JOINT ECDC-EFSA RAPID OUTBREAK ASSESSMENT

Prolonged multi-country outbreak of *Salmonella* Strathcona ST2559 linked to consumption of tomatoes in the EU/EEA and the UK

12 November 2024

Abstract

A cross-border outbreak of *Salmonella* Strathcona ST2559 is ongoing in the European Union/European Economic Area (EU/EEA) and the United Kingdom (UK). From 1 January 2023 to 5 November 2024, 232 confirmed cases of *S.* Strathcona ST2559 have been identified in 16 EU/EEA countries according to the European case definition: Austria (33), Croatia (3), Czechia (10), Denmark (9), Estonia (1), Germany (62), Finland (3), France (23), Ireland (1), Italy (67), Luxembourg (2), the Netherlands (2), Norway (3), Slovakia (5), Slovenia (2) and Sweden (6). Twenty-nine cases were also identified in the UK. Among the travel-associated cases, the most frequently visited country was Italy.

Tomatoes were identified as the vehicle of infection in several national epidemiological investigations undertaken in response to this multi-country outbreak. Whole genome sequencing cluster analyses suggest that the outbreak strain from multiple affected countries has a recent common origin.

The epidemiological, microbiological and traceability investigations in the 2023 Austrian outbreak and 2024 Italian outbreak confirmed that small tomatoes from the Sicily region of Italy were the vehicle of infection in these two outbreaks. The same conclusion was confirmed for a historical *S.* Strathcona ST2559 outbreak in Denmark in 2011.

Human and food sectors should continue to conduct investigations to verify whether small tomatoes from Sicily are the vehicle of infection in all EU countries that have reported or continue to report cases in this multi-country outbreak, as other foods could also be involved in the transmission. The environment's role in the contamination of the tomatoes should also be investigated, as the outbreak strain was also identified in a farm animal in the region. Investigations to identify the point of entry of *S.* Strathcona – including of irrigation water – should be conducted so the appropriate corrective measures are taken to stop the contamination from spreading and prevent possible new cases.

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Event background

On 27 October 2023, Germany reported to ECDC 46 cases of *Salmonella* Strathcona ST2559 infection since August 2023 (event ID 2023-FWD-00090 in EpiPulse, the European surveillance portal for infectious diseases). Of these cases, 28 were confirmed by whole genome sequencing (WGS). The cases occurred across multiple federal states in Germany. All age groups were affected, with a median age of 35 years. Cases were equally distributed between genders. This was a re-emergence of the *S.* Strathcona ST2559 strain, which had previously been reported to have caused outbreaks in Germany in 2022 (22 cases) and in 2019 (7 cases), linked to an outbreak reported by Denmark in 2020 (see section 'Historical outbreaks of S. Strathcona in 2011 (ID 2011-FWD-00034) and 2020 (ID 2020-FWD-00032)').

Also on 27 October 2023, Austria, Denmark, France and Norway reported cases with genetically close *S.* Strathcona ST2559 isolates, confirming an ongoing multi-country outbreak. Since then, cases have been identified in at least 16 countries in the European Union/European Economic Area (EU/EEA). In January 2024, a Rapid Alert System for Food and Feed (RASFF) notification (News 2024.0384) was issued by the food safety authority in Austria (see 'Microbiological and environmental investigations of food and control measures' section and Annex 1), linked to the same EpiPulse event, 2023-FWD-00090 [1].

The most recent cases were reported in Italy in October 2024, followed by an Early Warning and Response System (EWRS) notification 5863 on 29 October. As of this date, three RASFF notifications (2024.0384, Information Notification for Attention 2024.7763 and Alert Notification 2011.1630) had been issued (see 'Microbiological and environmental investigations of food and control measures' section and Annex 1).

This *S.* Strathcona ST2559 strain has previously caused multi-country outbreaks, as was notified by Denmark in 2011 (event ID in EpiPulse 2011-FWD-00034 and RASFF 2011.1630) and in 2020 (event ID 2020-FWD-00032) [1]. Based on patient interviews and related national investigations, the suspected vehicle in the 2011 outbreak was tomatoes.

Due to the long-term and ongoing risk of infection with this *S.* Strathcona strain in multiple EU/EEA countries and a possible common source in the food chain, on 24 September 2024 the European Commission asked ECDC and EFSA to produce a joint rapid outbreak assessment (ROA) to trigger further public health and food safety investigations.

Outbreak strain characterisation

The outbreak strain is characterised as *Salmonella enterica* serovar Strathcona, with:

- 7-gene sequence type (ST) 2559;
- SeqSphere complex type CT3910 (EnteroBase scheme in SeqSphere+); and
- EnteroBase hierarchical cluster HC5_26490 [2,3].

A representative German strain is available in EnteroBase: 23-05042 (SAL_ED2423AA_AS).

A representative historical Danish strain from 2020 is available in the European Nucleotide Archive with a code ERR4344279 or in EnteroBase with a code 2006F11891.

European outbreak case definition

The European outbreak case definitions are provided below.

A confirmed outbreak case is defined as:

A laboratory-confirmed *Salmonella* Strathcona case with symptom onset on or after 1 January 2023 (date of sampling or date of receipt by the reference laboratory if date of onset is not available).

AND

Fulfilling at least one of the following laboratory criteria for an *S.* Strathcona ST2559 isolate by:

- the national cgMLST pipeline within seven cg-allelic differences from the representative German outbreak strain, OR
- clustering within seven cg-allelic differences in a centralised single-linkage analysis, OR
- belonging to the hierarchical HC5_26490 cluster (EnteroBase scheme).

OR

Fulfilling the epidemiological criterion:

- Epidemiologically linked to a confirmed case based on a national outbreak case definition.

A historical outbreak case is defined as:

A laboratory-confirmed *S.* Strathcona case with symptom onset before 1 January 2023 (date of sampling or date of receipt by the reference laboratory if date of onset is not available).

AND

Fulfilling at least one of the following laboratory criteria for an *S.* Strathcona ST2559 isolate by:

- the national cgMLST pipeline within seven cg-allelic differences from the representative German outbreak strain, OR
- clustering within seven cg-allelic differences in a centralised single-linkage analysis, OR
- belonging to the hierarchical HC5_26490 cluster (EnteroBase scheme).

OR

Fulfilling the epidemiological criterion:

- Epidemiologically linked to a confirmed case based on a national outbreak case definition.

Epidemiological and microbiological investigations of human cases

EU/EEA countries

Since 1 January 2023 and as of 5 November 2024, 232 confirmed cases of *S.* Strathcona ST2559 have been reported by 16 EU/EEA countries (Table 1). Available information on gender distribution shows that cases occurred in females more often than in males (male-to-female ratio: 1:1.6). Cases were reported in all age groups, from infants to older adults (Table 1).

The 43 travel-associated cases with known travel destination visited a total of 12 countries. The most frequently visited countries were: Italy (16 cases), Croatia (9 cases) and Montenegro (7 cases) (Table 1). Three cases had visited more than one country before onset of symptoms (one travelled to Italy, Tunisia and Spain; one to Croatia and Montenegro; and one to Italy, Greece and Türkiye). Italy reported five domestic cases among the seven cases with information on travel history.

In addition, from late September to early October 2024, two Italian regions (Tuscany and Umbria) reported *Salmonella* outbreaks involving over 300 symptomatic cases associated with primary schools and childcare. So far, 46 of these cases have been confirmed as *S.* Strathcona and the food isolate from Tuscany was part of the *S.* Strathcona ST2559 cluster (see the details for Italy below). Nine clinical isolates from the Umbria outbreak were sequenced and all were *S.* Strathcona ST2559. Microbiological evaluation of clinical samples is ongoing; therefore, these data are not included in Table 1.

Outside the EU/EEA

The **UK** reported 29 confirmed cases in 2023 and 2024 (Table 1); one of two travel-associated cases in 2024 had visited Italy. **Canada** reported five confirmed cases with travel history to Europe in 2023 and 2024. Two of the five Canadian cases reported visiting only Italy, one reported Italy and the Netherlands, one reported Italy and Ireland, and one reported only Austria.

Table 1. Confirmed S. Strathcona ST2559 cases by age, gender and age range in 14 EU/EEA countries (n = 232 cases), 1 January 2023 to 5 November 2024

Country	Number of confirmed cases	Male	Female	Age range (years)	Travel history prior to illness
Austria	33	13	20	1–81	Travel histories to Montenegro (2), Italy (4) and Croatia (1). For one case the country could not be determined.
Croatia	3	0	3	3–54	Travel history unknown.
Czechia	10	6	4	1–46	Travel history to Croatia (1).
Denmark	9	6	3	18–72	Travel histories to Italy (1) and Montenegro (1).
Estonia	1	0	1	75–80	No travel-associated cases.
Finland	3	1	2	20–60	Travel history to Georgia (1).
France	23	8	15	0–82	Travel histories to Italy (5); Spain, Tunisia and Italy (1); and Montenegro and Croatia (1).
Germany	62	23	39	1–88	Travel histories to Croatia (8), Italy (5), Montenegro (3), Austria (1) and Egypt (1).
Ireland	1	0	1	45–50	Case reported no international travel in the three days prior to onset of symptoms.
Italy	67[a]	13	20	0–92	Seven cases with travel history: Italy (domestic cases) (5), Spain (1) and Malta (1).
Luxembourg	2	1	1	8–65	One case with travel history to Italy, Greece and Türkiye (cruise).
Netherlands	2	0	2	25–40	Travel history unknown.
Norway	3	0	3	60–75	Two cases with no travel and travel history unknown for one case.
Slovenia	2	0	2	24–65	Travel history unknown.
Slovakia	5[a]	1	3	2–74	No travel-associated cases.
Sweden	6	4	2	5–85	One case had been to northern Italy (Lake Garda) three weeks prior to disease onset.
Total EU/EEA	**232[a]**	**76**	**121**		
United Kingdom	29	12	17	0–76	Two cases reported travel abroad prior to disease onset: Italy (1) and Malta (1).

EU/EEA: European Union/European Economic Area.
[a] *Age and gender information were not available for 35 cases (Italy: 34; Slovakia: 1).*

Investigations by country

Austria has reported 33 confirmed cases of *S.* Strathcona ST2559. Of these, 13 cases were in males and 20 in females. The median age reported was 32 years (interquartile range (IQR): 24–58 years). Cases were reported between January 2023 and October 2024 (26 cases were reported in 2023 and 7 cases were reported in 2024). National outbreak investigation identified imported organic cherry tomatoes from one supermarket chain as the suspected vehicle of infection. As a byproduct of the outbreak, secondary transmission was reported in one laying hen farm that is owned and operated by a person who fell ill with an *S.* Strathcona ST2559 infection in November 2023. As of October 2024, three flocks and one batch of eggs have tested positive for *S.* Strathcona. In 2024, seven new cases of *S.* Strathcona have been reported (two in August, three in September and two in October), three of which reported travel to Italy before illness. Five of these cases occurred in males. The median age was 25 years (range: 1–81 years; IQR: 3–26 years). In total, 39 isolates – 29 from human cases (two human isolates are pending), one isolate from sewage sludge and seven isolates from a laying hen farm – were sequenced and all were part of the defined outbreak cluster.

Belgium has reported three *S.* Strathcona cases: one in December 2023, one in September 2024 and one in October 2024. No sequence data are available.

Croatia reported three *S.* Strathcona ST2559 cases in 2023. Two cases reported in September were in children with diarrhoea. One asymptomatic case was in an adult female, with isolation in November.

Czechia has reported 21 cases of *S.* Strathcona between January 2023 and July 2024. Isolates from 14 cases were sequenced, and 10 of 14 were confirmed as *S.* Strathcona ST2559 cases.

Denmark has reported nine cases of *S.* Strathcona ST2559 with sample dates between September 2023 and October 2024, six in males and three in females. The age range of cases was 18–72 years. Two cases reported travel before illness: one to Italy and one to Montenegro. Five cases reported no travel and one case had an unknown travel history. Two of three cases from 2024 have been interviewed. Both have eaten tomatoes and one reported eating cherry or datterino tomatoes. This outbreak is related to the historical event (ID 2020-FWD-00032) reported by Denmark in 2020, when 27 cases were reported and the suspected vehicle of infection was snack tomatoes. Denmark noticed a smaller cluster of seven cases in 2022. A larger outbreak from Italian tomatoes – with 43 cases reported – occurred in 2011 (RASFF 2011.1630) [4].

Estonia has reported one domestic case of *S.* Strathcona ST2559, with date of onset 13 November 2023.

Germany reported 62 confirmed *S.* Strathcona ST2559 cases between the beginning of August 2023 and October 2024. The median age reported was 37 years (range: 1–88 years; IQR: 19–56 years); 39 of these cases were reported in females and 23 in males. For 47 cases, the following countries were reported as possible place of exposure: Germany (30 cases), Croatia (7 cases), Italy (5 cases), Montenegro (3 cases), Austria (1 case) and Egypt (1 case). Most cases (44/62) had disease onset between August and November 2023. In February 2024, three cases were diagnosed and one of these was an asymptomatic case. From July 2024, six new cases were identified. Between 2011 and 2022, Germany reported a total of 81 historical cases based on the EU outbreak case definition (2011: 10 cases; 2015: 3 cases; 2016: 2 cases; 2017: 3 cases; 2018: 8 cases; 2019: 15 cases; 2020: 9 cases; 2021: 9 cases; 2022: 22 cases).

Finland has reported three cases with matching *S.* Strathcona ST2559 isolates from September 2023: one in a male with unknown travel history, one in a female with domestically acquired infection and one in a female with travel history to Georgia.

France has reported 23 cases of *S.* Strathcona ST2559. Of these, 19 people were diagnosed from the end of August to December 2023 (median age: 24 years; range: 0–82 years; 15 female and 8 male). For 15 cases, the following information regarding possible place of exposure is available: exposure in France (8 cases); exposure in Italy (5 cases); history of travel to Spain, Tunisia and Italy before the onset of symptoms (1 case); and history of travel to Montenegro and Croatia before the onset of symptoms (1 case). Two of the three cases reported in 2024 had a history of travel to Italy (Sicily: 1 case; Foglia: 1 case) before symptom onset.

Ireland has reported one *S.* Strathcona ST2559 case from January 2024 in a female between 45–50 years old. The woman reported no international travel in the three days prior to onset of symptoms. Two historical cases have been reported: one from 2021 and one from 2020.

Italy reported 62 sporadic cases of *S.* Strathcona in 2023: 30 in females, 19 in males and 13 with gender information not available. The age range of cases was 0–88 years. More than 90% of isolates had sampling dates between late July and mid-December 2023. Of these, 45 isolates were fully sequenced and 41 were confirmed as *S.* Strathcona ST2559 cases. Of the confirmed cases, 15 were in females, 4 in males and 22 with gender information not available. In 2024, 39 human sporadic cases have been reported to date: 30 isolates have been sequenced and 26 were confirmed as cases. Of the confirmed cases, 5 were in females, 9 were in males and 12 were with gender information not available. The age range of cases was 2–92 years old. Most of the isolates had sampling dates between July and September 2024. Of the seven cases with information on travel history, five were domestic cases, one travelled to Spain and one to Malta. Further, from late September to early October 2024, two Italian regions (Tuscany and Umbria) reported *Salmonella* outbreaks with 46 *S.* Strathcona cases and nine *S.* Strathcona ST2559 clinical isolates confirmed as of 8 November 2024.

In the **Tuscany region** of Italy, a total of 248 cases of gastroenteritis (93 confirmed as salmonellosis and 14 identified as *S.* Strathcona) affecting 240 children aged 1–10 years, 7 food workers and 1 teacher in 39 schools have been identified, with exposure to meals prepared at a single cooking centre. The date of symptom onset ranged between 19 September and 4 October 2024, with 20 September reported for most cases (n = 103). Of these cases, 130 were in females and 103 were in males. Among the adults, the age range of cases was 24–65 years old. Fourteen clinical isolates, selected from different schools and across the period of symptom onset, were identified as *S.* Strathcona serovar. Microbiological evaluation of clinical samples is ongoing; therefore, these data are not included in Table 1. However, a food isolate resulted in the identification of *S.* Strathcona ST2559 (see 'Microbiological and environmental investigations of food and control measures' section and Annex 1).

In the **Umbria region** of Italy, a total of 63 cases of salmonellosis (n = 32 confirmed as *S.* Strathcona, 9 as *S.* Strathcona ST2559) were identified among attendees of education establishments that shared a cooking centre and the staff working for it. Of these cases, 56 were in children aged 1–10 years (16 male, 16 female and 24 with gender information not available) from nine different schools, where a total of 624 children are enrolled.

Four were in food workers (out of the total 21 people working for the cooking centre). One child from a primary school was not served by the same cooking centre. Two cases do not attend these schools; one of these is a sibling of another case who does and the other attends a secondary school where meals from the cooking centre are not consumed. The secondary student also does not have any kinship link to the other cases. The date of symptom onset ranged from 26 September to 17 October 2024, with 27 September reported for most cases (n = 16). Microbiological evaluation of clinical samples is ongoing; therefore, these data are not included in Table 1.

Luxembourg reported one case of *S.* Strathcona ST2559 in 2023. The case is in a male over 60 years old with sampling date at the end of September 2023. He did not report travelling before illness. Four historical cases have been reported: one in 2022 and three in 2021. In 2024, one *S.* Strathcona ST2559 case was reported in September. This case had a history of travel to Italy, Greece and Türkiye, via a cruise.

The Netherlands has reported two *S.* Strathcona ST2559 cases in females aged 25–40 years, from September 2022 and January 2024, respectively. Both had unknown travel history.

Norway has reported three *S.* Strathcona ST2559 cases with sampling dates in September 2023 (one case) and September 2024 (two cases), respectively. Travel history is unknown for the case in 2023. The two cases in 2024 did not report travelling before illness. In addition, there are three historical *S.* Strathcona ST2559 cases with sampling dates in 2019, 2020 and 2021. Two of the historical cases had a history of travel to Italy and one had a history of travel to Denmark.

Slovenia has reported three cases of *S.* Strathcona ST2559 in 2023. Isolates from two cases were sequenced. Two more cases of *S.* Strathcona infections were reported in October 2024. Isolates (one from 2023 and two from 2024) are being sequenced.

In **Slovakia**, five *S.* Strathcona ST2559 cases were identified in 2023. The cases reported no travel history. In 2024, no linked cases were reported.

Sweden has reported six confirmed cases of *S.* Strathcona ST2559: five with disease onsets between August and December 2023 and one in August 2024. All six cases are reported as domestic infections but one person had visited northern Italy (Lake Garda) three weeks prior to disease onset. There is also a historical Swedish case with a clustering isolate and disease onset in September 2021. This case was reported as infected in Italy and fell ill while in Sicily.

The **UK** has reported 29 cases of *S.* Strathcona ST2559 with sample dates between 2023 and 2024. Cases have occurred in people aged 0–76 years (median age: 49 years) and in 17 females and 12 males. Two cases reported in September 2024 reported travel abroad prior to disease onset via laboratory report forms: one to Italy and one to Malta.

Information from patient interviews

In **Austria** in 2023, the first round of 14 patient interviews revealed that 13 of 14 people reported shopping at the same supermarket chain and eating small tomatoes (preferably with the vine). During the second round of interviews, 12 people mentioned the same packaging style preference for tomatoes (cardboard tray wrapped in plastic), as well as a purchasing preference for organic tomato products. Nine of the 12 cases mentioned that they purchase tomato products from countries outside of Austria and nine also mentioned purchasing and eating 'organic cherry tomatoes' specifically.

After the patient interviews were completed in December 2023, one person reported receiving a food donation via a humanitarian organisation that included organic cherry tomatoes from the same supermarket chain mentioned by the others. A traceback investigation was subsequently performed. On 18 January 2024, the food safety authority in Austria opened a RASFF notification (News 2024.0384) based on the food exposure information. Five of the 24 outbreak cases reported in 2023 had a history of travel outside Austria prior to illness and were not interviewed regarding consumption habits. Another five were never reached for an interview. In 2024, interviews were conducted for four out of seven cases and all four reported eating small tomatoes prior to their illness.

In **Czechia**, one patient interview was conducted. The case reported consumption of a ground beef hamburger, chicken meat, ham, paté, scrambled eggs, ice cream, tomatoes, melons, apples and chocolate products during a vacation to Vis island in Croatia.

In **Denmark**, three patient interviews were conducted for cases with sample dates in 2023. These found that two cases had been travelling prior to disease onset, one to Montenegro and another to Italy, and both had consumed tomatoes there. One domestic case with sample date in December 2023 did not report eating tomatoes. Interviews were not available for the last four cases; three of these were reported as domestic cases and one had unknown travel history.

In **Germany**, patient interviews were conducted for 26 cases (fulfilling the German outbreak case definition) in 2023. Of these, 24 interviews were used for further analysis. The following food items were often mentioned: tomatoes (21/24; large tomatoes (16/24) and small tomatoes (14/24)), eggs (17/24), cucumbers (16/23), apples (16/23), gouda cheese (15/23), leaf lettuce or leafy vegetables (15/23), iceberg lettuce (14/24), salami (12/21) and pepper (13/23). A large proportion of the interviewed cases travelled to the following countries in the three days before symptom onset: Croatia (eight cases), Italy (five cases), Montenegro (three cases), within Germany (two cases), Austria (one case) and Egypt (one case). Eating out in a restaurant (19/24) or in a bakery (15/24) was also mentioned often.

In 2024, five further patient interviews were conducted. Of these, no one travelled abroad but all ate tomatoes (but different ones – small and big, different packages, etc.). Other food items mentioned often were cucumbers (3/4) and any leafy salad (5/5).

In **France**, patient interviews were possible for 13 of 23 cases (57%). All reported eating chicken, 10 reported eating cherry tomatoes, nine reported eating salad and nine reported eating eggs.

In **Ireland**, one patient interview was conducted and the preparation and consumption of chicken and raw leafy salad were reported.

In **Italy**, patient interview questionnaires were available for 22/62 cases (36%) with sample date in 2023, six of which reported travel before illness. Consumption of the following foods were reported: meat (10 cases), cooked eggs (10 cases) and raw vegetables (12 cases). Of the 12 people who consumed raw vegetables, seven referred to consumption of tomatoes and three to salads. One person consumed only vegetables from his garden. Four cases did not consume raw vegetables. For the 2024 cases, interviews were available for only four cases. Three of these people reported eating hard cheese (parmesan), two raw vegetables (salad, small tomatoes), two fresh fruit, two cooked eggs and two minced meat.

In **Luxembourg**, two patient interviews were conducted. One case in 2023 reported eating lots of vegetables from various sources, including homegrown and bought from a market. The second case, identified in 2024, had a travel history that included a trip to Italy followed by a cruise that visited Italy, Greece and Türkiye. While on the cruise, the case regularly ate at a buffet, making it difficult to track the specific food items consumed. The case regularly ate scrambled or fried eggs but generally avoided raw tomatoes unless included in prepared meals. During the stop in Italy, she also consumed fresh fruit from a street market. Additionally, the case had contact with a younger brother who experienced diarrhoea a few days prior but was not tested.

In **Sweden**, one case from 2023 replied to a trawling questionnaire and reported intake of various foods including a variety of different vegetables and tomatoes. The only case from 2024 could not be interviewed. Among seven total cases (six from 2023–2024 and one historical case from 2021), *Salmonella* was isolated from blood from two people, urine from three people and faeces from two people.

Historical outbreaks of *S*. Strathcona in 2011 (ID 2011-FWD-00034) and 2020 (ID 2020-FWD-00032)

On 27 September 2011, Denmark reported the first registered outbreak of *S*. Strathcona in the EPIS platform (now called EpiPulse) (ID 2011-FWD-00034). The outbreak eventually included a total of 43 culture-confirmed cases registered in the Danish National Laboratory Surveillance System. The cases – 26 in females and 17 in males – occurred in children and adults from all over the country. The first patient became ill on 4 September and the last on 26 October 2011. During the same period, 17 cases of *S*. Strathcona were reported in Germany, one in Austria, two in Italy (the second case was reported at the EU level through EWRS) and one in Belgium. Small, elongated datterino tomatoes imported from Sicily were identified as the source of the infections in Denmark, based on descriptive, analytical epidemiological and traceback investigations (see section 'Microbiological and environmental investigations of food and control measures' and Annex 1) [4].

On 20 July 2020, Denmark notified a re-emergence of the same *S*. Strathcona strain, with snack tomatoes as the suspected vehicle of infection. In total, 26 cases were reported between May and August 2020 (ID 2020-FWD-00032). Following this alert, cases were also reported in Belgium (one case), Czechia (four cases), Germany (seven cases; several cases had also occurred in 2019, with these individuals falling ill after eating beef in restaurants in different towns), Ireland (one case), Italy (16 cases; cases were also isolated in 2019 and associated with an outbreak that occurred following the consumption of roast beef and roasted chicken at a restaurant), and Luxembourg (two cases in 2021, of which one had travel history to Sicily prior to illness). Several countries reported sporadic historical cases before 2020.

Microbiological and environmental investigations of food and control measures

On 18 January 2024, the food safety authority in Austria opened a RASFF notification (News 2024.0384) to request assistance from the food safety authority in Italy due to an *S.* Strathcona national outbreak under investigation in 2023 with small tomatoes (preferably with vine) as suspected food vehicle. Specifically, based on the food exposure information from one specific outbreak case, organic cherry tomatoes from Italy were the suspected vehicle of infection in the national outbreak. The outbreak case received a food basket donation via a humanitarian aid organisation that likely contained organic cherry tomatoes (Product A Batch A). The food safety authority linked the organic cherry tomatoes to the Italian Supplier A (traceability records not available from RASFF). The food safety authority identified a similar product of organic cherry tomatoes (Product B Batch B) from the Italian Supplier A, which is presumed to have the same origin as the concerned Product A Batch A. The traceback analyses of Product B Batch B pointed to the Italian Producer A as the primary producer of the cherry tomatoes.

On 18 October 2024, the food safety authority in Italy issued a RASFF notification (Information Notification for Attention 2024.7763) to inform about an ongoing national outbreak of infections caused by *Salmonella* and occurring in some schools. The national investigation linked the outbreak to cherry tomatoes as the common suspected ingredient of the meals consumed by the patients. *Salmonella* was detected from a composite food (spelt with tomatoes and pesto) collected on 26 September 2024 and further serotyped as *S.* Strathcona on 21 October 2024. The suspected cherry tomatoes were traced back to three Italian wholesalers (in particular to Wholesaler H, followed by Wholesaler D and Wholesaler E) and to Italian producers (Producer C and Producer D).

On 11 November 2011, the food safety authority in Denmark issued a RASFF notification (2011.1630) to inform about the food investigations carried out in the frame of a national outbreak of *Salmonella* Strathcona infections linked to the consumption of small, elongated tomatoes. According to the national investigations, the suspected tomatoes originated from the Italian Supplier B.

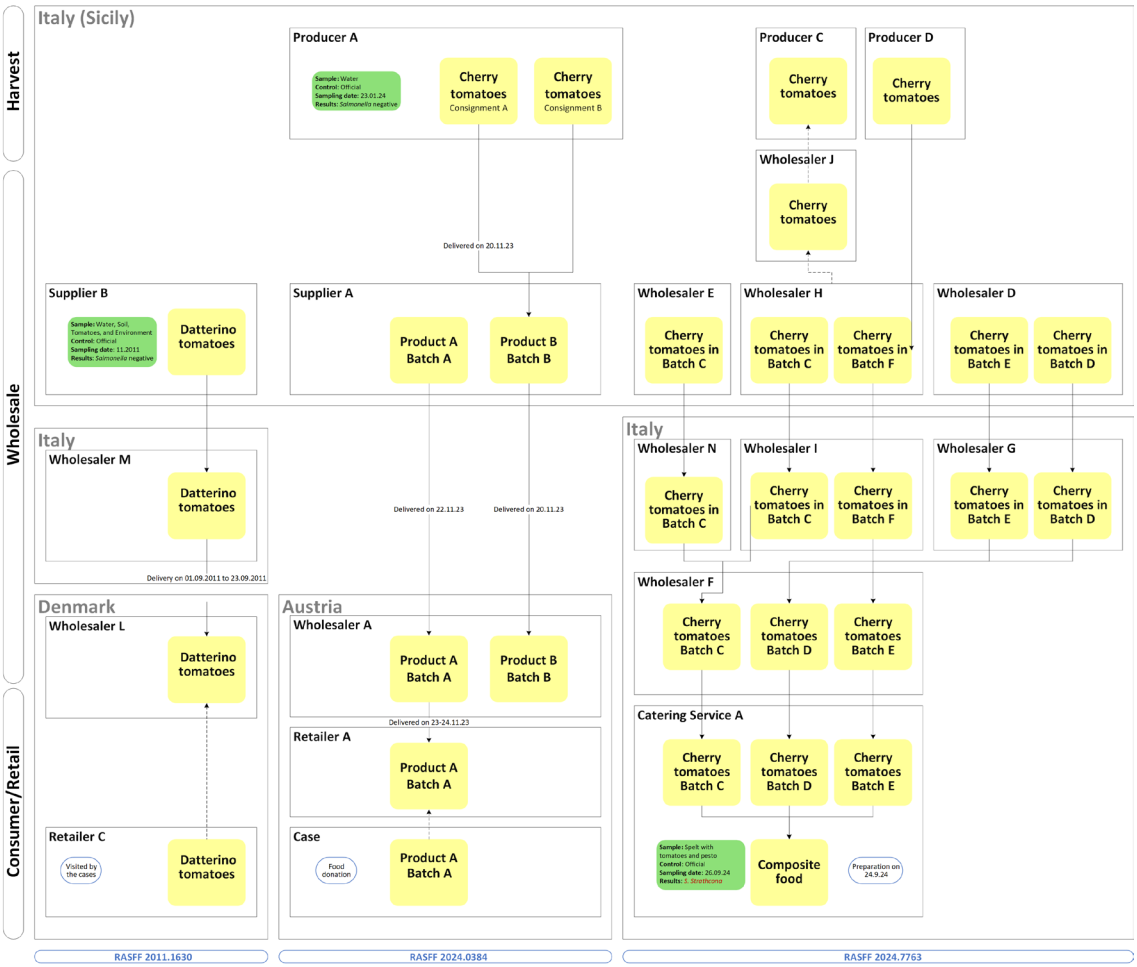
The Italian Producer A (suspected in the 2023 outbreak in Austria); the Italian Producer C, the Italian Producer D and the three Italian wholesalers (Wholesalers H, D and E) (suspected in the 2024 outbreak in Italy); and the Italian Supplier B (suspected in the 2011 outbreak in Denmark) are all located in the same region in Italy (Sicily).

On 7 October 2024, the food safety authority announced a national sampling to be completed by 31 December 2024. The national sampling aimed at collecting and testing for *Salmonella* the cherry tomatoes available on the national market, with a focus on the suspected region in Italy (Sicily) (*fup13, fup15*, 2024.0384).

Figure 1 presents a visual representation of the traceability and the microbiological data related to the suspected cherry tomatoes and food business operators, as reported by the involved countries in RASFF (2024.0384, 2024.7763 and 2011.1630).

A detailed summary of the results of the food investigations performed by the involved countries is available in Annex 1. As of 3 November 2024, RASFF News 2024.0384 included 18 European Commission (EC)-validated follow-ups (*fup*), RASFF Information Notification for Attention 2024.7763 included three EC-validated *fup* and two Member State-validated *fup*, and RASFF Alert Notification 2011.1630 included 13 EC-validated *fup*.

Figure 1. Graphical representation of the traceability of the suspected organic cherry tomatoes and microbiological investigations, as reported to RASFF by the involved countries



RASFF: Rapid Alert System for Food and Feed.
RASFF 2011.1630 refers to a historical outbreak that occurred in Denmark in 2011. Red colour indicates S. *Strathcona matching the outbreak strain.*

European whole genome sequencing analysis of human and non-human isolates

Whole genome sequencing data collection and cross-sectoral analysis

Human isolates

In a cluster analysis of *S.* Strathcona isolate sequences, including historical isolates related to this event, ECDC identified a total of 315 human isolates within seven allelic distances to the German outbreak strain. This analysis included isolates from 2011 to 2024. For the recent event with cases in 2023 and 2024, in total 196 human isolates matched the European case definition, including isolates from 16 countries: Austria, Croatia, Czechia, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Slovenia, Slovakia, Sweden and the UK.

Non-human isolates

EFSA launched calls for data in May and September 2024. EU Member States were invited to submit genomic information of *S.* Strathcona ST2559 isolates matching the representative outbreak strain to the EFSA WGS System. Nine countries replied to the call for data. By 5 November 2024, a total of 11 sequences of *S.* Strathcona non-human isolates had been shared in the EFSA WGS system by three countries (Italy: 7 isolates; Germany: 3 isolates; Austria: 1 isolate). Six countries (Denmark, Estonia, Finland, France, Lithuania and the Netherlands) replied that they did not have *S.* Strathcona non-human isolates.

The 11 isolates were as follows:

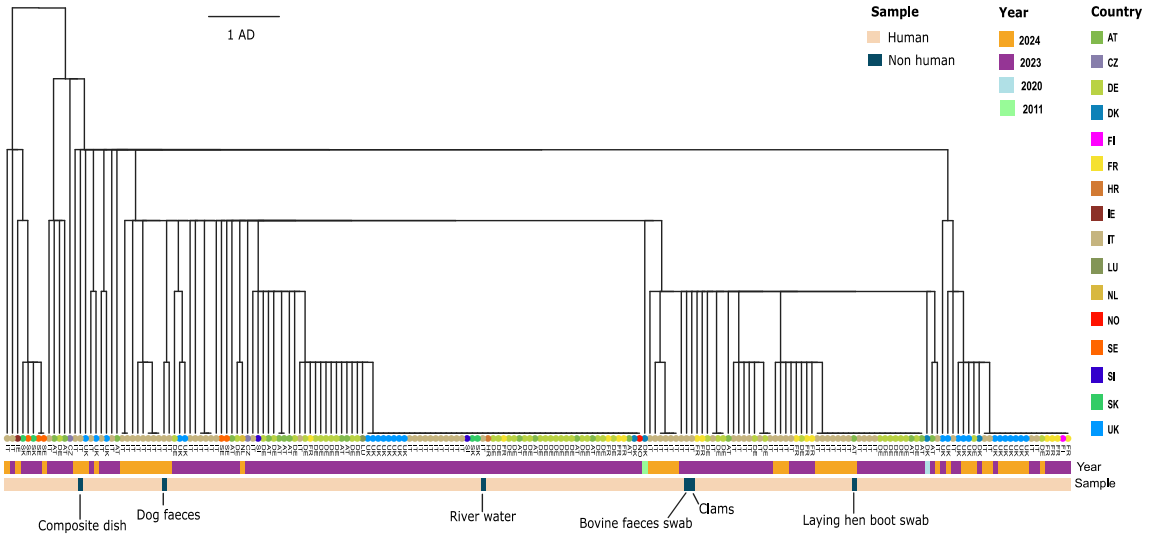
- Four isolates derived from **environmental samples**:
  - Three were from sludge (collected in Germany in 2012, 2018 and 2022);
  - One was from river water (collected in Italy in 2023).
- Four isolates derived from **animal samples**:
  - One was from wild boar organ (collected in Italy in 2022);
  - One was from bovine feces (collected in Sicily, Italy in 2023);
  - One was from dog feces (collected in Italy in 2024);
  - One was from a boot swab from a laying hen worker linked to the tomato outbreak in Austria (collected in Austria in 2023).
- Three isolates derived from **food samples**:
  - Two from bivalve mollusks (collected in Italy in 2020 and 2023);
  - One from a composite food (spelt with tomatoes and pesto) sample (collected in the frame of the national outbreak in Tuscany, Italy in 2024).

For cross-sectoral analysis, the cgMLST analysis was performed at both ECDC and EFSA, as previously described [5]. Briefly, genome profiles were calculated from assembled genomes using chewBBACA version ≥ 2.8.5 using the schema described by Rossi et al. 2018 [6] for *Salmonella enterica*, made available by chewie Nomenclature Server [7]. Isolates with more than 10% of missing loci (325 from a total of 3 255 loci) were excluded from the analysis.

Results of cross-sectoral whole genome sequencing analysis

ECDC queried the EFSA WGS System on 8 November 2024 using the cluster of *S.* Strathcona genomic profiles as reference and 10 allelic differences as the threshold. As a result of the query, all 11 submitted profiles of *S.* Strathcona non-human isolates clustered within seven allelic differences in a single-linkage cluster analysis with the human isolates. This resulted in a total of 202 *S.* Strathcona isolates (only considering the isolates collected in 2023 and 2024) in the joint dataset (Figure 2).

Figure 2. Single-linkage cluster tree of 196 human and 6 non-human *S.* Strathcona ST 2559 isolates collected in 2023 and 2024, by country, year and sample origin



The single-linkage cluster tree was created in the molecular typing tool in EpiPulse (cluster code: 2023-10.SALM.09.STRATHCONA), with data as of 8 November 2024. Two representative outbreak isolates from linked historical events from 2011 and 2020 are also included in the tree.

ECDC and EFSA risk assessment for the EU/EEA

Since 1 January 2023 and as of 5 November 2024, 232 confirmed cases of *S.* Strathcona ST2559 have been identified in 16 EU/EEA countries: Austria (33), Croatia (3), Czechia (10), Denmark (9), Estonia (1), Germany (62), Finland (3), France (23), Ireland (1), Italy (67), Luxembourg (2), the Netherlands (2), Norway (3), Slovakia (5), Slovenia (2) and Sweden (6). Among 197 cases with age and gender data available, females were more frequently affected than males.

Available information from patient interviews from Austria, Czechia, Denmark, Germany, France, Ireland, Italy, Luxembourg and Sweden indicated that 64/90 (71.1%) reported consumption of tomatoes and 42/64 (65.7%) mentioned small or cherry tomatoes specifically. Among the 43 travel-associated cases, the most frequently visited country within the incubation period was Italy (16/48 cases; 37%). In addition, one of two cases in the UK with travel data and four of five *S.* Strathcona cases reported in Canada visited Italy. In late September and early October 2024, Italy reported two *S.* Strathcona outbreaks comprising over 300 domestic salmonellosis cases. Of these, 46 were confirmed as *S.* Strathcona infections and 9 as *S.* Strathcona ST2559 infections.

Tomatoes were identified as the vehicle of infection in several national epidemiological investigations and patient interviews undertaken in response to this multi-country outbreak. Whole genome sequencing cluster analyses suggest that the outbreak strain from the multiple affected countries has a recent common origin.

The outbreak investigation in Austria in 2023 identified cherry tomatoes (Product A Batch A) as the suspected food vehicle based on a food donation that one patient received prior to illness. The traceback investigation carried out in collaboration with the food safety authority in Italy pointed to a specific geographical area of a region in Italy (Sicily) as the possible origin of the tomatoes. While the suspected cherry tomatoes (Product A) were not tested in Austria, other tomatoes (different from Product A) available on the market in December 2023 in Austria were tested and *Salmonella* was not detected. In addition, the microbiological sampling of tomatoes carried out in Germany (including tomatoes from the same region of Italy) did not detect any *Salmonella*. Inspections of the hygienic and microbiological procedures (including official sampling of the irrigation water in January 2024) were carried out at the primary production level by the food safety authority in Italy. No critical issues and no *Salmonella* detection were reported.

On 18 October 2024, a national outbreak caused by *S.* Strathcona was reported in Tuscany, Italy. The outbreak strain was detected in a composite food (spelt with tomatoes and pesto) consumed by the patients. The cherry tomatoes were considered the suspected vehicle and were traced back to Sicily, Italy – the same region that was identified in the investigation related to the outbreak in Austria in 2023.

The outbreak strain has been circulating in the EU/EEA since 2011, when a large multi-country outbreak was reported in Denmark [4]. Small, elongated datterino tomatoes traded from Sicily were identified as the source of the infections in Denmark, based on descriptive, analytical epidemiological and traceback investigations. Before 2011, the *Salmonella* serotype Strathcona had not been reported in the EU/EEA, suggesting that it entered the EU/EEA in 2011 [8]. The outbreak strain detected in Denmark in 2011 is genetically close to this outbreak strain. The national food traceability

investigation carried out in 2024 by the food safety authority in Italy indicated that the tomatoes implicated in the 2011 and 2023 events may have originated from the same region, but no common tomato producers were identified.

The epidemiological, microbiological and traceability investigations in the 2023 outbreak in Austria, and in the 2024 outbreak in Italy, confirmed small tomatoes from a region in Italy (Sicily) as the vehicle of infection in these outbreaks. This was also confirmed in the historical 2011 Danish outbreak.

Investigations from the human and food sectors should be continued to verify the hypothesis that small tomatoes from Sicily are the vehicle of infection in all EU countries that have reported or continue to report cases in this multi-country outbreak, as other foods could also be involved in the transmission. The environment's role in the contamination of the tomatoes should also be investigated, as the outbreak strain was also identified in a farm animal in the region. Investigations to identify the point of entry of S. Strathcona – including of irrigation water – should be conducted so the appropriate corrective measures are taken to stop the contamination from spreading and prevent possible new cases.

Recommendations

- **Human and food sectors** should continue to conduct investigations to verify whether small tomatoes from Sicily are the vehicle of infection in all EU countries that have reported or continue to report cases in this multi-country outbreak.
- **Public health authorities** are encouraged to:
  - Conduct a case-control study and patient interviews if new *S.* Strathcona ST2559 cases are identified. Small tomatoes should be considered as a likely vehicle of infection.
  - Sequence human isolates of *S.* Strathcona, if possible, and share them in the ECDC WGS system. ECDC can offer sequencing support to countries with limited or no capacity for it.
  - Update the EpiPulse event 2023-FWD-00090 should new cases of *S.* Strathcona ST2559 be reported.
  - Work closely with food safety authorities on national investigations if new *S.* Strathcona ST2559 cases are identified.
- **Food safety authorities** are encouraged to:
  - Share in the EFSA WGS system any sequences of *S.* Strathcona ST2559 food and environmental isolates linked to the present cluster either microbiologically (serotype or sequence type) or epidemiologically (e.g. suspected food items reported by patients), and share in RASFF the traceability information related to the foods these sequences were derived from.
  - Submit genomic data of *S.* Strathcona isolates from any kind of food, feed, animal or environmental samples to the EFSA WGS System.
  - Follow the EU Reference Laboratory for *Salmonella* recommendations for preparation of tomato samples for detection of *Salmonella* [9].
- **Consumers** are encouraged to follow proper hygiene practices at home, including handwashing, rinsing fresh produce and avoiding cross-contamination.

Source and date of request

The European Commission sent a request to EFSA on 24 September 2024 to produce a joint rapid outbreak assessment (ROA). EFSA sent a request to ECDC on the same day. ECDC accepted the request on 26 September 2024.

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Country Officers of the EFSA WGS system

Country Officers of the EFSA WGS system were consulted in Austria, Germany and Italy.

Disclaimer

This rapid outbreak assessment was written jointly by the European Centre for Disease Prevention and Control (ECDC) and the European Food Safety Authority (EFSA).

ECDC issued this outbreak assessment document in accordance with Article 20 of Regulation (EU) 2022/2371 on serious cross-border threats to health, Articles 7(1) and 8a of Regulation (EC) No 851/2004 establishing a European Centre for Disease Prevention and Control. EFSA's contribution is based on a mandate from the European Commission requesting EFSA to provide scientific assistance in the investigation of multinational food-borne outbreaks (Ares (2013) 2576387, Mandate M-2013-0119, 4 July 2013) in accordance with Article 31 of Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002, laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.

The specific purpose of an ECDC-EFSA rapid outbreak assessment is to present an analysis of a cross-border food-borne threat to health and to provide science-based recommendations and options for response. The responsibility for the choice of which options to pursue and which actions to take at the national level lies with EU/EEA countries.

All data published in this rapid outbreak assessment were collected by the EU/EEA countries affected by the outbreak up to the date this assessment was produced. Maps and figures do not represent statements from ECDC or EFSA on the legal or border status of the countries and territories shown but represent the information that this rapid outbreak assessment is based on.

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Annex 1. Traceability investigations and control measures implemented, by country

The following sections describe the traceability investigations performed by the countries involved in this EU multi-country outbreak of *Salmonella* Strathcona, as reported in RASFF. As of 3 November 2024, RASFF News 2024.0384 included 18 European Commission (EC)-validated follow-ups (*fup*), RASFF Information Notification for Attention 2024.7763 included three EC-validated *fup* and two Member State-validated *fup*, and RASFF Alert Notification 2011.1630 included 13 EC-validated *fup*.

2023-FWD-00090 and RASFF 2024.0384 and 2024.7763

Austria

On 18 January 2024, the food safety authority in Austria opened a RASFF notification (News 2024.0384) to request the assistance of the food safety authority in Italy due to an *S.* Strathcona national outbreak under investigation. The outbreak occurred in 2023, with small tomatoes (preferably with vine) as the suspected food vehicle for 13 of 14 interviewed patients. Specifically, based on the food exposure information from one specific outbreak case, organic cherry tomatoes from Italy were suspected as the vehicle of infections in the national outbreak. The patient had received these tomatoes in a food basket donation via a humanitarian aid organisation.

The basket was sourced from the same supermarket chain (Austrian Retailer A) named by the other cases in Austria (for detailed food exposure information, see the section 'Information from patient interviews'). Specifically, the food donation likely contained organic cherry tomatoes (Product A Batch A). This is in accordance with the warehouse register of Austrian Retailer A, which showed a write-off of 18 crates of organic cherry tomatoes from Italy on 29 November 2023. There was no microbiological analysis performed on the suspected tomatoes from the food basket donation.

The food safety authority linked the organic cherry tomatoes to the Italian Supplier A (traceability record not available from RASFF). The product was marked with a packing date of November 2023 and was traced back to the Austrian Wholesaler A that received the product on 22 November 2023 (*fup1*, 2024.0384). Austrian Wholesaler A distributed three shipments containing Product A Batch A on 23 and 24 November 2023 to the Austrian Retailer A warehouse.

The food safety authority identified a similar product of organic cherry tomatoes Product B Batch B, which was delivered on 20 November 2023 to Austrian Wholesaler A by Italian Supplier A (traceability record available in RASFF; *fup1*, 2024.0384).

In December 2023, the food safety authority performed a sampling of nine tomato products (organic cherry tomatoes, organic San Marzano tomatoes and organic oval tomatoes) available at the Austrian Retailer A. Five products originated from Spain. Four products originated from Italy (Sicily), two of which were from Italian Supplier A. All products tested negative for *Salmonella* in 25g of product (*fup17*, 2024.0384).

Italy

Soon after the request for collaboration, the food safety authority in Italy carried out an official control at the Italian Supplier A that had delivered Product B Batch B to Austria. Product B Batch B is presumed to have the same origin as the concerned Product A Batch A. The food safety authority informed that the Italian Supplier A received tomatoes from the primary producer, Italian Producer A, in November 2023 (*fup2*, 2024.0384).

Specifically, Product B Batch B – containing a total of 1996.80 kg of cherry tomatoes (Consignment A and B) from the Italian Producer A – was distributed to Austria on 20 November 2023.

In addition, cherry tomatoes from Consignment A, Consignment B and Consignment C from the Italian Producer A – together with Consignment D from the Italian Producer B – were wholesaled by the Italian Supplier A to the Italian Wholesaler B on 21 November 2023. The Italian Wholesaler B sold them to the German Wholesaler C, which further distributed them to the Slovakian Retailer B.

In November 2023, the Italian Supplier A distributed some other organic cherry tomatoes (other consignments from Producer A) within Italy (*fup4*, *fup8*, 2024.0384).

In 2024, the Italian Supplier A distributed organic cherry tomatoes from Producer A to Poland (on 5 February 2024; *fup4*, 2024.0384), to Austria (on 10 February 2024; *fup6*, 2024.0384) via Germany (on 7 February 2024; *fup4*, 2024.0384), and within Italy (on 12 February 2024; *fup4*, 2024.0384).

After an official inspection conducted at the Italian Producer A, the food safety authority reported that they did not identify any critical issues, as the producer had an up-to-date organic certification and all the hygiene procedures in place, including the microbiological monitoring of water used for the vegetable cultivation. The food safety authority also checked the microbiological analysis carried out on 17 February 2023, which showed the following results: fecal Streptococci, *E. coli* and total coliforms tested less than 3 MPN/100 mL of water sample, and total viable microorganisms (22°C and 36°C) tested less than 1 UFC/mL (*fup2*, 2024.0384).

In addition, the authority asked the Italian Producer A to perform microbiological testing of the water used for irrigation, and on 26 January 2024 no *Salmonella* was detected from the tested samples of potable water. Fecal Streptococci, *E. coli*, and *Clostridium perfringens* tested less than 1 UFC/100 mL; total coliforms tested 51 UFC/100 mL; and total viable microorganisms (22°C) tested at 1300 UFC/mL (*fup4*, 2024.0384). Finally, the food safety authority informed that at the Italian Producer A, the automatic irrigation system is not hydroponic and the water drips directly onto the roots of the plant without contact with the fruits (*fup8*, 2024.0384).

With regards to the historical outbreak investigated in Denmark in 2011, the food safety authority clarified that there was no epidemiological link between the supplier (Italian Supplier A) of organic cherry tomatoes under investigation in the 2023 Austrian outbreak and the supplier (Italian Supplier B) of tomatoes investigated during the 2011 outbreak in Denmark (RASFF 2011.1630; *fup8*, 2024.0384).

On 21 May 2024, the food safety authority informed that a *Salmonella* Strathcona isolate from an environmental sample had been collected in January 2023 (*fup7*, 2024.0384) but that the isolate was not available. The authority clarified that this isolate originated from a different region than the other *Salmonella* Strathcona ST2559 matching isolate detected in the same year (20 September 2023 in Northern Italy) from a surface river water sample. This isolate from the river water sample is included in the WGS centralised analysis. (*fup7*, 2024.0384).

On 18 October 2024, the food safety authority in Italy issued a RASFF notification (Information Notification for Attention 2024.7763) to inform about an ongoing national outbreak of infections caused by *Salmonella* and occurring in some schools. The national investigation linked the outbreak to cherry tomatoes as a common suspected ingredient in the meals consumed by the patients. *Salmonella* was detected from a composite food (spelt with tomatoes and pesto) collected on 26 September 2024 and was further serotyped as *S*. Strathcona on 21 October 2024.

The composite food was prepared by a catering service (Catering Service A) and served on 24 September 2024. It contained cherry tomatoes (Batch C, Batch D and likely Batch E) supplied by the Italian Wholesaler F. The Italian Wholesaler F purchased the cherry tomatoes from three different wholesalers: Italian Wholesaler D (via the Italian Wholesaler G, for the cherry tomatoes from Batch D and Batch E), Italian Wholesaler H (via the Italian Wholesaler I, for the cherry tomatoes from Batch E and Batch C), and Italian Wholesaler E (via the Italian Wholesaler N, for the cherry tomatoes from Batch C) (*fup2*, 2024.7763). The authority informed that the Italian Wholesaler H just sold the tomatoes and did not store them.

The food safety authority also informed that the Italian Catering Service A had possibly used cherry tomatoes from Batch E and Batch C in a meal prepared on 20 September 2024 (*fup2*, 2024.7763). The authority found that the highest correlation between origin of tomatoes (Batch E/Batch F) and occurrence of cases was with the Italian Wholesaler I and the Italian Wholesaler H (*fup3*, 2024.7763). Nevertheless, the authority informed that possible correlations with the origins of tomatoes and the occurrence of cases cannot be excluded for the other companies, such as Italian Wholesaler G (supplied by Italian Wholesaler D) and Italian Wholesaler N (supplied by Italian Wholesaler E). Official inspections were carried out at the wholesale level (Wholesalers D and E).

Further investigations revealed that the Italian Wholesaler H purchased cherry tomatoes from the Italian Producer C via the Italian Wholesaler J (#719742, 2024.7763). The Italian Producer C was further inspected on 22 and 23 October 2024. The official control revealed that the entire harvest of cherry tomatoes (6–18 September 2024) was sold to the Italian Wholesaler J. At the Italian Producer C, irrigation is done with well water and fertilisation is done using an industrial organic fertiliser (#720774, 2024.7763).

However, additional tracing analysis performed revealed that Batch E likely derived from a batch of tomatoes (Batch F) originating from the Italian Producer D, which is located in the same region in Italy (Sicily). Investigations and sampling of tomatoes was performed at Producer D.

On 7 October 2024, the food safety authority announced a national sampling due by 31 December 2024. The national sampling aimed at collecting and testing for *Salmonella* the cherry tomatoes available on the national market, with focus on the region Sicily (*fup13, fup15*, 2024.0384).

Germany

On 25 January 2024, the food safety authority in Germany informed in RASFF that the German Wholesaler C did not handle the organic cherry tomatoes received from the Italian Wholesaler B and distributed them to the Slovakian Retailer B (*fup3*, 2024.0384).

On 14 October 2024, the food safety authority shared the outcome of national food investigations carried out in August 2024 (weeks 32 and 34). The authority informed that there were no tomatoes on the market that corresponded to the description of the cherry tomatoes (i.e. same product and origin) suspected in Austria. However, 11 tomato samples – including cherry tomatoes from Italy (Sicily) – were collected and all tested negative for *Salmonella* (*fup16*, 2024.0384).

Slovakia

The food safety authority in Slovakia informed that an official inspection was carried out at the Slovakian Retailer B that had received goods (organic cherry tomatoes, other batches) from the Italian Supplier A. At the time of the inspection, there were no remaining goods at the retailer (*fup14*, 2024.0384).

2011-FWD-00034 and RASFF 2011.1630

Denmark

On 11 November 2011, the food safety authority in Denmark issued a RASFF notification (Alert Notification 2011.1630) to inform about the food investigations carried out in response to a national outbreak of *Salmonella* Strathcona infections linked to the consumption of small, elongated, datterino tomatoes. The suspected tomatoes had been sold in September and the first part of October 2011 at the Danish Retailer C, which had been visited by the patients. The suspected tomatoes originated from the Italian Supplier B via the Italian Wholesaler M and the Danish Wholesaler L. At the time of the investigation, there was no remaining stock of the suspected tomatoes; therefore, no microbiological analyses could be carried out (2011.1630).

Italy

Following the investigation in Denmark, the food safety authority in Italy performed an official control at the Italian Supplier B and informed that microbiological analysis of the collected samples detected no *Salmonella*. Samples had been taken from the water, the vehicle used for tomato transportation, the soil and the tomatoes (*fup1*, *fup9*, 2011.1630). In addition, the authority informed that during the period of the investigation in Denmark, tomatoes had been distributed to other countries (Austria, Belgium, Germany, the Netherlands, Switzerland and the UK) (*fup3, fup4, fup5, fup11*, *fup13*, 2011.1630).

Germany

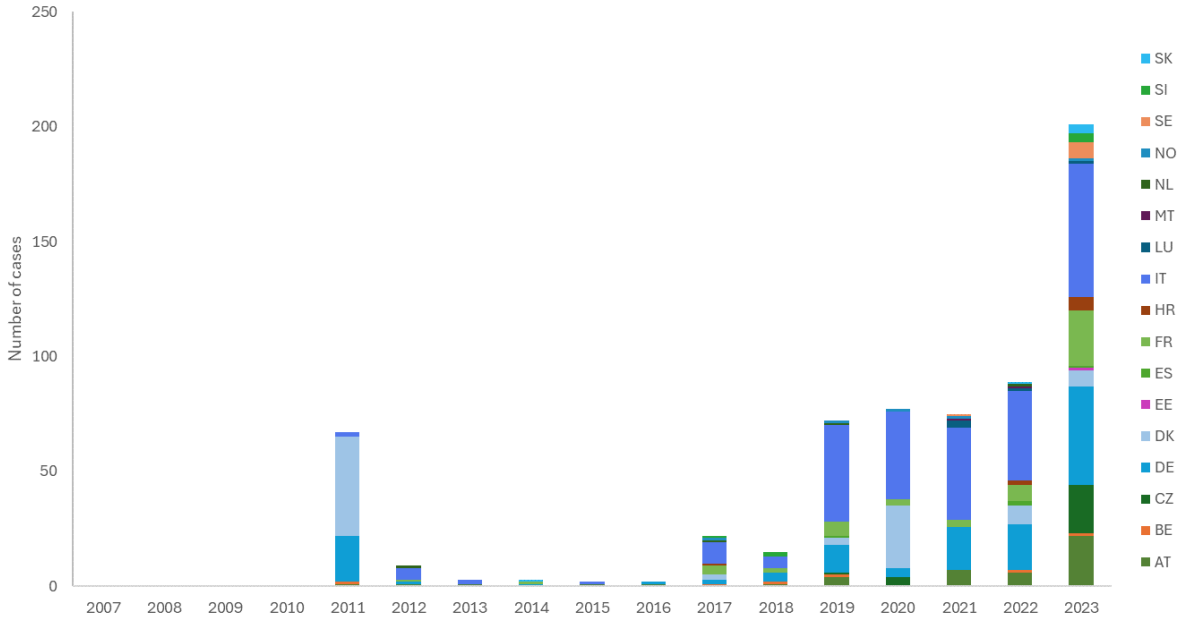
On 6 December 2011, the food safety authority in Germany informed about the precautionary withdrawals implemented and about the results of the sampling done. The collected samples of tomatoes received from Italy (Italian Supplier B) tested negative for *Salmonella* (*fup3 and fup7*, 2011.1630).

Annex 2. Disease background

Surveillance of *Salmonella* Strathcona infections in the EU/EEA

Salmonellosis is a notifiable disease in the EU. *Salmonella* Strathcona is a rare serotype in the EU/EEA. It was initially reported in 2011 when the first multi-country outbreak was identified (Figure 3). Between 2011 and 2023, 637 cases of *S.* Strathcona have been reported to The European Surveillance System (TESSy), with a notable increase in cases since 2019. Most cases were reported by Italy (37.8%), followed by Germany (19.9%) and Denmark (14.1%). In 2023, 201 cases were reported by 15 EU/EEA countries, and more than twice as many cases were reported compared with 2022.

Figure 3. Number of *S.* Strathcona cases (n = 637 cases) by year and country, EU/EEA countries, 2011–2023



AT: Austria; BE: Belgium; CZ: Czechia; DE: Germany; DK: Denmark; EE: Estonia; ES: Spain; FR: France; HR: Croatia; IT: Italy; LU: Luxembourg; MT: Malta; NL: Netherlands; NO: Norway: SE: Sweden; SI: Slovenia; SK: Slovakia.

Infection with *S.* Strathcona follows strong seasonality, with most (90.4%) cases reported between July and December, peaking between August and November. The cumulative monthly peaks in Denmark and Germany were in September and October, followed by a monthly peak in Italy in September. Of 324 cases, 53 (16.4%) were reported with travel history before illness and 24 (45.3%) were reported with Italy as the probable country of infection.

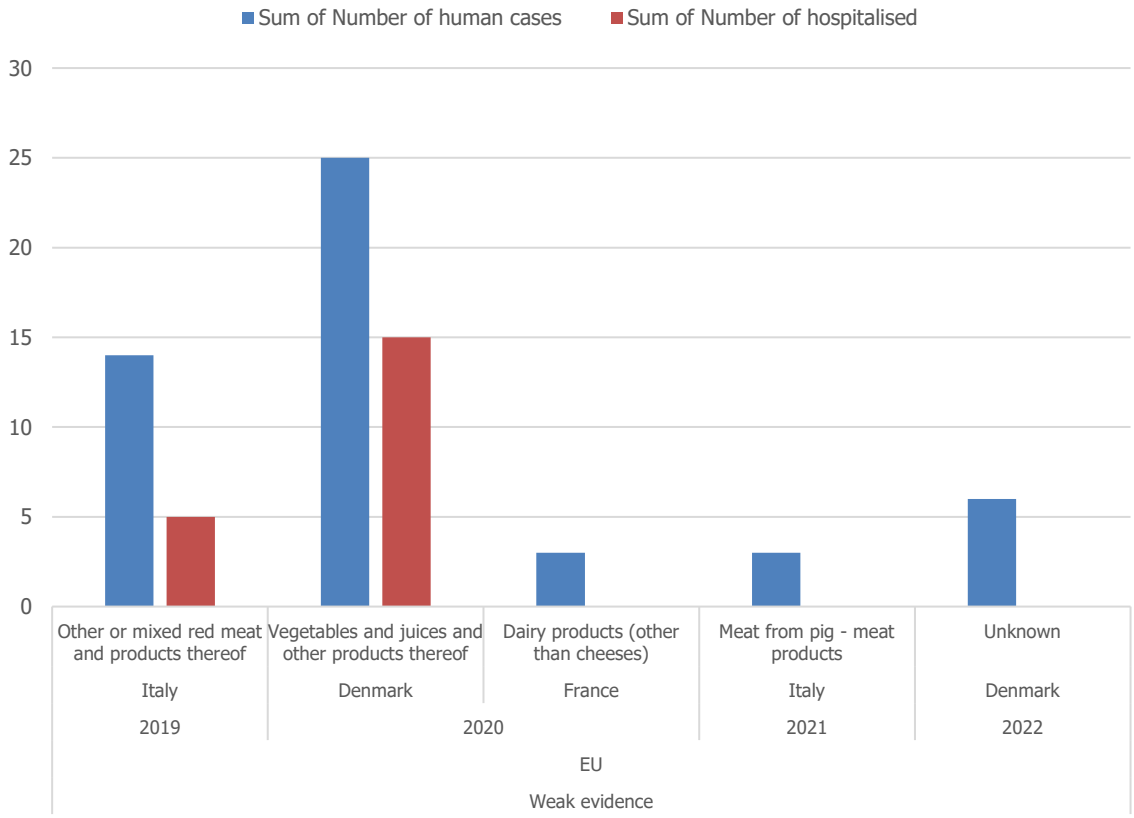
Despite slightly more cases reported in females than males, there were no statistically significant differences by gender in the age groups, except for the age group 0–4 years, where female cases were more frequent than male (male-to-female ratio: 1:1.8; $p<0.01$). No deaths due to or with *S.* Strathcona infection were reported between 2011 and 2023. Of 463 cases with available information, samples were positive from faeces (87.5%), blood (8.0%), urine (3.2%) and 'other' sample type (1.3%).

Further information on salmonellosis in the EU/EEA can be found on the online Surveillance Atlas of Infectious Diseases [8] and in ECDC's Annual epidemiological report [10].

Food-borne outbreaks caused by *S.* Strathcona

Country-specific data on food-borne outbreaks associated with *S.* Strathcona are reported to EFSA by EU countries in accordance with the Zoonoses Directive 2003/99/EC. Overall, five weak evidence foodborne outbreaks caused by *S.* Strathcona have been reported in the EU/EEA (all years), with 51 human cases, 20 hospitalisations, and no deaths. The outbreaks were reported by three EU Member States: Denmark (two outbreaks, in 2020 and 2022), France (one outbreak in 2020) and Italy (two outbreaks, in 2019 and 2021). The reported food vehicles were 'Foods of non-animal origin', 'Milk and milk products', and 'Meat and meat products' (Figure 4).

Figure 4. Overall distribution of the five reported foodborne outbreaks in the EU/EEA (all years) caused by *S.* Strathcona



Blue bars represent the total number of human cases reported in each outbreak; red bars represent the number of hospitalisations out of the number of human cases reported in each outbreak.

Occurrence of *S.* Strathcona in food

Country-specific data on the occurrence of *S.* Strathcona for all matrices (food, feed and animals) is reported to EFSA by EU countries in accordance with the Zoonoses Directive 2003/99/EC. For all matrices, one EU Member State (Italy) reported one total unit tested for the matrix 'Deer - wild - fallow deer', which tested positive for *S.* Strathcona in 2022.