



Survey of the microbiological safety of ready-to-eat cakes, pastries and desserts with high-risk fillings (14NS1)

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SUMMARY

This survey investigated the microbiological safety of ready-to-eat (RTE) cakes, pastries and desserts with high-risk fillings. Samples (n=997) were collected from April to June 2014 and were tested for four microbiological parameters. The overall microbiological quality of the samples tested was satisfactory.

- Of the 997 samples tested, 100% were satisfactory for *Salmonella* and *Listeria monocytogenes*. A low level (10 cfu/g) of *L. monocytogenes* serovar 1/2a was cultured from one sample of an “all custard slice” but was enumerated below the food safety criteria limit of 100 cfu/g.¹
- Of 997 samples tested for presumptive *Bacillus cereus*, 99.3% (n=990) were satisfactory and 0.3% (n=3/997) were acceptable. Unsatisfactory levels of presumptive *B. cereus* were enumerated in 0.3% (n=3/997) of samples and 0.1% (n=1/997) had levels considered to be unacceptable/potentially hazardous.
- Satisfactory levels of coagulase-positive staphylococci were enumerated in 98.1% (n=970/989) of samples and acceptable levels were enumerated in 1.5% (n=15/989) of samples. Unsatisfactory levels of coagulase-positive staphylococci were enumerated in 0.3% (n=3/989) of samples and 0.1% (n=1/989) had levels considered to be unacceptable/potentially hazardous.

The cakes, pastries and desserts identified with high levels of microbial contamination contained fresh dairy cream, custard or soft cheese. No issues were identified with samples containing raw or lightly cooked egg. The storage/display temperature for three unsatisfactory and two unacceptable/potentially hazardous samples were observed to be >5 °C, indicating the likely importance of temperature control in these types of foods to limit the growth of bacteria and thereby reduce the risk of gastrointestinal illness.

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¹ Samples were assessed against the food category 1.3 enumeration limit of 100 cfu/g for *L. monocytogenes*, as the RTE cakes, pastries and desserts with high-risk fillings examined for this survey had a shelf life of <5 days.

² (i) Public Health Laboratory, Limerick; (ii) Public Health Laboratory, Sligo General Hospital, Sligo; (iii) Public Health Laboratory, Waterford Regional Hospital, Waterford; (iv) Public Analyst's Laboratory, Sir Patrick Dun's Hospital, Dublin; (v) Public Health Microbiology Laboratory, St. Finbarr's Hospital, Cork; (vi) Public Health Microbiology Laboratory, Cherry Orchard Hospital, Dublin; and (vii) Public Health Microbiology Laboratory, Galway University Hospital.



INTRODUCTION

Fillings such as fresh dairy cream and fresh egg custard can be considered high risk because they provide an ideal growth medium for bacterial pathogens, which is exacerbated if the final product (or its constituents) is subject to time-temperature abuse. In addition, some cake, pastry or dessert recipes require the use of uncooked/raw eggs (e.g. icings, chocolate mousse, tiramisu) or lightly cooked eggs (e.g. soft meringues), meaning that there is little or no bactericidal step if the eggs are contaminated with *Salmonella*. Salmonellosis outbreaks have been previously linked to minimally cooked desserts containing raw egg (Sarna *et al.*, 2002; Ward *et al.*, 2002; Calvert *et al.*, 2007). A large proportion of *Salmonella* outbreaks associated with consumption of ready-to-eat (RTE) cakes published in the literature were attributed to the use of minimally processed eggs and/or temperature abuse (Appendix 1).

Outbreaks

Cakes, pastries and desserts containing cream or custard, or which contain uncooked or lightly cooked shell eggs, have been linked to outbreaks of illness caused by pathogens including *Salmonella*, *Staphylococcus aureus*, *Bacillus cereus* and shiga toxin-producing *Escherichia coli* (STEC), which is also known as verocytotoxigenic *E. coli* (VTEC). Reasons reported for these outbreaks include contaminated ingredients, cross-contamination during preparation because of inadequate cleaning or poor food preparation practices, contamination by infected food handlers and poor control of storage times and temperature (Appendix 1). Although there are no reported listeriosis outbreaks associated with eating cakes, pastries or desserts in the literature, *L. monocytogenes* is widespread in the environment, meaning that raw ingredients could be contaminated, or the final product may become contaminated via cross-contamination during filling, handling, slicing, packing, etc.

Prevalence of pathogens

A survey of cakes collected from hotels, restaurants and pastry shops in Croatia found *L. monocytogenes* in 4% of samples (n=12/283) at high contamination levels of 10^7 to 10^8 cfu/g (Uhitil *et al.*, 2004). This finding was consistent with a French survey of filled pastries that found *L. monocytogenes* in 13.7% (n=41/300) of samples at levels ranging from 0.3 to 7×10^5 cfu/g (Ferron and Michard, 1993). A study of RTE supermarket foods in Italy found *L. monocytogenes* in 1% (n=4/392) of pastries tested, but the level of contamination was below 100 cfu/g for all four samples (Pinto *et al.*, 2010).

In Ireland, the microbiological quality of cakes and pastries with perishable fillings and toppings (n=527) was examined previously in a national survey performed in 2001 (FSAI, 2001a). *S. aureus* was enumerated in one sample of a cream doughnut (0.2%, n=1/527) at levels $\geq 10^4$ cfu/g, which was categorised as unsatisfactory based on the guideline limits for coagulase-positive staphylococci set down in the Food Safety Authority of Ireland's (FSAI) Guidance Note No. 3 (FSAI, 2001b). A further 28 samples (5.3%, n=28/527) were categorised as borderline ($20 \leq 10^4$ cfu/g) and the remaining 498 samples (94.5%, n=498/527) were satisfactory (<20 cfu/g) for the presence of *S. aureus*. *E. coli* levels were unsatisfactory (>100 cfu/g) in 11 (2.1%, n=11/527), acceptable ($20 < 100$ cfu/g) in 24 (4.6%, n=24/527) and satisfactory (<20 cfu/g) in 492 (93.4%, n=492/527) of the samples tested.

A survey of baked custard tarts collected from retail premises in the United Kingdom (UK) detected *Salmonella spp.* in 0.05% (n=1/1,830), *B. cereus* in 3.5% (n=64/1,837) and *S. aureus* in 3.3% (n=61/1,831) of samples (Little and de Louvois, 1997). Analysis of laboratory results from RTE food in the UK between 2003 and 2005 by Meldrum *et al.* (2006) found that of the 433 cream cakes tested, 0.5% contained *B. cereus* and 0.2% contained *S. aureus*. Of the 254 custard slices tested, 0.8% contained *S. aureus*. *Salmonella* was not detected in any of the 687 samples and *L. monocytogenes* was not found in any sample at unsatisfactory levels (≥ 100 cfu/g).



Many strains of *S. aureus* and some other coagulase-positive staphylococci produce staphylococcal enterotoxins which can contaminate food and cause illness if ingested. However, not all strains are capable of producing toxin and causing disease. The enterotoxigenic strain needs to grow to levels $>1 \times 10^5$ cfu/g before the toxin is produced at detectable levels and can be influenced by parameters such as temperature, pH and water activity (FSAI, 2011a). Detection of coagulase-positive staphylococci in food at numbers $<1 \times 10^5$ cfu/g does not guarantee that the toxin is not present, as the organisms may have grown to sufficient levels to produce enterotoxins and then died off (FSAI, 2016a). If staphylococcal enterotoxin is detected, under Commission Regulation (EC) No. 178/2002 the food is considered unsafe and must be withdrawn/recalled from the market (FSAI, 2016a).

Typically, foods are contaminated with coagulase-positive staphylococci as a result of improper handling and subsequent storage at elevated temperatures. Outbreaks of staphylococcal food poisoning have been caused previously by the consumption of homemade ice cream (Fetsch *et al.*, 2014), cream-filled pastries (Waterman *et al.*, 1987) and a custard-based dessert called vanilla slices which were held at ambient temperatures for long periods of time during unusually warm weather (Fenton *et al.*, 1984). The International Commission on Microbiological Specifications for Foods (ICMSF) recognised the risk associated with cream-filled baked goods as a vehicle for staphylococcal food poisoning and published guidance on the use of performance criteria, process criteria and validation in relation to Hazard Analysis and Critical Control Point (HACCP) and good hygiene plans for managing the risk (Stewart *et al.*, 2003).

B. cereus causes two kinds of foodborne illness. One is an emetic (vomiting) intoxication due to the ingestion of a toxin pre-formed in the food and may be formed by certain strains of *B. cereus* if the vegetative count exceeds 1×10^5 cfu/g (FSAI, 2016b). The second is due to the ingestion of bacterial cells which produce enterotoxin in the small intestine, and this infection occurs when *B. cereus* levels exceed 1×10^6 cfu/g in the food and sufficient amounts of the enterotoxin are formed in the small intestine of the host (FSAI, 2016b). *B. cereus* foodborne infection or intoxication is a notifiable disease in Ireland since 2004; however, it is possible that this illness is under-reported because the symptoms are generally not severe enough for the patient to visit their general practitioner. There were no notifications of *B. cereus* foodborne infection or intoxication in 2014, the same year the current survey was carried out. To date, one case per year has been reported in Ireland in 2004, 2009 and 2015 (HSPC, 2015a; 2015b). A German outbreak of food poisoning in kindergarten children and personnel after consumption of a rice pudding during an excursion was linked to *B. cereus* emetic toxin (cereulide) as the causative agent; this factor coupled with inadequate food hygiene practices allowed the pathogen to multiply to sufficiently high levels to produce toxin in the rice pudding (Kamga-Wambo *et al.*, 2011). *B. cereus* caused an outbreak of gastrointestinal illness after consumption of a cheesecake held at an improper temperature for too long either before or after cooking (Department of Health Florida, 2005).

Temperature control

Temperature control is essential to restrict the growth of bacteria and minimise the risk of food poisoning from perishable foods. In Ireland, foods such as cakes, pastries and desserts that contain high-risk fillings should be stored or displayed at ≤ 5 °C in order to restrict bacterial growth (NSAI, 2007a; 2007b). A UK survey noted that the microbiological quality of fresh cream cakes was worse in those displayed at ambient temperatures than those refrigerated, even though the cakes were held at ambient temperatures for less than four hours (Williamson *et al.*, 2008).

To minimise the risk of foodborne illness from consuming chilled food which could be potentially subjected to temperature abuse, Irish Standards (I.S.) 340:2007 (NSAI, 2007a) recommends the following corrective actions where the temperature of chilled foods has not been maintained at 0–5 °C:

- Chilled foods held at >5 °C for <2 hours should either be used immediately, restored to a temperature of ≤ 5 °C or discarded as appropriate after risk assessment.
- Chilled food held at >5 °C for between 2 and 4 hours, should be used immediately or discarded.
- Chilled food held at >5 °C for >4 hours, should be discarded.

Thus, due to the potential of bacterial growth, it is not acceptable for a food business operator (FBO) to put chilled foods back into cold storage if they are held at temperatures of $>5^{\circ}\text{C}$ for the maximum time limit of four hours.

AIM OF SURVEY

The aim of this survey was to investigate:

1. The microbiological safety of RTE cakes, pastries and desserts with high-risk fillings.
2. If there is a microbiological difference between samples stored/displayed at $\leq 5^{\circ}\text{C}$ and those stored/displayed at $>5^{\circ}\text{C}$ at the time of collection.

METHOD

Sample collection

Between 1 April and 30 June 2014 (inclusive), Environmental Health Officers (EHOs) from the Environmental Health Service (HSE) collected single samples ($n=1$) of RTE cakes, pastries and desserts from a range of HSE-supervised food establishments handling the sample type.

Sample type

Two types of RTE cakes, pastries and desserts were specifically requested:

- (a) Those that contain high-risk fillings, e.g. fresh cream, custard, soft cheeses as part of their filling or topping,
- (b) Those that contain uncooked or lightly cooked raw egg (whole egg, yolk or white).

Samples could be pre-packaged, or sold loose, fresh or frozen. They could be made on the premises from which they were sold, or they could be made elsewhere. Products excluded from the survey included those that would undergo further heat treatment before consumption, or those for which the manufacturing process would eliminate the *Salmonella* risk, such as ice cream made with pasteurised egg.

Survey questionnaire

EHOs were asked to complete the National Sample Submission Form as well as a specific online survey questionnaire for each sample collected (Appendix 2).

Sample analysis

Samples were analysed for the presence or absence of *Salmonella* spp. using EN/ISO 6579. The enumeration of *L. monocytogenes* was conducted using EN/ISO 11290-2. Coagulase-positive staphylococci were enumerated using ISO 6888-2, and presumptive *Bacillus cereus* were enumerated using EN/ISO 7932. All samples were tested for these four microbiological parameters except for eight samples, which were not tested for coagulase-positive staphylococci.

Interpretation of results

- *L. monocytogenes* results were compared against the enumeration limit of 100 cfu/g under food category 1.3 set in Commission Regulation (EC) No. 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs, as amended. This limit applies to RTE foods that are unable to support the growth of *L. monocytogenes*. Since the RTE cakes, pastries and desserts with high-risk fillings examined for this survey

had a shelf life of <5 days and thus complied with footnote (8) of Chapter 1, they fell under food category 1.3: Satisfactory (counts ≤ 100 cfu/g), Unsatisfactory (counts > 100 cfu/g).

- *Salmonella*: Samples that contained uncooked or lightly cooked raw egg were assessed against the criteria for *Salmonella* under food category 1.15 in Commission Regulation (EC) No. 2073/2005, as amended: Satisfactory (absence in 25 g), Unsatisfactory (presence in 25 g). For the remaining samples, the guideline limits set in the FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (2007) were applied³: Satisfactory (absence in 25 g), Unsatisfactory (presence in 25 g).

As no legal microbiological criteria are set for *Bacillus cereus* and coagulase-positive staphylococci in RTE cakes, pastries and desserts with high-risk fillings, the guideline limits set in the FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (2007) were applied to categorise the results obtained as follows:

- Presumptive *Bacillus cereus*: Satisfactory ($< 10^3$ cfu/g); Acceptable (10^3 – $< 10^4$ cfu/g); Unsatisfactory (10^4 – $< 10^5$ cfu/g); Unacceptable/potentially hazardous ($\geq 10^5$ cfu/g).
- Coagulase-positive staphylococci: Satisfactory (< 20 cfu/g); Acceptable (20 to < 100 cfu/g); Unsatisfactory (100 to $< 10^4$ cfu/g); Unacceptable/potentially hazardous ($\geq 10^4$ cfu/g).

RESULTS AND DISCUSSION

In total, 997 samples were collected and a total of 4,525 laboratory tests were performed.

Microbiological results

The results from this survey showed that the microbiological quality of the majority of RTE cakes, pastries and desserts with high-risk fillings tested was satisfactory when assessed against the food safety criteria limits for RTE food laid down in Commission Regulation (EC) No. 2073/2005 and the guideline limits in the FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (FSAI, 2007) (Tables 1 and 2).

Salmonella

Salmonella was not detected in any of the samples tested. The results of the current study are similar to a survey on the microbiological quality of randomly selected RTE foods in Wales between 2003 and 2005 by Meldrum *et al.* (2006) which did not detect *Salmonella* in dairy cream cakes (n=433) or custard slices (n=254). Similarly, the results of a long-term surveillance programme (1995 through 2003) examining the microbiological quality of RTE foods across Wales did not detect *Salmonella* in cakes with dairy cream (n=862), custard slices (n=808) or ice cream (n=174) over the nine-year period (Meldrum *et al.*, 2005). Cakes (with and without dairy cream; n=144) and desserts (including cheesecake, fruit pies, fruit salad, ice cream, frozen yogurt, mousse and trifle; n=111) served in schools across Wales during the academic year 2006–2007 were not found to contain any detectable levels of *Salmonella* (Meldrum *et al.*, 2009) nor did 571 fresh cream cakes sampled from refrigerated and ambient display units in a wide range of retail and catering premises in the United Kingdom in 2008 (Williamson *et al.*, 2008).

L. monocytogenes

Enumeration of *L. monocytogenes* was performed on all of the 997 samples collected and 99.9% (n=996/997) of samples tested were found to have counts of < 10 cfu/g. The pathogen was enumerated in one sample (0.1%) described as an “all custard slice” at 10 cfu/g. However, the detection of *L. monocytogenes* at this low level is not considered unsafe as it is estimated that levels below 100 cfu/g in food represent a very low risk of listeriosis for all

³ Revision 2 to Guidance Note No. 3 was published in 2016 (FSAI, 2016a), after the sampling period of the current survey and thus the results were assessed using the old guidelines in force during the sampling period (FSAI, 2001b).

population groups (SCVMPH, 1999). Serotyping was performed on the isolate at the National Reference Laboratory for *L. monocytogenes* and it was confirmed as *L. monocytogenes* serovar 1/2a. The majority of *L. monocytogenes* strains associated with foodborne outbreaks of clinical illness in humans are serovars 1/2a, 1/2b and 4b (Kathariou, 2002).

A local authority survey carried out in the UK assessing the microbiological quality of cakes containing dairy cream found *L. monocytogenes* in 2.3% (13/571) of samples, with 1/2a the most commonly found serotype (six isolates) (Williamson *et al.*, 2008). A survey to estimate the level of microbial contamination in 283 cakes and pastry products collected from different hotels, restaurants and pastry shops in Croatia isolated *L. monocytogenes* from 12 samples (4.27%) which were determined as serovars 1/2a (3), 1/2b (2), 3b (6) and 4b (1) (Uhitil *et al.*, 2004). Meldrum *et al.* (2005) found *L. monocytogenes* in 2.9% (23/808), aerobic colony counts in 15% (121/808), *E. coli* in 3.6% (29/808), *B. cereus* in 0.1% (1/808) and *S. aureus* in 0.4% (3/808) of the samples of custard slices surveyed. These were an unbaked product made with cold custard on a pastry layer with icing on top. However, it is not known whether a cold mix-based product was used to manufacture the “all custard slice” found to contain *L. monocytogenes* in the current survey.

In the current study, the “all custard slice” in which *L. monocytogenes* was enumerated was manufactured on the day it was sampled and had a shelf life of 24 hours. The product was sold loose and the temperature of the storage unit at time of sampling was 4.8 °C. As the shelf life for this RTE food was set at less than five days, it was assessed under the food category 1.3 “Ready-to-eat foods unable to support the growth of *L. monocytogenes*, other than those intended for infants and for special medical purposes” under Commission Regulation (EC) No. 2073/2005. The *L. monocytogenes* enumeration result of 10 cfu/g in the custard slice was satisfactory, as it was below the criteria limit of ≤100 cfu/g laid down in the Regulation. While the food was compliant on this occasion, it is also worth noting that 20 cfu/g coagulase-positive staphylococci were enumerated in the same custard slice sample. When assessed under the guideline limits set down in the FSAI’s Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (FSAI, 2007) for coagulase-positive staphylococci, the enumeration result of 20 cfu/g was categorised as acceptable. *Salmonella* and *Bacillus cereus* were not detected in the sample.

The microbiological quality of two other samples from the same premises was assessed at the same time as the custard slice. One was a custard and cream slice and the other was a trifle, both sold loose, stored at 4.8 °C with a shelf life of 24 hours. None of the four microbiological parameters investigated were found in the custard and cream slice; however, 60 cfu/g coagulase-positive staphylococci were enumerated in the trifle, which falls under the guideline limits set down in the FSAI’s Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (FSAI, 2007) for acceptable results. Potential sources of *L. monocytogenes* contamination of RTE foods include incoming product, food handlers, consumers and environmental sources, such as utensils and equipment, which may harbour pathogenic microorganisms or serve as vehicles of contamination if cleaning and sanitation are poor (Lianou and Sofos, 2007).



Table 1. Interpretation of *Salmonella* and *L. monocytogenes* results according to the food safety criteria limits set down in Commission Regulation (EC) No. 2073/2005 and the FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (2007)

Parameter	No. of samples tested	Limits	
		Satisfactory (Absence in 25 g)	Unsatisfactory (Presence in 25 g)
<i>Salmonella</i> ^a	997	997 (100%) ^b	0 (0%)
<i>L. monocytogenes</i> (enumeration) ^c	997	997 (100%) ^d	0 (0%)

^a Samples that contained uncooked or lightly cooked raw egg were assessed against the criteria for *Salmonella* under food category 1.15 in Commission Regulation (EC) No. 2073/2005. For the remaining samples, the guideline limits set in the FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (2007) were applied.

^b *Samonella* was not detected in 25 g of sample.

^c *L. monocytogenes* results were compared against the enumeration limit of 100 cfu/g under food category 1.3 set in Commission Regulation (EC) No. 2073/2005.

^d *L. monocytogenes* count was below the limit of enumeration (<10 cfu/g) for 99.9% (996/997) samples and was 10 cfu/g for one sample (0.1%).

Presumptive *Bacillus cereus*

Enumeration of presumptive *B. cereus* was performed on all of the 997 samples collected and 99.3% (990/997) were found to have satisfactory levels of <10³ cfu/g according to the guideline limits in the FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (FSAI, 2007). Three of the samples tested had presumptive *B. cereus* levels that were interpreted as being acceptable (10³–<10⁴ cfu/g) using the guideline limits. Two of these samples were a fresh cream éclair containing 9 x 10³ cfu/g presumptive *B. cereus* and a fresh cream horn containing 5 x 10³ cfu/g presumptive *B. cereus*. Both were manufactured on the same premises and the relatively high (although acceptable) levels of presumptive *B. cereus* enumerated are most likely related to the fresh cream filling. *B. cereus* has been shown to produce toxin in whipped cream at 8 °C (Christiansson *et al.*, 1989); however, the numbers of *B. cereus* would need to exceed 1 x 10⁵ for the risk of the toxin being formed in food (FSAI, 2016b). Dairy cream cakes have been previously reported to contain unsatisfactory levels of *B. cereus* (Meldrum *et al.*, 2006; Williamson *et al.*, 2008). The other three microbiological parameters tested for these products were satisfactory. No information was given regarding the temperature of the storage unit at the time of sampling other than they were in a chilled display and they had a 24-hour shelf life. The third sample with an acceptable level of presumptive *B. cereus* had 1.4 x 10³ cfu/g, but no information was given other than it was taken from a chilled display unit with a temperature of 3.8 °C at time of sampling.

Three samples were designated as unsatisfactory (10⁴–<10⁵) according to the guideline limits with counts of 2.1 x 10⁴ cfu/g (sample description given as “cream added on premises”); 2 x 10⁴ cfu/g (sample description “not stated”) and 1 x 10⁴ cfu/g (fruit trifle) presumptive *B. cereus*. These items were not manufactured by the same food business. All were displayed at chilled storage temperatures. The food item with cream added on the premises was stored at 6.3 °C and the fruit trifle at 4 °C. No temperature information was given for the third food item other than being chilled at time of sampling.

One sample of banoffee pie was found to contain 1 x 10⁵ cfu/g presumptive *B. cereus* and was categorised as unacceptable/potentially hazardous (≥10⁵ cfu/g) using the guideline limits. The temperature of the chill storage unit at time of sampling was recorded as 10 °C. The EHO who took the sample reported that there were no concerns with cross-contamination or hygiene practices at the premises the banoffee pie was sampled from, except that the sampling day was very hot and the product had an elevated temperature of 10 °C in an open refrigerated display at

the time of sampling. Follow-up samples were taken from a banoffee pie made using the same ingredients and it returned a satisfactory result.

One sample of a pavlova dessert described as “mixed cooked and raw” had high counts of *Bacillus* spp. non-*cereus* (1.3×10^5 cfu/g), but had satisfactory levels of presumptive *B. cereus* ($<10^3$ cfu/g). The FSAI's Guidance Note No. 3 (FSAI, 2001b) and Interim Guidance Document (FSAI, 2007) state that if *Bacillus* counts exceed 10^4 cfu/g, the organism should be identified because those of the *B. subtilis-licheniformis* group have been implicated in outbreaks of food poisoning from meat and pastry products and meat or seafood dishes.

Coagulase-positive staphylococci

Enumeration of coagulase-positive staphylococci was performed on 989 of the samples collected. No information was provided as to the reason this microbiological parameter was not tested in the remaining eight samples collected. Satisfactory levels of coagulase-positive staphylococci (<20 cfu/g) were found in 970 (98.1%) of RTE cakes, pastries and desserts with high-risk fillings tested, and a further 15 (1.5%) samples had numbers that were categorised as acceptable according to the guideline limit of 20 – <100 cfu/g. Unsatisfactory levels (100 – $<10^4$ cfu/g) of coagulase-positive staphylococci were enumerated in three samples (0.3%). These were a chocolate éclair, an Oreo cheesecake (containing soft cheese) and a fresh cream meringue containing 130 cfu/g, 1.8×10^3 cfu/g and 2×10^3 cfu/g coagulase-positive staphylococci, respectively. All samples were chilled and the temperature of the display storage unit was recorded as 5.7 °C for the fresh cream meringue and 5.2 °C for the Oreo cheesecake. The storage temperature of the chocolate éclair was not stated. The minimum temperature allowing growth of coagulase-positive staphylococci is 7 °C, with the minimum temperature for production of staphylococcal enterotoxins reported to be 10 °C (FSAI, 2011a). One sample of fresh cream éclair was found to contain 5.7×10^5 cfu/g coagulase-positive staphylococci and was designated as unacceptable/potentially hazardous as it was above the guideline limit of $\geq 10^4$ cfu/g. It was manufactured by the same food business as the fresh cream meringue with unsatisfactory levels of coagulase-positive staphylococci (2×10^3 cfu/g) and both were made using the same brand of cream. *Salmonella*, *L. monocytogenes* and presumptive *B. cereus* were not detected in either sample. This fresh cream éclair sample was stored at 5.7 °C.

The three unsatisfactory and one unacceptable/potentially hazardous samples were notified to the rapid alert team in the FSAI as per the enforcement actions outlined in the protocol for this survey. The follow-up results for repeat samples taken of the chocolate éclair and Oreo cheesecake (containing soft cheese) were satisfactory. The FBO manufacturer's premises was inspected by EHOs and found to be satisfactory. Testing for staphylococcal enterotoxin was not performed on these two samples as coagulase-positive staphylococci were enumerated at levels $<1 \times 10^5$ cfu/g in both samples (FSAI, 2016a). Follow-up samples of the fresh cream meringue and fresh cream éclair manufactured at the same premises were both found to be unsatisfactory for coagulase-positive staphylococci, which were enumerated at levels of 4.5×10^3 cfu/g and 1.4×10^5 cfu/g in the repeat samples, respectively. At this point, the FBO ceased production of these products until the source of contamination was identified and resolved. There was an insufficient amount of the original samples of fresh cream meringue and fresh cream éclair remaining to test for the presence of staphylococcal enterotoxin, although the coagulase-positive staphylococci isolates cultured in these samples were tested for the presence of nine *S. aureus* enterotoxin genes (A-E and G-J) instead. Cultured isolates from both samples were found to be negative for the presence of enterotoxin genes. In the repeat samples of fresh cream meringue and fresh cream éclair, the presence of staphylococcal enterotoxin was investigated as part of the follow-up investigation, in addition to microbiological examination of all individual ingredients used in the manufacture of these products. Both repeat samples were negative for the presence of staphylococcal enterotoxin and coagulase-positive staphylococci were not enumerated (<10 cfu/g).

Table 2. Interpretation of Presumptive *Bacillus cereus* and coagulase-positive staphylococci results according to the guideline limits for set in the FSAI’s Guidance Note No. 3 (2001b) and Interim Guidance Document (2007)

Parameter	No. of samples tested	Limits (cfu/g)			
		Satisfactory	Acceptable	Unsatisfactory	Unacceptable/potentially hazardous
Presumptive <i>B. cereus</i>	997	<10 ³	10 ³ –<10 ⁴	10 ⁴ –<10 ⁵	≥10 ⁵
		990 (99.3%)	3 (0.3%)	3 (0.3%)	1 (0.1%) ^a
Coagulase-positive staphylococci	989	<20	20–100	100–10 ⁴	≥10 ⁴
		970 (98.1%)	15 (1.5%)	3 (0.3%) ^b	1 (0.1%) ^c

^a Result of follow-up sample for presumptive *B. cereus* was satisfactory (<10³ cfu/g).

^b Results of follow-up samples for coagulase-positive staphylococci were satisfactory for two and unsatisfactory for one repeat sample. The repeat unsatisfactory sample was from the same bakery as the sample designated as unacceptable/potentially hazardous for coagulase-positive staphylococci.

^c Result of follow-up sample for coagulase-positive staphylococci was unsatisfactory. Staphylococcal enterotoxin was not detected. FBO ceased production until the source of the contamination had been identified and resolved.

Information collected on the National Sample Submission Form

EHOs completed a National Sample Submission Form (NSSF) for each sample collected and sent to the laboratory for analysis (n=997). This section will discuss the results of data submitted on the NSSF regarding the samples collected.

Food chain stage

Figure 1 shows the percentage of samples collected from each food chain stage. The majority of samples were collected from the service sector (n=464/997; 46.5%) and retailers (n=269/997; 27.0%).

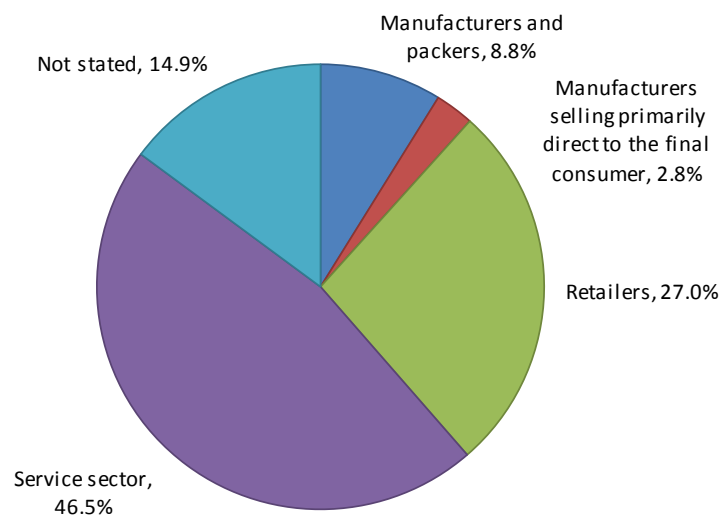


Figure 1: Percentage of total samples collected (n=997) from each food chain stage

Sample type

A variety of RTE cakes, pastries and desserts with high-risk fillings or toppings and/or containing raw or lightly cooked egg were assessed for their microbiological safety during the current survey (Figure 2). A large proportion of samples collected contained fresh dairy cream (n=297/997; 29.8%) or soft cheese (n=184/997; 18.5%) as a topping or filling. Of the samples collected, 7.7% (n=77/997) were stated to contain raw or lightly cooked egg.

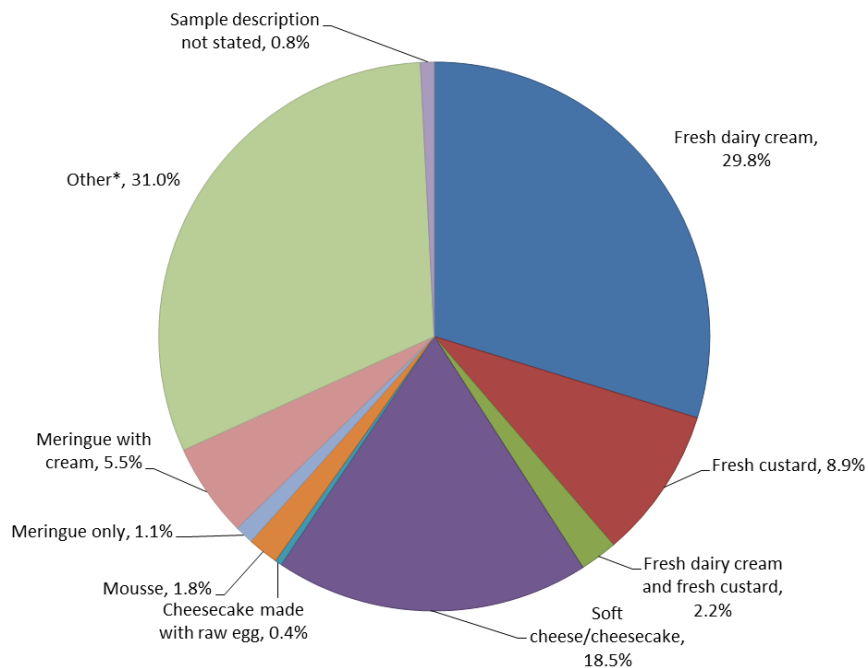


Figure 2: Description of sample types (n=997) which were stated to contain either a high-risk filling or topping and/or raw or lightly cooked egg. *Other includes any sample type that did not give a clear description as to whether it contained a high-risk filling or topping or raw/lightly cooked egg. Examples include doughnuts, chocolate éclairs, pastries, sponge, fruit tarts and tiramisu.

Air temperature of the storage or display unit

The air temperature of the storage or display unit was measured at the time of collection and recorded on the NSSF in the case of 76.1% (759/997) of the samples collected. Table 3 presents a summary of the overall microbiological quality of these samples at the different temperature ranges recorded. Maintenance of the cold chain is a requirement of Commission Regulation (EC) No. 852/2004. However, limited periods outside temperature control are permitted to accommodate the practicalities of handling food during preparation, transport, storage, display and service provided that it does not result in a risk to health. In Ireland, the hygiene requirements for catering and food retail businesses are set out in two Irish Standards certified by the National Standards Authority of Ireland (NSAI). Both I.S. 340:2007 Hygiene in Catering and I.S. 341:2007 Hygiene in Food Retailing and Wholesaling state that the temperature of chilled foods should be maintained at 0 °C to 5 °C and for frozen foods at ≤ -18 °C (NSAI, 2007a; 2007b).

The results presented in Table 3 show that one unsatisfactory sample was displayed in a storage unit with recorded temperatures within the required limit. This was a sample of fruit trifle stored or displayed at 4 °C which had presumptive *B. cereus* counts of 1×10^4 cfu/g. It is interesting to note that three further unsatisfactory samples and two unacceptable/potentially hazardous samples were in storage/display units with recorded temperatures above

the required limit, ranging from 5.1 °C to 10 °C. The unsatisfactory samples were a sample described as “cream added on premises” which was stored or displayed at 6.3 °C with presumptive *B. cereus* counts of 2.1×10^4 cfu/g; a fresh cream éclair stored at 5.7 °C with 2×10^3 cfu/g coagulase-positive staphylococci; and an Oreo cheesecake containing soft cheese stored at 5.2 °C with 1.8×10^3 cfu/g coagulase-positive staphylococci. The unacceptable/potentially hazardous samples were a banoffee pie stored at 10 °C with 1×10^5 cfu/g presumptive *B. cereus* and a fresh cream éclair stored at 5.7 °C with 5.7×10^5 cfu/g coagulase-positive staphylococci.

Table 3. Microbiological quality (*Salmonella*, *L. monocytogenes*, *Bacillus cereus* and coagulase-positive staphylococci) of RTE cakes, pastries and desserts with high-risk fillings according to the temperature range they were displayed or stored at during sampling

Temperature range (°C)	Average temperature (°C)	Total no. of samples	Overall microbiological quality of sample No. of samples (%)			
			Satisfactory	Acceptable	Unsatisfactory	Unacceptable/ potentially hazardous
-28 to -1	-13.9	41	41 (100%)	0	0	0
0 to 5	3.3	486	476 (97.9%)	9 (1.9%)	1 (0.2%)	0
5.1 to 10	6.3	184	176 (95.7%)	3 (1.6%)	3 (1.6%)	2 (1.1%)
10.1 to 15	10.4	25	24 (96%)	1 (4%)	0	0
15.1 to 21.1	17.5	23	22 (95.7%)	1 (4.3%)	0	0
Not stated	–	238	232 (97.5%)	4 (1.7%)	2 (0.8%)	0
Total		997	971 (97.4%)	18 (1.8%)	6 (0.6%)	2 (0.2%)

Information collected on survey questionnaire

EHOs were asked to complete an online survey questionnaire (Appendix 2) to provide additional information about the sample that would not be captured on the NSSF. A survey questionnaire was returned for 867 of 997 samples collected, giving an overall response rate of 87%. The remainder of this section will discuss the questionnaire results.

Products containing raw egg

Hen eggs and duck eggs can contain *Salmonella*. RTE foods made with raw egg that do not receive a cooking step sufficient to kill *Salmonella*, e.g. raw egg-based desserts such as homemade ice cream and tiramisu, potentially represent a risk to the consumer if *Salmonella* is present in the eggs. All those who completed the online survey questionnaire gave information on whether the product contained raw egg where the manufacturing risk was not sufficient to eliminate the *Salmonella* risk (Table 5). Those who responded “Yes” to this question were asked to provide further information on whether the eggs used were approved by the Bord Bia Quality Assurance Scheme or similar, e.g. British Lion. Producing hen eggs under the Bord Bia Quality Assurance Scheme or an equivalent scheme in another EU Member State does not eliminate the *Salmonella* risk but does reduce the risk of *Salmonella* being present in the eggs, due to strict controls and production practices. For the samples declared to contain raw egg, 58.4% (45/77) were manufactured using eggs that were part of the Bord Bia Quality Assurance Scheme and 1.3% (1/77) with organically produced eggs certified by the Organic Trust. Respondents to this question stated “Don’t



know” for 27.3% samples (21/77) or left the response blank for 9.1% samples (7/77), and thus the number of foods containing raw or lightly cooked egg tested in the current survey which were manufactured using eggs approved by the Bord Bia Quality Assurance Scheme or other equivalent schemes such as British Lion could be higher in reality.

The Bord Bia Quality Assurance Scheme is a voluntary standard that sets out the requirements for best practice in the production of eggs at farm level with a view to achieving continual improvement in production standards. The scheme conveys, through the use of a logo, to both retailer and consumer that eggs are produced and packed to a standard that reduces the risk of contamination with *Salmonella*. The results of the current study are a positive indication of the microbiological quality of raw eggs used in the manufacture of minimally cooked RTE foods in Ireland. Qualitative exposure assessments estimate a low probability and level of *Salmonella* contamination in eggs produced in both the Republic of Ireland and Northern Ireland (Murchie *et al.*, 2008). Kelly *et al.* (2009) used a statistical model to estimate the probability of serving a food manufactured with eggs originating on the island of Ireland which was contaminated with *Salmonella* and found there was a 90% chance of contamination levels between 0.0043% and 0.038%. A study by Murchie *et al.* (2007) of 300,000 grade A eggs produced for retail sale in the island of Ireland yielded only two positive samples, with *Salmonella* Infantis and Montevideo isolated from shells. *Salmonella* was not detected in any of the egg contents tested. The study concluded that hen shell eggs produced in the Republic of Ireland under the Bord Bia Egg Quality Assurance Scheme, and in Northern Ireland under the British Lion Quality Code of Practice, are unlikely to be a source of human salmonellosis. A 2003 National Survey carried out by the FSAI to investigate the bacteriological safety of eggs produced under the Bord Bia Egg Quality Assurance Scheme found that *Salmonella* spp. was not detected in any of 1,169 samples tested (each sample comprised six eggs) (FSAI, 2003).

Storage temperature of samples at time of collection

Question 9 on the survey questionnaire asked whether the sample was displayed or stored at ambient temperatures at time of collection. In response to this question, 95.6% (829/867) of samples were stated not stored at ambient temperatures at time of collection (Table 4). Of the 27 samples which were stored at ambient temperature, 25.9% (7/27) were identified as having a time limit for display set by the food business operator (Table 5). Of these, 18.5% (5/27) complied with the time limits recommended by I.S. 340:2007 (NSAI, 2007a) as best practice for display of chilled foods at ambient temperatures.

Table 4. Summary of responses to selected questions in the survey questionnaire

Survey question	Yes	No	Don't know
Q 4: Was this food manufactured in the establishment where the sample was collected?	520	343	4
Q 6: Is the sample one which contains raw egg and for which the manufacturing process is not sufficient to eliminate the <i>Salmonella</i> risk?	77	755	35
Q 7: Were the eggs used approved by the Bord Bia Quality Assurance Scheme or similar?	46	3	21
Q 9: When you collected the sample, was it displayed or stored at ambient temperature?	27	829	11
Q 10: Does the food business operator set a limit for the length of time this product can be displayed at ambient temperature?	9	15	3



Table 5. Limit for length of time products could be displayed at ambient temperature as set by food business operator

Product description	Temperature of display unit (°C)	Time limit	Compliance with best practice ^a
Custard tarts (pastel de nata)	20	24 hours	No
Danish vanilla crème (vanilla-flavoured cream filling)	17.6	10 hours	No
Cream doughnut	12.9	2 hours	Yes
Custard and cream slice	12.9	2 hours	Yes
Éclair	12.9	2 hours	Yes
Lemon meringue pie	21.1	1.5 hours	Yes
Strawberry cheesecake	20	4 hours	Yes

^a I.S. 340:2007 (NSAI, 2007a) recommends that chilled food held at >5 °C for between 2 and 4 hours, should be used immediately or discarded, and chilled food held at >5 °C for >4 hours should be discarded.

Conclusions

- The results from this survey show that in general the overall microbiological quality of RTE cakes, pastries and desserts with high-risk fillings is satisfactory.
- The sample with unsatisfactory or unacceptable/potentially hazardous levels of microbial contamination contained high-risk fillings of fresh dairy cream, custard or soft cheese.
- No issues were identified with samples containing raw or lightly cooked egg.
- The storage/display temperature for three unsatisfactory and two unacceptable/potentially hazardous samples was recorded as >5 °C.
- For a small number of samples, food businesses were found to have set periods of time for storage of chilled products in display at ambient temperatures that are much longer than best practice recommendations, and this could result in unsafe product due to the potential for bacterial growth.

Recommendations

- To ensure that good microbiological quality of RTE cakes containing high-risk fillings such as fresh dairy cream or soft cheese is maintained, good food hygiene is essential during the manufacturing process, in addition to storage or display in refrigeration units that do not exceed the maximum chilled temperature of 5 °C or storage at ambient temperature for a maximum time limit of four hours.
- FBOs should be aware that sometimes hen eggs and duck eggs can contain *Salmonella*. Therefore, RTE cakes, pastries and desserts made with raw or lightly cooked egg are a potential risk to the consumer. To control the risk, FBOs are advised to either use pasteurised egg or to source eggs produced under the Bord Bia Quality Assurance Scheme or an equivalent scheme, as the strict *Salmonella* controls reduce the level of risk of *Salmonella* being present.

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APPENDIX 1: Selection of outbreaks associated with cakes, pastries and desserts containing high-risk fillings

Year	Country	Vehicle	Causative agent	No. cases	Suspected reason for outbreak	Reference
2016	United States	Flour	Shiga toxin-producing <i>Escherichia coli</i> (STEC) O121 and O26	63	Epidemiological, laboratory, and traceback evidence indicated that flour produced at a General Mills facility was the likely source of this outbreak. Those who became ill reported either using the flour in the week before they became ill or eating or tasting raw homemade dough or batter. Three children who were ill reported eating or playing with raw dough at restaurants. Flour linked to this STEC outbreak was used as an ingredient in three cake mix products from a well-known brand. The cake mixes were included in a voluntary recall since they might include the contaminated flour but were not linked to any illnesses.	CDC, 2016 FDA, 2016
2013	Germany	Homemade ice cream	Staphylococcal enterotoxins	13	Coagulase-positive staphylococci were enumerated in varying numbers from all five varieties of homemade ice cream freshly produced at a hotel and served at a christening party. <i>S. aureus</i> isolates cultured from four ice cream varieties were enterotoxigenic and a non-enterotoxigenic isolate was cultured in the fifth. Staphylococcal enterotoxin was detected in three of the five different types of ice cream.	(Fetsch <i>et al.</i> , 2014)
2012	USA	Buffet dessert	<i>E. coli</i> O111:NM	56	Epidemiological evidence suggested the outbreak resulted from cross-contamination of restaurant food from food preparation equipment or surfaces, or from an unidentified infected food handler.	(Bradley <i>et al.</i> , 2012)
2011	Poland	Angel cake	<i>Salmonella</i> Enteritidis	16	Home-produced raw egg used in the desserts, as well as possible cross-contamination in home kitchen. The chicken's coop was next to birding pigeons, an environmental reservoir of <i>Salmonella</i> .	(Zielicka-Hardy <i>et al.</i> , 2012)



Survey of the microbiological safety of ready-to-eat cakes, pastries and desserts with high-risk fillings (14NS1)

Year	Country	Vehicle	Causative agent	No. cases	Suspected reason for outbreak	Reference
2011	Ireland, The Netherlands, Norway, USA and Canada	Milk tart or egg dish served on flight	<i>Salmonella</i> Heidelberg	18	Milk tart or egg dish served on board a flight from Tanzania. Possible contamination at production source in Tanzania, as <i>S. Heidelberg</i> is a common serovar in East Africa.	(Rebolledo <i>et al.</i> , 2014)
2009	Australia	Buffet dessert	<i>Salmonella</i> Typhimurium	20	Raw undercooked shell egg in dessert was thought to be the source of contamination. However, no environmental evidence was obtained.	(Reynolds <i>et al.</i> , 2010)
2007	Germany	Various cream cakes	<i>Salmonella</i> Enteritidis	111	Cake containing non-heated egg components was left at ambient temperature for a number of hours, resulting in an escalated level of contamination.	(Frank <i>et al.</i> , 2007)
2007	Belgium	Ice cream	<i>E. coli</i> O145 <i>E. coli</i> O26	3	Ice cream was made on-farm using pasteurised milk, but most likely contaminated by one of the food handlers who was not properly trained or instructed, and who also worked with the animals.	(Schrijver <i>et al.</i> , 2008)
2007	Singapore	Cream cakes	<i>Salmonella</i> Enteritidis	216	Butter cream was made using raw egg whites. Pooled egg whites were held at room temperature. Butter cream was prepared in bulk and held at room temperature over a two-day period. Cross-contamination could also have occurred due to poor segregation of semi-processed and RTE foods; in addition, utensils and work surfaces were not cleaned thoroughly and regularly.	(Suhana <i>et al.</i> , 2011)
2007	Germany	Rice pudding	<i>Bacillus cereus</i> emetic toxin	65	Improper disposal of leftovers and inadequate cleaning of serving pots between uses may have allowed <i>Bacillus</i> spores to germinate and produce toxin in the commercially produced rice pudding.	(Kamga-Wambo <i>et al.</i> , 2011)
2006	England	Tiramisu	<i>Salmonella</i> Enteritidis	15	The tiramisu was made using raw shell eggs.	(Calvert <i>et al.</i> , 2007)
2005	USA	Cheesecake	<i>Bacillus cereus</i>	5	Cheesecake held at improper temperature for too long either before or after cooking, thus allowing <i>B. cereus</i> spores to germinate and produce toxin.	(Department of Health Florida, 2005)



Survey of the microbiological safety of ready-to-eat cakes, pastries and desserts with high-risk fillings (14NS1)

Year	Country	Vehicle	Causative agent	No. cases	Suspected reason for outbreak	Reference
2004	Japan	Dessert buns	<i>Salmonella</i> Enteritidis	163	Cross-contamination in factory due to inadequate cleaning of filling machine. Possible inadequate heating of dessert buns after they were produced.	(Matsui <i>et al.</i> , 2004)
2002	Spain	Hard pastry with vanilla cream (coca de crema)	<i>Salmonella</i> Enteritidis	1,435	Poor food handling practices occurred because manufacturer exceeded its safe food production capacity to meet demand for the pastry at a festival. Although the filling was made with pasteurised egg, cross-contamination likely occurred because the filling was cooled on the same surface used to make the dough, which was prepared with raw shell eggs. Poor temperature control is believed to have contributed to the high numbers of <i>Salmonella</i> (10^7 cfu/ml) found in samples of the product.	(Camps <i>et al.</i> , 2005)
2001	Australia	Mango pudding dessert	<i>Salmonella</i> Typhimurium	19	A food handler was the sole employee making the pudding while ill; in addition, poor hygiene practices facilitated transmission such as lack of hand washing and non-separation of raw and cooked foods.	(Hundy and Cameron, 2002)
2000	Australia	Mock ice cream dessert	<i>Salmonella</i> Typhimurium	53	The dessert contained both uncooked and lightly cooked shell eggs. The frozen (mock ice cream) base contained uncooked egg yolks. The meringue topping contained egg whites that were only lightly cooked in order to brown the top.	(Sarna <i>et al.</i> , 2002)
1998	Australia	Custard cakes	<i>Salmonella</i> Typhimurium	54	Poor handling and refrigeration practices during preparation of custard and cakes.	(Ward <i>et al.</i> , 2002)
1998	England	Chocolate mousse	<i>Salmonella</i> Enteritidis	54	Cross-contamination via mixing bowl that was not properly washed after preparing cake mix that contained raw shell eggs.	(Linnane <i>et al.</i> , 2002)
1998	Italy	Iced cake	<i>Salmonella</i> Enteritidis	36	Raw egg whites used in cake icing which was left at room temperature on warm day for four hours during a banquet.	(D'Argenio <i>et al.</i> , 1999)



Survey of the microbiological safety of ready-to-eat cakes, pastries and desserts with high-risk fillings (14NS1)

Year	Country	Vehicle	Causative agent	No. cases	Suspected reason for outbreak	Reference
1997	Scotland	Cream-filled cakes	<i>E. coli</i> O157:H-	37	Cross-contamination either between unpasteurised milk and pasteurised cream stored together in a fridge or at some point during cake preparation.	(O'Brien <i>et al.</i> , 2001)
1996	Ireland	Chocolate mousse cake	<i>Salmonella</i> Enteritidis	65	Chocolate mousse cake made with raw shell eggs by bakery and supplied to a hospital. In addition, due to insufficient cold storage facilities at the hospital, desserts were stored for long periods at room temperature.	(Grein <i>et al.</i> , 1997)
1996	Ireland	Strawberry mousse cake	<i>Salmonella</i> Enteritidis	7	A second <i>S. Enteritidis</i> outbreak was linked to consumption of strawberry mousse cake produced by the bakery detailed above. The same batch of raw shell eggs was used for manufacture of both the chocolate and strawberry mousse cakes.	(Grein <i>et al.</i> , 1997)
1996	Italy	Tiramisu	<i>Clostridium</i> <i>Botulinum</i>	8	Possible lapse in pasteurisation control at processing plant, although no supporting evidence. All home-prepared desserts containing mascarpone were left at ambient temperature for prolonged periods of time.	(Aureli <i>et al.</i> , 2000)
1994	Brazil	Cream cake	<i>Staphylococcus</i> Enterotoxin A	12	A food handler with a visible skin condition prepared an unusually large cake with insufficient cooking time for the size of cake. It was left at ambient temperature to cool for a number of hours.	(Pereira <i>et al.</i> , 1994)
1992	Wales	Custard slices	<i>Salmonella</i> Enteritidis	32	Cross-contamination during preparation of the cold custard mix.	(Evans <i>et al.</i> , 1996)
1992	Wales	Fresh cream cakes	<i>Salmonella</i> Enteritidis	22	Inadequate cleaning and disinfection of nozzles for piping cream.	(Evans <i>et al.</i> , 1996)
1988	England	Custard slices and trifles	<i>Salmonella</i> Enteritidis	27	Outbreak occurred three weeks after bakery changed its recipe for trifles and custard slices to one including fresh shell eggs. Custard slices were held at ambient temperature during storage and transport.	(Barnes and Edwards, 1992)
1984	England	Vanilla slices	<i>Staphylococcus aureus</i>	36	Prepared vanilla slices were left at room temperature during exceptionally hot weather for >24 hours. One	(Fenton <i>et al.</i> , 1984)



Survey of the microbiological safety of ready-to-eat cakes, pastries and desserts with high-risk fillings (14NS1)

Year	Country	Vehicle	Causative agent	No. cases	Suspected reason for outbreak	Reference
			Enterotoxin A		bakery worker had eczematous lesion on hand from which <i>S. aureus</i> was grown (but a different strain).	
1983	USA	Cream-filled pastries	<i>Staphylococcus aureus</i>	215	The pastry was prepared in large quantities in several steps by several food handlers, providing the opportunity for staphylococci to be introduced into the pastry and given adequate time to grow at warm temperatures and produce enterotoxin.	(Waterman <i>et al.</i> , 1987)



APPENDIX 2: Survey questionnaire

Please complete on Safetynet by 15 August 2014. Hard copies cannot be accepted. Log on at <https://safetynet.fsai.ie/>. Click 'Useful Links' at top. Select 'National Survey Questionnaires'. Click 'View'. Click on link for 14NS1 survey. Password is: **14NS1**

1. EHO's name _____
2. EHO's sample reference number _____
3. Laboratory's reference number (see lab report) _____
4. Was this food manufactured in the establishment where the sample was collected?
Yes (Go to Q6) No (Go to Q5) Don't know (Go to Q6)
5. Manufacturer's contact details (if different to the food business operator where the sample was collected)
Name: _____
Address: _____
Phone: _____
6. Is the sample one which contains raw egg and for which the manufacturing process is not sufficient to eliminate the *Salmonella* risk? (Examples include: icings containing raw egg, tiramisu, chocolate mousse, ice cream containing raw egg, soft meringue, etc.)
Yes (Go to Q7) No (Go to Q9) Don't know (Go to Q9)
7. Were the eggs used approved by the Bord Bia Quality Assurance Scheme or similar, e.g. British Lion?
Yes (Go to Q8) No (Go to Q9) Don't know (Go to Q9)
8. Name of egg quality assurance scheme:
Bord Bia British Lion Other Specify _____
9. When you collected the sample, was it displayed or stored at ambient temperature?
Note: the actual temperature you measured must be recorded on the National Sample Submission Form
Yes (Go to Q10) No End of survey, thank you
10. Does the food business operator set a limit for the length of time this product can be displayed at ambient temperature?
Yes (Go to Q11) No End of survey, thank you Don't know End of survey, thank you
11. What is the time limit set by the food business operator? _____

End of survey, thank you





The Exchange,
George's Dock, IFSC,
Dublin 1, D01 P2V6.

Advice Line: 1890 336677
Telephone: +353 1 817 1300
Email: info@fsai.ie
Website: www.fsai.ie