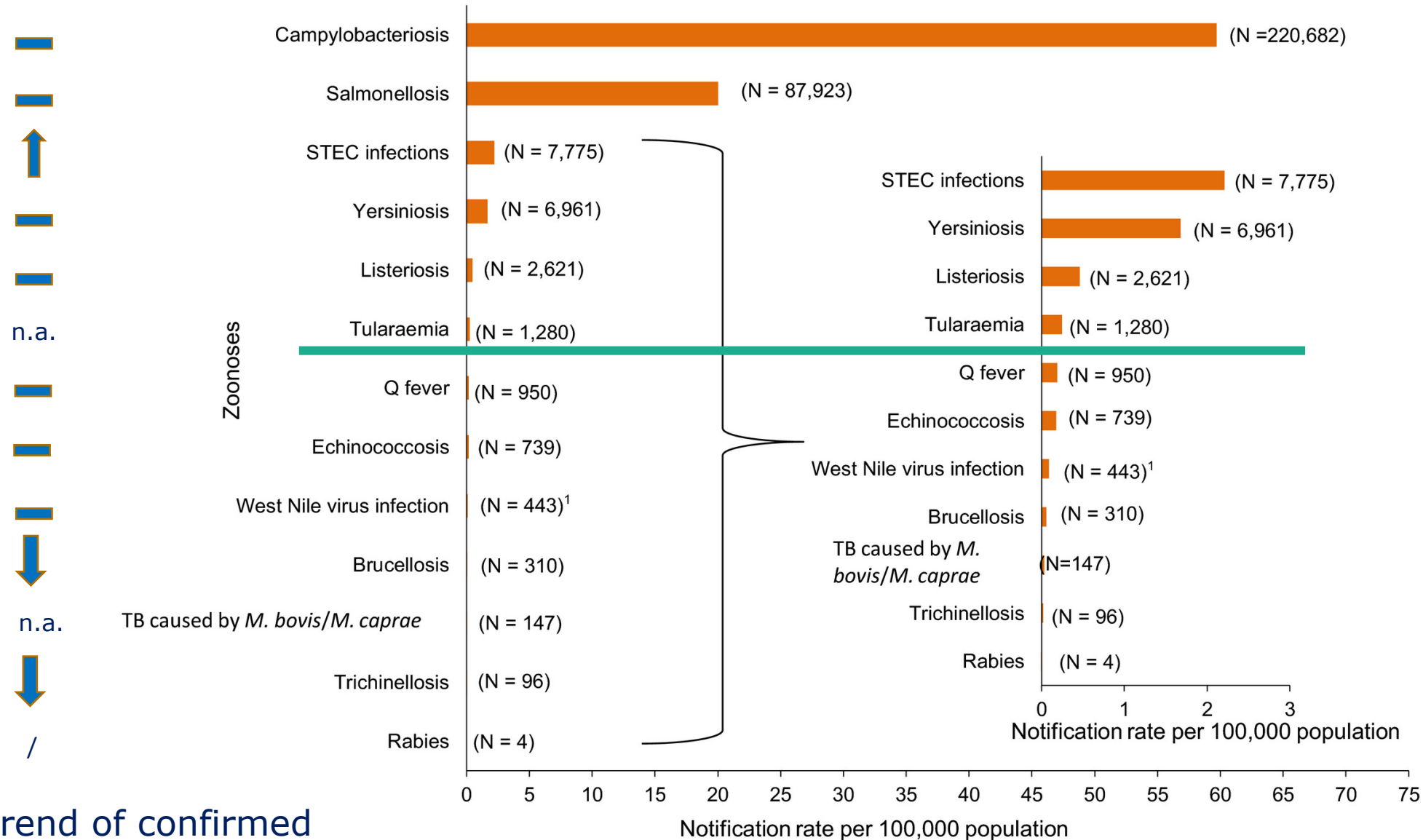


The EUOHZ:

- a joint scientific report by EFSA and ECDC, and
- the product of intensive collaboration with MS and EC DG SANTE (D4, G2 and G4)

Data flow and EFSA's integrated approach for the production of the joint EFSA-ECDC EU Summary Report on zoonoses and food-borne outbreaks in the EU. Note: FWD Network: European Food and Waterborne Diseases and Zoonoses Network; EVD Network: European Emerging and Vector-borne Diseases Network.

Reported numbers and notification rates of confirmed human zoonoses in the EU, 2019



EU trend of confirmed cases in 2015–2019

Reported hospitalisations and case fatalities due to zoonoses in confirmed human cases in the EU, 2019



Disease	N confirmed human cases	Hospitalisation				Deaths			
		Status available (%)	N reporting MS ^(b)	N reported hospitalised cases	Proportion hospitalised (%)	Outcome available (%)	N reporting MS ^(b)	N reported deaths	Case fatality (%)
Campylobacteriosis	220,682	29.1	16	20,432	31.8	78.0	17	47	0.03
Salmonellosis	87,923	44.5	15	16,628	42.5	71.8	17	140	0.22
STEC infections	7,775	37.3	18	1,100	37.9	61.0	20	10	0.21
Yersiniosis	6,961	27.4	15	648	33.9	57.0	14	2	0.05
Listeriosis	2,621	51.1	19	1,234	92.1	65.1	20	300	17.6
Tularaemia	1,280	22.8	12	149	51.0	21.6	13	1	0.4
Echinococcosis	739	33.3	14	109	44.3	31.4	14	2	0.86
Q fever	950	NA ^(c)	NA	NA	NA	67.3	13	4	0.63
West Nile virus infection ^(a)	443	83.7	9	347	93.5	99.3	11	52	11.8
Brucellosis	310	44.5	11	98	71.0	36.8	12	2	1.75
Trichinellosis	96	16.7	5	6	37.5	25.0	7	1	4.2
Rabies	4	NA ^(c)	NA	NA	NA	75.0	3	3	100.0

(a): Instead of confirmed human infections, total number of human infections was included.

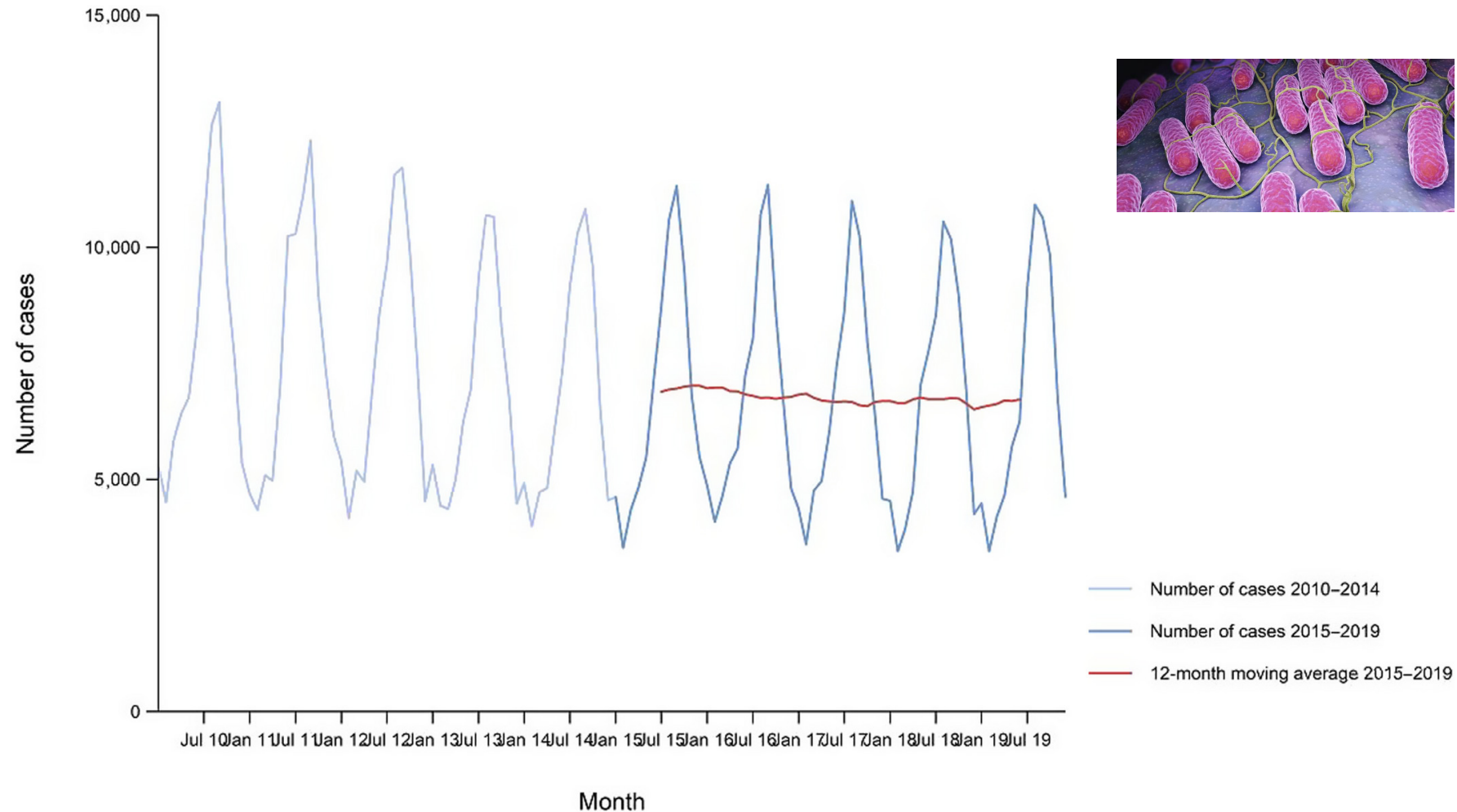
(b): Not all countries observed cases for all diseases.

(c): NA-not applicable as the information is not collected for this disease.

Severity of the diseases was analysed based on hospitalisation and outcome of the reported cases. Based on data on severity, **listeriosis** and **West Nile virus infection** were the two most severe diseases with the highest case fatality (listeriosis, 17.6%) and the highest hospitalisation (West Nile virus infection, 93.5%). Almost all confirmed cases with data available on hospitalisation for these two diseases were hospitalised. About one out of every fifth and one out of 10 confirmed listeriosis and WNV cases, respectively, with known data were fatal.

Salmonellosis in humans, EU, 2015-2019

A seasonal trend was observed for confirmed salmonellosis cases in the EU/EEA in 2010–2019, with more cases reported during summer months. The overall EU/EEA trend for salmonellosis was stable (flat) in 2015–2019



Finland was the only MS reporting a significantly decreasing trend ($p < 0.01$) during 2015–2019. An increasing trend was not observed in any MS in 2015–2019.

Salmonellosis FBO, by incriminated food vehicle, EU

2019

Food vehicle	N outbreaks	% outbreaks
Eggs and egg products	98	37.0%
Bakery products	31	11.7%
Pig meat and products thereof	26	9.8%
Mixed food	23	8.7%
Meat and meat products	15	5.7%
Broiler meat (Gallus gallus) and products thereof	14	5.3%
Unknown	11	4.2%
Other or mixed red meat and products thereof	9	3.4%
Other, mixed or unspecified poultry meat and products thereof	5	1.9%
Vegetables and juices and other products thereof	5	1.9%
Sweets and chocolate	5	1.9%
Dairy products (other than cheeses)	4	1.5%
Crustaceans, shellfish, molluscs and products thereof	4	1.5%
Cheese	3	1.1%
Other foods	3	1.1%
Buffet meals	3	1.1%
Bovine meat and products thereof	2	0.8%
Fruit, berries and juices and other products thereof	2	0.8%
Milk	1	0.4%
Sheep meat and products thereof	1	0.4%
Total	265	100.0%

2018-2010

Food vehicle	N outbreaks	% outbreaks
Eggs and egg products	927	39.8%
Bakery products	225	9.7%
Mixed food	215	9.2%
Pig meat and products thereof	163	7.0%
Broiler meat (Gallus gallus) and products thereof	115	4.9%
Other foods	113	4.8%
Cheese	83	3.6%
Sweets and chocolate	82	3.5%
Meat and meat products	79	3.4%
Bovine meat and products thereof	57	2.4%
Vegetables and juices and other products thereof	42	1.8%
Buffet meals	40	1.7%
Other or mixed red meat and products thereof	38	1.6%
Fish and fish products	27	1.2%
Other, mixed or unspecified poultry meat and products thereof	24	1.0%
Dairy products (other than cheeses)	22	0.9%
Crustaceans, shellfish, molluscs and products thereof	16	0.7%
Turkey meat and products thereof	13	0.6%
Cereal products including rice and seeds/pulses (nuts, almonds)	11	0.5%
Milk	9	0.4%
Fruit, berries and juices and other products thereof	7	0.3%
Unknown	7	0.3%
Sheep meat and products thereof	6	0.3%
Tap water, including well water	4	0.2%
Herbs and spices	4	0.2%
Canned food products	1	0.0%
Total	2,330	100.0%

Data from strong-evidence food-borne outbreaks

- Salmonellosis is the **second most commonly** reported gastrointestinal infection in humans after campylobacteriosis, and an important cause of food-borne outbreaks in the EU/EEA.
- In 2019, 87,923 confirmed cases of salmonellosis in humans were reported with an **EU notification rate 20.0** cases per 100 000 population, which was **at the same level as in 2018**.
- **The trend for salmonellosis in humans has been stable (flat) over the last five years** after a long period of a declining trend.
- The trend of *S. Enteritidis* cases in humans acquired in the EU has stabilised in 2015–2019.
- In total, 926 salmonellosis food-borne outbreaks were reported by 23 EU MS in 2019, causing 9,169 illnesses, 1,915 hospitalisations (50.5% of all outbreak-related hospitalisations) and seven deaths. **Salmonella caused 17.9% (~one in six) of all food-borne outbreaks** during 2019. The vast majority (72.4%) of the salmonellosis food-borne outbreaks were caused by *S. Enteritidis*. The four most implicated food vehicles in strong-evidence salmonellosis food-borne outbreaks were **'eggs and egg products'**, followed by **'bakery products'**, **'pig meat and products thereof'** and **'mixed food'**, as in previous years.

Comparisons of proportions (%) of *Salmonella*-positive single samples from pig carcasses before chilling, by sampler, reporting MS, EU, 2019

Country	Competent authorities (CA)					Food business operator (FBOp)					p-value (b)	Interpretation
	Sample weight	N samples Tested	N samples Positive	% samples positive	CI ₉₅	Sample weight	N samples Tested	N samples Positive	% samples positive	CI ₉₅		
Austria						400 cm ²	5,633	5	0.09	[0.03; 0.21]		
Belgium	600 cm ²	1,049	65	6.20	[4.81; 7.83]	600 cm ²	5,055	88	1.74	[1.40; 2.14]	< 0.001	CA > FBOp
Bulgaria	400 cm ²	2,094	0	0.00	[0.00; 0.18] ^(a)	400 cm ²	337	0	0.00	[0.00; 1.09] ^(a)	NS	
Cyprus	400 cm ²	6	0	0.00	—							
Denmark						400 cm ²	10,743	133	1.24	[1.04; 1.46]		
Estonia	400 cm ²	401	15	3.74	[2.11; 6.09]	400 cm ²	1,666	2	0.12	[0.01; 0.43]	< 0.001	CA > FBOp
France						400 cm ²	14,409	651	4.52	[4.18; 4.87]		
Germany						400 cm ²	27,269	148	0.54	[0.46; 6.37]		
Ireland	400 cm ²	383	16	4.18	[2.41; 6.70]							
Italy	400 cm ²	6,186	235	3.80	[3.34; 4.31]	400 cm ²	15,786	231	1.46	[1.28; 1.66]	< 0.001	CA > FBOp
Latvia						400 cm ²	606	0	0.00	[0.00; 0.61] ^(a)		
Malta	400 cm ²	60	5	8.33	[2.76; 18.38]	400 cm ²	125	3	2.40	[0.5; 6.85]	< 0.10	CA > FBOp
Netherlands	400 cm ²	383	22	5.74	[3.63; 8.57]						< 0.001	CA > FBOp
						100 cm ²	9,613	272	2.83	[2.51; 3.18]		
Poland	400 cm ²	4,189	26	0.62	[0.41; 0.91]	400 cm ²	10,035	5	0.05	[0.02; 0.12]	< 0.001	CA > FBOp
Portugal						400 cm ²	6,806	76	1.12	[0.88; 1.40]		
Slovakia	400 cm ²	2,352	9	0.38	[0.17; 0.72]							
Slovenia						400 cm ²	1,095	11	1.00	[0.50; 1.79]		
Spain	400 cm ²	1,383	243	17.57	[15.59; 19.68]	400 cm ²	2,761	67	2.43	[1.88; 3.07]	< 0.001	CA > FBOp
United Kingdom^(c)	400 cm ²	3,785	65	1.72	[1.33; 2.18]							
Total		22,271	701	3.15	[2.92; 3.38]		111,939	1,692	1.51	[1.44; 1.58]	< 0.001	CA > FBOp
Total^(d)		15,745	611	3.88	[3.58; 4.19]		35,765	396	1.11	[1.00; 1.22]	< 0.001	CA > FBOp

MS: Member State.

(a): One-sided 97.5% confidence interval.

(b): p-value: NS, not significant.

(c): The United Kingdom informed during the last phase of the production of this report of a reporting error and that samples had been taken by the food business operators.

(d): Total number of samples considering only the MS that provided both CA and FBOp data (data in white rows).

Salmonella, occurrence in RTE food, EU, 2015-2019

Food	2019			2015–2018		
	N reporting MS	N sampled units	Positive N (%)	N reporting MS	N sampled units	Positive N (%)
RTE food						
All	21	66,113	178 (0.27)	24	198,922	542 (0.27)
Meat and meat products	16	22,328	122 (0.55)	21	46,115	200 (0.43)
Meat and meat products from broilers	7	331	0	17	5,544	28 (0.51)
Meat and meat products from turkeys	7	679	0	13	1,312	5 (0.38)
Meat and meat products from pigs	14	7,307	24 (0.33)	18	26,661	113 (0.42)
Meat and meat products from bovine animals	10	1,154	1 (0.09)	17	2,916	5 (0.17)
Mixed meat and meat products from bovine animals and pigs	3	3,946	40 (1.01)	4	272	8 (2.94)
Mixed ^(a)	9	843	9 (1.07)	13	2,808	7 (0.25)
Other meat and meat products	11	8,068	48 (0.60)	15	6,602	34 (0.52)

Salmonella, occurrence in RTE food, EU, 2015-2019 (2)

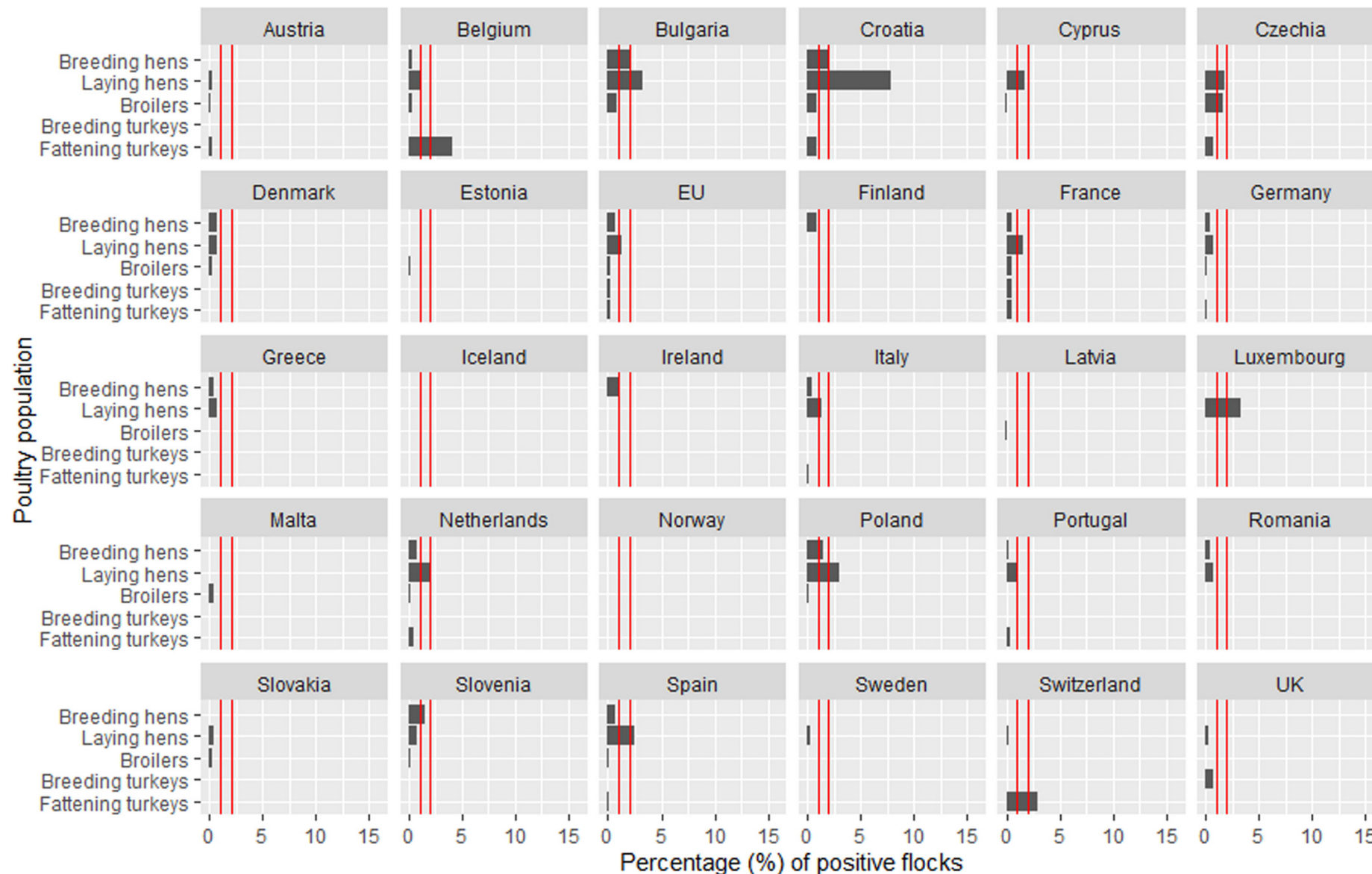
Food	2019			2015–2018		
	N reporting MS	N sampled units	Positive N (%)	N reporting MS	N sampled units	Positive N (%)
Milk and milk products	18	19,929	24 (0.12)	22	58,231	66 (0.11)
Milk	8	616	1 (0.16)	13	1,589	3 (0.19)
Raw milk	3	258	0	5	864	0
Cheese	16	7,817	16 (0.21)	22	26,612	42 (0.16)
Dairy products excluding cheeses (butter, cream, ice cream, whey, yoghurt and fermented dairy products)	16	11,496	7 (0.06)	20	30,030	21 (0.07)
Fruits, vegetables and juices	11	2,052	1 (0.05)	18	8,727	2 (0.02)
Fish and fishery products	15	2,562	1 (0.04)	21	11,604	12 (0.10)
Spices and herbs	16	2,136	7 (0.33)	18	4,399	50 (1.14)
Bakery products	13	3,656	0	16	14,744	39 (0.27)
Salads	10	3,695	2 (0.05)	13	9,533	47 (0.49)
Other processed food products and prepared dishes	14	7,197	11 (0.15)	17	32,749	114 (0.35)
Eggs and egg products	4	56	0	5	174	0
Beverages, alcoholic	1	5	0	2	14	0
Cereals and nuts	10	436	1 (0.23)	11	1,322	1 (0.08)
Infant formulae and follow-on formulae–RTE	4	123	2 (1.63)	8	576	0
Other food	7	84	1 (1.19)	9	279	1 (0.36)
Cocoa and cocoa preparations, coffee and tea	3	530	6 (1.13)	6	919	0

Salmonella, occurrence in non-RTE food, EU, 2015-2019

Food	2019			2015–2018		
	N reporting MS	N sampled units	Positive N (%)	N reporting MS	N sampled units	Positive N (%)
All	25	191,981	2,919 (1.52)	26	569,789	11,448 (2.01)
Meat and meat products	24	174,411	2,889 (1.66)	25	499,648	11,118 (2.23)
Fresh meat from broilers	15	23,580	1,805 (7.66)	26	94,629	6,082 (6.43)
Fresh meat from turkeys	12	4,417	160 (3.62)	20	13,588	882 (6.49)
Fresh meat from pigs	19	20,613	132 (0.64)	25	111,106	1,372 (1.24)
Fresh meat from bovine animals	13	18,377	36 (0.20)	22	87,329	179 (0.21)
Other fresh meat	15	42,998	687 (1.60)	21	86,171	1,998 (2.32)
Milk and milk products	8	1,390	0	15	3,324	11 (0.33)
Fruits, vegetables and juices	16	4,955	4 (0.08)	22	6,870	51 (0.74)
Fish and fishery products	11	1,943	0	16	7,956	27 (0.34)
Eggs and egg products	11	5,051	6 (0.12)	20	26,392	113 (0.43)
Sprouts	1	124	1 (0.84)	11	1,505	3 (0.20)
Infant formulae	9	562	10 (1.78)	15	3,060	0
Foodstuffs intended for special nutritional uses	8	400	0	15	1,604	5 (0.31)
Cereals, dried seeds	13	878	8 (0.91)	16	3,149	79 (2.51)
Other processed food products and prepared dishes	12	1,356	1 (0.07)	19	12,989	16 (0.12)

Salmonella reduction targets achievement, EU, 2019

Eighteen of the 26 Member States reporting on *Salmonella* control programmes in poultry populations met all the reduction targets, compared to 14 in 2018.



- Official control samples verifying compliance with food safety criteria according to Regulation (EC) No 2073/2005 found the highest percentages of **Salmonella-positive samples in poultry meat**, including minced meat and meat preparations intended to be eaten cooked (8.3%), meat products intended to be eaten cooked (6.4%) and fresh meat (3.5%).
- For 2019, 66,113 'ready-to-eat' and 191,181 and 'non ready-to-eat' food sampling units were reported from 21 and 25 MS with 0.3% and 1.5% positive samples, respectively. Within the category of '**ready-to-eat' food samples, positive samples were from divers food products**'; 'meat and meat products', 'milk and milk products', 'fruits, vegetables and juices', 'fish and fishery products', 'spices and herbs', 'salads', 'other processed food products and prepared dishes', 'cereals and nuts', 'infant formulae and follow-on formulae', 'other food' and 'cocoa and cocoa preparations, coffee and tea'.
- **Significantly lower percentages of Salmonella-positive pig carcasses** were reported, based on food business operators **self-monitoring** data (1.51%, N = 111,939), compared with official control data from the competent authorities (3.15% (N = 22,271). The same observations were made for 2018 and 2017 data.
- In the context of national control programmes in poultry, proportions of **Salmonella target serovars-positive broiler and fattening turkey flocks** reported by **food business operators** was **significantly lower** than those reported by competent authorities.
- A significant **increase** was noted in estimated **Salmonella prevalence** in breeding flocks of *Gallus gallus*, laying hens and breeding turkeys over the last 4–6 years. The trends in the **prevalence of Salmonella target serovar-positive flocks** were, in contrast, quite **stable (flat)** since 2015 for all animal categories, with some fluctuations for breeding turkey flocks.

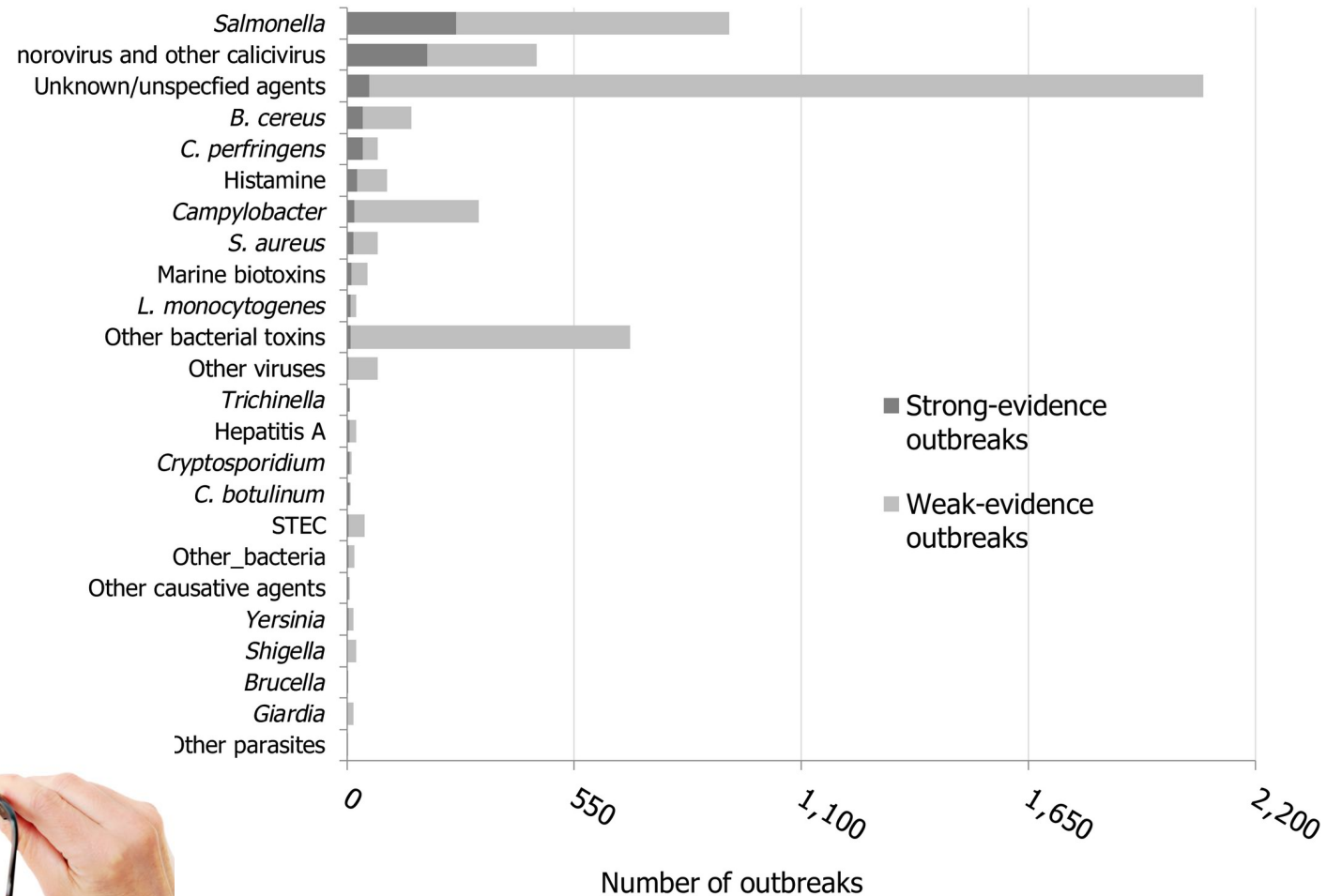
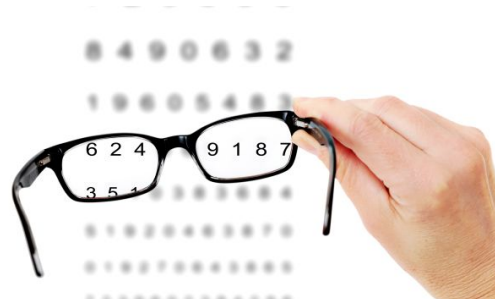
Agents most frequently implicated FBO, EU, 2019

Distribution of strong- and weak-evidence food-borne outbreaks, per causative agent, in reporting EU MS, 2019

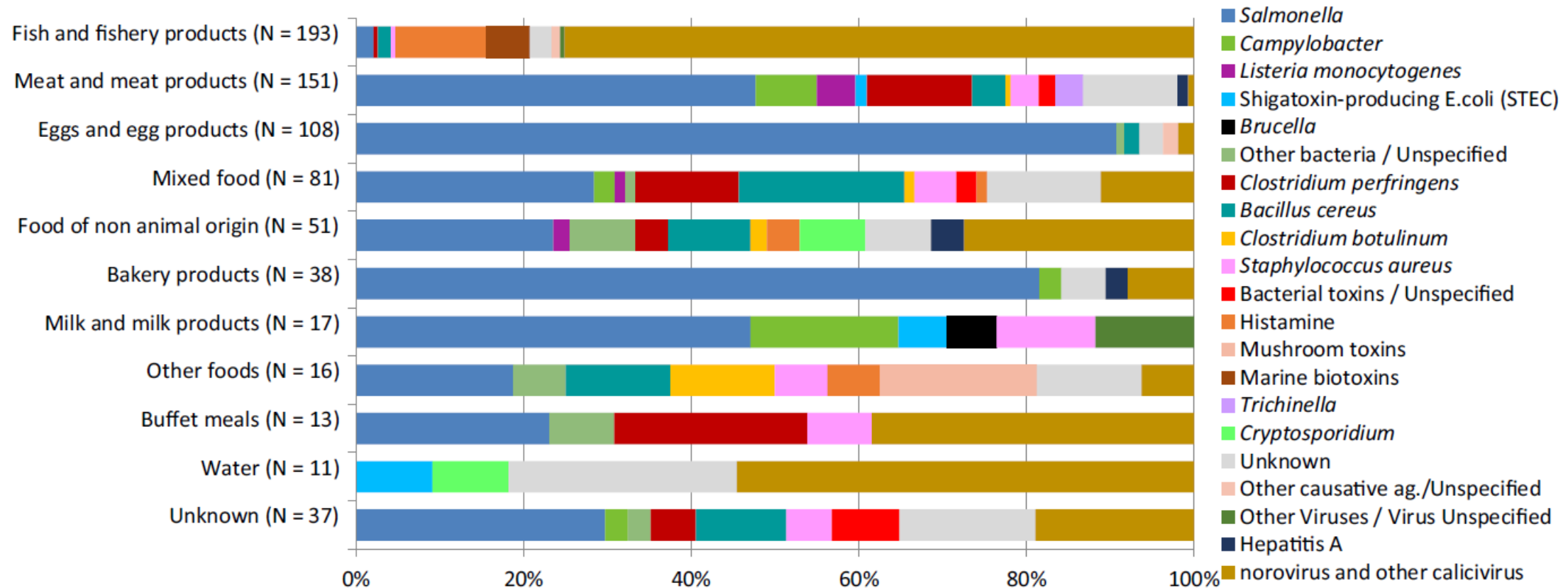
in total 5,175

- 716 strong-evidence
- 4,459 weak-evidence
- ~ average: 100 FBO per week

49,463 illnesses,
3,859 hospitalizations and
60 deaths

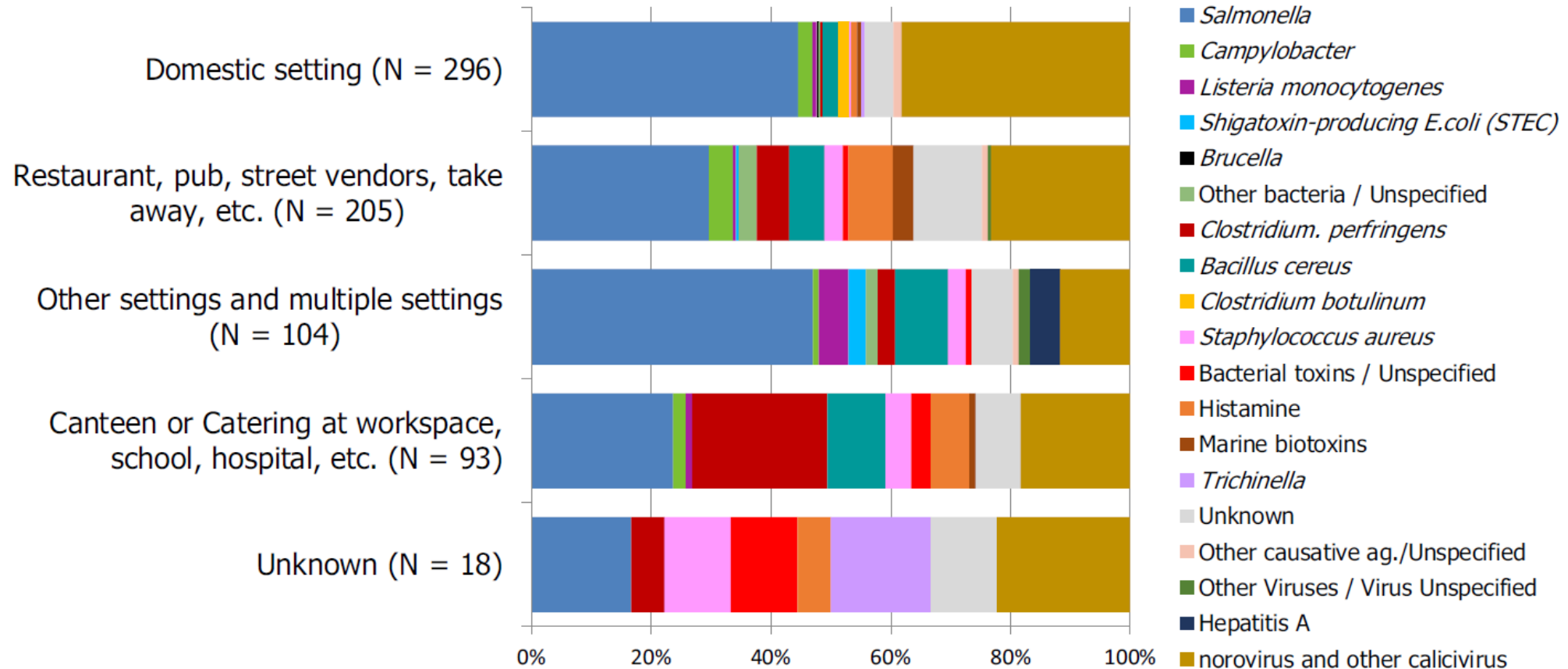


Food vehicle in strong-evidence outbreaks, EU, 2019



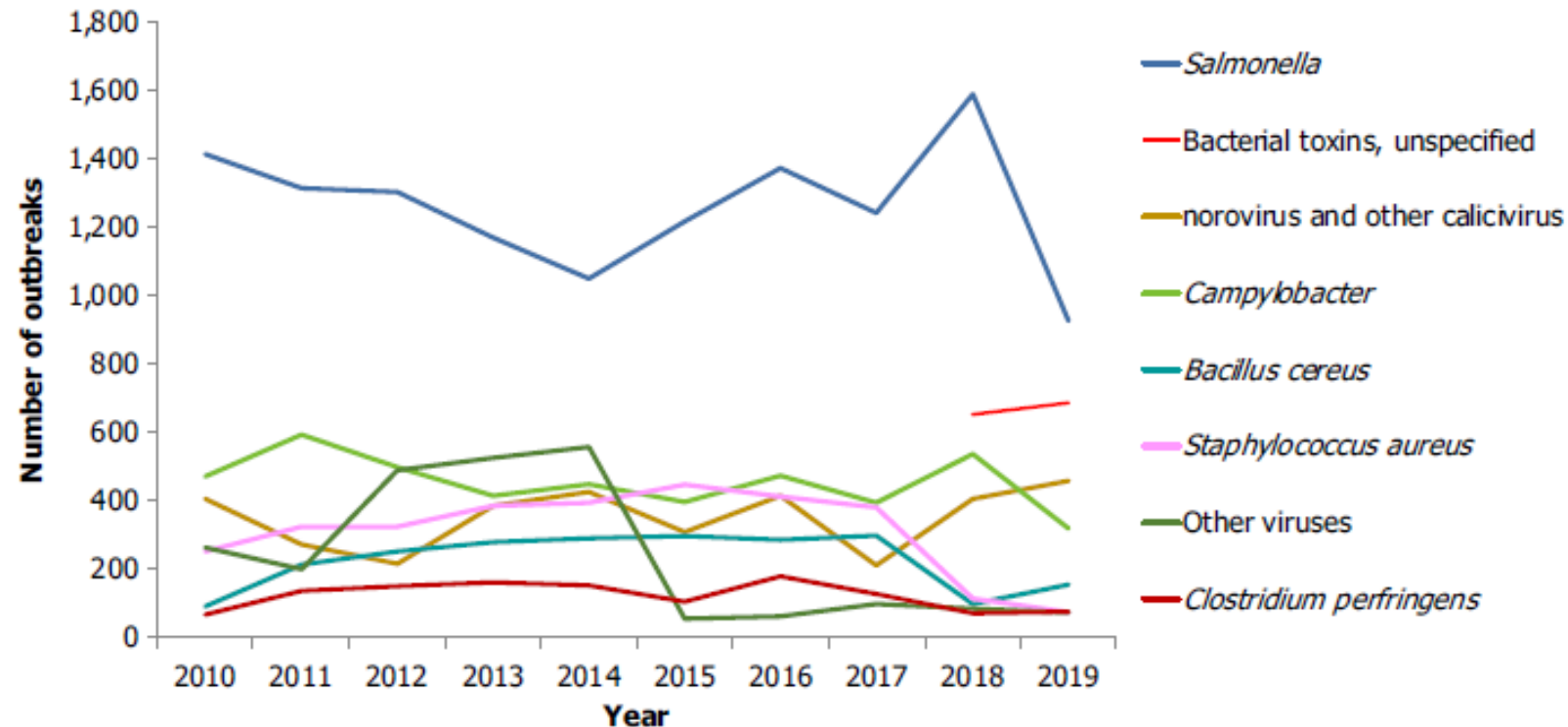
Frequency distribution of causative agents associated with strong-evidence food-borne outbreaks, by food vehicle, in reporting EU MS, 2019

Settings in strong-evidence outbreaks, EU, 2019



Distribution of strong-evidence food-borne outbreaks, by place of exposure (setting) and by causative agent, in reporting EU MS, 2019

Temporal trends by causative agent, EU, 2010 - 2019



Note: other viruses include adenovirus, flavivirus, hepatitis E virus, rotavirus and other unspecified viruses.

Number of food-borne outbreaks, by causative agent, in reporting EU MS, 2010–2019

Top-10 agent/food pairs in strong-evidence outbreaks associated with the highest impact on health in the EU, 2019

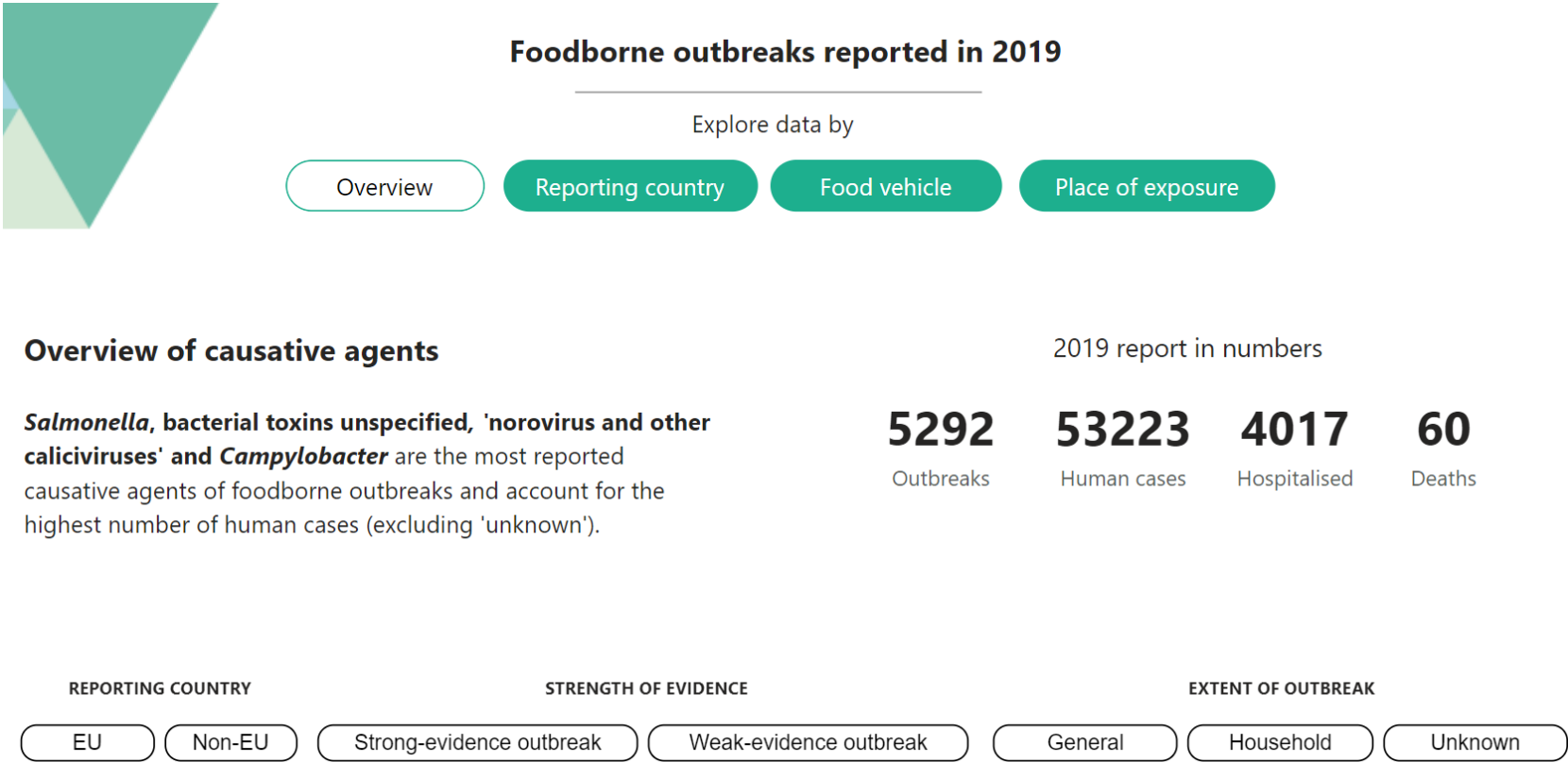
- **Norovirus in 'fish and fishery products', *Salmonella* in 'eggs and egg products' and *Salmonella* in 'meat and meat products'** were the agent/food pairs that caused the highest number of strong-evidence outbreaks.
- ***Salmonella* in 'mixed food', norovirus in 'fish and fishery products' and *Salmonella* in 'eggs and egg products'** were the agent/food pairs that caused the highest number of cases.
- Pairs with ***Salmonella*** in different types of food ('eggs and egg products', 'mixed foods', 'meat and meat products', 'bakery products', 'buffet meals') caused the highest numbers of hospitalisations.
- ***Listeria monocytogenes* in 'meat and meat products'** was the agent/food pairs that caused the highest number of deaths.



- **Mixed foods** (i.e. food resulting from mixing together multiple ingredients in the same preparation) were the foodstuff most frequently consumed by outbreaks cases. These mixed foods were associated with a wide range of causative agents including bacteria, viruses, bacterial toxins and histamine.
- The number of **outbreaks implicating food of non-animal origin (FNAO)** reported in 2019 was **similar to those reported in recent years**. Outbreaks by FNAO (mainly vegetables) were larger, on average, compared with outbreaks caused by food of animal origin and were associated with the widest variety of causative agents, mainly norovirus, *Salmonella*, *Bacillus cereus* and *Cryptosporidium*.

Link provided on main landing page and on related EFSA web pages :  [Foodborne outbreaks reported in 2019](#)

<https://app.powerbi.com/view?r=eyJrIjoiaZTQzYWQ0ZmItNWRmOC00NmFmLTk1NjctODYxN2MxOGEyNzA1IiwidCI6ImM0ODdkZDVhLTM3NjktNDQyYy1hYjc3LTI5MTkwODFkODVmYyIsImMiOiJ9>



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Data Providers

EFSA Scientific Network for Zoonoses Monitoring Data

ECDC Food and Waterborne Diseases and Zoonoses Network, Emerging and Vector-borne Diseases Network and the Tuberculosis Network

AHAW Panel

BIOHAZ Panel

DG SANTE D4, G2 and G4

European Union Reference Laboratories

Animal Health

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