

Outbreak of *Salmonella* Weltevreden infections in Norway, Denmark and Finland associated with alfalfa sprouts, July-October 2007

[Check for updates](#)

K E Emberland , S Ethelberg , M Kuusi , L Vold , L Jensvoll , B A Lindstedt , K Nygård , C Kjelsø , M Torpdahl , G Sørensen , T Jensen , S Lukinmaa , T Niskanen , G Kapperud

Citation style for this article: Emberland K E, Ethelberg S, Kuusi M, Vold L, Jensvoll L, Lindstedt B A, Nygård K, Kjelsø C, Torpdahl M, Sørensen G, Jensen T, Lukinmaa S, Niskanen T, Kapperud G. Outbreak of *Salmonella* Weltevreden infections in Norway, Denmark and Finland associated with alfalfa sprouts, July-October 2007. *Euro Surveill.* 2007;12(48):pii=3321. <https://doi.org/10.2807/esw.12.48.03321-en>

Full-Text

Outbreak of *Salmonella* Weltevreden infections in Norway, Denmark and Finland associated with alfalfa sprouts, July-October 2007

KE Emberland (Knut.Erik.Emberland@fhi.no)¹, S Ethelberg^{3,6}, M Kuusi⁷, L Vold¹, L Jensvoll², B-A Lindstedt¹, K Nygård¹, C Kjelsø⁶, M Torpdahl³, G Sørensen⁴, T Jensen⁵, S Lukinmaa⁸, T Niskanen⁹, G Kapperud¹

1. Division of Infectious Disease Control, Folkehelseinstituttet (FHI, Norwegian Institute of Public Health), Oslo, Norway
2. Mattilsynet (Norwegian Food Safety Authority), Oslo, Norway
3. Department of Bacteriology, Mycology and Parasitology, Statens Serum Institut (SSI), Copenhagen, Denmark
4. National Food Institute, Technical University, Copenhagen, Denmark
5. Danish Veterinary and Food Administration, Copenhagen, Denmark
6. Department of Epidemiology, Statens Serum Institut (SSI), Copenhagen, Denmark
7. Department of Infectious Disease Epidemiology, Kansanterveyslaitos (KTL, National Public Health Institute), Helsinki, Finland
8. Enteric Bacteria Laboratory, Kansanterveyslaitos (KTL, National Public Health Institute), Helsinki, Finland
9. Department of Food and Veterinary Control, Finnish Food Safety Authority (EVIRA), Helsinki, Finland

Between 10 and 15 October 2007, the national reference laboratory at the Norwegian Institute of Public Health (FHI) detected *Salmonella* Weltevreden in samples from four gastroenteritis patients. The patients were all living in the south-eastern part of Norway, and had no history of foreign travel during the month prior to onset of illness.

S. Weltevreden is a common cause of gastroenteritis in south-east Asia [1,2], but is a very rare serovar in Norway. Over the past 30 years, fewer than 10 cases were reported annually, only seven of which were domestically acquired.

In response to the detected cases, an outbreak investigation was initiated on 19 October in order to identify the source of the outbreak. It involved FHI, the Norwegian Food Safety Authority (NFSA), and the municipal medical officers. An urgent enquiry was sent out through the European Centre for Disease Prevention and Control

(ECDC) on 22 October. In response to the enquiry, Denmark reported a cluster of 18 cases of *S. Weltevreden* that was under investigation at the time. The onset of illness of the first cases had been in late July. In three cases, it was thought likely that the infection had been acquired abroad. On 26 October, Finland reported a cluster of seven cases that had occurred between 1 August and 1 October.

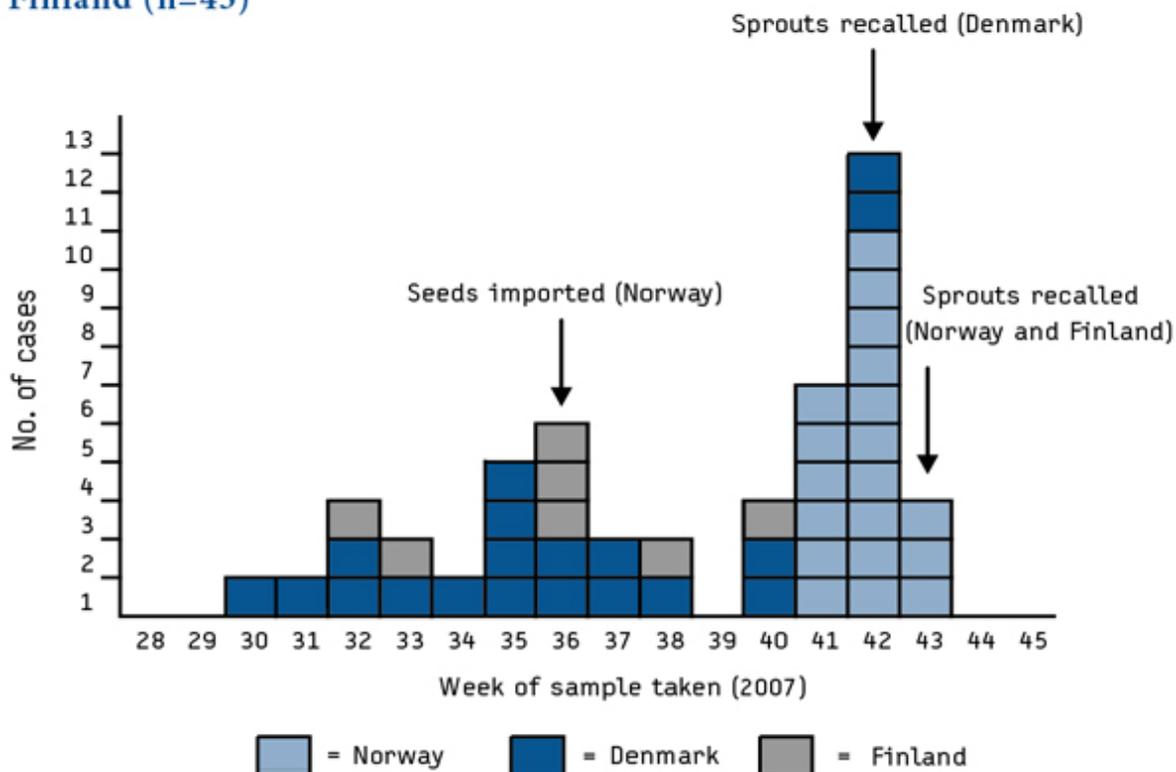
On 23 October, a salmonella isolate obtained from a major Danish alfalfa sprout producer was serotyped as *Weltevreden*. The Danish authorities issued an alert through the Rapid Alert System for Food and Feed (RASFF) on the same day. The isolate was later shown to have the same multiple locus variable number tandem repeat analysis (MLVA) and Pulsed Field Gel Electrophoresis (PFGE) profiles as the isolates from the case-patients from Denmark, Norway and Finland. *S. Weltevreden* has also been verified in the sprouts sold in Finland, but the PFGE result of this strain is pending.

The seeds for growing the alfalfa sprouts had been imported to Denmark in July and August 2007. The Danish producer had then exported part of the batch of seeds to a Norwegian alfalfa sprout producer on 19 September. The batch of seeds used in Denmark and Norway was traded, according to invoices, via retailers in Germany and the Netherlands to Denmark, and probably originated from Italy (further information is pending). No clear link has been found as yet to the seeds used in Finland, except that they came from the same Dutch supplier. A link may appear when the full traceability accounts from the Netherlands are provided through the RASFF system. The batch of alfalfa seeds had been imported to Finland in June. However, sprouts from this batch were not on the market in Finland before August.

The alfalfa sprouts were recalled and withdrawn in Denmark on 18 October, in Norway on 23 October, and in Finland on 28 October (Figure 1).

FIGURE 1

Cases of *Salmonella Weltevreden* associated with alfalfa sprouts, by week of sample taken, July-October 2007, Norway, Denmark and Finland (n=45)



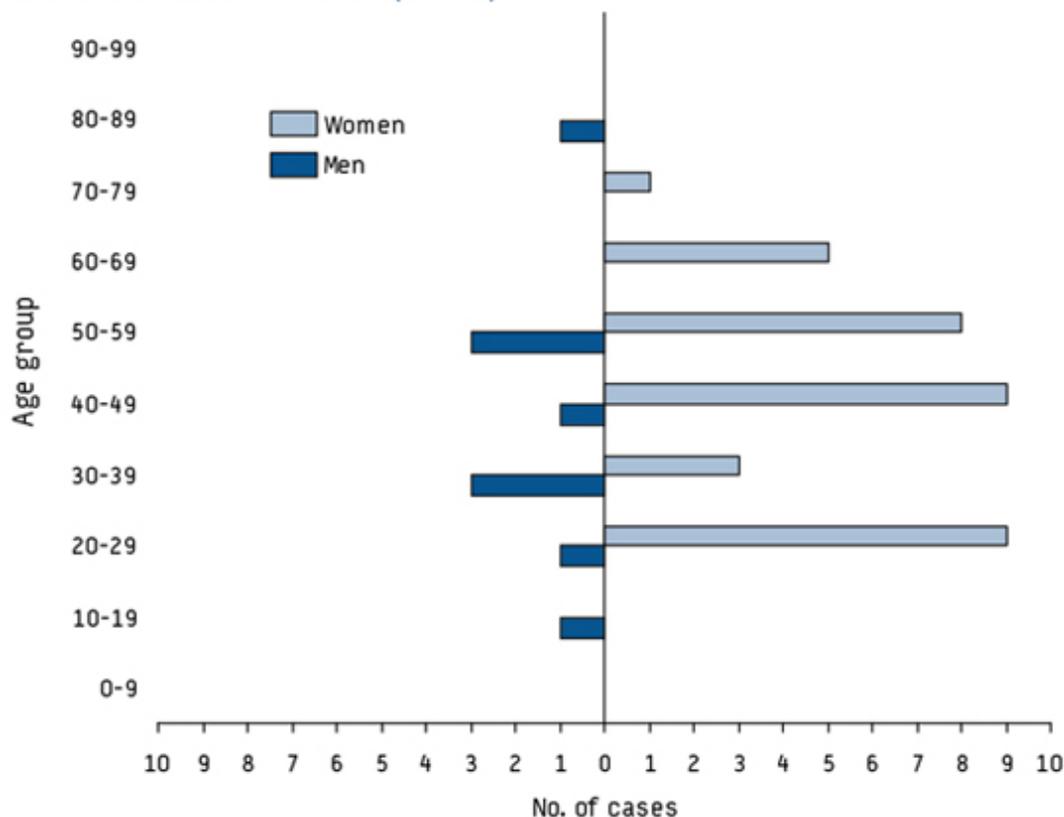
Outbreak investigation

A case was defined as a person living in Denmark, Finland or Norway, with a laboratory-confirmed infection with a strain of *S. Weltevreden* that matched the PFGE and/or MLVA profile of the outbreak strain, and with onset of symptoms of gastroenteritis July to October 2007.

Figure 1 shows the combined epicurve for the three countries of all *S. Weltevreden* cases by week of taking the sample. By 19 November, 19 cases had been reported in Norway, 19 in Denmark, and seven in Finland. The patient's ages ranged from 18 to 83 years (median age 34 years). Thirty-five cases were female and 10 male (Figure 2). The demographic characteristics of the cases are comparable in all three countries: they are adults and predominantly female. The dates of symptom onset for the Norwegian cases range from 28 September to 15 October; two cases were not available for interview. The 14 Danish cases that were available for interview fell ill between 23 July and 20 October. Five of the Finnish cases were available for interview; their disease onset was between 11 August and 30 September.

FIGURE 2

Cases of *Salmonella Weltevreden* associated with alfalfa sprouts, by gender and age group, July-October 2007, Norway, Denmark and Finland (n=45)



In Norway, NFSA interviewed the first six cases using a standard pilot questionnaire for foodborne outbreaks, focusing on food items known to be risk products causing gastroenteritis. Five cases had eaten alfalfa sprouts during the incubation period, and one had not eaten this product. As a follow-up, 13 patients identified later were asked whether or not they had eaten alfalfa sprouts: seven remembered having eaten sprouts, three were not sure, and two were not available for interview.

Most of the Danish cases were interviewed several weeks or months after the illness and therefore had difficulties remembering their food consumption in the relevant time period. Only the two cases with recent illness onset clearly remembered buying

and eating alfalfa sprouts. The Finnish cases were also interviewed several weeks after onset of illness. Two of them recalled exposure to alfalfa sprouts prior to illness. Alfalfa sprouts are typically part of sandwiches and salad buffets not prepared at home, and it can therefore be difficult to recall consumption of this product.

Conclusions

Based on the available information, it was concluded that alfalfa sprouts grown from contaminated seeds were the source of the outbreak in all three countries. A case-control study will not be conducted, since the source of the outbreak is well documented by other methods. In support of this conclusion, molecular typing of isolates from epidemiologically unrelated cases and of other food sources, including the two different *S. Weltevreden* isolates found in baby corn related to the recent *Shigella sonnei* outbreak in Denmark [3], showed a number of DNA-profiles that differed from the outbreak strain.

Sprouts are a well-known source of salmonella infections and have been described as the source of a large number of outbreaks [4]. The gender distribution may simply mean more females eat alfalfa sprouts in salads and sandwiches.

In both Norway and Finland, precautionary chlorination had been used to decontaminate the imported seeds. No decontamination process had been used by the Danish producer. The seeds imported to Denmark and Norway were part of the same batch. The seeds traded to Finland came from the same supplier in the Netherlands; they were not from the same batch but probably a related one. More information on traceability concerning a possible link is pending through RASFF. Contaminated seeds may therefore have been exported to other countries and a trace-back investigation is ongoing.

References:

1. Bangtrakulnonth A, Pornreongwong S, Pulsrikarn C, Sawanpanyalert P, Hendriksen RS, Lo Fo Wong DM, Aarestrup FM. Salmonella serovars from humans and other sources in Thailand, 1993-2002. *Emerg Infect Dis*. 2004 Jan;10(1):131-6. Available from: <http://www.cdc.gov/ncidod/eid/vol10no1/02-0781.htm>
2. Vo AT, van Duijkeren E, Fluit AC, Heck ME, Verbruggen A, Maas HM, Gastra W. Distribution of *Salmonella enterica* serovars from humans, livestock and meat in Vietnam and the dominance of *Salmonella* Typhimurium phage type 90. *Vet Microbiol*. 2006 Mar 10;113(1-2):153-8. Epub 2005 Dec 7.
3. Lewis HC, Kirk M, Ethelberg S, Stafford R, Olsen KEP, Nielsen EM, et al. Outbreaks of shigellosis in Denmark and Australia associated with imported baby corn, August 2007 – final summary. *Euro Surveill*. 2007;12(10). Available from: <http://www.eurosurveillance.org/ew/2007/071004.asp#2>
4. Montville R, Schaffner DW. Analysis of published sprout seed sanitization studies shows treatments are highly variable. *J Food Prot*. 2004 Apr;67(4):758-65.