UNIVERSITÀ CATTOLICA del Sacro Cuore

Metodologie e innovazione nel tracciamento e nei controlli della qualità dei prodotti alimentari

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Food Safety: quali conseguenze per il settore alimentare?

Costi - Reputazione
Risarcimenti
GDO
Consumers' choice

Tecnologie Innovazione
Mitigazione
Nuove tecnologie
Disciplinari DOP

Salute dei conumatori
Morbidità e Mortalità

Richiami e Ritiri
Autorità competente
Retail
Media
FSMS

OUTBREAKS

RAW FARM cheddar cheese linked to E. coli outbreak

The dairy's products have been linked to other outbreaks of foodborne illnesses in recent years

by CORAL BEACH

FSN Food Safety News

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OUTBREAKS

France hit by deadly Listeria outbreak

Drôme Ardèche Tradition has recalled products

by JOE WHITWORTH

One of the recalled products

FSN | Food Safety News

WORLD

Dried fruit linked to serious E. coli outbreak

Nineteen children developed hemolytic uremic syndrome (HUS)

by JOE WHITWORTH

OUTBREAKS

Outbreak of botulism traced to ByHeart infant formula declared over

First patient became sick in December 2023

by CORAL BEACH

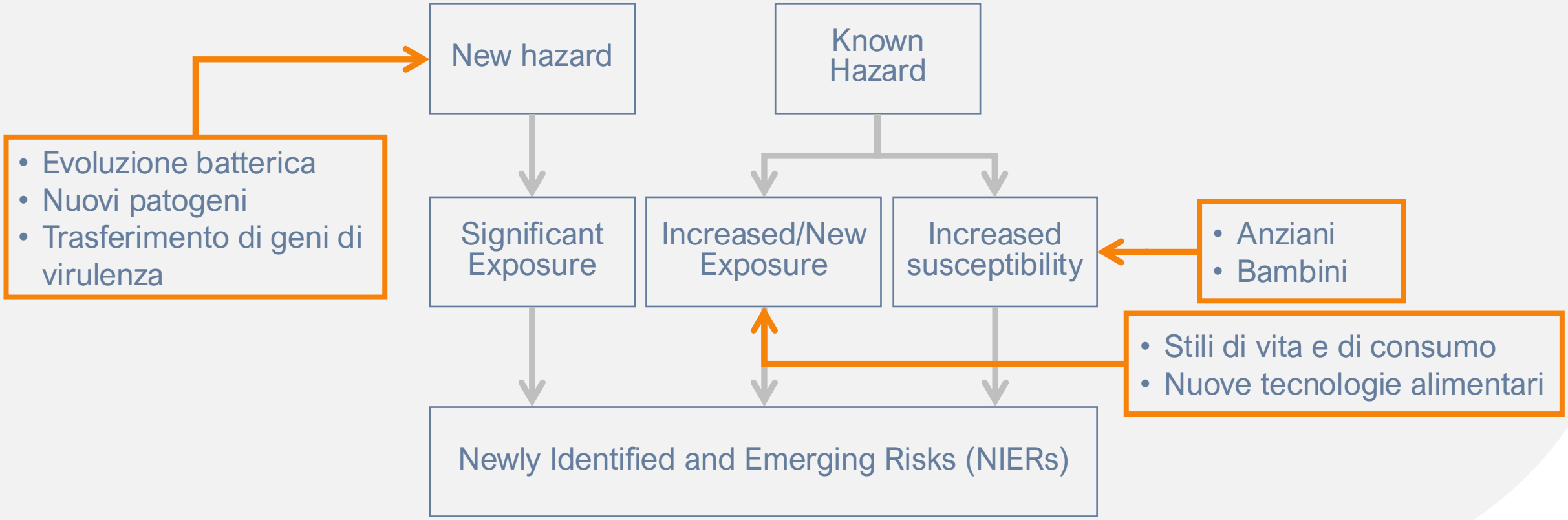
Published: February 26, 2026, 9:17 pm
↳ Last updated: February 26, 2026, 10:06 pm

Innovazione nel tracciamento e nei controlli della sicurezza e qualità

- **Globalizzazione** delle filiere agroalimentari
- Aumento dei **rischi emergenti**
- Necessità di sistemi rapidi, sensibili
- Vulnerabilità (VACCP) – **Frodi**
- Passaggio da controlli reattivi a approcci predittivi e integrati
- Concetto chiave: **from testing to monitoring & prediction**

Rischi alimentari emergenti nel settore

- un rischio derivante da un nuovo pericolo con una un'esposizione significativa,
- una nuova o maggiore esposizione e/o suscettibilità a un pericolo noto.



Tecnologie Innovative (elenco non esaustivo)

- Next Generation Sequencing (NGS) per analisi del microbioma e source tracking
- Microfluidica (lab-on-a-chip) per analisi microbiologiche rapide
- Digital PCR (dPCR) per quantificazione assoluta ad alta sensibilità
- DNA barcoding e metabarcoding per autenticità e tracciabilità
- LC-MS/MS ad alta risoluzione (HRMS) per screening multi-residuo
- Metabolomica target e non-target
- Spettroscopia NIR/MIR/FTIR portatile per analisi in linea
- Isotope Ratio Mass Spectrometry (IRMS) per autenticità geografica
- Data integration & AI
- Foodomics (integrazione multi-omica)
- Blockchain per tracciabilità sicura e trasparente
- Lab-on-a-chip integrati multi-parametrici
- Tecniche rapid testing point-of-care

efsa
EUROPEAN FOOD SAFETY AUTHORITY

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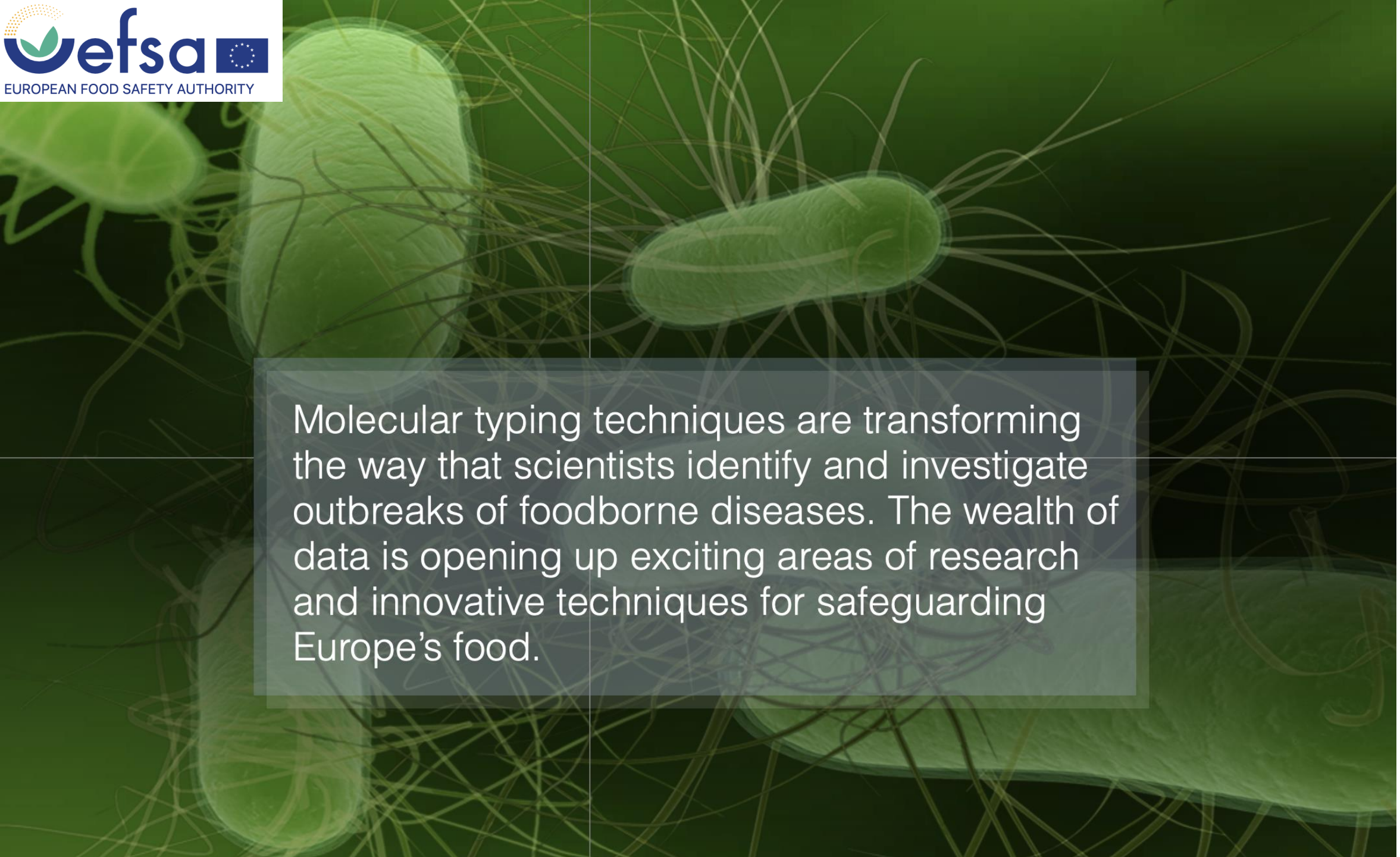
GENOMICS

OUTBREAK INVESTIGATION

Increasingly, scientists are using a technique called molecular typing or DNA fingerprinting to investigate foodborne outbreaks and pinpoint their source. This technique is also used in forensic medicine.



EUROPEAN FOOD SAFETY AUTHORITY

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Molecular typing techniques are transforming the way that scientists identify and investigate outbreaks of foodborne diseases. The wealth of data is opening up exciting areas of research and innovative techniques for safeguarding Europe's food.

Human cases [EU, 2024]

Notification rate (per 100,000 population) 0.69 | Trend (2020-2024) ↑ Increasing ↓ Decreasing — Stable

3041 Cases of illness

- 2062 Infections acquired in the EU
- 14 Infections acquired outside the EU
- 965 Unknown travel status or unknown country of infection
- 1715 Hospitalisations (97.3%)*
- 301 Deaths (15.6%)*

* The percentages are calculated on the number of cases with information available (for further details see Table 2)

ECDC data

Foodborne outbreaks & related cases [EU, 2024]

- 38 Foodborne outbreaks
  - 14 Strong-evidence outbreaks
  - 24 Weak-evidence outbreaks
- 210 Cases of illness
- 149 Hospitalisations (72.3%)*
- 17 Deaths (8.1%)*

* The percentages are calculated on the number of cases with information available (for further details see Table 2)

	N of outbreaks	N of outbreaks per 100,000 population **	N of outbreak cases per 100,000 population
Austria	1	AT 0.011	AT 0.044
Belgium	8	BE 0.068	BE 0.228
Bulgaria	0	BG 0	BG 0
Croatia	0	HR 0	HR 0
Cyprus	0	CY 0	CY 0
Czechia	1	CZ 0.009	CZ 0.092
Denmark	6	DK 0.101	DK 0.403
Estonia	0	EE 0	EE 0
Finland	3	FI 0.054	FI 0.625
France	1	FR 0.001	FR 0.038
Germany	5	DE 0.006	DE 0.013
Greece	0	EL 0	EL 0
Hungary	0	HU 0	HU 0
Ireland	1	IE 0.019	IE 0.056
Italy	8	IT 0.014	IT 0.095
Latvia	0	LV 0	LV 0
Lithuania	0	LT 0	LT 0
Luxembourg	0	LU 0	LU 0
Malta	0	MT 0	MT 0
Netherlands	1	NL 0.006	NL 0.022
Poland	1	PL 0.003	PL 0.011
Portugal	0	PT 0	PT 0
Romania	0	RO 0	RO 0
Slovakia	0	SK 0	SK 0
Slovenia	0	SI 0	SI 0
Spain	1	ES 0.002	ES 0.004
Sweden	1	SE 0.009	SE 0.038
UK (N. Ireland)	0	XI 0	XI 0

Implicated food vehicles (Strong-evidence outbreaks)

Top food vehicles

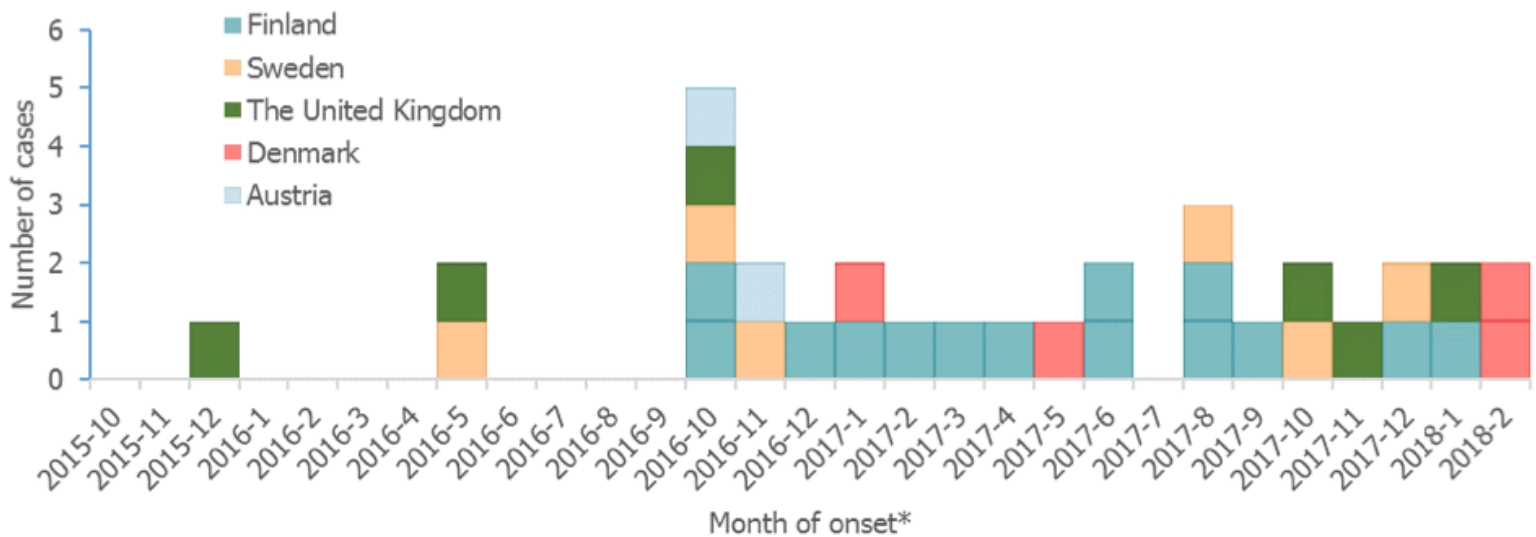
- Vegetables and juices and other products thereof — 3 Outbreaks
- Mixed food — 3 Outbreaks
- Fish and fish products — 3 Outbreaks
- Pig meat and products thereof — 2 Outbreaks
- Cheese, Dairy products other than cheeses, Meat and meat products, unspecified — 1 Outbreak (each)

** Differences among countries shall be interpreted with caution as this indicator depends on several factors including the type of outbreaks under surveillance and does not necessarily reflect the level of food safety in each country.

EFSA data

FIGURE 11 Trend in reported confirmed human cases of listeriosis in the EU by month, 2020–2024.
Source: Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Figure 1. ***Listeria monocytogenes*** **PCR serogroup IVb, ST6 confirmed outbreak cases by month of symptoms onset*, European Union 2015–2018 (n=32)**



**If month of onset missing: month of sampling or month of receipt in reference laboratory*

JOINT ECDC-EFSA RAPID OUTBREAK ASSESSMENT

Prolonged multi-country outbreak of *Listeria monocytogenes* ST1607 linked to smoked salmon products

25 April 2024

Figure 1. Distribution of confirmed cases of *L. monocytogenes* ST1607 CC14 infection by country and year, as of 22 April 2024

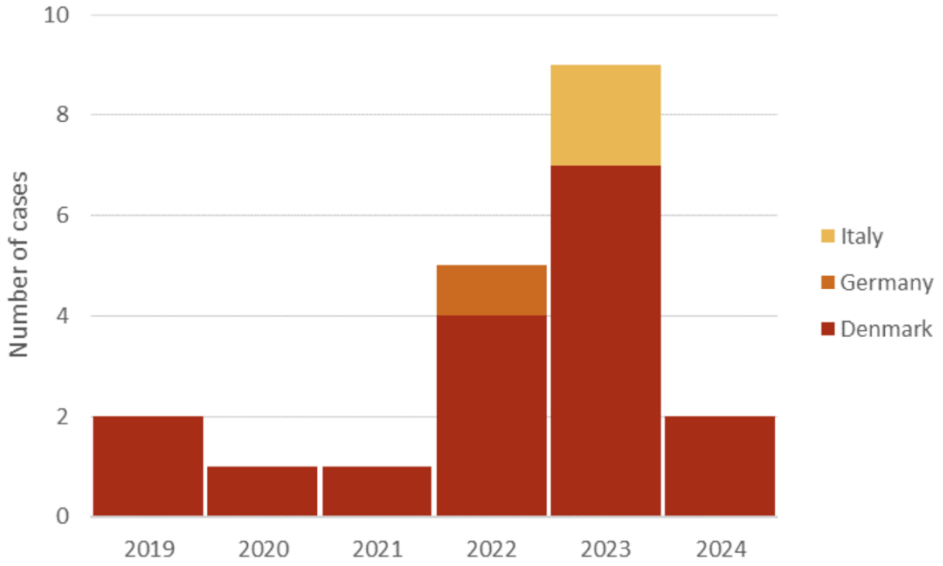
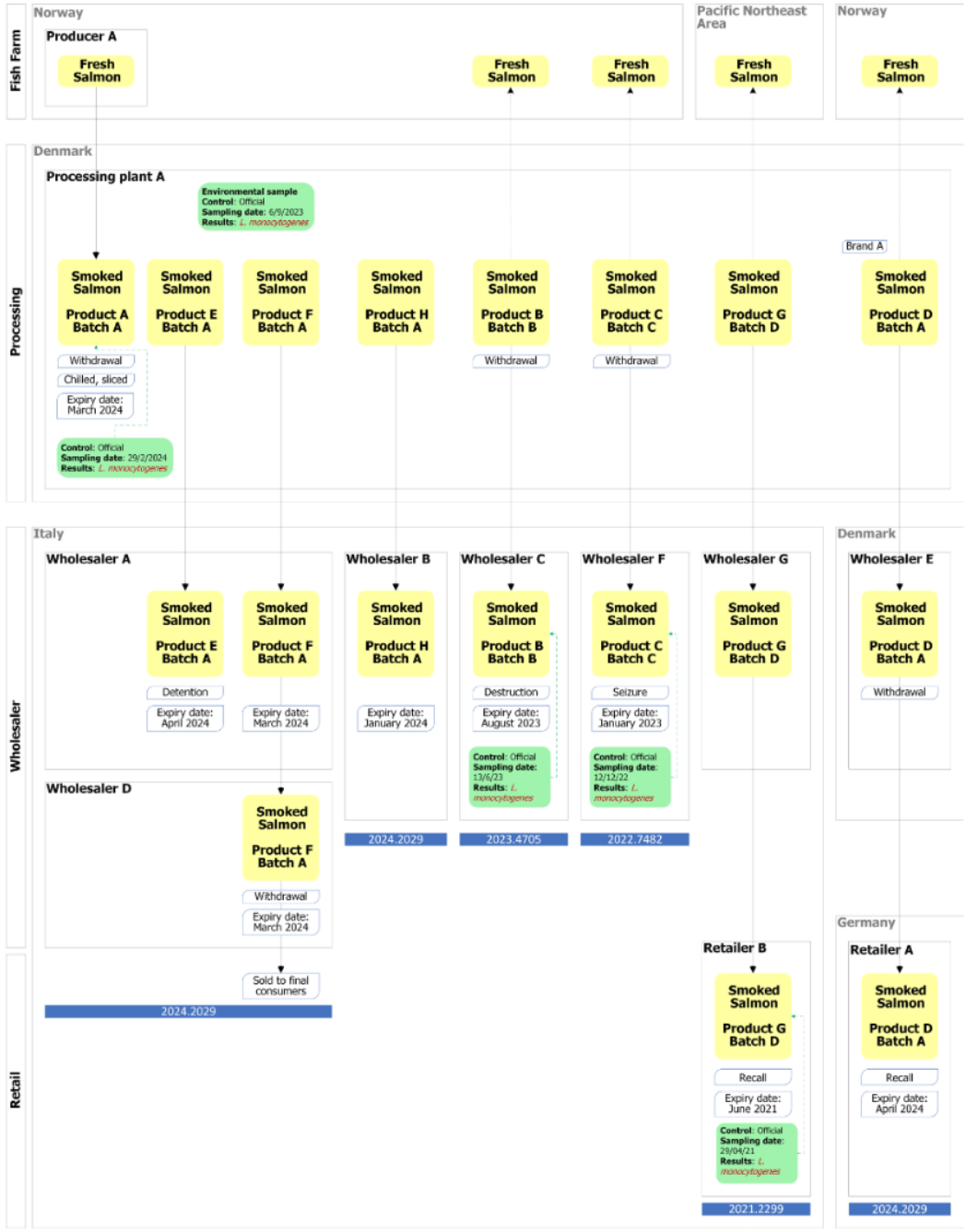


Figure 2. Graphical representation of traceability and microbiological analysis of the smoked salmon products manufactured at the Danish Processing plant A as reported by the countries involved under RASFF Alert Notifications 2024.2029, 2023.4705, 2022.7482, and 2021.2299



Eurosurveillance

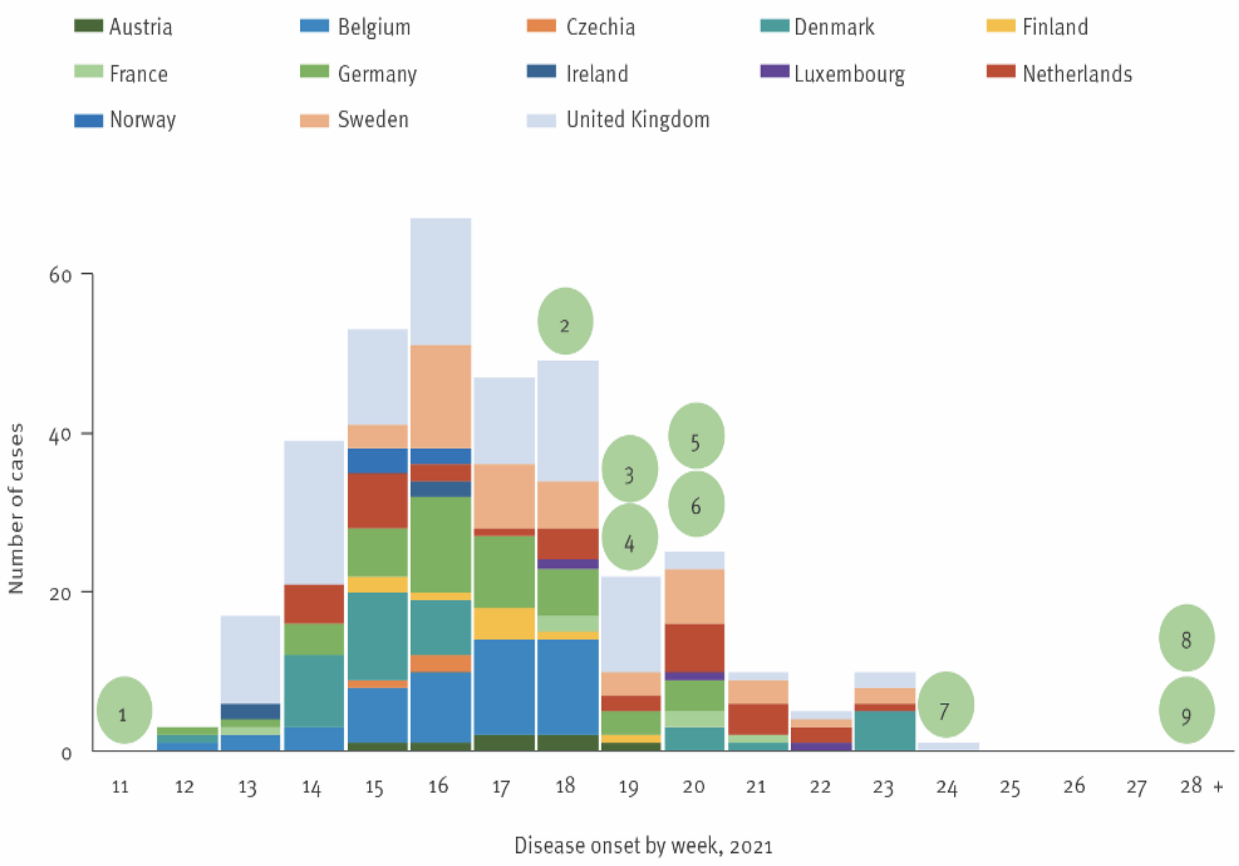
Home / Eurosurveillance / Volume 29, Issue 1, 04/Jan/2024 / Article

Outbreaks

Open Access

Multinational collaboration in solving a European *Salmonella* Braenderup outbreak linked to imported melons, 2021

Hannah L Moore[1,2,*], Martine Aabye[3,4,5,*], Ann Hoban[2], Bettina Rosner[6], Stine K Lefevre[4], Eva Litrup[4], Luise Müller[2], Steen Ethelberg[4,7], Sandra Simon[8], Sooria Balasegaram[8], Lesley Larkin[2], Cecilia Jernberg[9], Johanna Takkinen[9], EU/EEA/UK S. Braenderup Outbreak Investigation Group[10]



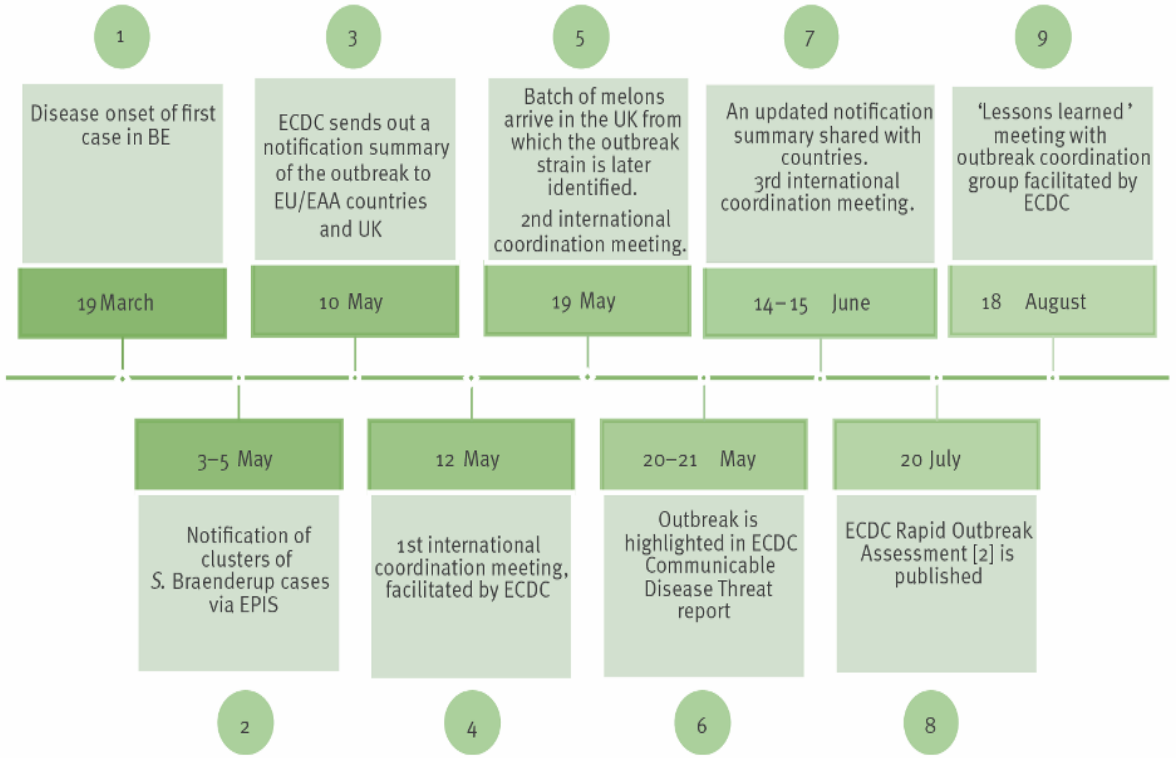
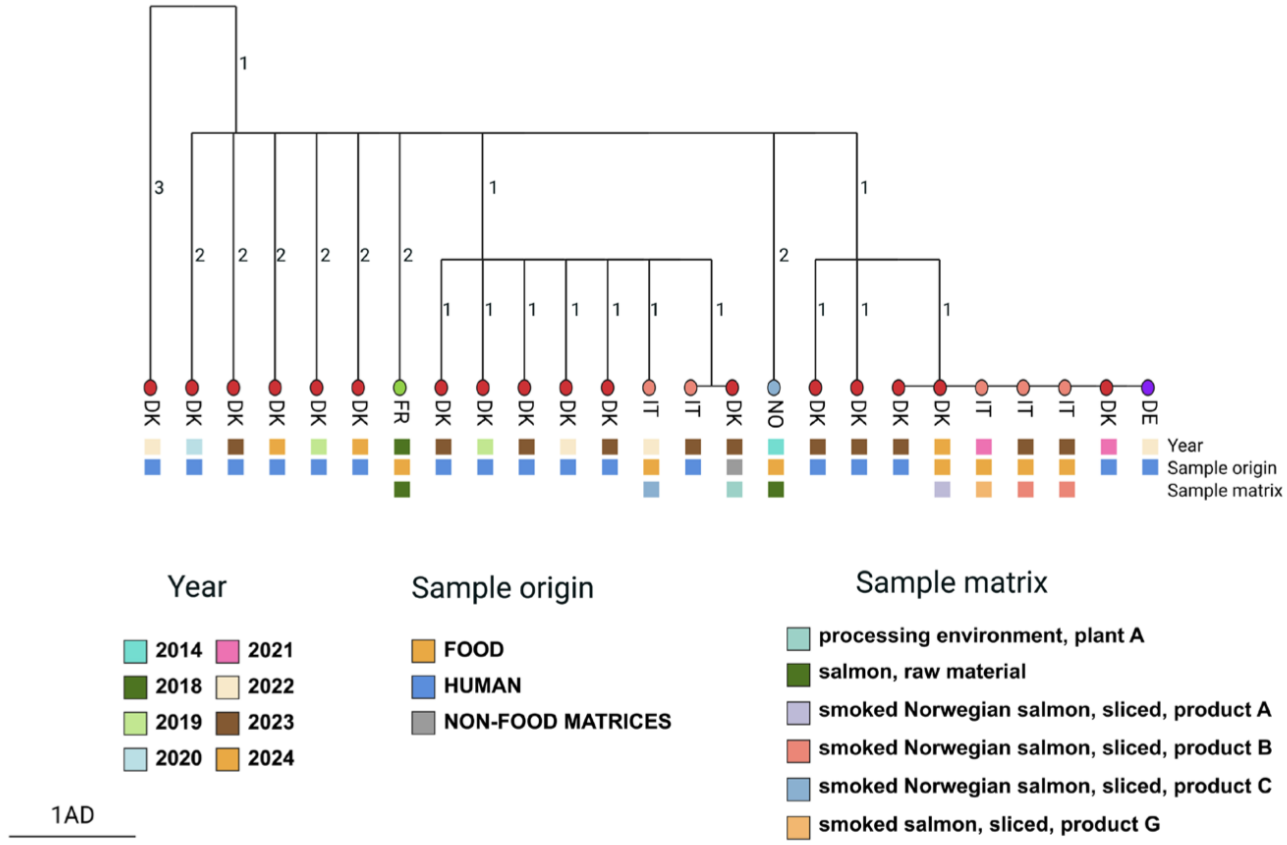


Figure 3. Single linkage clustering tree of 17 human and eight non-human *L. monocytogenes* ST1607 isolates by country, year, sample origin, and sample matrix in the molecular typing tool in EpiPulse (cluster code: 2023-08.LIST.60.), as of 22 April 2024



Source: *ROA Listeria monocytogenes ST1607 linked to fish products (microreact.org)*

Figure 4. cgMLST-based minimum spanning tree of 17 human and eight non-human *L. monocytogenes* ST1607 isolates by sample origin, as of 22 April 2024

Human cases [EU, 2024]

Notification rate (per 100,000 population) 3.5

Trend (2020-2024) ↑ Increasing ↓ Decreasing — Stable

11,738 Cases of illness

- **7221** Infections acquired in the EU
- **684** Infections acquired outside the EU
- **3833** Unknown travel status or unknown country of infection
- **1411** Hospitalisations (35.7%)*
- **25** Deaths (0.31%)*

* *The percentages are calculated on the number of cases with information available (for further details see Table 2)*

ECDC data

Foodborne outbreaks & related cases [EU, 2024]

- **31** Foodborne outbreaks
  - **4** Strong-evidence outbreaks
  - **27** Weak-evidence outbreaks
- **158** Cases of illness
- **19** Hospitalisations (12.2%)*

* *The percentages are calculated on the number of cases with information available (for further details see Table 2)*

	N of outbreaks	N of outbreaks per 100,000 population **	N of outbreak cases per 100,000 population
Austria	0	AT 0	AT 0
Belgium	4	BE 0.034	BE 0.118
Bulgaria	0	BG 0	BG 0
Croatia	0	HR 0	HR 0
Cyprus	0	CY 0	CY 0
Czechia	0	CZ 0	CZ 0
Denmark	3	DK 0.050	DK 0.302
Estonia	0	EE 0	EE 0
Finland	1	FI 0.018	FI 0.071
France	3	FR 0.004	FR 0.019
Germany	7	DE 0.008	DE 0.020
Greece	1	EL 0.010	EL 0.019
Hungary	0	HU 0	HU 0
Ireland	3	IE 0.056	IE 0.336
Italy	1	IT 0.002	IT 0.005
Latvia	0	LV 0	LV 0
Lithuania	0	LT 0	LT 0
Luxembourg	0	LU 0	LU 0
Malta	4	MT 0.710	MT 1.420
Netherlands	1	NL 0.006	NL 0.028
Poland	2	PL 0.005	PL 0.147
Portugal	0	PT 0	PT 0
Romania	0	RO 0	RO 0
Slovakia	0	SK 0	SK 0
Slovenia	0	SI 0	SI 0
Spain	0	ES 0	ES 0
Sweden	0	SE 0	SE 0
UK (N. Ireland)	1	XI 0.052	XI 0.104

Implicated food vehicles (Strong-evidence outbreaks)

Top food vehicles

- **Water** — 2 Outbreaks
- **Bovine meat and products thereof** — 1 Outbreak
- **Milk** — 1 Outbreak

** *Differences among countries shall be interpreted with caution as this indicator depends on several factors including the type of outbreaks under surveillance and does not necessarily reflect the level of food safety in each country.*

EFSA data

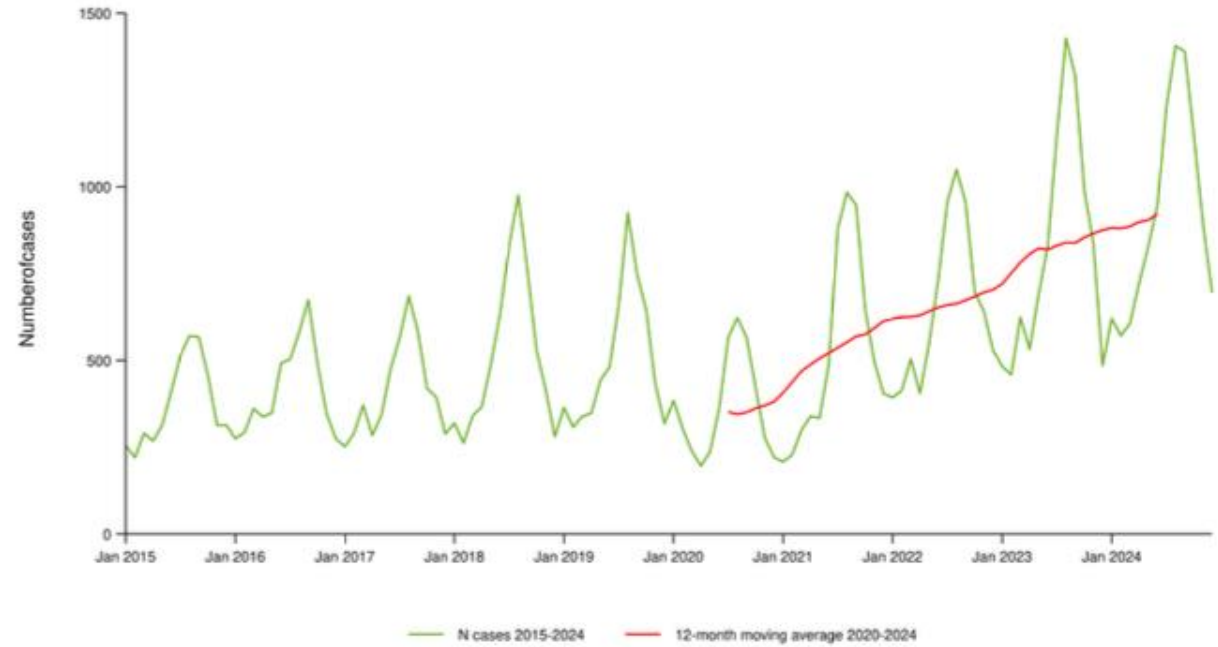


FIGURE 12 Trend in reported confirmed human cases of Shiga toxin-producing *Escherichia coli* (STEC) infection in the EU by month, 2020–2024. *Source:* Austria, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Shiga Toxins *E. coli* - STEC

2020 → + 7292 cases → 2024

Human cases

Notification rate (per 100,000 population) 1.49

Trend (2016–2020) —

Increasing / Decreasing / Stable

4,446 Cases of illness

- 3,327 Infections acquired in the EU
- 148 Infections acquired outside the EU
- 971 Unknown travel status or unknown country of infection
- 652 Hospitalisations
- 13 Deaths

Human cases in foodborne outbreaks

34 Foodborne outbreaks

- 5 Strong-evidence outbreaks
- 29 Weak-evidence outbreaks

208 Cases of illness

- 30 Hospitalisations
- 1 Death

Human cases [EU, 2024]

Notification rate (per 100,000 population) 3.5

Trend (2020-2024) ↑

Increasing / Decreasing / Stable

11,738 Cases of illness

- 7221 Infections acquired in the EU
- 684 Infections acquired outside the EU
- 3833 Unknown travel status or unknown country of infection
- 1411 Hospitalisations (35.7%)*
- 25 Deaths (0.31%)*

* The percentages are calculated on the number of cases with information available (for further details see Table 2)

ECDC data

Foodborne outbreaks & related cases [EU, 2024]

31 Foodborne outbreaks

- 4 Strong-evidence outbreaks
- 27 Weak-evidence outbreaks

158 Cases of illness

- 19 Hospitalisations (12.2%)*

* The percentages are calculated on the number of cases with information available (for further details see Table 2)

Top food vehicles

Dairy products (other than cheeses)
3 Outbreaks

Cheese
2 Outbreaks

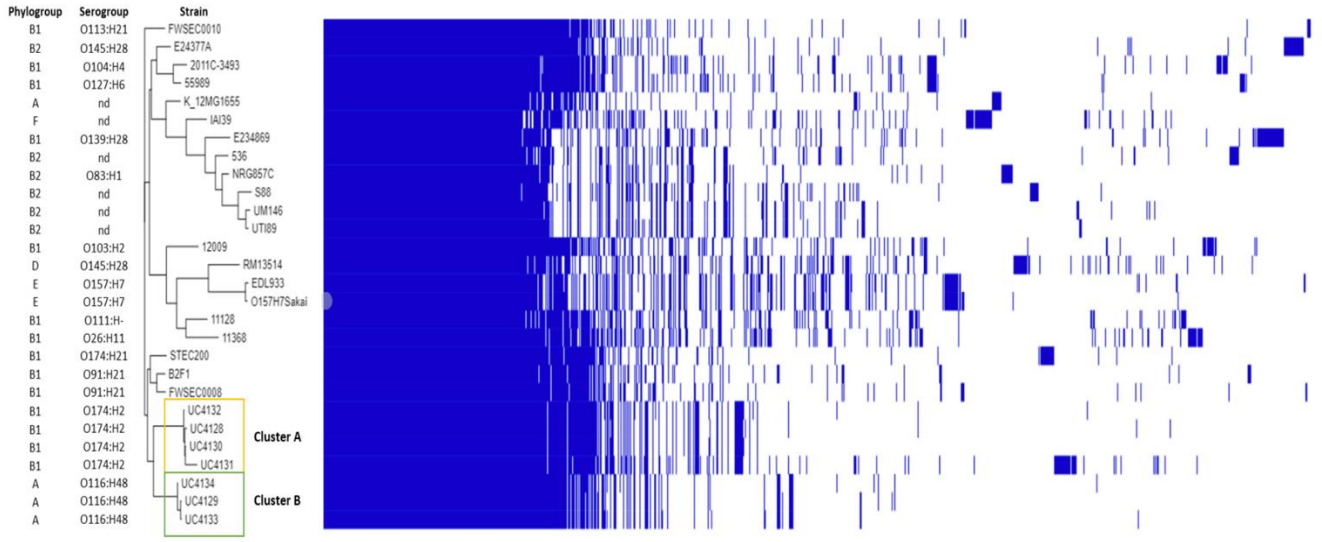
STEC da prodotti a latte crudo italiani

frontiers in Microbiology

ORIGINAL RESEARCH
published: 01 February 2021
doi: 10.3389/fmicb.2020.629189

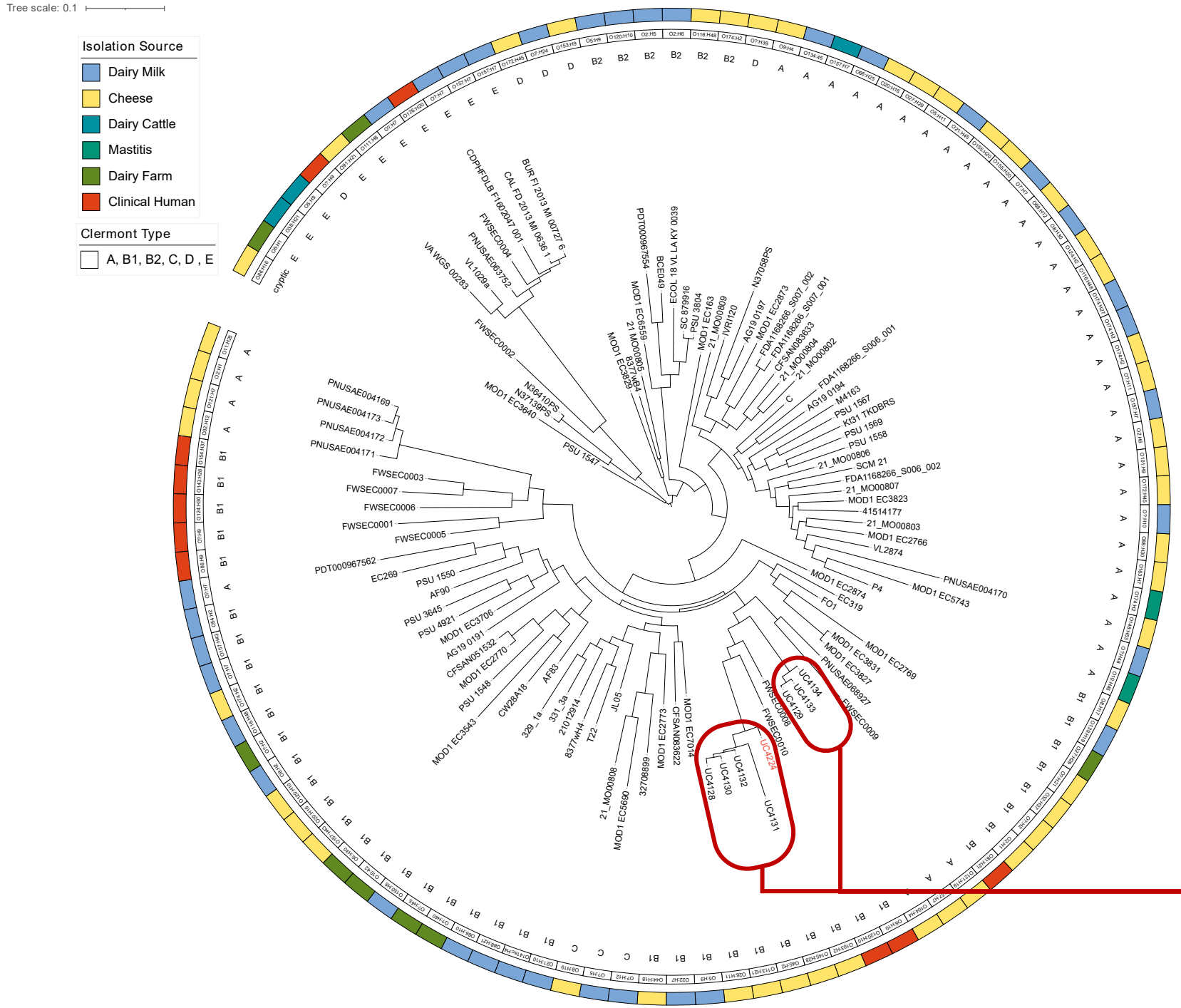
Genomic Investigation of Virulence Potential in Shiga Toxin *Escherichia coli* (STEC) Strains From a Semi-Hard Raw Milk Cheese

*Claudia Cortimiglia, Maria Francesca Borney, Daniela Bassi and Pier Sandro Cocconcelli**



		STEC		ADHERENCE								SERUM RESISTANCE		HAEMO LYSIN	SPATE			
Serogroup	Strain	*stx1*	*stx2*	*lpf*	*ompT*	*papC*	*iha*	*saa*	*sab*	*hra1*	*hes*	*iss*	*traT*	*ehxA*	*espP*	*sepA*	*epeA*	*lesP*
O174:H2	UC4128																	
O174:H2	UC4130																	
O174:H2	UC4131																	
O174:H2	UC4132																	
O116:H48	UC4129																	
O116:H48	UC4133																	
O116:H48	UC4134																	

FIGURE 2 | Virulence gene pattern analyzed in this study. The presence of virulence genes is identified with gray cells, the absence with white cells. Other virulence determinants involved in adherence (*tia* and *eibG*) and markers of *E. coli* pathotypes [EHEC/EPEC (*eae*), EIEC (*ipaH*), ETEC (*elt* and *est*), and EAEC (*aggR*, *aatA*, *aaiC*)] resulted absent in all the Shiga-toxin producing *Escherichia coli* (STEC) strains.



Phylogenomics of STEC isolates

Italian raw milk cheese isolates

European Commission

24 February 2026

Health and Food Safety
Directorate-General

eNews

Food Safety

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Infant formula: the Commission reinforces controls on imports from China

Following a positive opinion from the Member States, today, the European Commission has adopted a reinforcement of the controls on the imports of arachidonic acid oil from China used in the manufacture of infant formula.

Since last December, notifications in the Rapid Alert System for Food and Feed (RASFF), together with follow-up investigations carried out by the competent authorities of the Member States concerned, have identified the presence of the toxin cereulide in arachidonic acid oil, coming from China, used in the production of infant formula which has led to recalls by various food companies.

As from 26/02/2026, imports of arachidonic acid oil from China, will be subject to special conditions upon the entry into the Union. Every consignment of arachidonic acid oil originating in China will have to be presented at Border Control Posts (BCP) of the Member States, where they will be subject to documentary checks and – at a 50% frequency – to physical and identity checks. In addition, every consignment will have to be accompanied by a results of laboratory analyses and an official certificate, issued by China, stating that the results of sampling and analyses show the absence of cereulide toxin.

The Commission now calls on Member States to fully implement these measures.

Date of publication: 6 March 2026

European outbreak case definition

In order to harmonise the investigations related to the cereulide contamination of infant formula products (EpiPulse event 2025-FWD-00107), the following European outbreak case definition is proposed:

A possible outbreak case:
An infant presenting with acute gastrointestinal symptoms, with vomiting as the predominant symptom but diarrhoea also possible, from October 2025 and onwards. Onset within eight hours* after consumption of any infant formula product, and with no other cases of gastrointestinal infection in the household within two days before and after the onset of symptoms, and with no other GI pathogens detected in stool samples from the infant.

A probable outbreak case:
An infant presenting with acute gastrointestinal symptoms, with vomiting as the predominant symptom but diarrhoea also possible, from October 2025 and onwards, onset within eight hours* after consumption of a recalled infant formula product.

A confirmed outbreak case:
An infant presenting with acute gastrointestinal symptoms, with vomiting as the predominant symptom but diarrhoea also possible, from October 2025 and onwards, onset within eight hours* after consumption of any infant formula product,

AND

1. Detection of cereulide in stool samples from the infant
   OR
2. Detection of cereulide in the same batch of infant formula as the one consumed by the infant

Precautionary global recall of infant nutrition products following detection of *Bacillus cereus* toxin

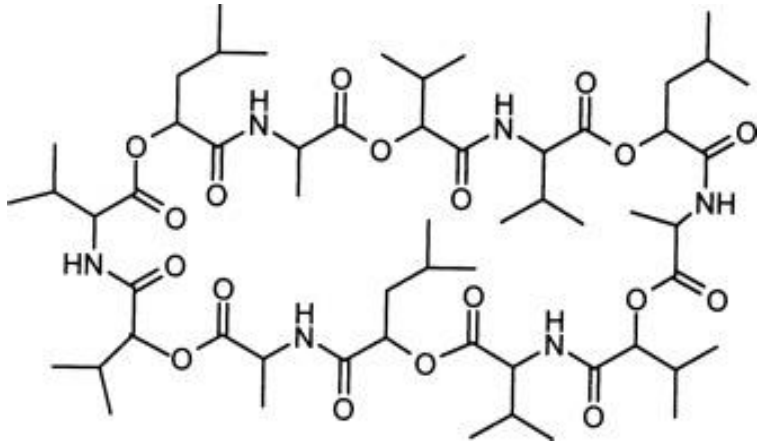
Published: 28 January 2026 | 3 minutes read

Share:

Lower risk of exposure to cereulide following continued recall of infant formula products across European countries

Identificazione della cereulide

- PCR per l'identificazione del cluster genetico *ces*
- Saggi biologici di citossicità
  - HEp-2 cell vacuolation assay
  - Boar sperm mobility
- Liquid chromatography tandem mass spectrometry (LC-MS/MS), ISO method (18465:2017) - metodo di riferimento



Concentrations that may lead to exceedance of the ARfD (Dose Acuta di Riferimento)

By comparing the ARfD with these high consumption values, EFSA concluded that cereulide concentrations in reconstituted (liquid) infant formula above:

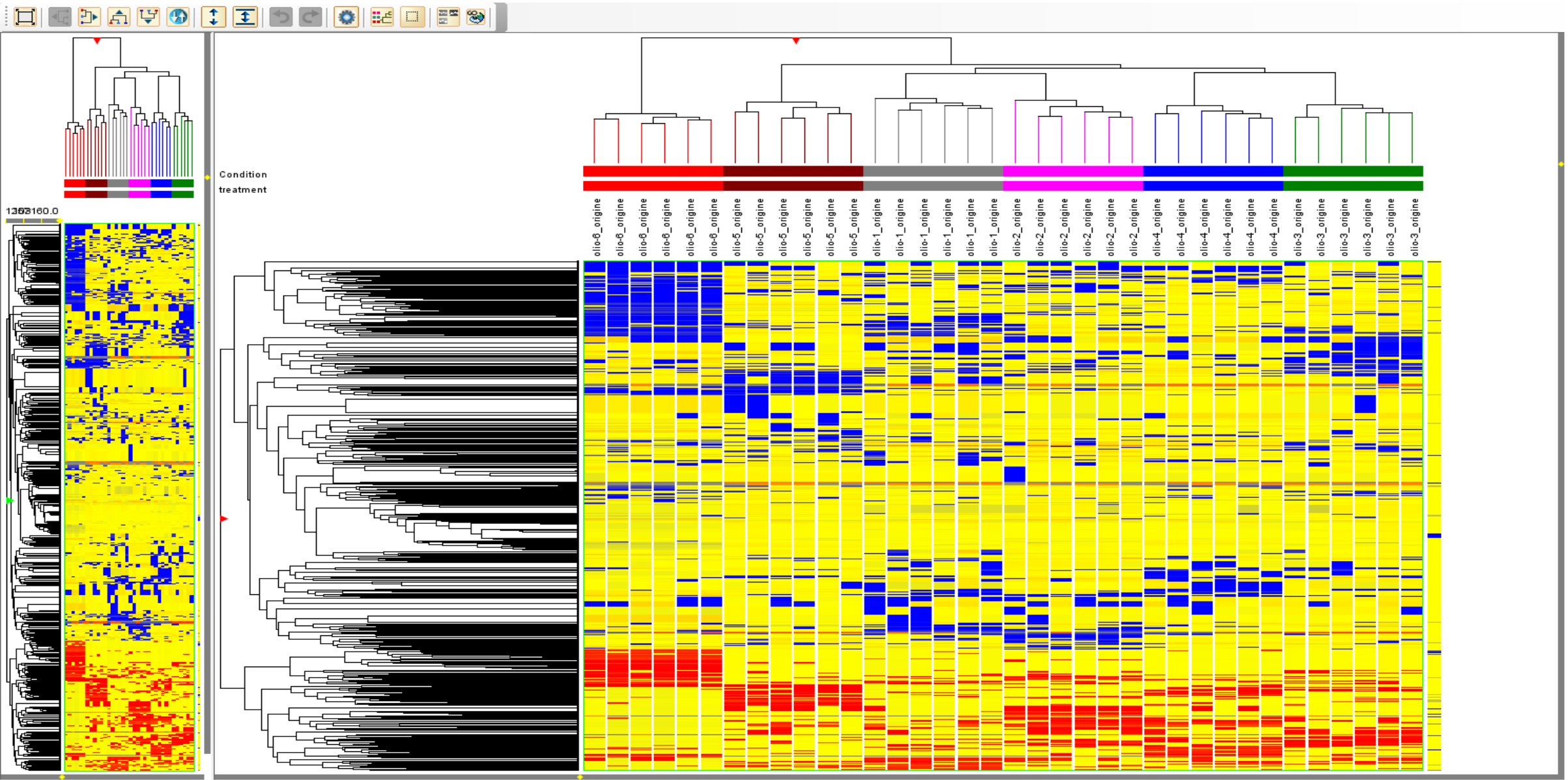
- **0.054 µg/L** for infant formula, and
- **0.1 µg/L** for follow-on formula,

may lead to safe levels being exceeded.

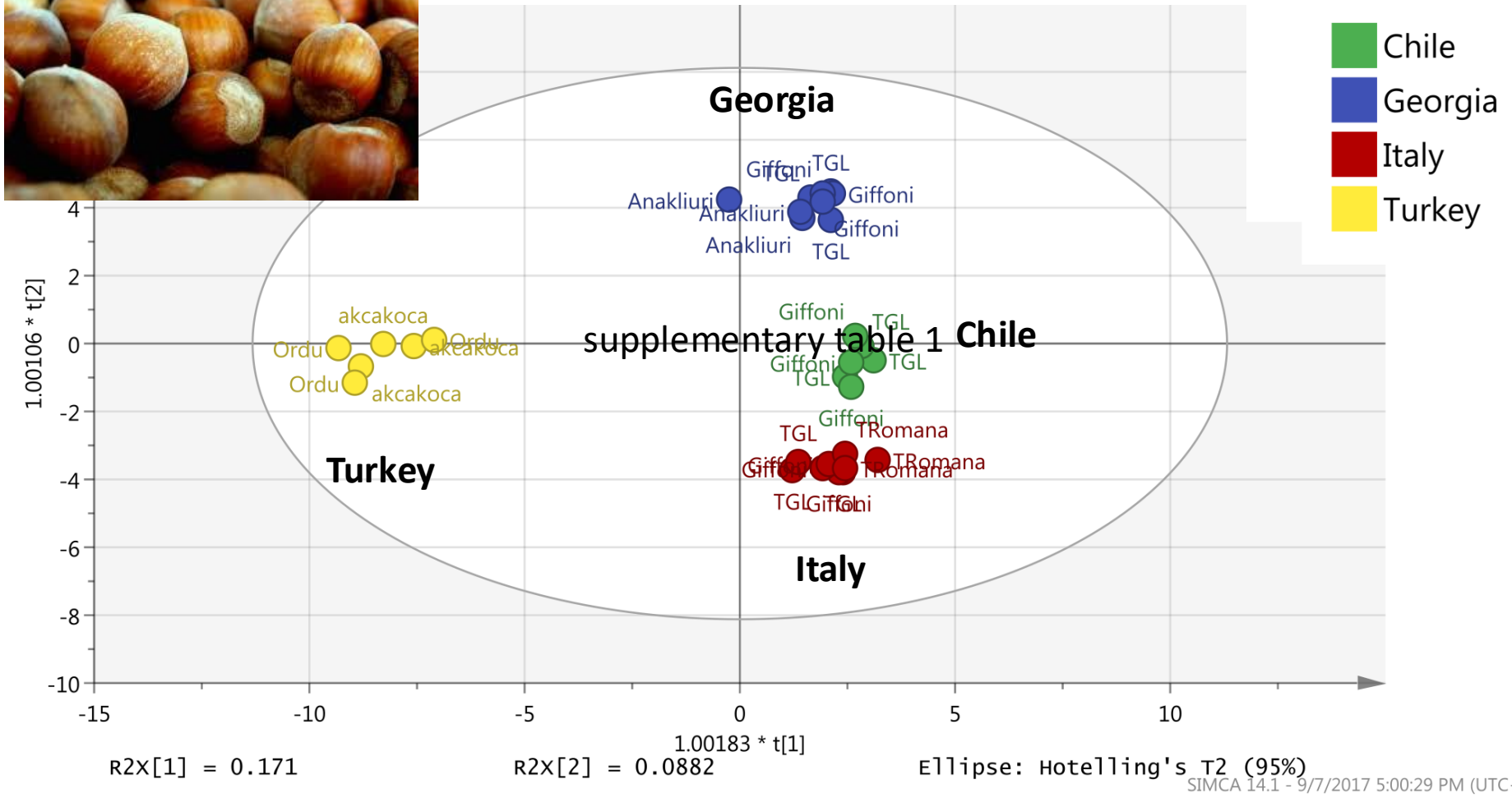
Metabolomics Technologies

- UPLC, HPLC
- CE/microfluidics
- LC-MS
- FT-MS
- QqQ-MS
- NMR spectroscopy
- X-ray crystallography
- GC-MS
- FTIR

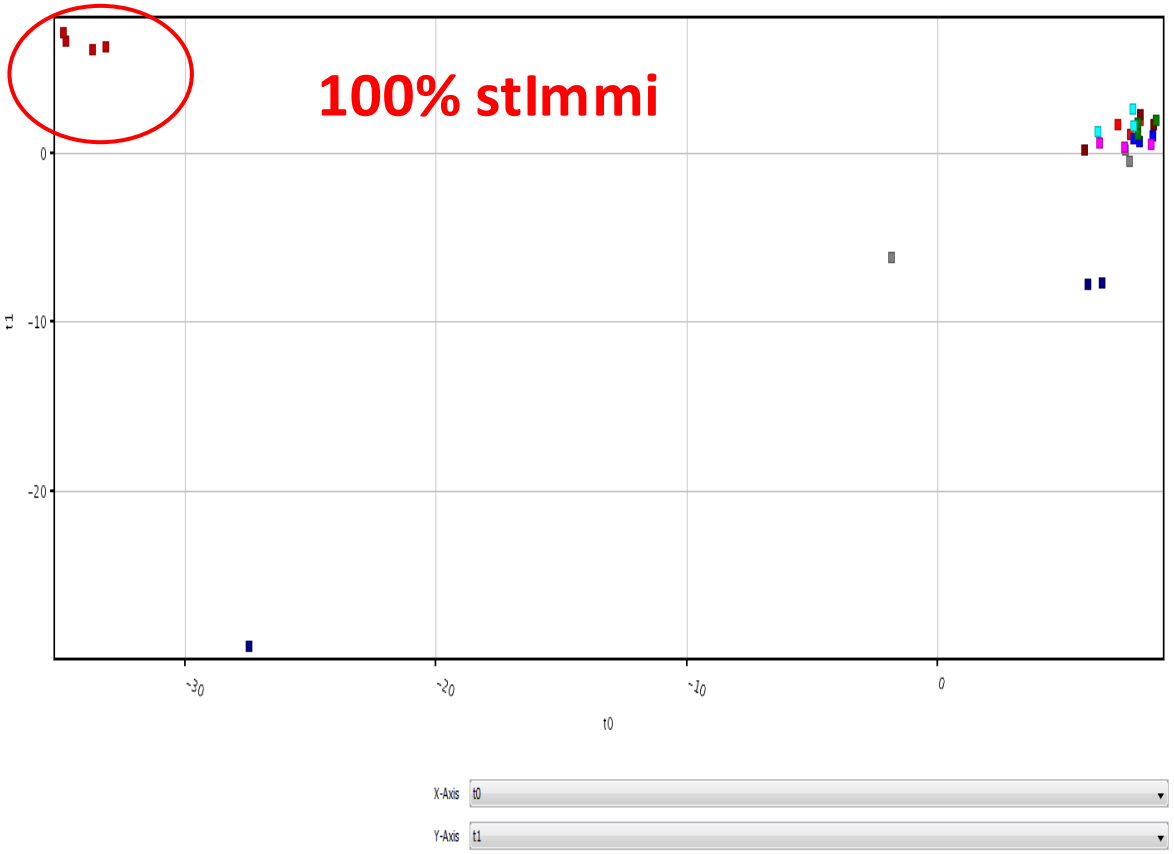
EVO DOP oil, geographical origin

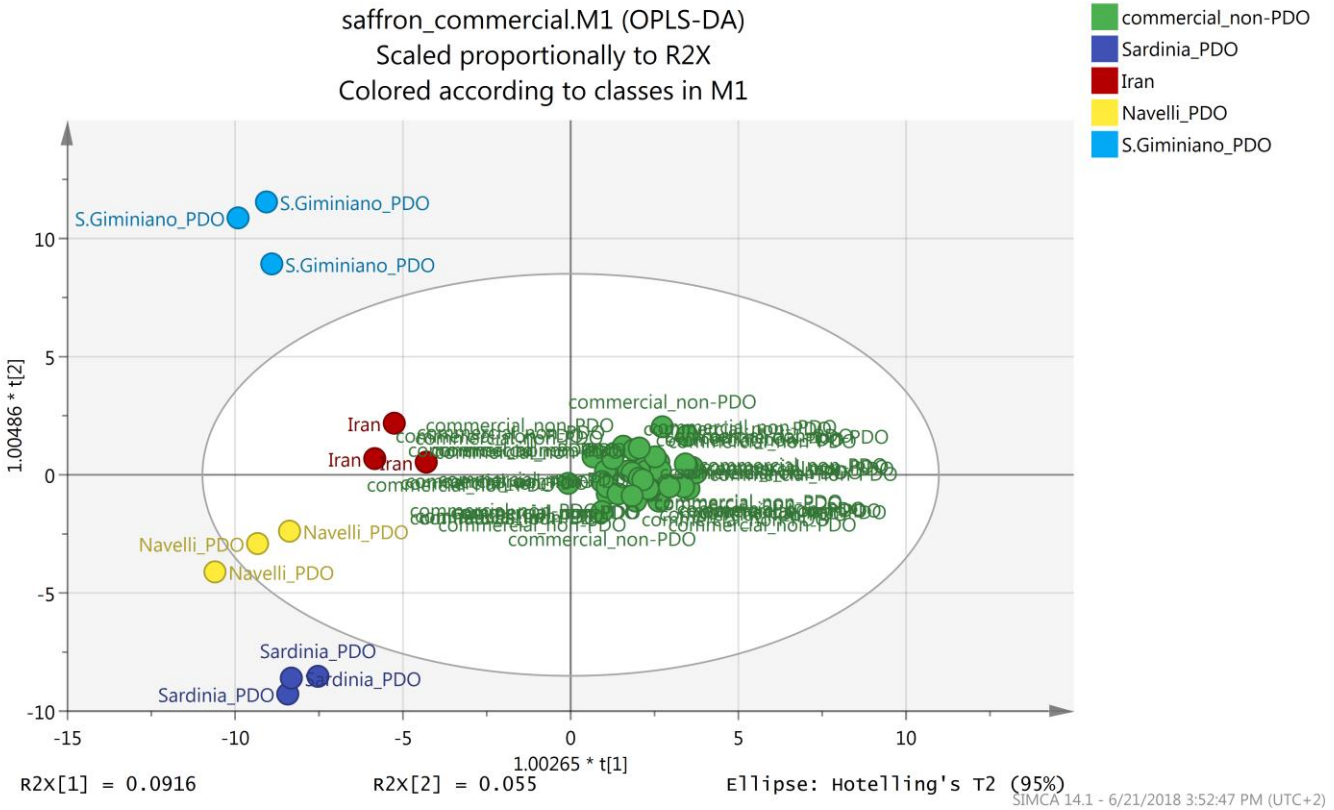


Hazelnut, geographical origin



Saffron adulteration - origin





CONCLUSIONI