

RECURRING OUTBREAKS OF *SALMONELLA* TYPHIMURIUM PHAGE TYPE 135 ASSOCIATED WITH THE CONSUMPTION OF PRODUCTS CONTAINING RAW EGG IN TASMANIA

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Abstract

Large egg-associated outbreaks of *Salmonella* Typhimurium 135 (STm135) that were associated with inadequate food safety practices but also linked to a common poultry farm occurred in Tasmania in 2005. A series of public health interventions were implemented to prevent further occurrences but 2 more egg-associated outbreaks in Tasmania in March 2007 and January 2008 led to a further 66 cases of STm135. This report describes these outbreaks and their links to the common source associated with the outbreaks in 2005. *Commun Dis Intell* 2008;32:466–468.

Keywords: salmonellosis, foodborne illness, outbreak, cohort studies, surveillance, eggs, Typhimurium 135

Introduction

In recent years in Australia, eggs and dishes containing eggs have been the most common food vehicle identified in *Salmonella* outbreaks.¹ Uncooked or lightly cooked foods containing raw egg as an ingredient accounted for 14% of foodborne outbreaks in 2006,¹ 13% of foodborne outbreaks in 2007 (OzFoodNet Working Group. OzFoodNet unpublished data) and 28% of foodborne outbreaks in the 1st quarter of 2008.² All jurisdictions, except the Northern Territory, reported egg-related outbreaks due to various strains of *Salmonella* Typhimurium in 2006 and 2007.¹

In Tasmania, one of the largest egg-associated outbreaks of foodborne illness in Australia for many years occurred between June and December 2005. During this time, 5 outbreaks of *Salmonella* Typhimurium phage type 135 (STm135) were identified in Tasmania, leading to 125 laboratory-confirmed cases.

Public health investigations included case and food handler interviews, cohort studies, environmental health investigations of food businesses, microbiological testing, traceback, and inspections and drag swabbing of an egg farm. These investigations enabled the identification of foods containing raw egg or foods contaminated through inadequate

food handling and/or storage procedures as possible vehicles for exposure. A particular poultry farm that supplied a large share of the catering and restaurant market was reported as the common source of eggs. Interventions targeting the general public and food handlers to promote better handling of egg products, and advice to egg producers regarding harm minimisation strategies led to the series of outbreaks being brought under control.³

In March 2007 and January 2008, another 2 point-source outbreaks of STm135 occurred in Tasmania. These outbreaks, and their links to the egg-associated outbreaks reported above, are described in this paper.

Outbreak 1 – March 2007 (OB1)

Between 19 March and 2 April 2007, a total of 18 individuals were identified as having a microbiologically-confirmed *Salmonella* infection following the reported consumption of products originating from a bakery in the north-west of Tasmania (the bakery). A further 2 individuals were identified as having a microbiologically-confirmed *Salmonella* infection following the consumption of eggs or dishes containing eggs purchased from retail businesses that sourced their eggs from the same egg supplier as that which supplied the bakery. All cases were interviewed and were questioned about foods consumed as far back as 7 days prior to onset of symptoms, with additional questions asked about places of purchase of foods prepared both in and out of the home, illness in contacts, and non-food (environmental) exposures.

Food businesses identified in the food histories of more than 1 case were investigated by local and State government environmental health officers (EHOs). In each case food handling practices were reviewed, and samples were collected for microbiological investigation from food products, raw ingredients, food preparation surfaces and equipment. Following a series of case interviews, it became apparent that the bakery was the only food business reported by all cases. It was subsequently hypothesised that bakers, who were the only staff that handled raw egg product for glazing could have transmitted salmonellae

from raw egg to ingredients in sandwiches or rolls or to the sandwich-making area at the front of the bakery. Rolls and other ready-to-eat products were typically placed in a refrigerated display cabinet prior to sale and when measured by probe thermometer, EHOs found temperatures ranging from 9 to 11 degrees Celsius—or twice the appropriate food storage temperature required for potentially hazardous foods, under the *Food Act 2003*. Several food samples were taken from this display cabinet and submitted for laboratory analysis.

Traceback of ingredients confirmed that the bakery had been supplied eggs from the same egg farm (Farm A) that was implicated in previous outbreaks of STm135.³ The microbiological tests of food and environmental samples from the bakery all returned negative results for the presence of *Salmonella*. Some of the eggs supplied to the bakery were also found to have been co-mingled with eggs from a non-authorised producer (Farm B) which was later closed. A second authorised egg producer (Farm C) was also found to be co-mingling the local eggs with eggs from Farm A. As a precautionary measure and in light of epidemiological evidence pointing to eggs as the most likely original source of STm135, all remaining products supplied by Farm A through Farm B and Farm C prior to the outbreak were voluntarily withdrawn from retail sale by the egg producers.

Outbreak 2 – January 2008 (OB2)

Between 30 January and 12 February 2008, a total of 47 individuals were identified as having a microbiologically-confirmed *Salmonella* infection following the consumption of products originating from a restaurant in southern Tasmania (the restau-

rant). Cases were interviewed and were defined as belonging to 1 of 4 cohorts linked to either eating at the restaurant or eating foods that had been provided by the restaurant. Cohorts 1 to 3 were made up of attendees of 3 separate catered functions (2 funerals and 1 workplace meeting). Cohort 4 was made up of restaurant attendees, and restaurant staff and their family members. A breakdown of the estimated numbers in each cohort is shown in the Table. Cases were questioned about foods consumed at the funerals or restaurant using questionnaires developed from the restaurant and catering menus. Analysis of foods consumed by cases found that chicken sandwiches containing aioli resulted in the highest attack rate for illness in catered cohorts 1, 2 and 3 and that all cases from cohort 4 had eaten restaurant items that contained aioli. A very strong association was found between eating any product containing aioli and becoming ill (OR 511, 95%CI 90–4709).

Food Safety Officers and local council EHOs visited the restaurant. A number of food safety issues were identified including: a failure to monitor temperature; concerns about hygiene arising from a failure to maintain handwashing stations and to provide paper towel; and evidence of inadequate cleaning and sanitation of the mixer used to blend aioli and in the production area.

Fourteen food samples and a range of environmental samples were obtained for microbiological testing. Culture results confirmed the presence of *Salmonella* Typhimurium 135 in 4 foods, one of which was aioli. The recipe for aioli included raw egg yolks. Traceback revealed that the eggs used were again supplied by the same egg farm (Farm A) that was implicated in previous outbreaks of STm135³ and in outbreak 1 described above.

Table. Cohorts – outbreak 2

Cohort	Number of attendees*	Number interviewed†	Number ill	Number laboratory-confirmed	% of ill laboratory-confirmed
Cohort 1 – (funeral 1)	99	66	30	16	53
Cohort 2 – (funeral 2)	153	65	17	10	59
Cohort 3 – (workplace meeting)	7	7	4	1	25
Cohort 4 – (restaurant attendees, restaurant staff and their family members)	74+	72	29	20	69
Total	333+	210	80	47	59

* Total numbers for catered functions 1 and 2 were determined from signed guest lists at the 2 funerals and from details provided by the immediate family and other social networks of the deceased person. For these 2 cohorts the total numbers are likely to be close to the true numbers who attended. The total number for catered function 3 was supplied by the organiser of the meeting and is accurate. The total number for restaurant attendees was determined by the restaurant booking lists and from members of the public who contacted the Communicable Diseases Prevention Unit. This total is therefore an estimate.

† Interviews were conducted until it was determined that enough evidence had been gathered to inform the investigation.

Microbiology

All human and non-human isolates from both OB1 and OB2 were sent to the Microbiological Diagnostic Unit, Public Health Laboratory in Victoria for serotyping and phage typing. All 20 cases from OB1 were microbiologically-confirmed as STm135. In OB2, 46 of 47 isolates were reported as STm135, and 1 was reported as *Salmonella* Typhimurium untypable. As described previously, all STm135 isolates were found to be antigenically identical and exhibited a phage reaction pattern that is designated as *S. Typhimurium* 135a by the Institute of Medical and Veterinary Science in South Australia.³

Discussion

There was very strong epidemiological evidence indicating the point source of infection in both outbreaks. The evidence suggested that *Salmonella* was introduced into the food preparation environment implicated in each outbreak, on eggs (or possibly in cracked eggs) and the organism was then able to multiply in foods and/or spread through cross-contamination, thus becoming a public health risk and leading to an outbreak of STm135.

The lack of confirmatory microbiological testing of egg and food samples in OB1 in no way undermines these conclusions as positive *Salmonella* culture results in such circumstances are useful corroboration but negative results do not indicate absence of the organism from these or other foods. OB1 also underscores the need to improve egg industry packaging and labelling compliance and to implement measures to provide better traceability of eggs in the marketplace.

These 2 outbreaks and previous egg-related outbreaks of *Salmonella* Typhimurium 135 in Tasmania³ emphasise the need for a through-chain approach in managing food safety risks. It is clear that vigilance must be exercised at all points in the food supply chain to remove as far as possible on-farm risks and to ensure that appropriate interventions are in place to remove remaining risk prior to sale for human consumption.

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