Monitoring of foodborne outbreaks caused by toxin-producing bacteria in the European Union

Giusi Amore

BIOCONTAM unit - European Food Safety Authority (EFSA)

OUTLINE

- **BACKGROUND**
- **DATA COLLECTION ON FOOD-BORNE OUTBREAKS (FBOs) IN EU**
- **MAIN FINDINGS FROM EU SUMMARY REPORT 2014**
  - *FOODBORNE OUTBREAKS CAUSED BY*
    - *BACTERIAL TOXINS*
    - *STEC*
- **RAPID OUTBREAK ASSESSMENT**

EFSA IS…

- the EU reference body for risk assessment regarding food and feed safety
- independent European agency
- covers the entire food chain – from field to fork
- committed to ensuring food and feed safety

efsa
European Food Safety Authority

SCIENTIFIC ADVICE FROM FIELD TO FORK

Plant Health

Plant Protection

Genetically modified organisms

Animal feed

Animal health and welfare

Biological hazards

Chemical contaminants

Food additives

Food packaging

Nutrition

BIOCONTAM UNIT – BIOLOGICAL MONITORING

- **Monitoring of zoonoses and zoonotic agents in food, animals and feed**
- **Monitoring of food-borne outbreaks**
- **Joint EFSA-ECDC Rapid Outbreak Assessments**

EU-WIDE MONITORING OF FBOs

- Reporting of FBOs mandatory since 2003
- Based on Zoonoses Directive 2003/99/EC
- Member States investigate FBOs in their territory
- Report annual data on monitoring FBOs
- EFSA's tasks
  - Data collection & analysis
  - Publication of the EU annual Summary Reports

EU ZOONOSES DATA COLLECTION

EU Member States and other reporting countries

Animal, food and feed monitoring — *Data Collection Framework (DCF)*

Foodborne outbreaks

Communicable human diseases — *The European Surveillance System (TESSy)*

Scientific Network for Zoonoses Monitoring Data

efsa European Food Safety Authority

ecdc EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

FWD and EVD Networks

SCIENTIFIC REPORT

EFSA Journal

APPROVED: 2 December 2015 PUBLISHED: 17 December 2015

doi:10.2903/j.efsa.2015.4329

The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2014

European Food Safety Authority

European Centre for Disease Prevention and Control

Abstract

This report of the European Food Safety Authority and the European Centre for Disease Prevention and Control presents the results of the zoonoses monitoring activities carried out in 2014 in 32 European countries (28 Member States (MS) and four non-MS). Campylobacteriosis was the most commonly reported zoonosis with an increase in confirmed human cases in the European Union (EU)

Joint EFSA-ECDC annual EU Summary Report (EUSR) on zoonoses and food-borne outbreaks

[Available online: www.efsa.europa.eu/efsajournal]

EU-WIDE MONITORING OF FBOs

- 2007
- 2010
- 2014

Harmonised specifications on the reporting of FBOs progressively applied in the EU

European Union Food-borne Outbreaks reporting System (EU-FORS)

Classification of the outbreaks

'strong evidence'

'weak evidence'

based on the strength of evidence implicating a food vehicle

EU-WIDE MONITORING OF FBOs

Information on FBOs to report

- **N outbreaks per causative agent**
- **N human cases**
- **N hospitalisations**
- **N deaths**
- **Type of FBO** (i.e. general/household)
- **Type food vehicle**
- **Food vehicle info**
- **Type of evidence** (strong or weak)
- **Place of exposure**
- **Place of origin**
- **Origin of the food vehicle**
- **Contributory factor** (e.g. cross-contamination, inadequate heat treatment, etc.)

Latest updated guidelines for reporting on FBOs published in 2016 (www.efsa.europa.eu/efsajournal)

EU-WIDE MONITORING OF FBOs

EU-FORS

Evaluation of the strength of evidence implicating a suspected food vehicle

- **Assessment of all available types of evidence**
  - **Microbiological** evidence
  - **Epidemiological** evidence
  - **Environmental** evidence
  - **Tracing-back** of the investigated foodstuffs

- ***The nature of evidence is not necessarily correlated with its strength***

References & definitions: EU-FORS guidance and the published manual for reporting on food-borne outbreaks

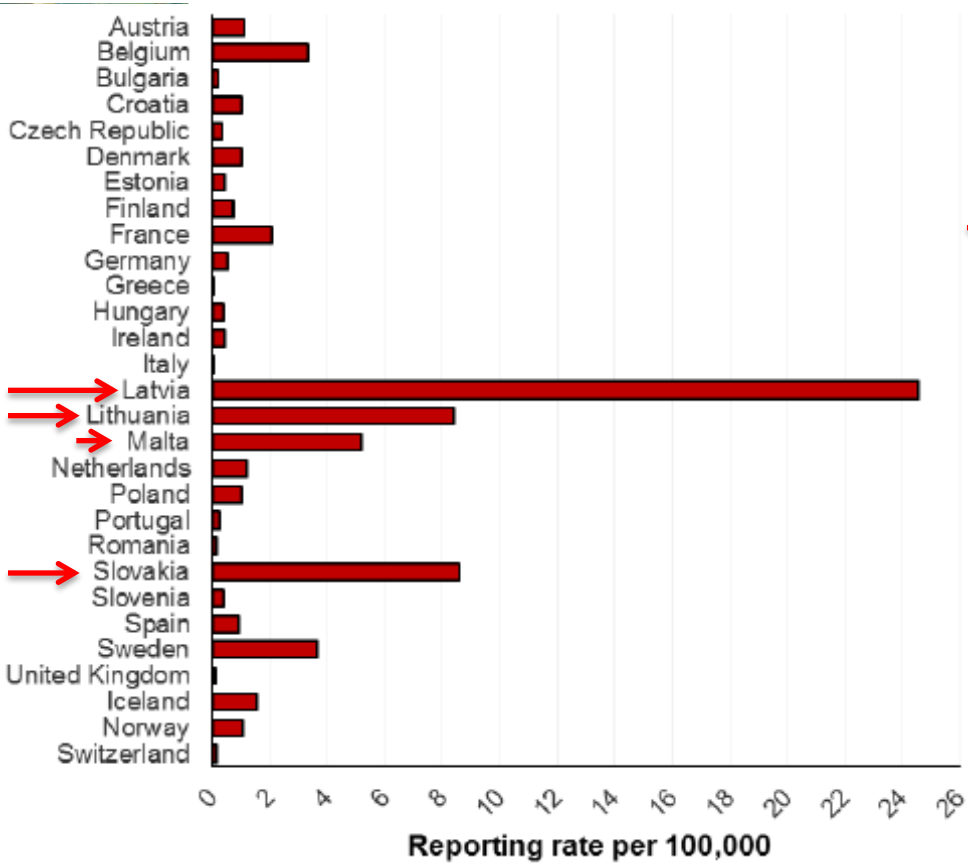
FOOD-BORNE OUTBREAKS (EUSR 2014)

- **Food-borne outbreak (FBO) investigation systems** at national level **non harmonised** among MS
  - Differences in the sensitivity of the surveillance systems for food-borne outbreaks in the different countries
- Some countries have implemented **changes in the national systems** over time
  - These aspects and limitations are to be considered when interpreting the results on the monitoring of foodborne outbreaks in the EU

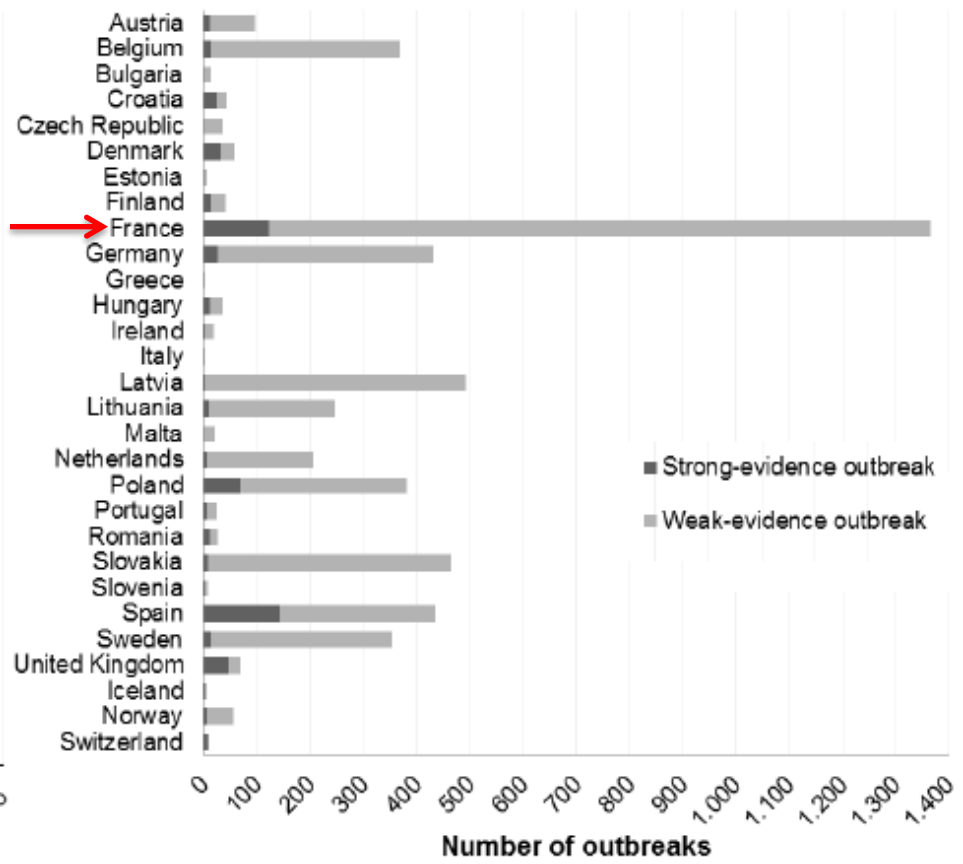
FOOD-BORNE OUTBREAKS (EUSR 2014)

In 2014, overall **5,251 food-borne outbreaks** reported by 26 EU MS → 45,665 human cases, 6,438 hospitalisations and 27 deaths

Reporting rate per 100,000 population



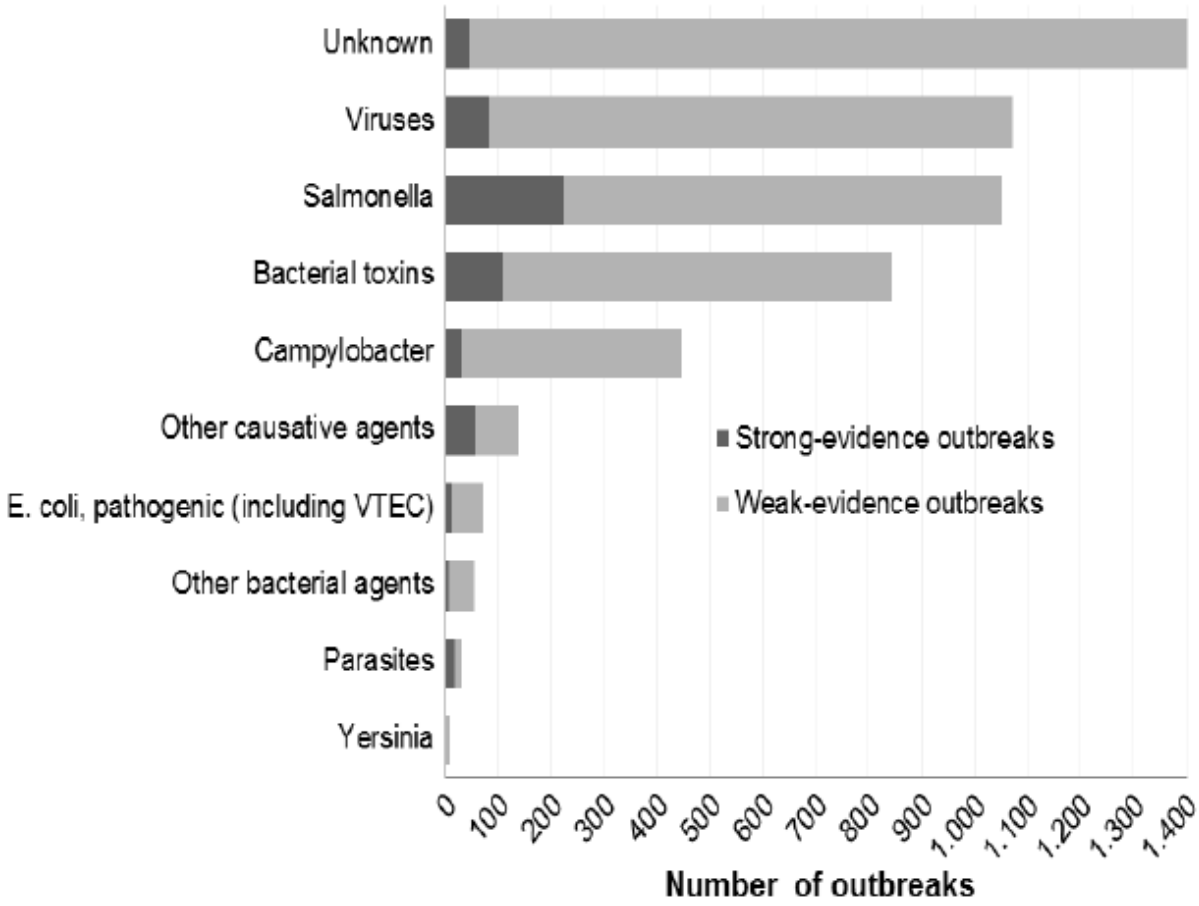
Distribution of the food-borne outbreaks



FOOD-BORNE OUTBREAKS (EUSR 2014)

Most food-borne outbreaks caused by **viruses**, followed by ***Salmonella***, **bacterial toxins** and ***Campylobacter***

→unknown causative agent in 29.1% of all outbreaks



FOOD-BORNE OUTBREAKS (EUSR 2014)

Food-borne outbreaks caused by bacterial* toxins (**Bacillus*, *clostridium*, *staphylococcus*)*

- **840 food-borne outbreaks** reported by 18 MS (excluding three water-borne outbreaks) →slight increased from 2013
- **3 water-borne outbreaks** (2 weak-evidence outbreaks by FR and 1 strong-evidence outbreak by ES)
- **10** outbreaks reported by the non-MS:
  - Iceland and Switzerland (3 strong-evidence outbreaks each), Norway (4 weak-evidence outbreaks)

- Mostly **general outbreaks** (less household outbreaks)

Causative agent	Strong-evidence outbreaks					Weak-evidence outbreaks					Total outbreaks	%
	Number	%	Cases	Hospitalised	Deaths	Number	%	Cases	Hospitalised	Deaths		
Bacterial toxins	109	18.41	3,026	187	3	734	15.75	6,342	405	2	843	16.05
E. coli, pathogenic – verotoxigenic *E. coli* (VTEC)	7	1.18	138	8	0	34	0.73	147	28	0	41	0.78

FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by *Bacillus* toxins

- In 2014, 12 Member States reported **287 food-borne outbreaks** caused by ***Bacillus* toxins** (5.5% of all outbreaks)
  - small increase (3.2%) compared with 2013, when 9 MS reported 278 *Bacillus* toxin outbreaks.

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	4	20	0	0	7	26	0	0	11	0.1
Czech Republic	0	0	0	0	1	110	110	0	1	0.01
Denmark	1	4	0	0	1	7	0	0	2	0.04
Finland	2	55	0	0	0	0	0	0	2	0.04
France	19	437	18	0	239	1,995	71	0	258	0.39
Germany	2	9	0	0	0	0	0	0	2	0
Hungary	1	170	15	0	0	0	0	0	1	0.01
Netherlands	2	9	0	0	0	0	0	0	2	0.01
Poland	0	0	0	0	2	152	11	0	2	0.01
Portugal	3	57	32	0	0	0	0	0	3	0.03
Spain	1	18	0	0	0	0	0	0	1	0
Sweden	0	0	0	0	2	4	0	0	2	0.02
Iceland	3	36	0	0	0	0	0	0	3	0.93
Norway	0	0	0	0	4	24	0	0	4	0.08
Switzerland	1	41	4	0	0	0	0	0	1	0.01
Total (MS)	35	779	65	0	252	2,294	192	0	287	0.09

FOOD-BORNE OUTBREAKS (EUSR 2014)

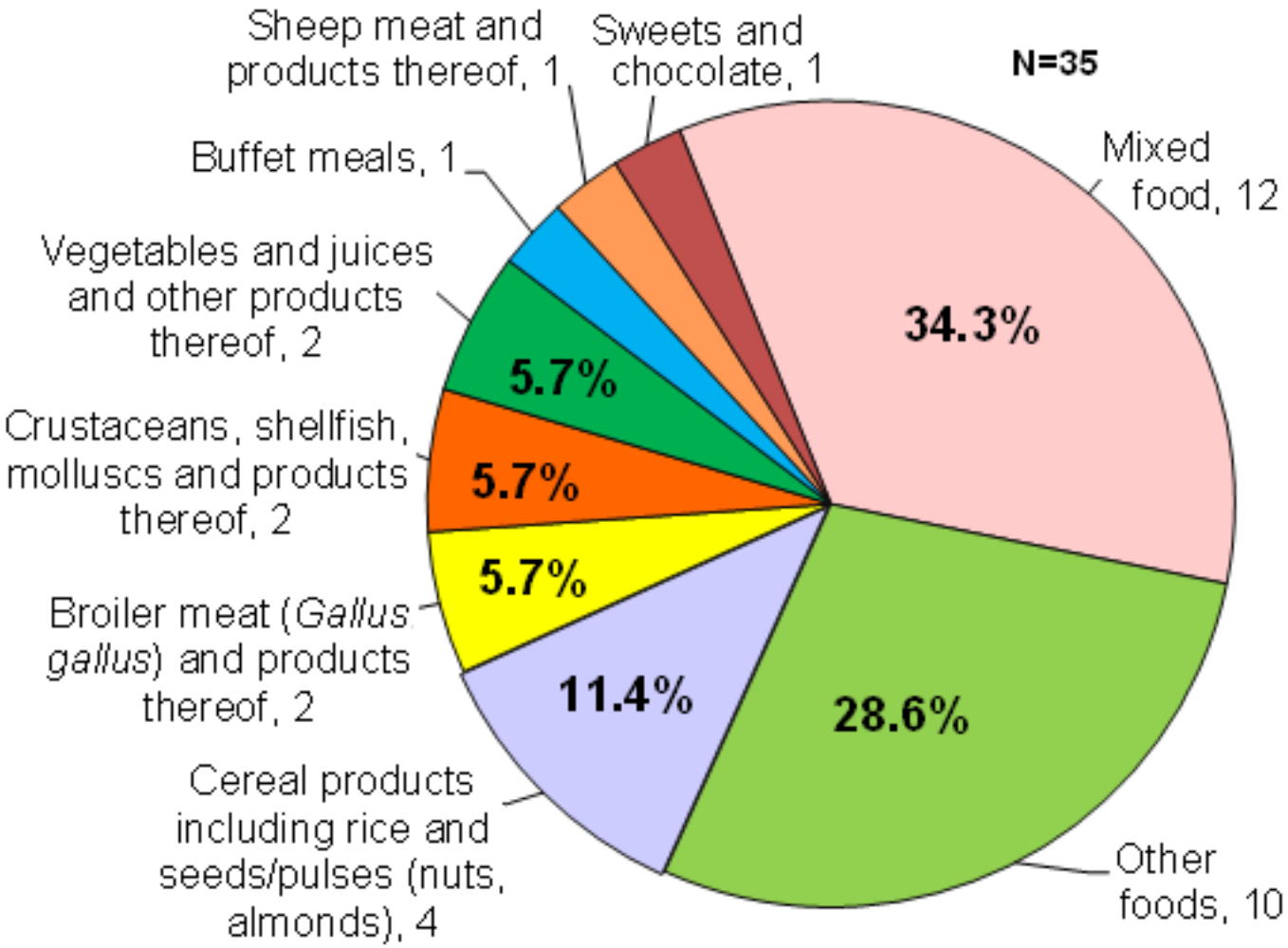
FBOs caused by *Bacillus* toxins

- **35 strong-evidence outbreaks reported**

- **Place of exposure**: mostly reported 'restaurant, café, pub, bar, hotel' and 'canteen or workplace catering' (six outbreaks each), followed by 'school and kindergarten' (four outbreaks). In 9 outbreaks reported as 'others'

FOOD-BORNE OUTBREAKS (EUSR 2014)

Distribution of FBOs caused by *Bacillus* toxins by food vehicle, 2014



FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by *Clostridium* toxins

- In 2014, 13 Member States reported **160 food-borne outbreaks** caused by ***Clostridium* toxins** (3.1% of all outbreaks)

  C. perfringens (124 outbreaks), ***C. botulinum*** (9 outbreaks) or **unspecified *Clostridia*** (27 outbreaks)

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	1	17	1	0	0	0	0	0	1	0.01
Denmark	2	461	0	0	4	63	0	0	6	0.11
Finland	1	67	0	0	0	0	0	0	1	0.02
France	15	421	0	0	99	1,304	18	0	114	0.17
Germany	2	62	20	0	0	0	0	0	2	0
Hungary	1	6	5	0	0	0	0	0	1	0.01
Lithuania	0	0	0	0	1	2	2	0	1	0.03
Poland	0	0	0	0	1	2	2	0	1	0
Portugal	1	30	1	0	1	2	1	0	2	0.02
Slovakia	0	0	0	0	2	5	5	0	2	0.04
Spain	9	456	8	2	6	120	0	0	15	0.03
Sweden	0	0	0	0	2	32	0	0	2	0.02
United Kingdom	10	207	1	1	2	28	1	0	12	0.02
Total (MS)	42	1,727	36	3	118	1,558	29	0	160	0.04

FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by *Clostridium* toxins

- **42 strong-evidence outbreaks reported**
- **Place of exposure**: mostly 'restaurant, café, pub, bar, hotel' (13), followed by 'residential institutions' (9) and 'household' (8)

5 strong-evidence outbreaks caused by *C. botulinum* toxins (by 4 MS)

→ 17 cases and 12 hospitalisations

→ All household outbreaks, except for one general outbreak

→ **Food vehicle**: 'canned food products' (2 outbreaks) and 'vegetables and juices and other products thereof' (2 outbreaks), 'other foods (1 outbreak)

FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by *Clostridium* toxins

37 strong-evidence outbreaks caused by *C. perfringens* toxins

→ 1710 cases, 24 hospitalisations, 3 deaths

Food vehicle: mostly 'bovine meat and products thereof' (6 outbreaks), 'other or mixed red meat and products thereof' (5 outbreaks) and 'mixed foods' (4 outbreaks).

In addition, **1 strong-evidence water-borne outbreak** reported by Spain, which involved 22 cases

FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by staphylococcal toxins

- In 2014, 12 Member States reported **393 food-borne outbreaks** caused by **staphylococcal toxins** (7.5% of all outbreaks)
- In addition, **Switzerland** reported **2 strong-evidence outbreaks** caused by staphylococcal enterotoxins

Country	Strong-evidence outbreaks				Weak-evidence outbreaks				Total outbreaks	Reporting rate per 100,000
	Number	Cases	Hospitalised	Deaths	Number	Cases	Hospitalised	Deaths		
Belgium	2	22	11	0	2	17	0	0	4	0.04
Croatia	4	37	10	0	0	0	0	0	4	0.09
Czech Republic	0	0	0	0	1	54	15	0	1	0.01
France	9	56	6	0	343	2,268	147	0	352	0.54
Germany	3	42	7	0	0	0	0	0	3	0
Hungary	2	20	3	0	1	33	7	0	3	0.03
Latvia	1	15	14	0	1	4	4	0	2	0.1
Portugal	2	106	22	0	0	0	0	0	2	0.02
Romania	1	24	8	0	0	0	0	0	1	0
Slovakia	0	0	0	0	1	20	2	0	1	0.02
Spain	5	70	5	0	13	58	3	2	18	0.04
United Kingdom	2	106	0	0	0	0	0	0	2	0
Switzerland	2	20	0	0	0	0	0	0	2	0.02
Total (MS)	31	498	86	0	362	2,454	178	2	393	0.12

FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by staphylococcal toxins

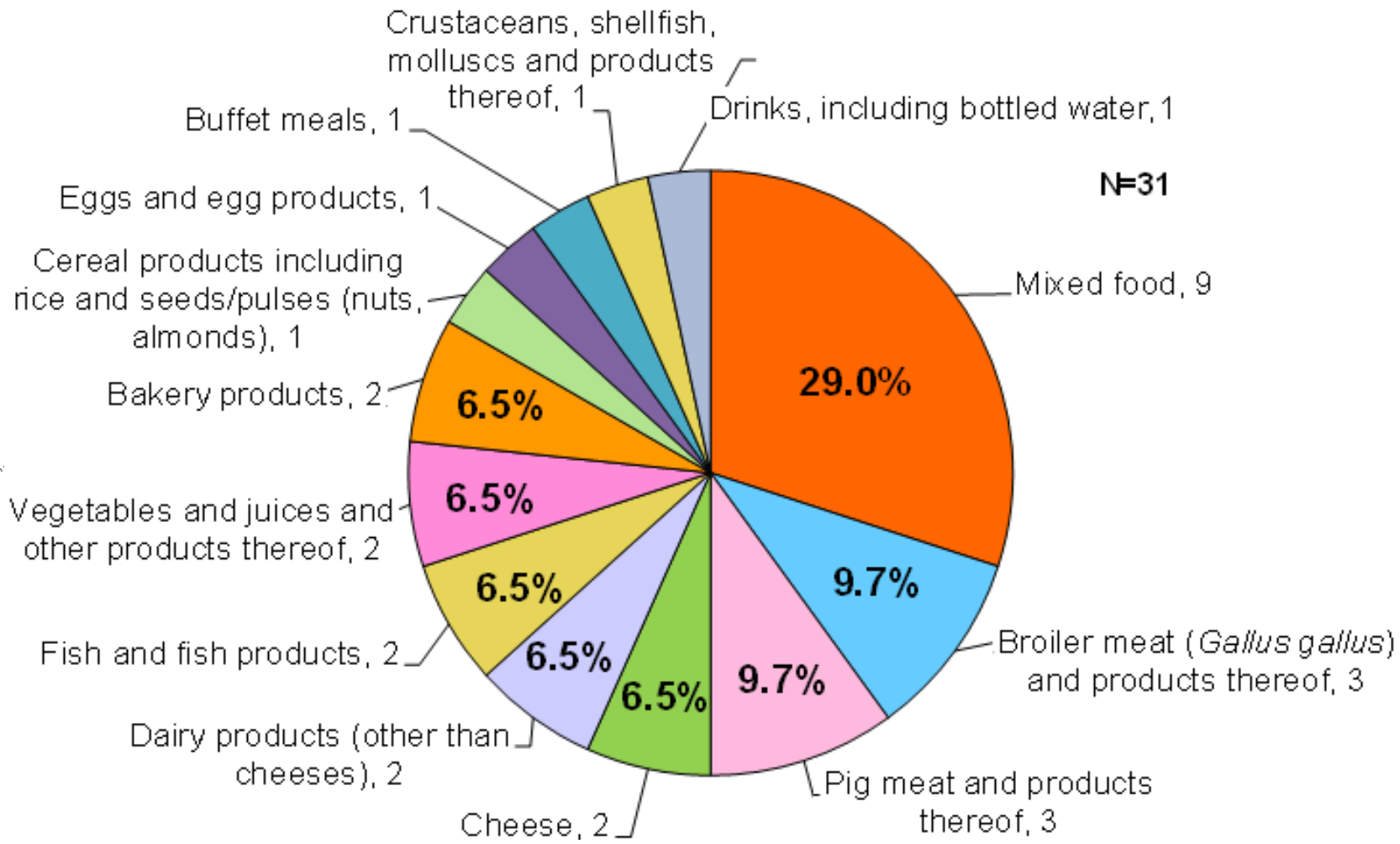
- **Only 31 strong-evidence outbreaks reported**, less than 2013 (94 strong-evidence outbreaks)

- **Type of outbreaks**:
  - 18 general outbreaks,
  - 12 household outbreaks

- **Place of exposure**: 'household' (10), 'restaurant, café, pub, bar, hotel' (7), 'school or kindergarten' (3), 'camp or pic nic' (3), residential institutions (2), others (3)

FOOD-BORNE OUTBREAKS (EUSR 2014)

Distribution of FBOs caused by staphylococcal toxins by food vehicle, 2014



FOOD-BORNE OUTBREAKS (EUSR 2014)

FBOs caused by Shiga-toxin producing *E. coli, STEC*

- In 2014, 13 Member States reported **38 STEC outbreaks** involving 270 human cases, of which 34 hospitalised
- Only **5 strong-evidence outbreaks** reported by 3 MSs (DE, ES, UK):
  - 3 outbreaks associated with consumption of **milk** (mainly raw milk)
  - 2 outbreaks associated with **vegetables** (bagged ready to eat salad and bagged rocket leaves).

In addition, **3 STEC waterborne outbreaks** involving 15 human cases were reported by 3 Member States (ES, Finland, Ireland)

Joint EFSA-ECDC Rapid Outbreak Assessments

An example of collaboration between EFSA and the European Centre for Disease Prevention and Control (ECDC) and EU Member States

Integrated approach to protect consumers

MAIN CONCLUSIONS

- **Importance of adopting an integrated approach to food safety, engaging all the actors in the food chain, and making optimal use of scientific expertise**

- **Prevention / risk reduction of food-borne diseases**

  ✓ **Safe handling of raw meat and other raw food ingredients**, thorough **cooking** and **good kitchen hygiene** can prevent or reduce the risk posed by micro-organisms causing food-borne diseases

FIVE KEYS TO SAFER FOOD (WHO)

Thank you for your attention!

Giusi Amore

Unit of Biological Hazards and Contaminants (BIOCONTAM)
Risk Assessment and Scientific Assistance Department
European Food Safety Authority (EFSA)
Parma, Italy
Email: giusi.amore@efsa.europa.eu

efsa
European Food Safety Authority

www.efsa.europa.eu