27th *EURL-Salmonella* workshop

23 and 24 May 2022 - Online

Assessment of multi-country food borne outbreak events at EU level

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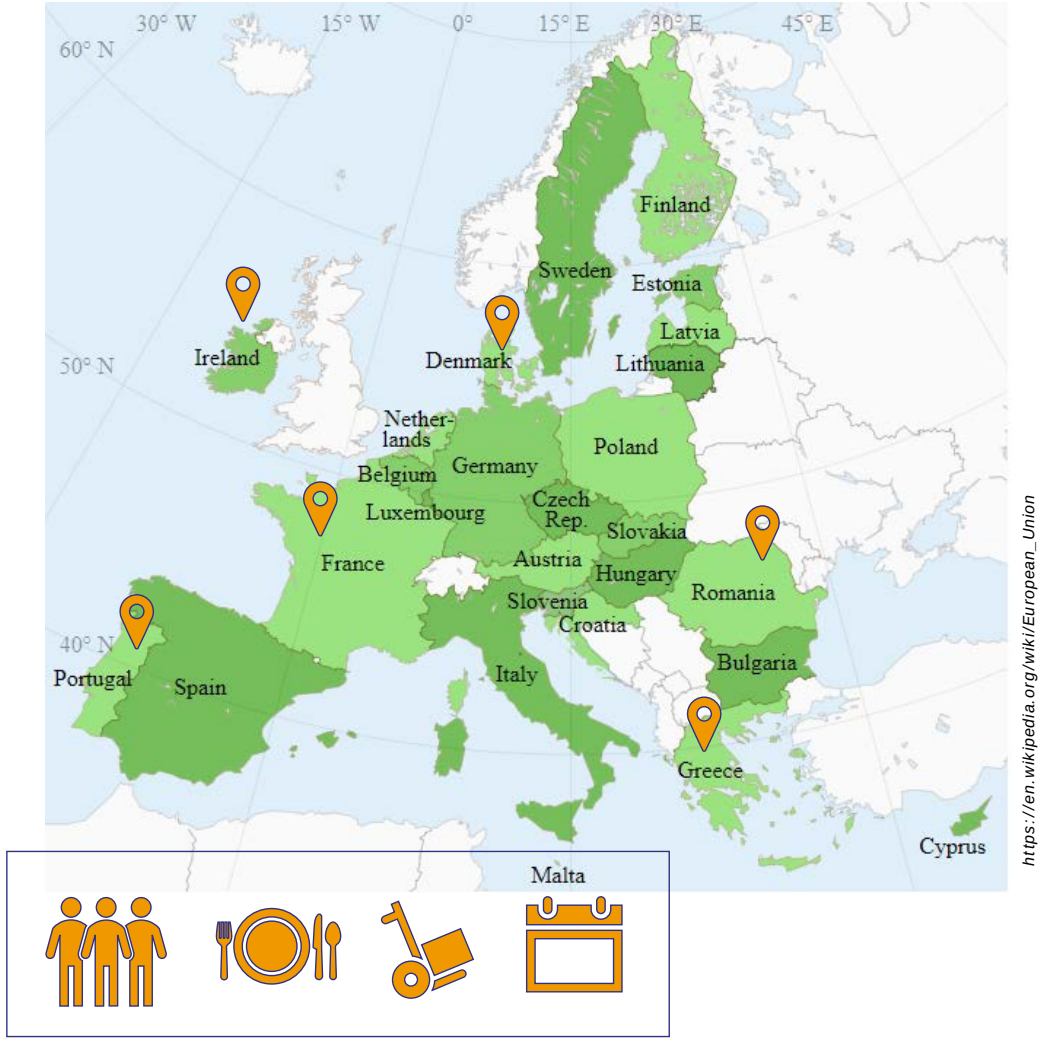
Agenda

1. Introduction
2. Role and Legal Framework
3. Outputs
   ROA, Rapid Outbreak Assessment
   JNS, Joint Notification Summary
4. Source of Data
5. Latest Published ROAs

1. Introduction: What is a multi-country FBO?

Prerequisite and Criteria to engage:

- When **clusters of human cases** of the same **foodborne disease**, identified by **the EU MSs**, are **ongoing**
- And there is the suspicion of an **exposure** to **common food** that was **EU traded**



https://en.wikipedia.org/wiki/European_Union

2. Role and Legal Framework (1/2)

- **Supporting** the European Commission with a scientific assessment of the event

- **Collecting the evidence to link the outbreak to a likely food source**

- **Communicating** to consumers and to risk managers about the source to prevent the occurrence of additional infections

2. Role and Legal Framework (2/2)

- **Mandate** from European Commission *[Ref. Ares(2013)2576387]*

- **Regulation** (EC) 178/2002 -European Parlament and Council, establishing EFSA *(Art.31)*

- **Directive** 2003/99/EC -European Parlament and Council on monitoring of zoonoses and zoonotic agents

- **Decision** 1082/2013/EU -European Parlament and the Council on serious cross-border threats to health *(supporting ECDC)*

3. Outputs and 4. Sources

Rapid Outbreak Assessment (ROA)

- Technical Report (Art.31)
- Open access
- In-depth analysis
- Data collection, validation

Joint Notification Summary (JNS)

- Working Document
- Restricted access
- Summary
- Data description

Data: EPI-Pulse; EWRS; iRASFF; EURLs, upcoming OH WGS System

5. Latest published assessments (ROAs)

2022

- Multi-country outbreak of **monophasic Salmonella Typhimurium ST34** linked to **chocolate products** – first update - *18 May 2022*
- Multi-country outbreak of **monophasic *Salmonella* Typhimurium ST34** linked to **chocolate products** – *12 April 2022*
- Multi-country outbreak of ***Salmonella* Enteritidis ST11** infections linked to **eggs and egg products** - *8 February 2022*

2021

- Multi-country outbreak of multiple ***Salmonella enterica*** serotypes linked to imported **sesame-based products** - *14 October 2021*
- Multi-country outbreak of ***Salmonella* Braenderup ST22**, presumed to be linked to imported **melons** - *20 July 2021*
- Multi-country outbreak of ***Salmonella* Enteritidis ST11** infections linked to **poultry products** in the EU/EEA and the United Kingdom - *01 March 2021*

Multi-country outbreak of monophasic *Salmonella* Typhimurium ST34* linked to chocolate products – 18 May 22 *(updating 12 April 2022)*

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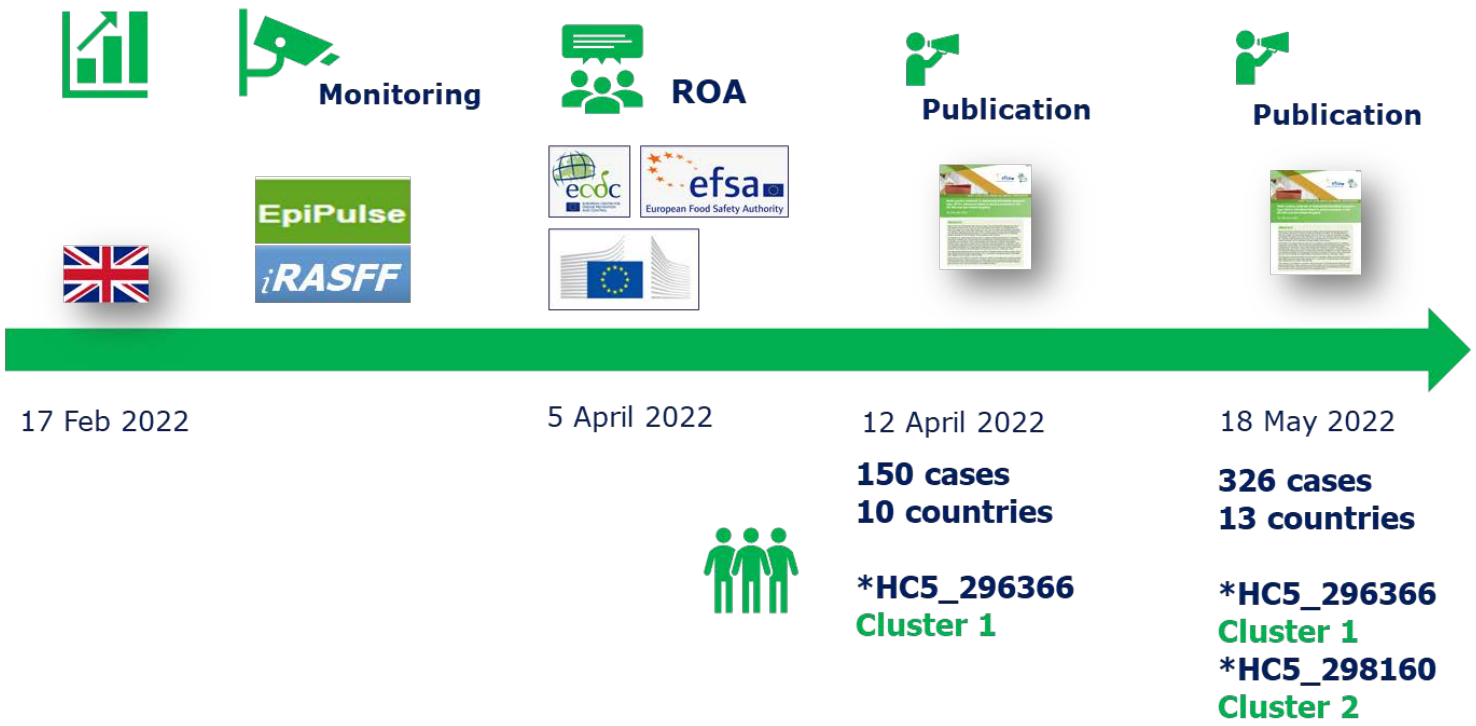
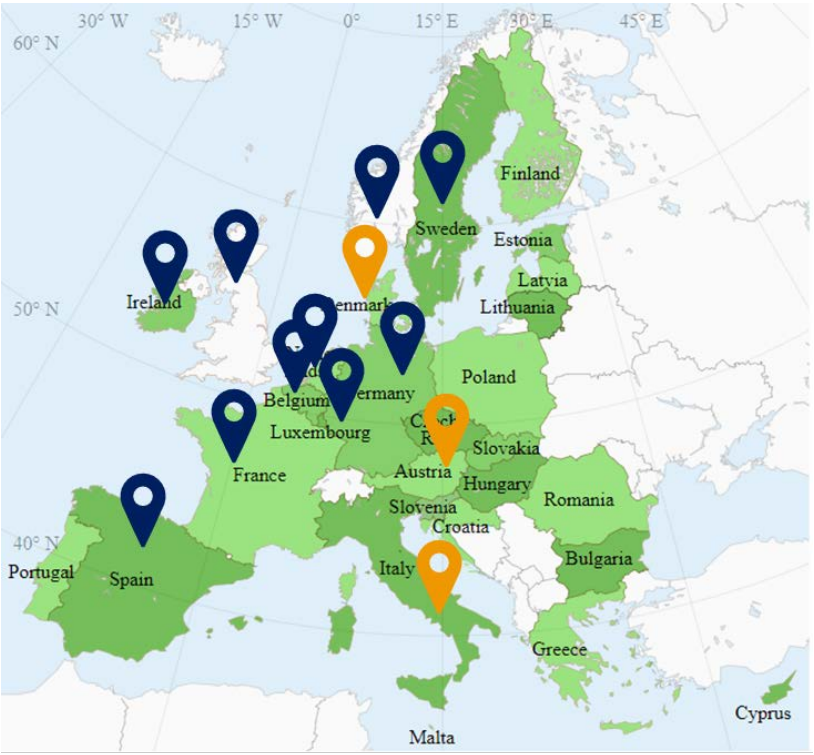




https://en.wikipedia.org/wiki/European_Union

Exposure

Most cases are **below 10 years of age**. Many children were hospitalized

As of 18 May, 179 of 191 (95%) interviewed cases had reported consumption of specific **chocolate products of Company A**

Number of confirmed and probable cases per country (total number 369 cases)

AT (14), BE (64), DK (2), FR (81), DE (22), IE (16), IT (1), LX (2), NL (3), NO (1), ES (5), SE (4) UK (109)

Canada (1), Switzerland (43), USA (1)

EFSA Journal 2022;19(5):EN-7352

EU / EEA case definition and resistance profile

A confirmed outbreak case

- **A laboratory-confirmed** monophasic *Salmonella* Typhimurium case **with symptom** onset on or **after 1 October 2022** (date of sampling or date of receipt by the reference laboratory if date of onset is not available).

AND

- Fulfilling the following laboratory criteria: a **mS. Typhimurium ST34 isolate clustering** with any of the representative outbreak isolates by:
  - the **national** cgMLST **pipeline** within **five allelic differences (AD)**;

  OR
  - clustering in a **centralised** WGS analysis within **five ADs** in a single linkage analysis

  OR
  - belonging to the same **cgMLST HC5_296366 (cluster 1) - HC5_298160 (cluster 2)** cluster according to the EnteroBase scheme;

  OR
  - falling into the 5-SNP (single nucleotide polymorphism) single linkage cluster 1.1.1.124.6096.7575.% **(t5.7575) (cluster 1) -** 1.1.1.2765.6144.7643.% **(t5.7643) (cluster 2)** (eburst group 1), according to the UK Health Security Agency (UKHSA) pipeline.

  OR
  - the national SNP pipeline within **five SNPs**.

A probable outbreak case

- **A laboratory-confirmed** monophasic *Salmonella* Typhimurium case **with symptom** onset on or **after 1 October 2021**

AND

  - By phenotypical testing expressing resistance to **ampicillin / amoxicillin, kanamycin / gentamicin, trimethoprim / co-trimoxazole (trimethoprim-sulfamethoxazole) and chloramphenicol (cluster 1) - ampicillin / amoxicillin, kanamycin, and tetracyclines (cluster 2)**

  OR
  - **MLVA** (multilocus variable number tandem repeat analysis) **profile 3-11-14-NA-0211 (cluster 1) 3-8-10-NA-0211 (cluster 2)**

Resistance profile

The outbreak strain in **cluster 1 is resistant to six families** of antibiotics:

- **penicillins** (*bla_{TEM-1}*);
- **aminoglycosides** (streptomycin, spectinomycin, kanamycin, and gentamicin (variable gene combinations); *strA-strB, aac(6')-Iaa, aac(3)-IId, aph(6)-Id, aadA-2, aadA-8b, aadA-12, aadA-15 and aadA-17*;
- **phenicols** (*cmlA1, floR*);
- **sulfonamides** (*sul2* with some strains having an additional *sul3* gene);
- **trimethoprim** (*dfrA12*);
- **tetracyclines** (*tetB and tetM*).

In addition, some strains contained the *lnu(F)* gene encoding resistance to **lincosamide**

The outbreak strain in **cluster 2 is resistant to four families** of antibiotics:

- **penicillins / beta lactams** (*bla_{TEM-1}*)
- **tetracyclines** (*tetA or tetB*)
- **sulphonamides** (*sul-2*)
- **aminoglycosides** (*aph(6)-Id/StrB* (streptomycin); *aph(3'')-Ib/StrA* (streptomycin); *aph(3')-Ia* (kanamycin); *aac(6')-Iaa*.

Traceability and Control Measures

Control Measures

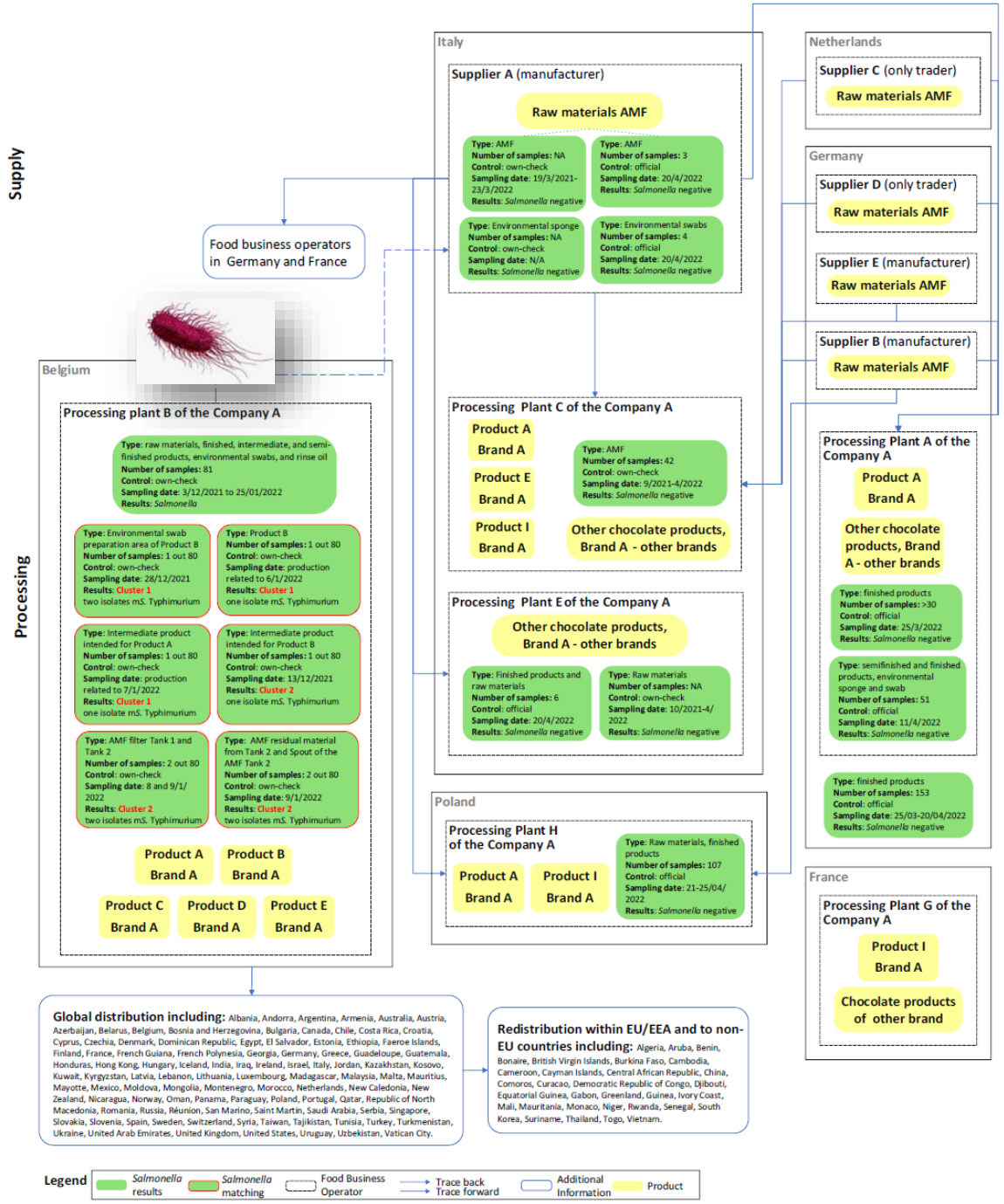
On 8 April, the food safety authority in Belgium **withdrew the authorisation for production** due to lack of transparency and insufficient guarantees for safe production

At the same time, Company A **recalled all batches of Brand A products** manufactured in this facility that had been distributed globally

The involved countries reported implementation of **recalls and withdrawals**

Official controls were carried out at the **Italian supplier** that provided **anhydrous milk fat** during the contamination event and at the **other plants of Company A** (Italy, Poland, Germany): *Salmonella* was not detected.

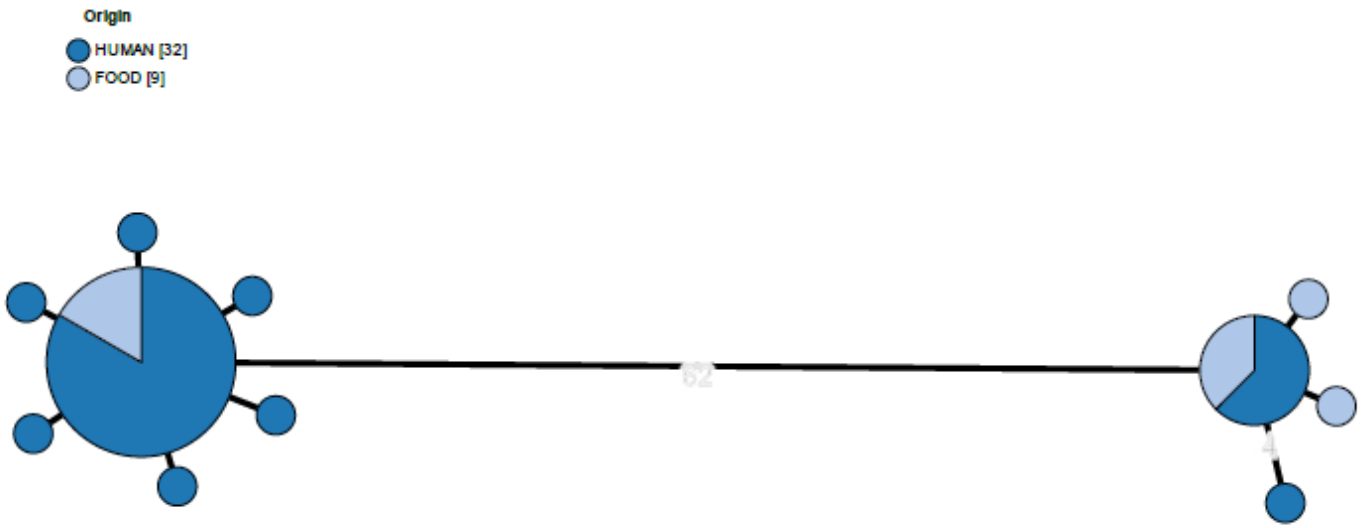
https://www.efsa.europa.eu/it/efsajournal/pub/en-7352



Centralised WGS Analysis

Minimum spanning tree of 32 human (dark blue) and nine non-human (light blue) monophasic Salmonella Typhimurium isolates

Two distinct clusters at 62 allelic differences from each other.



One cluster (left cluster) includes the representative isolates of the **cluster 1** outbreak strain (SRR17830210 and SRR18021617), and additionally 24 human isolates from HC5_296366 and four non-human isolates from the Belgian Processing Plant B.

The second cluster (right cluster) includes the representative isolates of the **cluster 2** outbreak strain (SRR18488397 and SRR18590198) and additionally, four human isolates from HC5_298160 and five non-human isolates from the Belgian Processing Plant B.

ECDC and EFSA outbreak assessment

The food exposure information and the traceability analysis pointed towards **Company A.**

The outbreak strains (4 isolates in cluster 1 and 6 isolates in cluster 2) were identified at the **Belgian Processing Plant B** of Company A (production period 3.12.21 – 25.1.22)

The source of the infection was established.

The exact point of contamination was identified in the anhydrous milk fat line common to the production lines of Brand A.

The average time from food production to retail is approximately 60 days and the first detected case in UK was on 21 December 2021 suggesting that:

The contamination might have happened earlier than 3 December 2021

During the same production period, overall *Salmonella* was detected in **81 own check samples** collected from the production lines of Brand A (WGS not available).

There is a need for further investigation to exclude the presence of additional strains

In addition, **7 official samples** collected in April from finished products tested positive for either cluster 1 or cluster 2.

Eight cases cannot be explained by consumption of chocolate products from the plant suggesting that

There may also be other sources of infection, albeit secondary infections, which cannot be excluded.

The closure the plant B and the global recall have reduced the risk of exposure

Multi-country outbreak of *S.* Enteritidis ST11* infections linked to eggs and egg products - *8 February 2022*

272 confirmed cases in 6 countries

DK (3), FR (216), NL (12), NO (7), ES (22), UK (12)

Two deaths, twenty-five cases were hospitalized

https://en.wikipedia.org/wiki/European_Union

*HC5_2301 cluster

https://doi.org/10.2903/sp.efsa.2022.EN-7180

EU / EEA case definition and number of cases

A confirmed outbreak case

- **A laboratory-confirmed** *Salmonella* Enteritidis case **with symptom** onset on or **after 1 January 2021** (date of sampling or date of receipt by the reference laboratory if date of onset is not available).

AND

- Fulfilling the following laboratory criteria: a **S. Enteritidis ST11 isolate clustering** with any of the three representative outbreak strains by:
  - the **national** cgMLST **pipeline** within **five allelic differences (AD)**;
  - OR
  - clustering in a **centralized** WGS analysis within five ADs in a single linkage analysis

    OR
  - belonging to the same **cgMLST HC5_2301** cluster according to the EnteroBase scheme;

    OR
  - belonging to the phylogenetically-defined outbreak-associated lineage within the 5-SNP (single nucleotide polymorphism) single linkage cluster 1.2.3.18.180.180.% **(t5.180)** (eburst group 4), according to the UK Health Security Agency (UKHSA) pipeline (UK excluding Scotland).

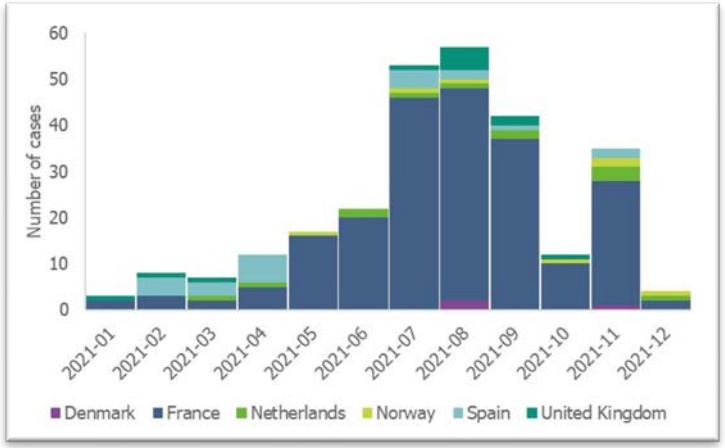
A historical outbreak-related case*

- **A laboratory-confirmed** *Salmonella* Enteritidis case with symptom onset **on or before 31 December 2020** (date of sampling or date of receipt by the reference laboratory if date of onset is not available).

AND

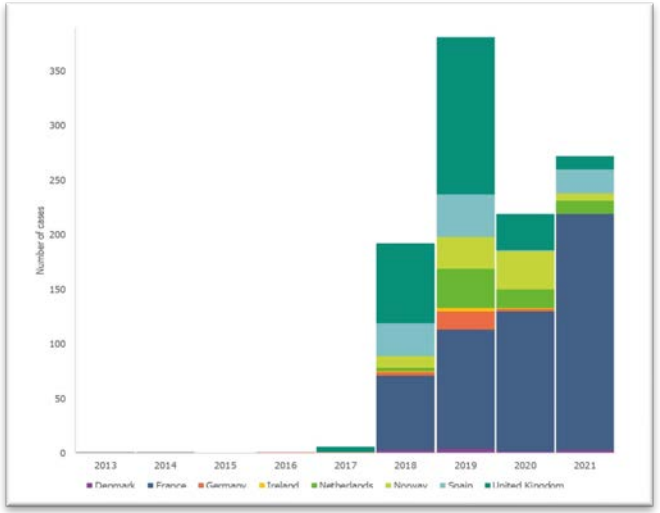
- Fulfilling any of the laboratory criteria for a confirmed outbreak case.

Distribution of 272 confirmed S. Enteritidis ST11 outbreak cases by month in five EU/EEA countries and UK in 2021, as of 11 January 2022



Exposure to eggs and egg products = 60 confirmed cases

Distribution of 1073 confirmed and historical outbreak-related S. Enteritidis ST11 cases in seven EU/EEA countries UK by country and year*, 2013–2021, as of 11 January 2022



801 historical cases with genetically close isolates according to the national pipelines were reported prior to 2021

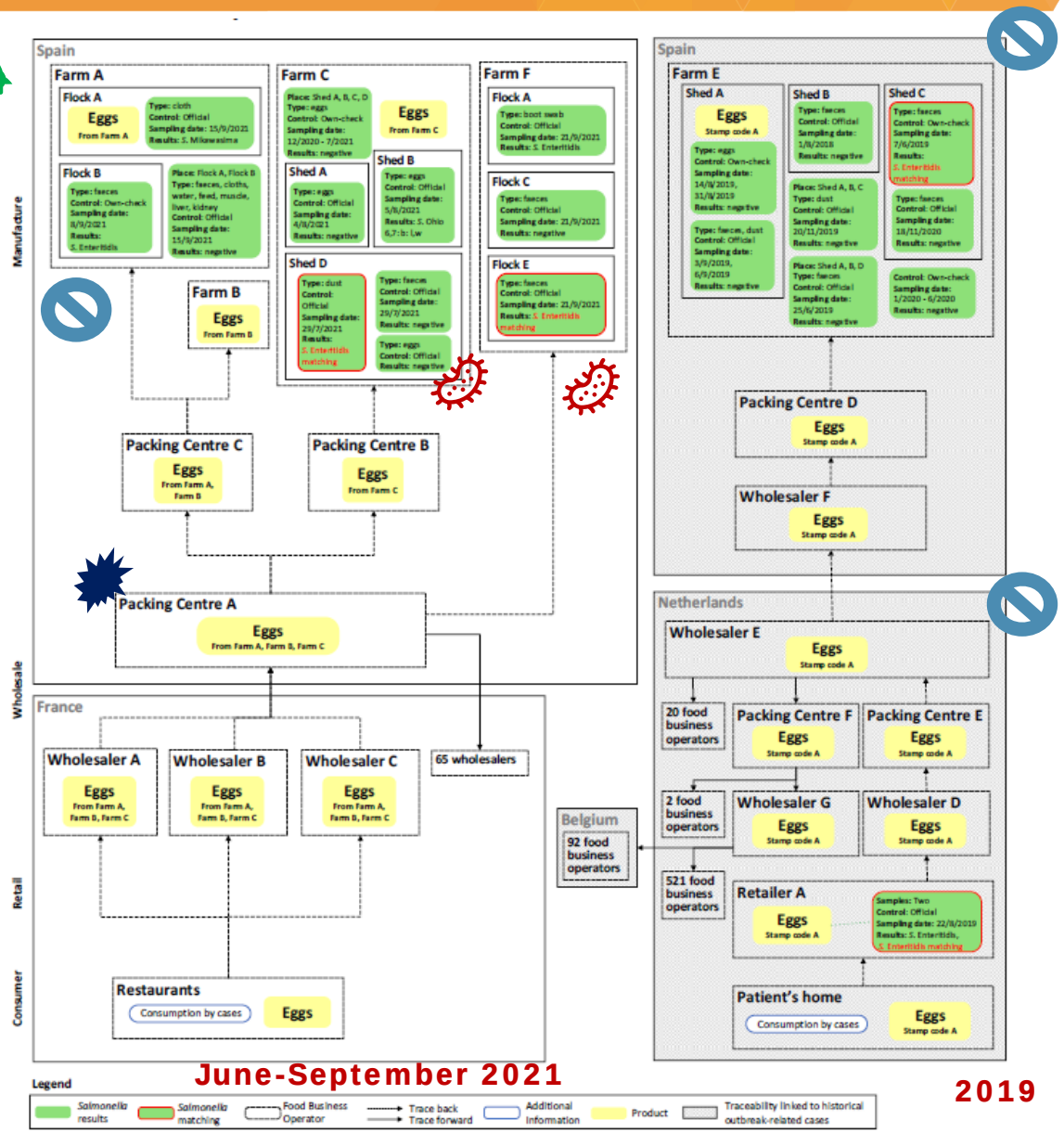
Traceability Analysis

Matching *S.* Enteritidis

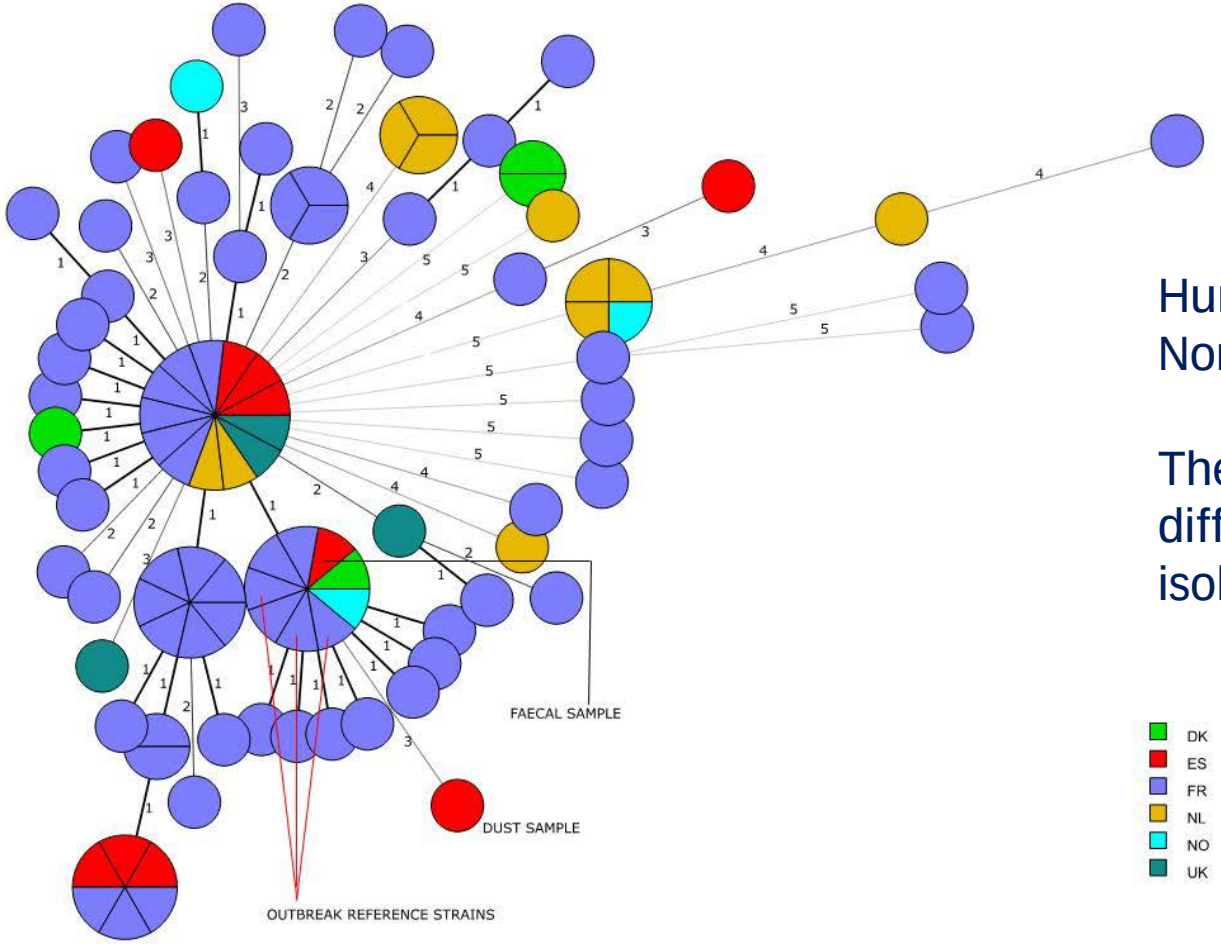
Common Supplier

Control Measures

Farm



Centralised WGS Analysis, 2021 infections



Human isolates n = 98 (6 MSs, UK)
Non-human isolates (dust + faeces) n=2 (ES)

The isolates in the MST clustered within 5 cg-allelic differences (cgMLST, Enterobase scheme) of any other isolate in the centralised single linkage analysis

- DK
- ES
- FR
- NL
- NO
- UK

ECDC and EFSA outbreak assessment

Traceability analysis:

- Identified one FARM in ES positive for the outbreak strain that delivered eggs to the Packing Center A, common supplier of the restaurants visited by the French cases.
- Highlighted no further distribution to other countries in summery 2021
- Highlighted that the fresh eggs from the farms linked to the outbreak were withdrawn and redirected to heat-treated egg products

The source of the infection for cases occurring later than Sept. 2021, and in countries other than ES and FR could not be established

The most recent case reported in NO (sampling date 22 December 2021) suggested that:

There is a risk of ongoing exposure

The outbreak in 2021 is **microbiologically** (**but not epidemiologically**) **linked** to a historical cross-border outbreak (NL in 2019) related to another Spanish farm, therefore:

A common point and/or source of contamination between the two events could not be identified

Suggesting that there may be a

Wide distribution of the outbreak strain that may circulate in other farms (also outside ES) and may affect earlier phases of the food chain

In conclusion,

The risk for new infections caused by the S. Enteritidis ST11 outbreak strain and from contaminated eggs in general remains high in the EU/EEA

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