

JOINT ECDC-EFSA RAPID OUTBREAK ASSESSMENT

Multi-country outbreak of *Salmonella* Enteritidis sequence type (ST)11 infections linked to poultry products in the EU/EEA and the United Kingdom

25 February 2021

Abstract

Between May 2018 and December 2020, 193 human cases of *Salmonella* Enteritidis sequence type (ST)11 were reported in Denmark (2), Finland (4), France (33), Germany (12), the Netherlands (3), Poland (5), Sweden (6), and the United Kingdom (UK) (122). One in five cases was hospitalised. One death was reported. Fifty percent of the cases were children ≤ 18 years. The most recent case was reported by the UK in December 2020. Epidemiological studies in the UK have identified an increased risk of *S. Enteritidis* infection associated with the consumption of frozen breaded chicken products.

Five batches of non-ready-to-eat poultry products (e.g. breaded products) tested positive for *S. Enteritidis* matching the outbreak strain. Three of these were manufactured by the Polish Processing Company B where *S. Enteritidis* was not detected. The five positive batches were traced back to different meat suppliers, slaughterhouses, and/or farms in Poland. Some of these farms had positive results for *S. Enteritidis* in 2020 (no whole genome sequencing typing). The scarce typing information available for the primary production did not enable the identification of a microbiological link between the positive Polish farms and the contaminated products. Control measures were implemented for the products involved (e.g. withdrawals, recalls).

The whole genome sequencing analysis of human and food *S. Enteritidis* isolates confirmed a cluster with 0–3 allelic differences through single linkage clustering. This, in combination with epidemiological and traceability data, suggests common source(s) in the food chain.

There remains a risk of infection in connection with the consumption of implicated poultry products purchased before the withdrawals, if these products are not properly cooked. Unknown source(s) of contamination and the identification of other *Salmonella* serotypes and *S. Enteritidis* strains indicate that these poultry products pose a recurrent risk for *Salmonella* infections in the EU/EEA and the UK.

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Event background

On 9 June 2020, the United Kingdom (Public Health England, Public Health Wales and Public Health Scotland) reported a 5-single nucleotide polymorphism (SNP) single linkage cluster of 65 *Salmonella* Enteritidis cases, with sample dates ranging from 5 September 2018 to 22 May 2020, through ECDC's Epidemic Intelligence Information system (EPIS, Urgent Inquiry 644). Almost half of the cases, 30/65 (46%) had sample dates reported since April 2020. Cases were nationally distributed, 54% were male and the median age was 16 years (range 0–87 years). One case reported travel to France and one to Cyprus. According to the Public Health England (PHE) pipeline, the SNP designation for this cluster is 1.1.2.2533.3617.4833.%. For comparison in national databases, the UK shared sequence read archive (SRA) codes of two representative isolates in EPIS are: SRR11741596 and SRR8333779.

Multi-country investigations

On 9 June 2020, **France** reported 23 isolates belonging to HC5-146173, which also includes the UK reference strains (Enterobase HierCC-cgMLST scheme, 'HC5' indicating a cluster of isolates within five core genome alleles in single linkage analysis) [1]. After an update on 24 December 2020, France reported 33 cases: nine cases in 2018, 11 in 2019, and 13 in 2020. Twenty-five of these isolates, including 11 isolates from 2020, were within the same HC2-148338.

On 9 June 2020, **Sweden** reported two isolates (three and five SNPs differences from the UK reference strains) from April and June 2019. The multiple locus variable-number tandem repeat analysis (MLVA) profile was 3-11-5-4-1. After an update on 17 September 2020, Sweden had identified four more cases in 2020, one with seven SNP difference and three with approximate five SNP differences from the UK outbreak strains.

On 10 June 2020, **Finland** reported two autochthonous cases, one in March and another one in May 2020. After an update on 26 August 2020, two more cases had been reported, in June and July 2020. Isolates from all four cases were within four allelic differences (AD) by cgMLST from one of the UK representative strains.

On 10 June 2020, **the Netherlands** reported one isolate with two AD from the UK representative strain from March 2019. By 31 December 2020, two more Dutch cases had been reported.

On 11 June 2020, **Canada** reported one genetically related case (one AD from the UK representative strain SRR11741596 by cgMLST) from 2019.

On 12 June 2020, **Ireland** reported nine *S. Enteritidis* ST11 isolates that were closely related (0-3 AD by cgMLST) to the representative UK isolates. Three of these patients were from 2019 and six from 2020. Since then, three new cases have been reported.

On 18 July 2020, **Poland** reported five human isolates linked to this cluster (sequences within one AD by cgMLST from the representative sequences in the UK). Sampling dates for four cases ranged from March to July 2019.

On 30 July 2020, **Germany** reported its first human isolate with a sequence matching the UK representative strains by 0-1 AD. On 4 February 2021, Germany confirmed that it had detected six human isolates with 0–2 AD from the UK representative strains by 31 December 2020.

On 21 September 2020, **Denmark** reported two related cases with 0-2 AD to SRR8333779 (cgMLST scheme from Enterobase calculated in BioNumerics).

This Rapid Outbreak Assessment focuses on the public health risk in the EU/EEA and the UK related to the cross-border spread of this specific *Salmonella* Enteritidis ST11 strain, as characterised by the national SNP pipeline for Public Health England (UK), and linked contaminated poultry products.

EU/EEA outbreak case definition

The European outbreak case definition is as follows:

A confirmed outbreak case

- A laboratory-confirmed *Salmonella* Enteritidis case with symptom onset on or after 1 January 2018 (date of sampling or date of receipt by the reference laboratory if date of onset is not available)

AND

- Fulfilling the additional laboratory criterion: with a strain sharing the same t5-level PHE SNP address as the outbreak cluster defined by the PHE SNP pipeline [2]: 1.1.2.2533.3617.4833.% (PHE-t5.4833 –represented by accession numbers SRR11741596 and SRR8333779) OR clustering within five cg-allelic differences from any other isolate in the cluster in a centralised single linkage analysis.

A probable outbreak case

- A laboratory-confirmed *Salmonella* Enteritidis case with symptom onset on or after 1 January 2018 (date of sampling or date of receipt by the reference laboratory if date of onset is not available)

AND

- Fulfilling the additional laboratory criterion: with a strain determined as genetically closely related to at least one of the representative UK strains using national WGS-based analysis pipelines (see analyses by country above).

Search suggestions for *Salmonella* Enteritidis isolates possibly linked to UI-644

- HC10-146173 in Enterobase [1]
- Within ≤ 10 cg-alleles from SRR11741596 or SRR8333779.

Epidemiological and microbiological investigations of human cases

Epidemiological overview

The focus of this public health risk assessment is on the *Salmonella* Enteritidis strain, which is characterised as follows:

Salmonella Enteritidis

Sequence type (ST) 11

MLVA 3-11-5-4-1 (according to MLVA analysis by the Public Health Agency of Sweden)

PHE SNP Address 1.1.2.2533.3617.4833.% (PHE-t5.4833).

Based on the EU/EEA outbreak case definition and as of 31 December 2020, 193 cases of *S. Enteritidis* ST11 (153 confirmed and 40 probable) have been reported by eight EU countries and the UK since May 2018: Denmark (2), Finland (4), France (33), Germany (6), Ireland (12), the Netherlands (3), Poland (5), Sweden (6), and the United Kingdom (122) (Figure 1, Figure 2). In addition, one probable case was reported in Canada in 2019. The Canadian case had a history of travel to Europe during the exposure period. By 31 December 2020, further analyses had been performed of the 193 cases reported from Europe. The UK reported 63.2% of all cases.

Figure 1. Distribution of 193 human *S. Enteritidis* cases (confirmed and probable) by reporting country and month-year in eight EU countries and the UK, April 2018 – 31 December 2020

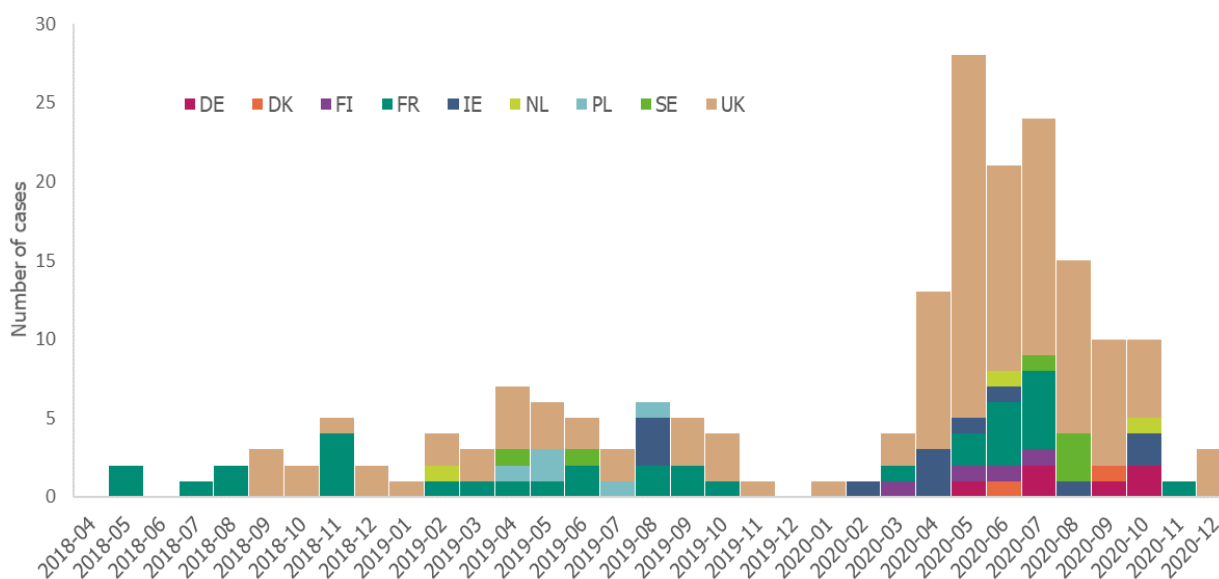
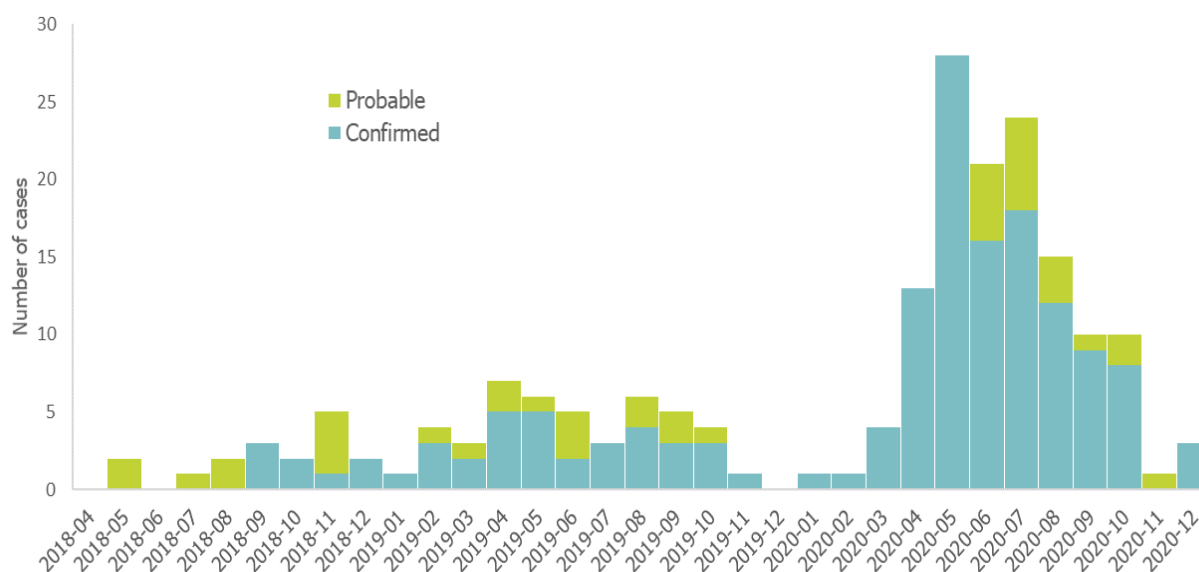


Figure 2. Distribution of 193 human *S. Enteritidis* ST11 confirmed and probable cases by case classification and month-year in eight EU countries and the UK, April 2018 – 31 December 2020

In 2018, eight *S. Enteritidis* ST11 cases were reported in the United Kingdom and nine in France (Table 1). In 2019, the number of cases (probable and confirmed) increased to 45, involving six countries. The case numbers peaked in 2020, with 131 cases being reported by eight countries (Table 1). The most recent case was reported in the UK, with the sampling date 17 December 2020.

One in five cases (19.7%) has been hospitalised and one death (of an 86-year-old female) has been reported in France (Table 2). Four cases reported travel before onset of illness; two visited Poland, one visited France, and one Cyprus (Table 2).

Table 1. Number of confirmed and probable *S. Enteritidis* cases in eight EU countries and the UK, 2018 – 2020, as of 31 December 2020

Country	2018		2019		2020		Total
	Confirmed	Probable	Confirmed	Probable	Confirmed	Probable	
Denmark	-	-	-	-	-	2	2
Finland	-	-	-	-	4	-	4
France	-	9	-	11	3	10	33
Germany	-	-	-	-	4	2	6
Ireland	-	-	3	-	9	-	12
Netherlands	-	-	1	-	2	-	3
Poland	-	-	5	-	-	-	5
Sweden	-	-	-	2	-	4	6
United Kingdom	8	-	23	-	91	-	122
Total	8	9	32	13	113	18	193

Table 2. Number of *S. Enteritidis* cases (confirmed and probable) in terms of reported travel, hospitalisation, and death in eight EU countries and the UK, 2018–2020, as of 31 December 2020

Country	Number of cases	Travel abroad <i>N</i> (%)	Hospitalised <i>N</i> (%)	Deaths <i>N</i> (%)
Denmark	2	-	-	-
Finland	4	-	1 (25.0)	-
France	33	-	-	1 (3.0)
Germany	6	-	4 (66.7)	-
Ireland	12	2 (16.7) ^b	9 (75.0)	-
Netherlands	3	-	-	-
Poland	5	-	3 (60.0)	-
Sweden	6	-	-	-
United Kingdom	122	2 (1.6) ^a	21 (17.2)	-
Total	193	4 (2.1)	38 (19.7)	1 (0.5)

^a One case travelled to Cyprus and one to France.

^b Both cases travelled to Poland.

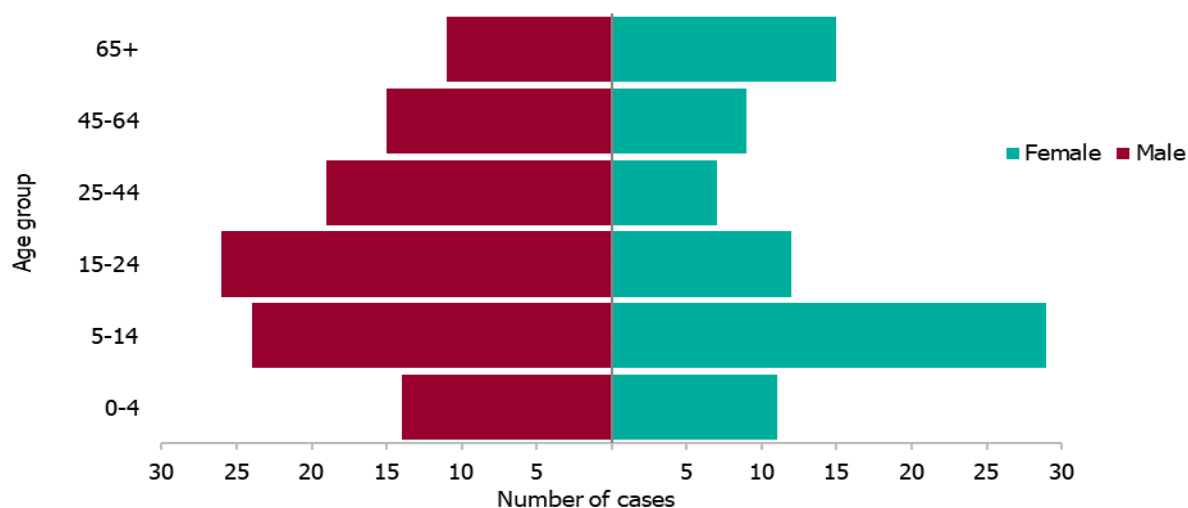
Fifty percent of the cases were children ≤ 18 years and 75% were ≤ 45 years. While cases were reported in all age groups, males were predominant among 15–64-year-olds and this dominance was statistically significant in the age groups 15–24 and 25–44 years (Table 3, Figure 3) [3]. In the UK, the male predominance was only statistically significant in the 15–24 years age group.

Table 3. Distribution of *S. Enteritidis* confirmed and probable cases by age group and gender in eight EU countries and the UK, 2018–2020, as of 31 December 2020

Age group (years)	Female <i>N</i> (%)	Male <i>N</i> (%)	Total* <i>N</i>
0-4	11 (44.0)	14 (56.0)	25
5-14	29 (54.7)	24 (45.3)	53
15-24**	12 (31.6)	26 (68.4)	38
25-44**	7 (26.9)	19 (73.1)	26
45-64	9 (37.5)	15 (65.2)	24
65+	15 (57.7)	11 (42.3)	26
Total	83 (43.2)	109 (56.8)	192

* Age not known for one case in Germany

** $p < 0.05$ (chi-square test) [3].

Figure 3. Distribution of 192 *S. Enteritidis* confirmed and probable cases by gender and age group in eight EU countries and the UK, 2018–2020, as of 31 December 2020

Information from patient interviews

Information on patient interviews was available for 74 (44.0%) cases from six countries. Of these, 86.4% (n=64) reported consumption of chicken during the week before illness. At least one of the interviewed cases with no known chicken consumption was a secondary case and therefore probably contracted the infection from another case. Among those cases for which consumption data was available, 77.6% reported consumption of fresh chicken and 67.4% of cases reported consumption of breaded chicken (Table 4). Consumption of chicken was reported in restaurants, at home and at school. In addition to freshly-made and purchased breaded chicken products, chicken was consumed in the form of burgers, kebabs, salad and/or sandwiches. The following types of specific chicken products were included: chicken nuggets, goujons, Kiev, drumsticks, thighs, wings, breast filets, poppers, and skewers.

Table 4. Consumption of chicken and chicken products by exposure types in five EU countries and the UK, 2019–2020, as of 31 December 2020

Exposure types		UK N (%)	IE N (%)	FR N (%)	SE* N (%)	PL N (%)	FI N (%)	Total N (%)
Consumption of fresh chicken	Yes	26 (72.2)	6 (100.0)	6 (100.0)	-	-	-	38 (77.6)
	No	10 (27.8)	-	-	1 (100.0)	-	-	11 (22.4)
	Unknown	10	-	-	2	1	2	15
Consumption of purchased breaded chicken	Yes	24 (64.9)	6 (100.0)	-	-	1 (100.0)	-	31 (67.4)
	No	13 (35.1)	-	-	1 (100.0)	-	1 (100.0)	15 (32.6)
	Unknown	9	-	6	2	-	1	18
Consumption of pre-cooked or cooked/ready-to-eat chicken	Yes	14 (38.9)	2 (66.7)	-	2 (100.0)	-	2 (100.0)	20 (46.5)
	No	22 (61.1)	1 (33.3)	-	-	-	-	23 (53.5)
	Unknown	10	3	6	1	1	-	21

* One Swedish case reported consumption of chicken drumsticks and wings but it was not known whether these were fresh/frozen or pre-cooked.

Epidemiological investigations in the United Kingdom

The local authorities in the United Kingdom interviewed 37 cases reported since January 2020. The interviews suggested a primary hypothesis of chicken products as the likely vehicles of infection. National public health authorities performed 33 more targeted interviews of cases that were reported between June and September 2020. These interviews revealed high levels of chicken consumption (85%), with 93% reporting having bought and consumed raw frozen breaded chicken products, 75% fresh chicken, and 39% ready-to-eat chicken products.

PHE performed a case-control analysis using 32 case questionnaires and 273 control questionnaires from market research panel participants recruited during separate investigations into two national *Salmonella* outbreaks (linked to fresh salad products and Brazil nuts) in 2019 and 2020. Univariate analysis identified consumption of purchased raw frozen breaded chicken products as a risk factor for illness (odds ratio [OR] 23.6, 95% CI 8.6 – 64.7), as well as shopping at two retailers (Retail Chain B: OR 4.5, 95% CI 2.0 – 10.1; Retail Chain D: OR 2.9, 95% CI 1.3 – 6.6). When adjusting for potential confounders using multivariable logistic regression, cases had higher odds than controls of having purchased raw frozen breaded chicken at Retail Chain D and eaten it (adjusted OR 149.7; 95% confidence interval 12.3 - 1,191.7), or of having purchased raw frozen breaded chicken products at Retail Chain B and eaten them (aOR 121.0; 95% CI 11.4 – 1 968.2).

An additional case-case analysis was also performed using 31 case questionnaires and 69 case-comparator questionnaires, obtained from investigations of the same two *Salmonella* outbreaks linked to fresh salad products and Brazil nuts. This analysis provided further evidence that the cases were more likely to have eaten raw frozen breaded chicken (aOR 35.5; 95%CI 6.4 - 196.5) and shopped at Retail Chain D (aOR 7.0; 95% CI 1.6 - 30.0).

These investigations occurred alongside a second outbreak investigation (July 2020 to January 2021) into a cluster of *S. Enteritidis* (PHE SNP address designation 1.1.2.12.% [t25.12], including PHE-t5.12 and PHE-t5.590), with over 300 reported cases in 2020. Epidemiological investigations identified an association between human infections and raw frozen breaded chicken products, which was supported by further case-control and case-case studies (detailed in EPIS UI-656). This resulted in further investigations in the UK, including microbiological sampling of raw frozen breaded products, being undertaken to address both outbreaks simultaneously due to commonalities in the vehicles of illness (various raw frozen breaded chicken products) and their supply chains. It is interesting to note that the French National Reference Centre reported on 29 January 2021 (in EPIS UI-656) that they are continuing to identify cases with *S. Enteritidis* isolates closely related to the UK strains, according to the Enterobase scheme.

Epidemiological investigations in Sweden

In Sweden, two cases were reported in 2019 and four in 2020. Three of the four cases in 2020 were from the same small town in northern Sweden. Two cases went to the same Chinese restaurant but they did not like chicken and therefore reported that they had avoided eating it. The third case went to a Thai restaurant, where the person ate chicken skewers. The fourth case in 2020 had eaten chicken dishes three days in a row before the onset of symptoms. On 26 June 2020, the case ate chicken pieces at a Thai restaurant; on 27 June, the case purchased chicken thighs in a supermarket; and on 28 June, the case ate stir-fried chicken at a restaurant. Traceability information is available in the section 'Traceability related to food exposure information'.

Microbiological and environmental investigations of food and control measures

This section summarises country-specific information on microbiological investigations and traceability analyses of food products, and on control measures implemented by the EU/EEA countries and the UK, involved in the RASFF notification RASFF 2018.1911, 2020.3868, 2020.3237, 2020.3179 (63, 8, 27, 3 follow up - *fup*, as of 10 February 2021). A visual representation is provided in Figure A-1 and A-2 (Annex 1).

Traceability and microbiological investigations of products positive for *S. Enteritidis* ST11 matching the representative isolates of the outbreak strain

United Kingdom

Overall, poultry products sampled and found positive for *S. Enteritidis* matching the representative isolates of the outbreak strain were:

- Batch A, Brand A, southern fried chicken breast fillets, frozen, not ready-to-eat (RTE).
- Batch B, Brand B, southern fried chicken pops, frozen, not RTE.
- Batch C (unknown batch number) of the Brand C fried chicken pops, frozen, not RTE.
- Batch D Brand D, breaded fried chicken breast, frozen, not RTE.

On 3 July 2018, the food safety authority in the UK (Food Standards Agency) reported the detection of *S. Enteritidis* in samples collected from a frozen poultry product (**RASFF 2018.1911**). The meat product consisted of southern fried chicken breast fillets belonging to Batch A of Brand A. The samples were collected during an 'own-check' control at a store of the British Retail Chain A and analysed on 13 June 2018. WGS analysis of the isolate from Batch A revealed the presence of *S. Enteritidis* sequence type (ST) 11 with PHE SNP address 1.1.2.2533.3617.4833.10342 matching the representative outbreak strains (*fup17*). Batch A was manufactured by the German Processing Company A, and it was imported into the UK by the British Wholesaler A that delivered the products to the British Retail Chain A. The British Retail Chain A further distributed products from Batch A to its stores in Spain (Spanish Retail Chain A) and Iceland (Icelandic Retail Chain A) (*fup1*).

On 22 September 2020, the food authority reported (**RASFF 2020.3868**) that during a national outbreak investigation, official samples from a sealed bag of a frozen poultry product (fried chicken pops) were collected on 11 August 2020 from the freezer of a British confirmed case. The southern fried chicken pops belonged to Batch B of Brand B and the product had been bought in a store of the British Retail Chain B. Microbiological analyses of the sample revealed the presence of *S. Enteritidis* matching the outbreak strains. Batch B was manufactured by the Polish Processing Company B. The food authority reported that the British Retail Chain B had delivered products from Batch B to its stores in Ireland (Irish Retail Chain B).

On 23 December 2020, the food authority reported (**RASFF 2018.1911**) that a frozen poultry product (fried chicken pops) had tested positive for *S. Enteritidis* (two isolates with SNP address 1.1.2.2533.3617.4833.16150, *fup58-fup62*; two isolates with SNP address 1.1.2.2533.3617.4833.16131, *fup62*) matching the representative isolates of the outbreak strain. The food belonged to Batch C (unknown batch number) of the Brand C. The official samples were collected on 20 October 2020 at the British Retailer C. The poultry products were manufactured by the Polish Processing Company B. The Processing Company B delivered the fried chicken pops in sealed bags to the British Processing Company D which had only re-boxed them in new external packaging with Brand C. Further traceability information was not available (*fup58*).

On 31 December 2020, the food authority reported (**RASFF 2018.1911**) (*fup60*) that 'own-check' samples taken at the Retail Chain D of a frozen poultry product (breaded fried chicken breast) collected on 9 June 2020 from Batch D Brand D tested positive for *S. Enteritidis* ST11, matching the outbreak strains (three isolates with SNP address 1.1.2.2533.3617.4833.15844; and one isolate with SNP address 1.1.2.2533.3617.4833.15425) (*fup53*, *fup62*). Batch D was manufactured by the Polish Processing Company B.

Germany

Overall, the poultry product sampled and found positive for *S. Enteritidis* matching the outbreak strain was:

- Batch E, chicken thighs, chilled, not RTE.

On 12 November 2020, the food authority in Germany (Federal Office of Consumer Protection and Food Safety) reported (**RASFF 2018.1911**) (*fup45*) that samples of raw chilled and unprocessed chicken thighs from Batch E were collected on 7 February 2020 in the context of an 'own-check' control at the German Wholesaler C. Microbiological analysis resulted in the identification of *S. Enteritidis* matching one of the representative outbreak strains (2 AD in cgMLST, clustering analysis performed in Germany, RidomSeqsphere + Enterobase cgMLST-scheme v 2.0). Batch E was produced by the Polish Processing Company C and imported into Germany by the German Wholesaler B (without intermediate storage) (*fup52*). Further trace-forward information was not available in RASFF.

With regard to Batch A, manufactured by the German Processing Company A and testing positive in 2018 for the outbreak strain in the United Kingdom, the food authority in Germany reported (**RASFF 2018.1911**) (*fup2*) that Batch A was produced with raw meat (chicken fillets) originating from Poland. The chilled chicken fillets were raw meat Batch A sourced from the Polish Meat Supplier A (**RASFF 2018.1911** *fup2*). Batch A was produced only for the British market and delivered on 14 May 2018 to the British Retail Chain A through the British Wholesaler A (**RASFF 2018.1911**, *fup2*). At the time of the inspection (in 2018) performed by the German food authority, 'own-check' microbiological results for Batch A were not available at the German Processing Company A (**RASFF 2018.1911**, *fup2*). However, analytical results from 'own-check' samples of poultry products taken from other batches available at the company premises (Batch H and Batch G) showed no detection of *Salmonella* on 25 April 2018 and 4 June 2018, respectively. Batch H was produced immediately before the implicated Batch A. Batch G was produced only for the British market and delivered on 14 May 2018 (**RASFF 2018.1911**, *fup2*) to the British Retail Chain A, where it was sampled and gave positive results for *Salmonella*. WGS analysis of the isolate from Batch G showed the presence of *S. Enteritidis* not matching the representative isolates of the outbreak strain (Table A-2 in Annex 1).

In 2020, the German food authority reported that the German Processing Company A had been acquired by another German Processing Company and therefore the traceability documents were only kept available up to the end of 2019 (**RASFF 2018.1911**, *fup52*).

Two additional food isolates matching the outbreak strain were identified retrospectively by Germany through consultation with EURL-*Salmonella*. The *Salmonella* isolates were detected in chicken in 2018 and non-frozen pork neck in 2020, but no further information or traceability data was available in relation to the food products.

France

Overall, the poultry product sampled and found positive for *S. Enteritidis* matching the outbreak strain was:

- Batch F chicken leg meat, frozen, not RTE.

On 8 February 2021, the food authority in France (Ministry of Agriculture and Food) reported (**RASFF 2018.1911** (*fup63*) and **RASFF 2020.3179** (*fup3*)) that a *S. Enteritidis* isolate from a chicken product had been sequenced and found to match the representative outbreak strain (according to the national pipeline). The food isolate belonged to an 'own-check' sample of frozen chicken leg meat taken from Batch F at the French Wholesaler D on 13 July 2020. Batch F was produced by the Polish Processing Company F and delivered via the French Wholesaler E.

Poland

In July 2018, the food authority in Poland (General Veterinary Inspectorate) reported (**RASFF 2018.1911**) (*fup1*) that an official control had been carried out at the Polish Meat Supplier A that had supplied the raw materials (chicken fillets from raw meat) Batch A used to produce Batch A (southern fried chicken breast), whose samples tested positive for the outbreak strains. At the Polish Meat Supplier A, the results of the microbiological analysis of chicken fillets from raw meat Batch A, performed on 15 April 2018, did not detect *Salmonella*. Raw meat Batch A was traced back to flocks slaughtered on 12 April 2018 at the three Polish Slaughterhouses A, B, and C and farmed at Polish Farm A and other Polish Farms (B, C, and D) (*fup10*). In each flock at the farms indicated, the sampling was done as part of a *Salmonella* control programme and *Salmonella* was not detected (*fup10*). In addition, the health certificates (provided in RASFF) for the flocks that were delivered to Polish Meat Supplier A showed no *Salmonella* detection (*fup1*). Raw meat Batch A was partly delivered to the German processing Company A via the German Wholesaler B. Raw meat Batch A was also distributed within Poland and to other countries in Europe, namely Austria, Denmark, Germany, Sweden, and the United Kingdom (*fup1*, *fup13*).

On 1 February 2021, additional information shared in **RASFF 2018.1911** indicated that Batch A had also been traced back to Farm G, Farm H, Farm AG, Farm M, and Farm S, located in Poland. Farm G, Farm H, Farm M, and Farm S were also linked to Batch B (*fup62*).

In November 2020, the food authority in Poland reported that two official samples collected between January and June 2020 at the Polish Farm A had resulted in the isolation of *S. Enteritidis* (**RASFF 2018.1911**, *fup55*). The isolates were not available for further typing. In the previous years (2019 and 2018), 'own-check' samples collected at the Polish Farm A had tested negative for *Salmonella* (Table A-8 in Annex 4).

With regard to the chicken pops Batch B from Brand B that were sampled from the freezer of a British confirmed case, the food authority in Poland reported that Batch B was manufactured by the Polish Processing Company B. The microbiological results from analyses performed on food and from environmental samples taken at the Polish

Processing Company B during official controls and 'own-check' controls performed in the period 2018–2020 (**RASFF 2018.1911**, *fup55*) showed no detection of *Salmonella* (Table A-7 Annex 3). Batch B was traced back to animals slaughtered (unknown raw meat Batch B) at the Polish Slaughterhouse D, where 'own-check' samples of neck skin tested negative for *Salmonella* on 2 June 2020 and on 25 May 2020 (**RASFF 2020.3868**, *fup2*). In addition, other raw materials ('raw meat batches' from C to G) were used in Batch B. 'Raw meat batches' from C to G were sourced from the Polish Slaughterhouse E (**RASFF 2018.1911**, *fup53*) and were traced back to flocks farmed in Poland (15 Polish farms from E to S) (**RASFF 2020.3868**, *fup4*).

The food authority also reported that five of the 15 above-mentioned Polish farms tested negative during environmental sampling in May 2020: Farm E, Farm F, Farm G, Farm H and Farm I (**RASFF 2020.3868**, *fup2*).

On 30 November 2020, the food authority in Poland reported that an official sample collected between January and June 2020 at the Polish Farm J (one of the farms from E to S) resulted in the detection of *S. Enteritidis* (no typing data available) (Table A-8 in Annex 4). The Polish Farm J was indicated by the British Retail Chain B as one of the farms that supplied animals for the production of Batch B. At the Polish Farm J, *Salmonella* was not detected in 2019 (own check) and data were not available for the year 2018 (**RASFF 2018.1911**, *fup56*).

With regard to the positive samples of fried chicken pops from Batch C (unknown batch number) of the Brand C, the lack of a clear identification of the product and its raw material batches made it impossible to determine and verify its traceability.

Batch D was traced back to farms located in Poland, namely Farm U, Farm V, Farm W, Farm X, Farm Y, Farm Z, Farm AA, Farm AB, Farm AC, Farm AD, Farm AE, and Farm AF.

Farm Y is also linked to the trace-back of Batch L, Batch M, and Batch N that tested positive for *S. Enteritidis* (WGS not available). Farm U and Farm AB are linked to the trace-back of Batch N (WGS not available) and Batch Q that tested positive for *S. Enteritidis* (PHE SNP address 1.2.3.18.180.15829). Farm W is linked to the traceability of Batch M and Batch L (*S. Enteritidis* positive but WGS not available). Farm V, Farm X, Farm AA, Farm AD, and Farm AE are linked to the trace-back of Batch M (*S. Enteritidis* positive but WGS not available). Farm AC is linked to the trace-back of Batch N (*S. Enteritidis* positive but WGS not available). Further details on the batches are available in Annex A-2.

With regard to the chilled chicken thighs from Batch E, that were sampled at the German Wholesaler C and found to be positive for the outbreak strains, the available labelling information pointed to the Polish Processing Company C as their manufacturer (RASFF 2018.191,1 *fup52*). Further trace-back information on the origin of Batch E was not available in RASFF. The food authority in Poland reported that between January and June 2020, 'own-check' samples (28 samples, type of sample not available) were collected at the Polish Processing Company C and *S. Enteritidis* was not detected. The raw materials used in Batch E originated from flocks (numbers not available) in which *Salmonella* was not detected. Finally, the food authority reported that Batch E was tested as an 'own-check' by the Polish Processing Company C and *Salmonella* was not found (report date 3 February 2020).

Batch F, consisting of frozen chicken leg meat, was produced by the Polish Processing Company F on 26 March 2020. The frozen batch was then transferred for cold storage at the Polish Company G. Batch F was produced with raw materials (fresh legs) sourced by the Polish Company I and consisting of 'raw material batches' from H to K. All the batches of raw materials were also used to produce Batch F, intended for the French Wholesaler D, frozen poultry skins intended for the Polish Processing Company R and culinary chicken, thigh meat, leg meat (fresh vacuum), culinary thigh, leg meat cuts (blocked in the company's cold store). In addition, some leg meat (vacuum) products from Batch F that were fresh were sold on 28 March 2020 to the German Company H.

On 10 August 2020, the food authority in Poland issued an administrative decision ordering the blocking of the distribution into the market of chicken leg meat products from Batch F. In addition, the Polish Processing Company F was asked to implement corrective measures, consisting of a thorough cleaning and disinfection of the entire plant, an increase in environmental sampling (swabbing of devices, equipment, rooms) and food sampling to verify the effectiveness of the corrective measures taken.

Traceability related to food exposure information

United Kingdom

As a result of the food exposure information provided by the food authority and collected by the public health authority (PHE) in the UK, on 24 August 2020 the food authority in Poland provided information on the production of some of the poultry products reported as consumed by the British cases (analytical data were not available) and manufactured by some Polish processing companies, along with information on their delivery history (in the previous 12 months) to the UK (**RASFF 2018.1911**, *fup20-23*, *fup26*, *fup35*). The detailed information is available in Annex 2.

Sweden

Following the food exposure information provided by the health authority in Sweden (section 'Information from patient interviews'), the food authority in Sweden reported (**RASFF 2018.1911**) (*fup33*) that one of the cases from 2020 had eaten chicken at a restaurant serving chicken meat from Thailand and Brazil, and one at a restaurant serving chicken meat from Thailand. Two cases had eaten from a buffet at the same restaurant; they did not eat chicken, but the restaurant handled raw chicken meat from Sweden, Brazil and Poland. The chicken meat from Poland was produced by the Polish Processing Company C.

Consumer advice

On 16 October 2020, the food authority in the UK reported (**RASFF 2020.3237**) (*fup26*) that a proactive communication had been published on their website to advise consumers to cook frozen poultry products thoroughly and to practice good hygiene in the kitchen at home.

Control measures linked to traceability

The control measures implemented by the food safety authority in the UK consisted of the withdrawal from the market of Batch A (**RASFF 2018.1911**).

On 23 July 2018, the food authority in Spain reported that Batch A had been taken off the market by the Spanish Retail Chain A and destroyed (**RASFF 2018.1911**, *fup6*).

On 9 November 2018, the food authority in Iceland (Food and Veterinary Authority) informed that on 17 July 2018 the units from the implicated Batch A had been destroyed by the Icelandic Retail Chain A, and had therefore not been distributed onto the market (**RASFF 2018.1911**, *fup12*).

On 18 July 2018, the food authority in Austria (Austrian Agency for Health and Food Safety) confirmed that the raw materials batch (raw meat Batch A) of chicken fillets, originating from the Polish Meat Supplier A, was supplied to Austrian Company A accompanied by a certificate indicating negative results for *Salmonella* detection (*fup3*). Control measures were not reported.

On 20 July 2018, the food authority in Sweden (Stockholm Municipality Authority) confirmed that the Swedish Company B had purchased the meat belonging to raw meat Batch A from the Polish Meat Supplier A. As it had been fresh, the meat only had a shelf-life of ten days and was therefore no longer in stock at the time of the notification. The meat had been also distributed on to business operators within Sweden (*fup4*).

On 20 July 2018, the food authority in Denmark (Danish Veterinary and Food Administration) reported that the meat from the raw meat Batch A had been received by two business operators (Danish Company C and D). Being chilled, the meat had already been distributed to catering establishments and restaurants in April and therefore, no action could be taken.

On 22 September 2020, the food authority in the UK reported (**RASFF 2020.3868**) that Batch B had been withdrawn and a recall was implemented on 22 October 2020 (*fup7*).

On 12 October 2020, the food authority in Ireland reported (**RASFF 2020.3868**) (*fup5*) that Batch B had been withdrawn and recalled from the market and that a public warning had been issued to extend the recall to five additional batches manufactured by the Polish Manufacturer B.

On 23 December 2020, the food authority in the UK reported that the British Processing Company D had placed all suspected stock from Batch C (unknown batch number) of the Brand C on hold, awaiting return to the producer (*fup58*).

Trace-forward information and details of the control measures implemented were not available in RASFF for the chicken thighs from Batch E from which *S. Enteritidis* matching the representative outbreak strains was retrospectively identified by the food authority in Germany (**RASFF 2018.1911**, *fup52*).

Batch F underwent a thermal treatment before being used at the French Wholesaler D. The remaining units from the batch were destroyed (**RASFF 2020.3179**).

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

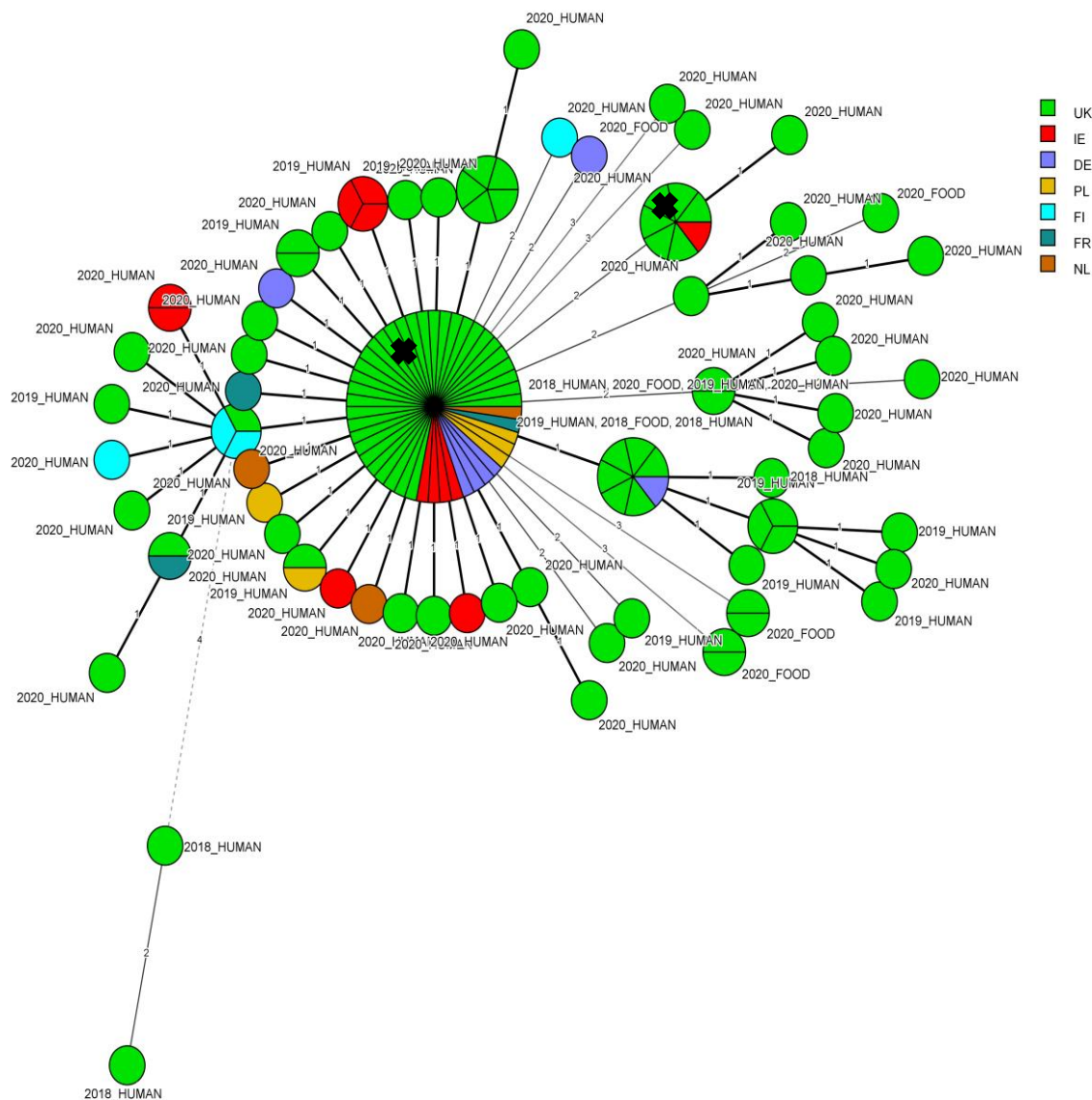
Initial WGS-based searches to identify possible outbreak-related *S. Enteritidis* isolates were performed in the Member States' public health institutes and national reference centres using sequences of the two UK representative strains of UI-644 (UK_SRR8333779 and UK_SRR11741596), shared through EPIS FWD and identified by national WGS pipelines. Sequence-read data were collected for centralised analyses at ECDC. In total, sequences were shared for 127 closely-related (as reported through EPIS) *S. Enteritidis* human isolates by public health institutes and national reference centres in the UK (96), Ireland (12), Poland (5), Finland (4), Germany (4), France (3), and the Netherlands (3). Nine food isolates were added in the joint analysis. These included sequences for six food isolates (Batch A, Batch B and Batch C) from the UK. Moreover, the EURL-*Salmonella* launched a consultation among Member States requesting them to submit sequences of *S. Enteritidis* that were genetically closely related to the isolate sequences for UI-644. In total, three isolates from Germany were retrieved by the EURL's national reference laboratory network. One was from chicken meats sampled in 2020 (Batch E), one from chicken breast sampled in 2018 (batch not available), and one from a pork neck sample (not frozen) collected in 2020 (batch not available).

Sequences were analysed by ECDC using BioNumerics version 7.6.3 (Applied-Maths, Sint-Martens-Latem, Belgium), which included trimming using the default Bionumerics 7.6.3 settings; *de novo* assembly using SPAdes v.3.7.1; post-assembly optimisation by mapping reads back onto the assembly and keeping the consensus (using MismatchCorrector implemented in SPAdes v3.7.1). The default settings of BLAST parameters for allele calling

were used. Assembly-based allele calling was performed using the Enterobase core genome scheme [1,4] as implemented in BioNumerics, resulting in a cgMLST allelic profile per isolate. Isolates were excluded from further analysis if less than 2 702 (90%) of the 3 002 core loci were detected.

All 136 *S. Enteritidis* isolates clustered within 3 cg-allelic differences in a single linkage analysis (i.e. each isolate differed by maximum three cg-alleles from at least one other isolate) indicating close genetic proximity and a possible common origin for the cluster (Figure 4).

Figure 4. Minimum spanning tree (cgMLST, Enterobase scheme) including *S. Enteritidis* sequences from 127 human confirmed case isolates* from six EU countries and the UK, and nine non-human isolates collected in Germany and the UK, 2018–2020, as of 31 December 2020



* The two UK representative isolates are marked with a cross.

ECDC and EFSA risk assessment for the EU/EEA and the UK

Salmonella Enteritidis is the most commonly reported cause of human *Salmonella* infections in the EU/EEA and after several years of decline, the reporting of *S. Enteritidis* infections has slightly increased in the EU/EEA since 2013. This risk assessment focuses on a specific *S. Enteritidis* strain, which is characterised by the analytical pipeline of PHE (PHE-t5.4833) and further verified by centralised analysis of WGS data from *S. Enteritidis* isolates taken from human and non-human samples. However, all human cases with *S. Enteritidis* isolates that fulfil the confirmed or probable case definition are considered to be a part of this event.

Since May 2018 and as of 31 December 2020, 193 human cases of *S. Enteritidis* ST11, as defined by the EU case definition, have been reported in eight EU countries and the UK: Denmark (2), Finland (4), France (33), Germany (6), Ireland (12), the Netherlands (3), Poland (5), Sweden (6), and the UK (122). In addition, one human case with a travel history to Europe was reported in Canada in 2019. The average monthly number of cases infected with the outbreak strain has been <5 between May 2018 and April 2020 when case reports started to increase. The peak in the case numbers occurred between May and July 2020, following the characteristic seasonality of a higher number of *Salmonella* infections in the summer months. The UK has reported 63.2% of all cases, probably due to their comprehensive WGS-enhanced national surveillance for human *Salmonella* infections. One in five cases (19.7%) has been hospitalised and France has reported one death (an 86-year-old female). The response to COVID-19 during 2020 may have affected the case ascertainment in countries and therefore the number of cases identified for this assessment is probably an underestimation of the actual number of infections. The most recent case was reported in the UK with the sampling date of 17 December 2020, suggesting that the outbreak is still ongoing in the UK.

Human cases have been reported for both genders and across all age groups. However, 50% of the cases were children ≤ 18 years and the proportion of males in the age groups 15–24 and 25–44 years differed significantly ($p < 0.05$) from that of females, possibly indicating differences in cooking and consumption habits.

The analytical epidemiological studies in the UK in 2020 showed an increased risk of *S. Enteritidis* infection after consumption of purchased frozen raw breaded chicken products (OR 23.6, 95% CI 8.6 – 64.7). Among the patients interviewed in six countries, 86.5% reported consumption of chicken in some form during the week before illness. Consumption of chicken was reported in restaurants, at home and at school. In addition to freshly-made and purchased breaded chicken products, chicken was consumed in the form of burgers, kebabs, salad and/or sandwiches. Specific types of chicken products mentioned included: chicken nuggets, goujons, Kiev, drumsticks, thighs, wings, breast fillets, poppers, and skewers.

The four Swedish patients in 2020 had visited restaurants and at least two of them ate chicken dishes. Two of these restaurants served chicken meat from Thailand. The patient interviews and subsequent investigation into the origins of the chicken meat at these restaurants did not reveal a common epidemiological link between the restaurants. The two cases reported that they had avoided eating chicken, and so may have been exposed in the restaurant through possible cross-contamination of other foods in the restaurant's kitchen. Further investigation into the role of chicken meat from Thailand is needed to clarify the link to this event.

During the national food investigations in Germany, France and the UK, isolates of *S. Enteritidis* matching the representative outbreak strain were detected. The isolates were identified in poultry products sampled in 2018 (Batch A) and in 2020 (Batch B, C, D, E, and F). Seven of these isolates (from batches A, B, C, and E) were available for the joint analysis that verified the existing match. The poultry products were not ready-to-eat (RTE) and were intended to be cooked prior to consumption. The poultry products had been sampled in the UK at Retail Chain A (Batch A), Retail Chain C (Batch C), Retail Chain D (Batch D), at a British case's home (Batch B), in Germany at Wholesaler C (Batch E), and in France at Wholesaler D (Batch F). The available traceability data could not identify a unique common food business operator upstream in the food chain that linked all the poultry products traced back to Poland, Germany, France, and the UK. However, some batches of these poultry products share some common operators upstream in the food chain.

Batch B (sealed bag of southern fried chicken pops sampled at a British case's home), Batch C (unknown batch number of fried chicken pops), and Batch D (breaded fried chicken breast), were manufactured by the same Polish Processing Company B where *S. Enteritidis* was not detected between 2018 and June 2020, either in the food products or the environment. Therefore, with the available RASFF information, the possible point and/or source(s) of contamination for the frozen products from Batch B, C and D could not be identified at processing level.

Batch F (frozen chicken legs) was manufactured by the Polish Processing Company F for which microbiological data were not available. However, the Polish Processing Company F was also reported to be the producer of some of the chicken products indicated by the cases during their food habits interviews.

Moving backwards from the processing step, all products positive for the outbreak strain for which traceability information is available, were traced back to different meat suppliers, slaughterhouses, and/ or farms (or flocks) in Poland. For example, Batch A and Batch B were traced back to four common farms (Farm G, Farm H, Farm M, and Farm S) located in Poland. Based on the available RASFF information, the farms were reported to be *S. Enteritidis* negative at the time the batches were produced. However, *S. Enteritidis* was isolated in two farms (Farm A and J) in

2020. The *S. Enteritidis* isolates from these farms were not available for WGS and therefore, it was not possible to assess whether the detected *S. Enteritidis* isolates matched the representative isolates of the outbreak strain.

The centralised WGS analysis of 127 human and nine non-human *S. Enteritidis* isolates from various sources (isolates from poultry products and fresh chicken, and one pork neck isolate) confirmed a tight cluster with 0-3 AD through single linkage clustering. This, in combination with epidemiological and traceability data, suggests a common source(s) higher up the food chain rather than at the processing level. Further investigation on the pork neck isolate is needed to clarify whether it is related to this event.

As part of the national outbreak investigation in the UK, other *S. Enteritidis* strains, not matching the outbreak strain but matching other human outbreak strains investigated alongside this outbreak (i.e. PHE-t5.590 and PHE-t5.12, belonging to the t25.12 cluster; PHE-t5.180), have been isolated in poultry products that were traced back to the Polish Processing Company B. Other *Salmonella* serotypes (*Salmonella* Infantis, *Salmonella* Newport, and *Salmonella* Livingstone), and *Campylobacter* spp. have also been isolated in poultry products traced back to the Polish Processing Company B (Table A-6 in Annex 3). These products were within their durability date. Following these microbiological findings, the Polish Processing Company B implemented corrective measures by introducing full thermal treatment of poultry products intended for Retail Chain D. The Processing Company F implemented corrective measures consisting of a thorough cleaning and disinfection of the processing plant. In addition to the Polish Processing Company B, patients' food exposure identified other poultry products, produced and distributed in 2020 (e.g. chicken pops, chicken Kiev, chicken goujons, and chicken fillets), that could be traced back to different Polish Processing Companies (E and F). However, microbiological results were not available for these products.

Withdrawals and recalls were implemented as control measures for the products that tested positive for the outbreak strain, and as precautionary measures for other products involved in the traceability of the event. A public communication was published to advise consumers to cook frozen poultry products thoroughly and to practice good hygiene in the kitchen at home. None of the poultry products were RTE and all were intended to be cooked (thermal treatment) before being eaten, according to the producer's instructions for preparation.

The consumption data available from cases in humans and the detection of *Salmonella* matching the outbreak strain from the sampled poultry products suggest that various types of chicken meat and chicken products contaminated with the outbreak strain have been released onto the market since at least 2018.

The epidemiological and microbiological information available indicates that the poultry products, which tested positive for the *S. Enteritidis* outbreak strain and were traced back to business operators in Poland (either at processing or primary production level), pose a risk for human infection in the EU/EEA and the UK. Given the type of products implicated (frozen, long shelf-life) and the lack of identification of the source(s)/origin of contamination, there remains a risk that new infections may emerge with the *S. Enteritidis* outbreak strain. Moreover, there is a risk linked to the consumption of purchased breaded chicken products if undercooked, particularly for children ≤ 18 years. Given that several *S. Enteritidis* strains other than the outbreak strain and other *Salmonella* serotypes have been identified in the tested chicken products, these may constitute a recurrent risk for human *Salmonella* infections in the EU/EEA and the UK. The risk of infection is reduced at consumer level if the food label instructions regarding cooking (thermal treatment) and expiry dates are followed properly.

The gaps in molecular typing data and lack of information at primary production level does not allow a link to be established, or ruled out, between the *S. Enteritidis*-positive farms in Poland and the contaminated frozen products. Although, the available traceability data suggest that the probable origin of contamination can be traced back to operators in Poland, gaps in the traceability and microbiology meant that it was not possible to identify the specific source(s) and point(s) of contamination of the positive batches with the outbreak strain.

Further investigation and comprehensive sharing of traceability and molecular typing data on the *S. Enteritidis* isolates is needed, along the entire food chain, to clarify the specific source(s) and point(s) of contamination of the poultry products positive for the outbreak strain.

Options for response

New human cases that fulfil the EU/EEA outbreak case definition and other developments in public health investigations related to this event should be reported in EPIS-FWD under the UI-644. Notifications in the Early Warning and Response System (EWRS) should be issued if the appropriate criteria are fulfilled.

ECDC encourages public health authorities to cooperate closely with food safety authorities, to investigate outbreaks caused by the *Salmonella* strains specified in this assessment in order to identify exposures, and where possible, store related information on brands and lots of suspected food products.

The food safety authorities in the countries involved should share additional information on microbiological investigations at European level, including analysis of raw materials upon entry to food business operator premises, environmental investigation, and tracing information by issuing relevant notifications through the Rapid Alert System for Food and Feed (RASFF). Molecular typing information for isolates collected in primary production will support further assessment. EFSA can offer technical support to the countries involved via a contractor for genome sequencing of non-human isolates relevant to the investigation of the event.

Disease background

Disease characteristics

Background information about salmonellosis can be found in the disease fact sheets from ECDC, CDC, and WHO [5-7].

Disease surveillance for *Salmonella* Enteritidis infections in the EU/EEA and the UK

Salmonella Enteritidis isolation in humans

Salmonella Enteritidis is reported as part of salmonellosis surveillance in the EU/EEA. Notification of non-typhoidal salmonellosis is mandatory in the most of the EU Member States, as well as Iceland and Norway. In four Member States, reporting is voluntary (Belgium, France, Luxembourg and the Netherlands). Food poisoning is a notifiable disease under national legislation in all the countries of the UK apart from Scotland. Under this legislation, reporting of *Salmonella* spp. isolated from human samples in public health laboratories is also mandatory throughout the UK. The surveillance systems for salmonellosis have national coverage in all Member States except three (France, the Netherlands and Spain). The population coverage in 2019 is estimated to be 48% in France and 64% in the Netherlands.

From 2007 to 2019, 544 529 cases of *S. Enteritidis* were reported to The European Surveillance System (TESSy) (mean number of cases per year 41 887, range 29 089 to 83 756) by 29 countries, with Germany and the Czech Republic accounting for 47.3% of all cases. The number of reported cases decreased by 52% between 2007 and 2019 (Figure 5). The median age for all cases with information available was 19 years (interquartile range IQR=5–49); 52% (n=277 090) were female, and 90% (n=415 574) of infections were acquired in the reporting country. The highest number of cases were reported between July and October. Further information can be found in ECDC's online *Surveillance atlas of infectious diseases* [8].

EU/EEA-wide collection of *S. Enteritidis* MLVA data into TESSy started in June 2016. As of 10 December 2020, 11 countries had submitted MLVA data for *S. Enteritidis*, including 649 *S. Enteritidis* isolates with the MLVA profile 3-11-5-4-1, the MLVA type associated with this outbreak. This profile is the second most commonly reported *S. Enteritidis* MLVA type and these isolates constitute 9.8% of the total number of isolates of this serotype with MLVA characterisation data submitted to TESSy.

Figure 5. Number of confirmed *S. Enteritidis* cases by year, EU/EEA, TESSy 2007–2019



Food-borne outbreaks caused by *Salmonella* Enteritidis

This section summarises country-specific data on foodborne outbreaks caused by *S. Enteritidis* linked to the category 'Broiler meat (*Gallus gallus*) and products thereof' - the food category for the suspected food products in this investigation - for the period 2013-2018. The foodborne outbreaks were reported to EFSA by the Member States and non-EU countries under the framework of the Zoonoses Directive 2003/99/EC.

In 2018, a total of 15 food-borne outbreaks (four strong-evidence outbreaks and 11 weak-evidence outbreaks) due to *S. Enteritidis* in 'broiler meat and products thereof' were submitted to EFSA by seven EU countries: Czechia, Estonia, France, Hungary, Lithuania, Poland and Spain. Among the four strong-evidence outbreaks, 37 cases and 12 hospitalisations were reported. No deaths were reported. Among the 11 weak-evidence outbreaks, 53 cases, 22 hospitalisations and no deaths were reported. In 2018, no non-EU countries reported foodborne outbreaks due to *S. Enteritidis* in 'broiler meat and products thereof' to EFSA.

During the period 2013–2017, a total of 76 foodborne outbreaks (40 strong-evidence outbreaks and 36 weak-evidence outbreaks) caused by *S. Enteritidis* in 'broiler meat and products thereof' were submitted to EFSA by 12 EU Member States: Austria, Croatia, Czechia, Denmark, Estonia, France, Lithuania, Poland, Slovakia, Slovenia, Spain and the UK. Among the 40 strong-evidence outbreaks, 567 cases and 101 hospitalisations were reported. Three patients died due to or with the disease. Among the 36 weak-evidence outbreaks, 272 cases, 52 hospitalisations and one death were reported. During the period 2013–2017, no non-EU countries reported foodborne outbreaks due to *S. Enteritidis* in 'broiler meat and products thereof' to EFSA.

Salmonella Enteritidis isolation in food

This section summarises country-specific data on the prevalence of *S. Enteritidis* in the food category 'broiler meat non-RTE' which represents the food category for the suspected food products in this investigation, as reported to EFSA by EU Member States and non-EU countries during the period 2013–2018.

In accordance with the Zoonoses Directive 2003/99/EC, in 2018, for the category 'broiler meat non-RTE', 25 EU Member States reported 283 *S. Enteritidis* units positive out of 50 493 total units tested for *Salmonella* (positive percentage of 0.56) to EFSA (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, and the UK). Three non-EU countries (Iceland, North Macedonia, and Switzerland) reported four *S. Enteritidis* units positive out of 4 121 total units tested for *Salmonella* (positive percentage of 0.97).

During the period 2013–2017, for the category 'broiler meat non-RTE', 28 EU Member States reported 1 878 *S. Enteritidis* units positive out of 370 281 total units tested for *Salmonella* (positive percentage of 0.50) to EFSA (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the UK). Three non-EU countries (Albania, Iceland, and Switzerland) reported no *S. Enteritidis* units positive out of a total 17 388 total units tested for *Salmonella*.

Source and date of request

The Directorate-General for Health and Food Safety (DG SANTE) G4 sent EFSA a request for a Rapid Outbreak Assessment (ROA) on 30 October 2020. EFSA sent an official request to ECDC on 4 November 2020 and ECDC approved this on the same day.

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Disclaimer

ECDC issued this outbreak assessment document in accordance with Article 10 of Decision No 1082/13/EC and Article 7(1) of Regulation (EC) No 853/2004 establishing a European Centre for Disease Prevention and Control (ECDC), and with the contribution of EFSA 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 (EFSA) and laying down procedures in matters of food safety.

In the framework of ECDC's mandate, the specific purpose of an ECDC-EFSA outbreak assessment is to present different options on a specific issue. The responsibility for the choice of which option to pursue and which actions to take, including the adoption of mandatory rules or guidelines, lies exclusively with the EU/EEA Member States. In its activities, ECDC strives to ensure its independence, high scientific quality, transparency and efficiency.

This report was written under the coordination of an internal response team at ECDC, with contributions from EFSA, at the behest of the European Commission based on a mandate requesting scientific assistance from EFSA in the investigation of multinational food-borne outbreaks (Ares (2013) 2576387, Mandate M-2013-0119, 7 July 2013).

All data published in this rapid outbreak assessment are correct to the best of ECDC's and EFSA's knowledge as of 25 February 2021. Maps and figures published do not represent a statement on the part of ECDC, EFSA or its partners on the legal or border status of the countries and territories shown.

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Annex 1.

Traceability, control measures and microbiological data for products positive for the outbreak strains and products positive for other *Salmonella* strains linked to the traceability of the investigated event

Summary of traceability and microbiological investigations into products positive for *Salmonella* Enteritidis matching the outbreak strains

Table A-1 summarises the frozen and chilled poultry products reported to be positive for *Salmonella* Enteritidis ST11 matching the outbreak strains, as reported in RASFF 2018.1911, 2020.3868, 2020.3237 (last access 2 February 2021).

Table A-1. Poultry products with positive isolation of *S. Enteritidis* ST11 matching the representative outbreak strains, RASFF 2018.1911, 2020.3868, 2020.3237 (last access 2 February 2020)

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	Salmonella serovar	WGS type (pipeline)
Batch A Brand A	Chicken breast (frozen)	Retail Chain A (UK)	Own check	June 2018 [13 June 2018]	Processing Company A (DE)	PL	S. Enteritidis ST11	SNP address 1.1.2.2533.3617.4 833.10342 (PHE pipeline)
Batch B Brand B	Chicken pops (frozen)	Patient's freezer (UK)	Official control	August 2020 [11 August 2020]	Processing Company B (PL)	PL	S. Enteritidis ST11	SNP address 1.1.2.2533.3617.4 833.15868 (PHE pipeline)
Batch C (unknown batch number) Brand C	Chicken pops (frozen)	British Retailer C (UK)	Official control	October 2020 [20 October 2020]	Processing Company B (PL)	PL	S. Enteritidis ST11	SNP address 1.1.2.2533.3617.4 833.16150 1.1.2.2533.3617.4 833.16150 1.1.2.2533.3617.4 833.16131 1.1.2.2533.3617.4 833.16131 (PHE pipeline)
Batch D Brand D	Chicken breast (frozen)	British Retail Chain D (UK)	Own check	June 2020 [9 June 2020]	Processing Company B (PL)	PL	S. Enteritidis ST11	SNP addresses 1.1.2.2533.3617.4 833.15844; 1.1.2.2533.3617.4 833.15425; 1.1.2.2533.3617.4 833.15844 1.1.2.2533.3617.4 833.15844 (PHE pipeline)
Batch E	Chicken thighs (chilled)	Wholesaler C (DE)	Own check	February 2020 [7 February 2020]	Processing Company C (PL)	Na	S. Enteritidis	2 cg-MLST allelic* distance
Batch F	Chicken leg meat (frozen)	Wholesaler D (FR)	Own check	July 2020 [13 July 2020]	Processing Company F (PL)	PL	S. Enteritidis	Enterobase classification HC5_146173, HC2_148338**

* Clustering analysis performed in Germany (RidomSeqsphere + Enterobase cgMLST-scheme v 2.0)

** WGS analysis performed by France using Enterobase

Na= not available

Figure A-1. Traceability graph of products positive for *S. Enteritidis* ST11 matching the outbreak strains (PHE-t5.4833)

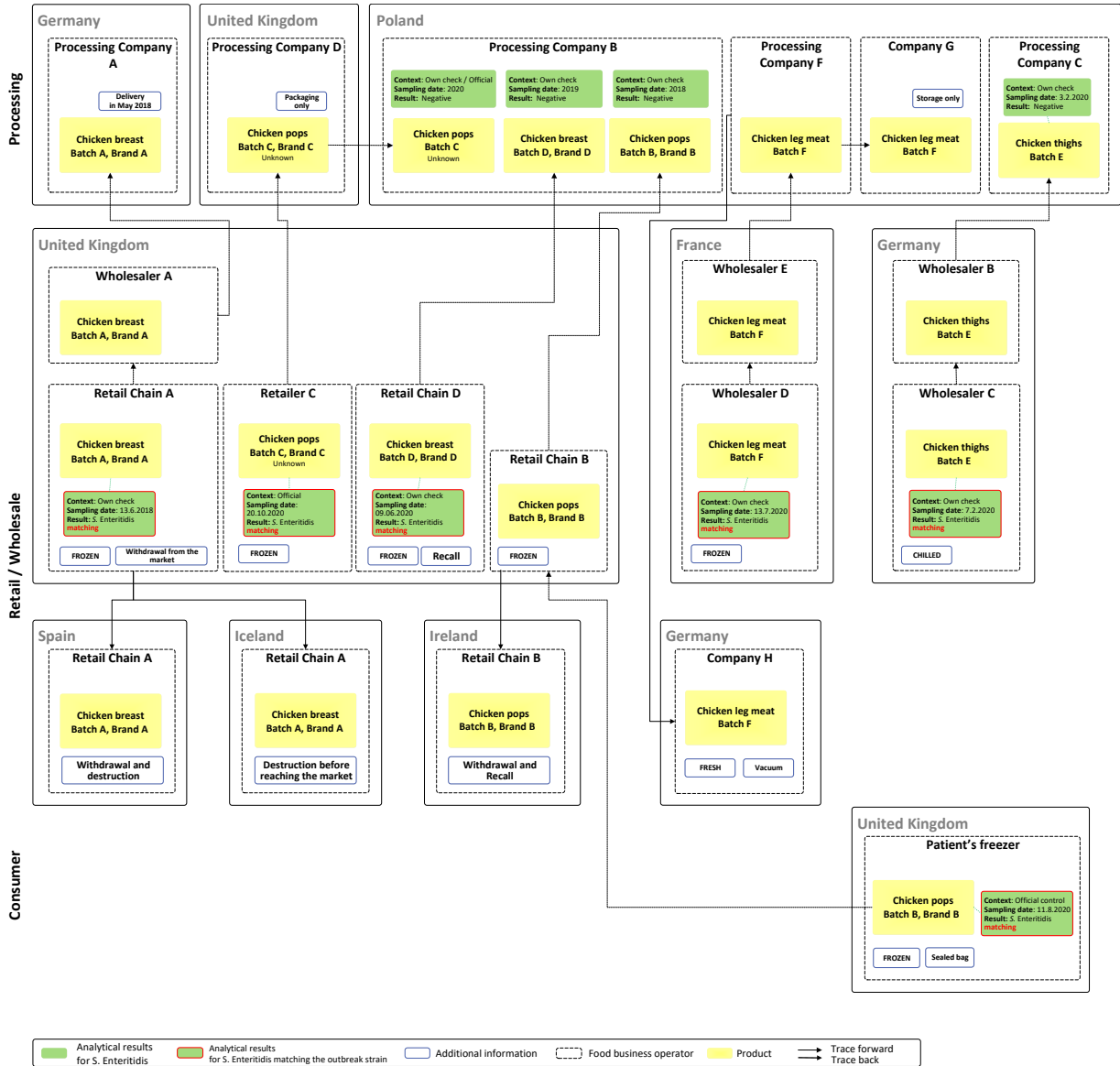
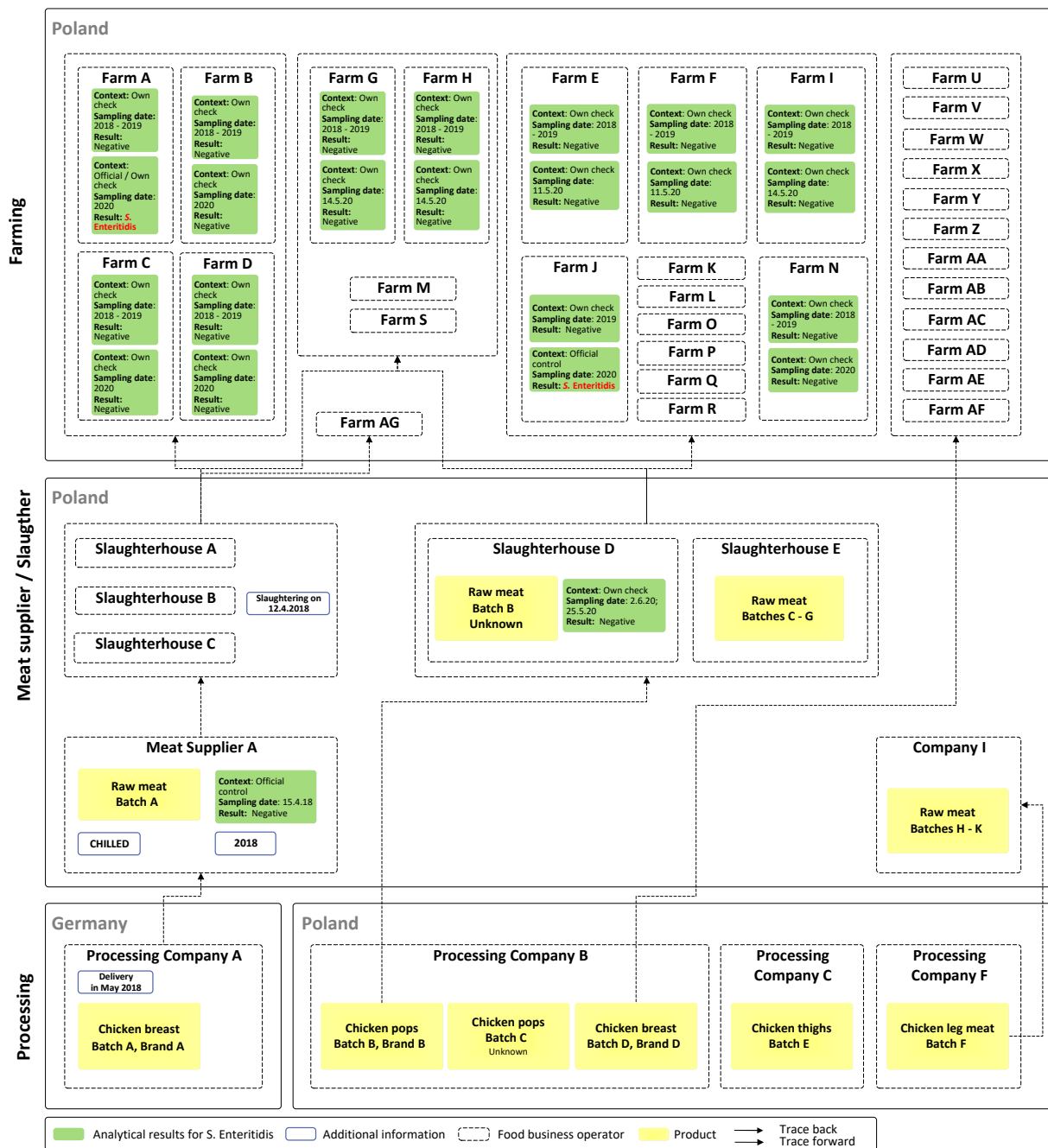


Figure A-2. Graph on the trace-back to farm of products positive for *S. Enteritidis* ST11 matching the UK outbreak strains (PHE-t5.4833)



The poultry products reported to be positive for *Salmonella* Enteritidis ST11 (not matching the outbreak strain) and positive for other *Salmonella* serovars, as reported in RASFF 2018.1911, 2020.3868, 2020.3237 (last access 2 February 2021) are displayed in Tables A-2, A-3, A-4 and A-5.

Table A-2. Traceability and microbiological investigations of products positive for *S. Enteritidis* and *S. Enteritidis* not matching the outbreak strains

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	<i>Salmonella</i> serovar	WGS type (pipeline)
Batch A * Brand A	Chicken breast	Retail Chain A (UK)	Own check	July 2018 [16/07/2018]	Processing Company A (DE)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.10340
Batch G Brand A	Chicken Kiev	Retail Chain A (UK)	Own check	June 2018 [13/06/2018]	Processing Company A (DE)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.2.3.18.180.180.10061
Batch I Unknown	Chicken fillet	Retailer M (UK)	Na	May 2019 [07/05/2019]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.9850
Batch J Unknown	Unknown	Na (UK)	Na	November 2019 [15/11/2019]	Na	Na	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.15079
Batch K	Chicken pops	Retail Chain D (CZ)	Official	August 2020 [17/08/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> (9,12:g.m:-)	> 50 AD in cg-MLST**
Batch L	Chicken breast	Retail Chain D (UK)	Own check	March 2020 [06/03/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i>	Na
Batch M	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [21/04/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i>	Na
Batch N	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [23/04/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i>	Na
Batch O	Chicken breast	Retail Chain D (UK)	Own check	May 2020 [15/05/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.2.3.18.180.180.15913 1.2.3.18.180.180.15840 1.2.3.18.180.180.15841
Batch P	Chicken breast	Retail Chain D (UK)	Own check	May 2020 [14/05/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.15553 1.2.3.18.180.180.10798 1.1.2.12.12.12.15846 1.1.2.12.12.12.15849 1.1.2.12.12.12.15842
Batch Q	Chicken pops	Retail Chain D (UK)	Own check	May 2020 [29/05/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.2.3.18.180.180.15829
Batch S Unknown	Chicken thigh boneless	Retail Chain D (UK)	Own check	October 2020 [05/10/2020]	Processing Company M (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.15990
Batch T Unknown	Na	Na (UK)	Own check	November 2014 [12/11/2014]	Na	Na	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.626
Batch U	Chicken pops	Retail Chain E (UK)	Official control	December 2020 [07/12/2020]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.16262
Batch V	Chicken nuggets	Retail Chain E (UK)	Official Control	November 2020 [17/11/2020]	Processing Company E (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.16017
		Retail Chain E (UK)	Official Control	December 2020 [15/12/2020]	Processing Company E (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.16017
		Retail Chain E (UK)	Official Control	November 2020 [30/11/2020]	Processing Company E (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.15548 1.1.2.12.12.590.15548
Batch Z	Chicken breast	Restaurant (UK)	Na	July 2015 [01/07/2015]	Processing Company L (NL)	Na	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.3049
Batch AA	Chicken and turkey chilled mixture	Processing Company K (DE)	Official control	August 2019 [14/08/19]	Processing Company K (DE)	PL and HU	<i>S. Enteritidis</i> ST11	2 AD in cgMLST***
Batch AB	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [2/10/20]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.15887
Batch AE	Chicken Kiev	Retail Chain A (UK)	Na	May 2018 [31/05/2018]	Processing Company A (DE)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.2.3.18.180.180.11120
Batch AF	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [2/10/20]	Processing Company B (PL)	PL	<i>S. Enteritidis</i> ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.16111

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	<i>Salmonella</i> serovar	WGS type (pipeline)
Batch AL	Chicken pops	Retail Chain E (UK)	Official control	November 2020 [23/11/20]	Processing Company B (PL)	PL	S. Enteritidis ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.16221 1.1.2.12.12.590.16221
Batch AI	Southern fried chicken	Retailer C (UK)	Official control	November 2020 [10/11/2020]	Processing Company B (PL)	PL	S. Enteritidis	SNP address (PHE pipeline) 1.1.2.12.12.590.16216
Batch AJ	Chicken pops	Retailer F (UK)	Official control	December 2020 [08/12/2020]	Processing Company B (PL) Packed at Company F (UK)	PL	S. Enteritidis ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.16256
Batch AK	Chicken pops	Retailer G (UK)	Official control	December 2020 [14/12/2020]	Processing Company B (PL) Re-packed at Processing Company D (UK)	PL	S. Enteritidis ST11	SNP address (PHE pipeline) 1.1.2.12.12.12.15734 1.1.2.12.12.12.15734 1.1.2.12.12.12.15734 1.1.2.12.12.12.15734 1.1.2.12.12.12.15734 1.1.2.12.12.12.15734
Batch AS	Chicken pops	Retailer L (UK)	Official control	December 2020 [02/12/2020]	Processing Company B (PL)	PL	S. Enteritidis ST11	SNP address (PHE pipeline) 1.1.2.12.590.16221
Batch AX	Chicken nuggets	Retailer K (UK)	Official Control	October 2020 [27/10/2020]	Processing Company E (PL)	PL	S. Enteritidis ST11	SNP address (PHE pipeline) 1.1.2.12.12.590.16155 1.1.2.12.12.590.15548 1.1.2.12.12.590.16155
Batch BD Batch BE Batch BF Batch BG Batch BH Batch BI Batch BJ Batch BK Batch BL	Chicken breast	Retail Chain D (UK)	Own check control	November 2020 [27/11/2020]	Processing Company E (PL)	PL	S. Enteritidis ST11	SNP address (PHE pipeline) 1.1.2.28.195.6669.16222****

* This poultry product tested also positive for *S. Enteritidis* SNP address 1.1.2.2533.3617.4833.% (PHE pipeline) matching the outbreak strain.

** Sequencing performed via the EFSA contractor at the request of the food authority in Czechia. cgMLST performed in EFSA using chewBBACA version 2.6.0 (<https://github.com/B-UMMI/chewBBACA>) using the schema for *Salmonella enterica* made available by chewie Nomenclature Server (Marnede et al. 2020; <https://doi.org/10.1093/nar/gkaa889>) at <https://chewbbaca.online/species/4>. The cgMLST schema described by Larena et al. 2018

([doi:10.2903/sp.efsa.2018.EN-1498](https://doi.org/10.2903/sp.efsa.2018.EN-1498); [doi:10.5281/zenodo.1323684](https://doi.org/10.5281/zenodo.1323684)) is composed of 3225 loci ([doi:10.5281/zenodo.1323684](https://doi.org/10.5281/zenodo.1323684)) and is a derivation of EnteroBase *Salmonella* wgMLST schema [3] adapted for use with chewBBACA. Isolates with more than 1% of missing loci were excluded from the analysis.

*** 2cg-AD to the human reference sequence SRR10247567. Analysis performed in Germany, RidomSeqsphere + EnteroBase cgMLST-scheme v 2.0.

**** Batches BD to BL are linked to RASFF 2020.4925.

Na= not available in RASFF; unknown= batch number not known.

Table A-3. Traceability and microbiological investigations of products positive for *S. Newport*

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	<i>Salmonella</i> serovar	WGS type (pipeline)
Batch N	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [23/04/2020]	Processing Company B (PL)	PL	<i>S. Newport</i>	SNP address (PHE pipeline) 2.5.14.49.154.167.192 2.5.14.49.155.168.193 2.5.14.49.154.169.194 2.5.14.49.155.168.195
Batch M	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [21/04/2020]	Processing Company B (PL)	PL	<i>S. Newport</i>	Na
Batch AS	Chicken pops	Retailer H (UK)	Official control	December [01/12/2020]	Processing Company B (PL)	PL	<i>S. Newport</i> ST166	SNP address (PHE pipeline) 2.5.14.49.155.168.201
Batch AU	Chicken chargrills	Retail Chain B (UK)	Official control	November 2020 [16/11/2020]	Processing Company E (PL)	PL	<i>S. Newport</i> ST166	SNP address (PHE pipeline) 2.5.14.130.158.173.200
Batch W	Crispy chicken breast strips	Retailer J (UK)	Official Control	December 2020 [04/12/2020]	Processing Company B (PL)	PL	<i>S. Newport</i> ST166	SNP address (PHE pipeline) 2.5.14.49.155.168.203
Batch AV	Chicken burgers	Retailer C (UK)	Official Control	October 2020 [20/10/2020]	Processing Company E (PL)	PL	<i>S. Newport</i> ST166	SNP address (PHE pipeline) 2.5.14.49.155.171.198

Na= not available in RASFF; unknown= batch number not known

Table A-4. Traceability and microbiological investigations of products positive for *S. Infantis*

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	<i>Salmonella</i> serovar	WGS type (pipeline)
Batch B	Chicken pops	Patient's freezer (UK)	Official control	August 2020 [11/08/2020]	Processing Company B (PL)	PL	<i>S. Infantis</i>	SNP address (PHE pipeline) 1.1.1.7.7.1795.2217
Batch G Brand A	Chicken Kiev	Retail Chain A (UK)	Own check	July 2018 [16/07/2018]	Processing Company A (DE)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.7.609.1638.1782
Batch AC	Chicken breast fillets	Patient's freezer (UK)	Official control	Sept. 2020 [14/09/2020]	Processing Company N (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.7.1809.1927.2233 1.1.1.7.1809.1927.2233 1.1.1.7.1809.1927.2233 1.1.1.7.1809.1927.2234
Batch AD	Chicken nuggets	Patient's freezer (UK)	Official control	July 2020 [14/07/2020]	Processing Company O (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.7.1782.1888.2198
Batch M	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [21/04/2020]	Processing Company B (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.36.60.60.1925.2228
Batch L	Chicken breast	Retail Chain D (UK)	Own check	March 2020 [06/03/2020]	Processing Company B (PL)	PL	<i>S. Infantis</i>	Na
Batch AF	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [2/10/20]	Processing Company B (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.280.1817.1936.2256
Batch AG	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [2/10/20]	Processing Company B (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.563.1818.1937.2257
Batch AH	Chicken steaks	Retail Chain E (UK)	Official control	December 2020 [07/12/20]	Processing Company E (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.7.1840.1968.2307
Batch AJ	Chicken pops	Retailer F (UK)	Official control	December 2020 [08/12/2020]	Processing Company B (PL) Re-packed at Company F (UK)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.449.449.1836.1961.2300
Batch U	Chicken pops	Retail Chain E (UK)	Official control	December 2020 [07/12/2020]	Processing Company B (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.7.1782.1962.2301
Batch AW	Chicken dippers	Retail Chain E (UK)	Official Control	December 2020 [14/12/2020]	Processing Company E (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.449.1324.1833.1957.2318
Batch V	Chicken nuggets	Retail Chain E (UK)	Official Control	Na	Processing Company E (PL)	PL	<i>S. Infantis</i> ST32	SNP address (PHE pipeline) 1.1.1.7.1834.1959.2298 1.1.1.7.1834.1967.2314

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	<i>Salmonella</i> serovar	WGS type (pipeline)
Batch AY	Chicken dippers	Retail Chain E (UK)	Official Control	December 2020 [02/12/2020]	Processing Company E (PL)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.36.60.60.1958.2297
Batch AZ	Chicken dippers	Retailer J (UK)	Official Control	December 2020 [04/12/2020]	Processing Company Q (IE)	Na	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.1325.1837.1964.2303
Batch BA	Breaded Chicken Bites	Retailer J (UK)	Official Control	December 2020 [16/12/2020]	Processing Company E (PL)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.7.7.1973.2313
Batch BB	Breaded Chicken Bites	Retailer J (UK)	Official Control	December 2020 [04/12/2020]	Processing Company E (PL)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.1326.1838.1965.2304
Batch BC	Breaded Chicken Bites	Retailer J (UK)	Official Control	November 2020 [03/11/2020]	Processing Company E (PL)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.7.609.1952.2284 1.1.1.7.609.1952.2284
Batch X	Breaded Chicken Bites	Retailer J (UK)	Official Control	November 2020 [26/11/2020]	Processing Company E (PL)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.449.1324.1833.1957.2295
Batch Y	Chicken nuggets	Retailer J (UK)	Official Control	December 2020 [04/12/2020]	Processing Company E (PL)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.563.1839.1966.2305
Batch AM	Chicken goujons	Retail Chain B (UK)	Official Control	November 2020 [24/11/2020]	Processing Company Q (IE)	Na	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.52.1586.1871.2289
Batch AN	Chicken balls	Retail Chain B (UK)	Official Control	December 2020 [14/12/2020]	Processing Company Q (IE)	Na	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.52.1844.1972.2312
Batch AO	Chicken balls	Retail Chain B (UK)	Official Control	November 2020 [23/11/2020]	Processing Company Q (IE)	Na	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.52.1832.1956.2293
Batch AP	Chicken goujons	Retail Chain B (UK)	Official Control	November 2020 [23/11/2020]	Processing Company Q (IE)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.52.1832.1956.2290 1.1.1.52.1832.1956.2291
Batch AQ	Chicken nuggets	Retail Chain B (UK)	Official Control	October 2020 [02/10/2020]	Processing Company Q (IE)	PL	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.7.1827.1948.2279
Batch AR	Chicken burgers	Retailer J (UK)	Official Control	December 2020 [04/12/2020]	Processing Company Q (IE)	Na	S. Infantis ST32	SNP address (PHE pipeline) 1.1.1.268.268.1963.2302

Na= not available in RASFF; unknown= batch number not known

Table A-5. Traceability and microbiological investigations of products positive for other *Salmonella* serovars

Batch brand	Type of products	Place of sampling (country)	Control	Date of sampling	Producer (country)	Meat origin	<i>Salmonella</i> serovar	WGS type (pipeline)
Batch AT	Chicken Nuggets	Retailer I (UK)	Official control	November 2020 [19/11/2020]	Processing Company P (NL) Re-packed at Processing Company D (UK)	Na	S. Java	SNP address (PHE pipeline) 1.1.1.42.55.59.67
Batch AI	Southern fried chicken	Retailer C (UK)	Official control	November 2020 [10/11/2020]	Processing Company B (PL)	PL	S. Livingstone ST1941	Na

Na= not available in RASFF; unknown= batch number not known

Control measures linked to traceability of products positive for *Salmonella* Enteritidis and other *Salmonella* serovars not matching the outbreak strain

On 3 July 2018, the food safety authority in the UK reported in RASFF 2018.1911 that the British Retail Chain A had withdrawn Batch G from the market.

On 1 September 2020, the food authority in Czechia (Czech Agriculture and Food Inspection Authority) reported that the Czech Retail Chain D had withdrawn the chicken pops Batch K, Brand D and issued a public warning to recall them.

On 18 September 2020, the food authority in Cyprus (Ministry of Agriculture, Rural Development and Environment) reported in RASFF 2020.3237 that Cypriot Company E had received chicken pops from Batch R from the British Retail Chain D but control measures were not reported (*fup12*).

On 12 August 2020, the food authority in Malta (Environmental Health Directorate) reported in RASFF 2020.3237 (*fup4*) that an official press release had been issued to recall chicken pops Batch Q that had reached the Maltese market. Some packages of the product were destroyed under the supervision of the food authority on 6 January 2021 (*fup28*).

On 11 August 2020, the food authority in the UK reported that a public warning had been issued on 10 August 2020 to withdraw and recall the frozen products (fried chicken pops) from Batch Q and frozen poultry products (fried chicken breast) from Batch L, M, and N, all from Brand D (RASFF 2020.3237).

On 12 August 2020, the food authority in Ireland (Food Safety Authority of Ireland) reported in RASFF 2020.3237 (*fup2*) that a public warning had been issued on 11 August 2020 to recall chicken pops Batch Q, and chicken breasts from Batch L, Batch M and Batch N.

On 20 November 2020, the food authority in the UK reported in RASFF 2018.1911 that poultry products from Batch O and Batch P had been identified as *Salmonella* Enteritidis positive before being distributed to the British market.

On 1 February 2021, the food authority in the UK reported in RASFF 2018.1911 (*fup62*) that the British Retail Chain B had recalled all batches, irrespective of the use-by-date, and suspended any further supplies from the Polish Processing Company B. Batch AX was withdrawn and recalled by the British Company G, having been supplied by the Polish Processing Company E. Batch AV was withdrawn on 30 October 2020. Batch BC was withdrawn by the British Retailer J after implementing an enhanced testing programme. This programme has been in place since 30 November 2020. The British Retail Chain B notified the food safety authority in the UK that as of 18 December 2020, all products supplied by the Polish Processing Company B underwent a complete cooking process.

Batch V, Batch U, Batch AL, and all products with use-by-date February 2022 were recalled by the British Retail Chain E on 16 December 2020.

Annex 2.

Traceability related to food exposure information

Traceability of poultry products originating from the food exposure information

On 6 August 2020, the food authority in the UK reported in RASFF having been made aware by the public health authority that the interviewed cases with the *S. Enteritidis* strain PHE-t5.4833 infection had consumed some poultry products with unknown batch numbers (chicken pops, chicken Kiev, chicken Kiev with garlic, Brand D; chicken goujons of the Brand E; chicken fillets, of the Brand F). These poultry products were manufactured by the Polish Processing Companies E, F, G and the Polish Processing Company B that manufactured the implicated chicken pops in Batch B. The positive isolation with outbreak-matching *S. Enteritidis* ST11 strain was confirmed in an unopened package of a poultry product from Batch B that was sampled from the freezer of a confirmed British case. The British case had consumed chicken products from another package (batch unknown) of the same product, bought from Retail Chain B, but no leftover food or the package itself were available for sampling and testing (RASFF 2018.1911, fup20-23).

On 24 August 2020, the food authority in Poland provided information (RASFF 2018.1911, fup26, fup35) on the production of the poultry products (reported as consumed by the British cases) from the indicated plants and their delivery history (12 months before) to the UK. The food authority clarified that the Polish Processing Company B produced/distributed the following poultry products: chicken pops, chicken Kiev, and chicken Kiev with garlic, (Brand D), and chicken goujons (Brand E). The Polish Processing Company E produced/distributed chicken Kiev with garlic, (Brand D). The Polish Processing Company F produced and sent the frozen chicken fillets of Brand F exclusively to the British market.

The Polish Meat Supplier A did not produce or send fried chicken products (Brand A) to the UK in the last 12 months. The Polish slaughterhouse A (slaughtering and cutting company) did not produce or distribute the products in question to the British market.

In addition, the Polish Processing Company H did not send the poultry burger products of Brand F to the UK. Neither Polish Processing Companies I or J produced/sent any of the following poultry products to the United Kingdom in last 12 months: fried chicken products (Brand A) and goujons, nuggets, and other breaded/battered/fried chicken (RASFF 2018.1911, fup26).

Annex 3.

Microbiological data at processing level in Poland

The microbiological results from analysis of the frozen poultry products linked to the Polish Processing Company B (RASFF 2018.1911, 2020.3237, 2020.3868, last access 2 February 2020) are displayed in Table A-6 below.

Table A-6. Results of the microbiological analysis of poultry products manufactured by the Polish Processing Company B

Batch, Brand	Type of products	Place of sampling (Country)	Control	Date of sampling	Microbiological hazard
Batch B	Chicken pops	Freezer of a British case (UK)	Official	August 2020 [11/8/2020]	S. Enteritidis
		Freezer of a British case (UK)	Official	August 2020 [11/8/2020]	S. Infantis
Batch C (unknown batch number)	Chicken pops	Retailer C (UK)	Official	October 2020 [20/10/2020]	S. Enteritidis
Batch D	Chicken breast	Retail Chain D (UK)	Own check	June 2020 [09/06/2020]	S. Enteritidis
Batch I (unknown)	Chicken fillet	Retailer M (UK)	Na	May 2019 [07/05/2019]	S. Enteritidis
Batch K	Chicken pops	Retail Chain D (CZ)	Official	Aug. 2020 [17/08/2020]	S. Enteritidis
Batch L	Chicken breast	Retail Chain D (UK)	Own check	March 2020 [06/03/2020]	S. Enteritidis
		Retail Chain D (UK)	Own check	March 2020 [06/03/2020]	S. Infantis
		Na	Na	Na	<i>Campylobacter</i> spp.
Batch M	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [21/04/2020]	S. Enteritidis
		Retail Chain D (UK)	Own check	April 2020 [21/04/2020]	S. Infantis
		Retail Chain D (UK)	Own check	April 2020 [21/04/2020]	S. Newport
		Processing Company B (PL)	Own check	Na*	<i>Salmonella</i> negative
Batch N	Chicken breast	Retail Chain D (UK)	Own check	April 2020 [23/04/2020]	S. Enteritidis
		Retail Chain D (UK)	Own check	April 2020 [23/04/2020]	S. Newport
Batch O	Chicken breast	Retail Chain D (UK)	Own check	May 2020 [15/05/2020]	S. Enteritidis
Batch P	Chicken breast	Retail Chain D (UK)	Own check	May 2020 [14/05/2020]	S. Enteritidis
		Na	Na	Na	<i>Campylobacter</i> spp.
Batch Q	Chicken pops	Retail Chain D (UK)	Own check	May 2020 [29/05/2020]	S. Enteritidis
		Processing Company B** (PL)	Own check	Na*	<i>Salmonella</i> negative
Batch AF	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [02/10/2020]	S. Enteritidis
		Retail Chain B (UK)	Official control	October 2020 [02/10/2020]	S. Infantis
Batch AB	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [02/10/2020]	S. Enteritidis
Batch AG	Chicken pops	Retail Chain B (UK)	Official control	October 2020 [02/10/2020]	S. Infantis
Batch AL	Chicken pops	Retail Chain E (UK)	Official control	November 2020 [23/11/2020]	S. Enteritidis
Batch AI	Southern fried chicken	Retailer C (UK)	Official control	November 2020 [10/11/2020]	S. Enteritidis
		Retailer C (UK)	Official control	November 2020 [10/11/2020]	S. Livingstone
Batch AJ	Chicken pops	Retailer F (UK)	Official control	December 2020 [08/12/2020]	S. Enteritidis
		Retailer F (UK)	Official control	December 2020 [08/12/2020]	S. Infantis
Batch AK	Chicken pops	Retailer G (UK)	Official control	December 2020 [14/12/2020]	S. Enteritidis
Batch AS	Chicken pops	Retailer H (UK)	Official control	December 2020 [01/12/2020]	S. Newport
		Retailer L (UK)	Official control	December 2020 [02/12/2020]	S. Enteritidis
Batch U	Chicken pops	Retail Chain E (UK)	Official control	December 2020 [07/12/2020]	S. Enteritidis
		Retail Chain E (UK)	Official control	December 2020 [07/12/2020]	S. Infantis
Batch W	Crispy chicken breast strips	Retailer J (UK)	Official Control	December 2020 [04/12/2020]	S. Newport

*Sampling date not available from RASFF 2020.3237 (fup2). The batch was sampled prior to delivery to the UK (British Retail Chain D). Analytical test (ISO-6579-1:2017-04) was performed commercially on an aggregate sample of five sub-samples (RASFF 2020.3237, fup16).

** Semi-finished products placed on the market by the Polish Processing Company B are subject to twice-monthly frequency testing. In addition, environmental sampling is performed once a month for total bacterial count, Enterobacteriaceae, *Salmonella* sp., *Listeria monocytogenes*, *Campylobacter* spp. Between 6 February and 5 April 2020 microbiological parameters were not exceeded. Following the positive findings at the British Retail Chain D, the Polish Processing Company B introduced full thermal treatment (RASFF 2020.3237, fup16) of poultry products intended for the British Retail Chain D.

Table A-7 shows the microbiological results from analyses performed on food and from environmental samples taken at the Polish Processing Company B in the context of official controls and own-check controls performed during the period 2018–2020 (RASFF 2018.1911, *fup55*).

Table A-7. Results of the microbiological investigation on food products and from the environment performed at the Polish Processing Company B*

Sampling year	Sample type	Number of samples collected		Number of <i>S. Enteritidis</i> positive samples
		Own check	Official control	
2018	Food products	785	0	0
	Environment	26	0	0
2019	Food products	920	0	0
	Environment	73	0	0
2020	Food products	565	5	0
	Environment	4778	0	0

**The Polish Processing Company B does not slaughter poultry, it uses raw materials (poultry meat) from the Polish Slaughterhouse D and the Polish Slaughterhouse E. Both plants slaughter poultry and cut poultry meat. According to Regulation (EC) 2073/2005 official verification is carried out at these slaughtering plants by testing official samples of broiler neck skin, (i.e. 15 samples at least five times a year).*

Annex 4.

Microbiological data at primary production level in Poland

Table A-8 displays the microbiological background (2018 – June 2020) of the three *S. Enteritidis* positive farms (no WGS available) linked to the traceability of the poultry products involved.

Table A-8. Results of microbiological investigations on the *S. Enteritidis*-positive farms in Poland

Farm	Sampling year	Number of official samples collected	Number of own-check samples collected	Number of positive official samples	Number of positive own-check samples
Farm A*	2018	0	6	0	0
	2019	0	6	0	0
	2020	2	2	2	0
Farm J*	2018	Na	Na	Na	Na
	2019	0	6	0	0
	2020	6	19	1	0
Farm T**	2018	2	30	0	0
	2019	1	36	0	0
	2020	19	24	4	0

*Farms A and J are linked to the traceability of the frozen poultry products, which tested positive for the outbreak strain.

**Farm T is linked to the traceability of the frozen poultry products that tested positive for *S. Enteritidis* and for which WGS analysis was not available.