ACT HEALTH PROTECTION SERVICE

MICROBIOLOGICAL QUALITY OF FRIED ICE CREAM JANUARY – JUNE 2016

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EXECUTIVE SUMMARY

Fried ice cream is a popular dessert often served at Asian style restaurants. As the frying process in the production of fried ice cream is designed to be performed quickly, there is a risk that it is insufficient to destroy the possible *Salmonella* present in the raw egg coating of the ice cream. There have been a number of *Salmonella* spp outbreaks attributed to the consumption of fried ice cream nationally in recent years.

This survey was conducted between January and June 2016. During this period 182 samples were collected randomly from twenty seven ACT retail outlets by Health Protection Service (HPS) Public Health Officers (PHOs) and processed by the ACT Government Analytical Laboratory. All 182 original samples were tested for the hygiene indicator *E. coli* and the food pathogen *Salmonella* spp.

Salmonella spp. was not detected in any of the 182 samples tested. Twelve samples (6.6%) were found to have marginal levels of *E.coli* present ranging from 3cfu/g to 53cfu/g across four retail outlets. The presence of *E.coli* in some of the fried ice cream samples suggests contamination of faecal origin from poor hygienic practices such as cross contamination from food contact surfaces, raw foods or food handlers. Corrective actions, re-sampling and education was undertaken by a graduated and proportionate response.

In conclusion, this survey of different outlets suggests that the microbiological quality of fried ice cream in the ACT is generally good. Due to the number of outbreaks associated with fried ice cream in Australia it would be prudent to conduct this survey again in the future to ensure food handling practises remain appropriate.

BACKGROUND

Fried ice cream is a popular dessert often served at Asian style restaurants. It consists of a ball of ice cream that is usually coated in crumbs then flash fried in order to crisp and set the outside. This cooking step is brief as the objective is to not melt the ice cream or to darken the coating making the food unappetising and undesirable. In order for the crumb coating to stick to the ice cream it is often first dipped in raw egg, then into crumbs and then frozen. This procedure is sometimes repeated to create a thicker crumb more likely to withstand the frying process. The crumb coating itself can be made from bread crumbs, thin cake slices or crushed corn flakes and may also include desiccated coconut.

Fried ice cream is categorised as a Ready-to-Eat (RTE) food according to the Australia and New Zealand Food Standard (FSANZ) Guidelines for the Microbiological Examination of Ready-to-Eat foods (FSANZ RTE Guidelines) 2001. RTE food is "food that is ordinarily consumed in the same state as that in which it is sold or distributed and does not include nuts in the shell and whole, raw fruits and vegetables that are intended for hulling, peeling or washing by the consumer."

Salmonella spp has been known to be present on the surface of eggs and improper handling can lead to raw egg products becoming contaminated. As the frying process in the production of fried ice cream is designed to be performed quickly, there is a risk that it is insufficient to destroy the Salmonella present in the raw egg coating of the ice cream. Therefore, this food type is a high-risk product, as it has the potential to cause food poisoning if it is not prepared correctly.

There have been a number of *Salmonella* spp outbreaks attributed to the consumption of fried ice cream nationally in recent years as seen in Table 1.

Table 1: Outbreaks of Foodborne or suspected foodborne disease attributed to Fried ice cream consumption and Reported by OzFoodNet January 2010- June 2014

Year	Month	State	Vehicle	Agent	Number Affected	Setting
2013	May	NSW	Fried ice cream	*Salmonella* Typhimurium	7	Restaurant
2012	Sept	SA	Fried ice cream	*Salmonella* Typhimurium	11	Restaurant
2012	May	NSW	Fried ice cream	*Salmonella* Typhimurium	12	Restaurant
2012	Apr	NSW	Fried ice cream	*Salmonella* Typhimurium	5	Restaurant
2012	Mar	QLD	Fried ice cream	*Salmonella* Typhimurium	5	Restaurant
2012	Feb	NSW	Fried ice cream	*Salmonella* Typhimurium	9	Restaurant
2012	Jan	NSW	Fried ice cream	*Salmonella* Typhimurium	14	Restaurant
2011	Apr	VIC	Fried ice cream	*Salmonella* Typhimurium	15	Restaurant

Year	Month	State	Vehicle	Agent	Number Affected	Setting
2011	Feb	NSW	Fried ice cream	*Salmonella* Typhimurium	6	Restaurant
2010	Aug	NSW	Fried ice cream	*Salmonella* Typhimurium	14	Restaurant

Prior to this survey, this food type had not been specifically covered by previous monitoring surveys in the Australian Capital Territory (ACT).

This survey set-out to determine the bacteriological status of fried ice cream available in the ACT market, focusing on pre-prepared fried ice cream typically found at Asian style restaurants. Both cooked and uncooked frozen samples were to be tested. Although as Table 1 shows there were no outbreaks attributed to fried ice cream consumption in the ACT, cases of salmonellosis continue to increase in the ACT in recent years (Australian Government Department of Health, National Notifiable Disease surveillance System). This survey therefore examined fried ice cream as a possible contributing factor in the ongoing increase in cases of salmonellosis in the ACT.

OBJECTIVE

The objective of the fried ice cream survey was:

- To assess the microbiological quality of RTE fried ice cream to the Australia and New Zealand Food Standard (FSANZ) Guidelines for the Microbiological Examination of Ready-to-Eat foods (FSANZ RTE Guidelines) 2001.

STANDARDS

The FSANZ RTE Guidelines identify four categories of microbiological quality ranging from satisfactory to potentially hazardous. Table 2 is an excerpt of FSANZ RTE guidelines and details the recommended guideline values. Table 2 not only reflects both the high level of microbiological quality that is achievable for RTE foods in Australia and New Zealand but also indicates the level of contamination that is considered to be a significant risk to public health.

Table 2

Test	Microbiological Quality (colony forming units per gram (CFU/g))			
	Satisfactory	**Marginal**	**Unsatisfactory**	**Potentially Hazardous**
Indicators				
Escherichia coli (E. coli)	<3	3-100	>100	**
Pathogens				
Salmonella spp.	not detected in 25g			detected

NOTE:
** Pathogenic strains of *E. coli* should be absent.

SURVEY

This survey was conducted between January and June 2016. During this period 182 samples were collected randomly from twenty seven ACT retail outlets by Health Protection Service (HPS) Public Health Officers (PHOs) and processed by the ACT Government Analytical Laboratory. Where possible, a mix of 5-10 cooked and uncooked frozen samples were collected from each premises.

All 182 original samples were tested for the hygiene indicator *E. coli* and the food pathogen *Salmonella spp*.

When the HPS identifies a non-compliance issue in a food business, corrective actions are addressed through a graduated and proportionate response. Unsatisfactory results are re-sampled. Marginal results are also re-sampled; this is dependent on resources as these foods are still considered compliant. Re-samples can be taken as statutory samples, as these can be later used as evidence for the purpose of prosecution if required.

During this survey six statutory re-samples were taken from two different retail outlets due to marginal *E.coli* results. These samples were only tested for the hygiene indicator *E. coli.*

MICROBIOLOGICAL METHOD OF ANALYSIS

Samples were tested for the presence of:

- *Salmonella* species: method modified from AS 5013.10 – 2009
- *E. coli* based: method modified from ISO 16649.2 -2001

***E. coli* enumeration:** The sample preparation for *E. coli* consisted of 25g of sample being homogenised with 225mL of 0.1% peptone saline diluent. Pour plates of TBX agar using 1ml of 10^{-1} dilution were prepared in triplicate and incubated at 37ºC/4h followed by 44ºC/20h. *E. coli* colonies appear blue/green after incubation.

***Salmonella* spp. detection:** 25g of sample was weighed out aseptically and homogenised with 225mL buffered peptone water (non-selective enrichment) and incubated at 37°C/24. Aliquots were then transferred into Brain Heart Infusion broth (BHI) and incubated for 3 hours. DNA was extracted from the BHI enrichment. This was screened for the presence of *Salmonella* spp. using a BAX cyber green Polymerase Chain Reaction (PCR).

Confirmation tests were not performed as all the samples screened negative.

RESULTS / DISCUSSION

E. coli

Altogether 182 survey samples were tested for *E. coli*, of which 17 were frozen uncooked samples. Twelve samples (6.6%) were found to have marginal levels of *E.coli* present ranging from 3cfu/g to 53cfu/g across four retail outlets. All of these samples were from cooked fried ice cream not from frozen uncooked samples. The remaining samples (93.4%) returned a satisfactory level of *E.coli* (<3cfu/g). Raw results are shown in Appendix A.

The presence of *E. coli* in RTE foods is undesirable. Its presence in food indicates that poor sanitation and unhygienic conditions has led to the contamination of food or that food has been inadequately heat treated.

Where samples had received marginal results follow-up inspections were undertaken and education sessions for staff were provided on the importance of proper hand washing. Literature was also provided in the form of posters.

Two premises were of particular concern.
From one retail outlet four of the five initial samples analysed by the laboratory returned positive results for *E.coli.* The highest count reported was 17cfu/g. This establishment was re-inspected and two statutory samples taken. One of the two statutory samples had a positive result of 3 cfu/g. PHO's re-visited the establishment and discussed sanitising procedures with the kitchen staff as well as providing a hand washing tutorial. Raw resample results are shown in Appendix B.

A second retail outlet returned all five initial samples positive for *E.coli* with the highest count reaching 53cfu/g. This premise was re-inspected and an education session was provided, at the same time two statutory samples were taken. One of the two statutory samples contained marginal levels of *E.coli* and again the premise was reinspected and education provided. A third set of two statutory samples were found to have satisfactory levels of <3 cfu/g of *E.coli*.

***Salmonella* spp.**

Salmonella spp. was not detected in any of the 182 samples tested, including the 17 frozen uncooked samples. RTE foods should be free of *Salmonella* spp. as consumption of food containing this pathogen may result in food borne illness.

CONCLUSION

This survey of different outlets suggests that the microbiological quality of fried ice cream in the ACT is generally good. Raw results of analysis are attached at Appendices A and B.

The presence of *E.coli* in some of the fried ice cream samples suggests contamination of faecal origin from poor hygienic practices such as cross contamination from food contact surfaces, raw foods or food handlers. As all of these samples were fried samples not uncooked frozen samples it also indicates that the frying process is potentially inadequate to eliminate pathogens such as *Salmonella* spp. if they were present in the egg coating.

Where *E.coli* was found to be present in fried ice cream samples from an establishment education was provided to the food handlers on hand hygiene.

Due to the number of outbreaks associated with fried ice cream in Australia it would be prudent to conduct this survey again to ensure food handling practises remain appropriate. Additional surveys can also serve as an opportunity for education of food handlers in terms of hand hygiene as well as the risks associated with and alternatives to raw egg use in fried ice cream preparation. Food safety guidelines for the preparation of raw egg products have been written by the NSW Government Department of Primary Industries Food Authority which are a useful educational resource.

BIBLIOGRAPHY

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Appendix A: Raw Data

Assessment: S = satisfactory, M = marginal, U = unsatisfactory, PH= Potentially Hazardous.
All fried ice cream samples were cooked unless otherwise stated.

Sample Description	Sample number from each premises	*Salmonella* spp. in food Presence / Absence in 25g	*E.coli* count in food cfu per gram	*Assessment*
Fried Ice cream	1	Absent	17	M
Fried Ice cream	2	Absent	<3	S
Fried Ice cream	3	Absent	3	M
Fried Ice cream	4	Absent	3	M
Fried Ice cream	5	Absent	3	M
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	8	Absent	<3	S
Fried ice cream	9	Absent	<3	S
Fried ice cream	10	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Soy fried ice cream	6	Absent	<3	S
Soy fried ice cream	7	Absent	<3	S
Soy fried ice cream	8	Absent	<3	S
Soy fried ice cream	9	Absent	<3	S
Soy fried ice cream	10	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S

Sample Description	Sample number from each premises	*Salmonella* spp. in food Presence / Absence in 25g	*E.coli* count in food cfu per gram	*Assessment*
Fried ice cream	4	Absent	3	M
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream (Uncooked)	2	Absent	<3	S
Fried ice cream (Uncooked)	3	Absent	<3	S
Fried ice cream (Uncooked)	4	Absent	<3	S
Fried ice cream (Uncooked)	5	Absent	<3	S
Fried ice cream (Uncooked)	6	Absent	<3	S
Fried ice cream (Uncooked)	7	Absent	<3	S
Fried ice cream (Uncooked)	8	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S

Sample Description	Sample number from each premises	*Salmonella* spp. in food Presence / Absence in 25g	*E.coli* count in food cfu per gram	*Assessment*
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	8	Absent	<3	S
Fried ice cream (Uncooked)	1	Absent	<3	S
Fried ice cream (Uncooked)	2	Absent	<3	S
Fried ice cream (Uncooked)	3	Absent	<3	S
Fried ice cream (Uncooked)	4	Absent	<3	S
Fried ice cream (Uncooked)	1	Absent	<3	S
Fried ice cream (Uncooked)	2	Absent	<3	S
Fried ice cream (Uncooked)	3	Absent	<3	S
Fried ice cream (Uncooked)	4	Absent	<3	S
Fried ice cream (Uncooked)	5	Absent	<3	S
Fried ice cream (Uncooked)	6	Absent	<3	S
Fried ice cream	1	Absent	3	M
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	8	Absent	<3	S
Fried ice cream	9	Absent	<3	S
Fried ice cream	10	Absent	<3	S
Fried ice cream	11	Absent	<3	S

Sample Description	Sample number from each premises	*Salmonella* spp. in food Presence / Absence in 25g	*E.coli* count in food cfu per gram	*Assessment*
Fried ice cream	12	Absent	<3	S
Fried ice cream	13	Absent	<3	S
Fried ice cream	14	Absent	<3	S
Fried ice cream	15	Absent	<3	S
Fried ice cream	16	Absent	<3	S
Fried ice cream	17	Absent	<3	S
Fried ice cream	18	Absent	<3	S
Fried ice cream	19	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	8	Absent	<3	S
Fried ice cream	9	Absent	<3	S
Fried ice cream	10	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	8	Absent	<3	S
Fried ice cream	9	Absent	<3	S

Sample Description	Sample number from each premises	*Salmonella* spp. in food Presence / Absence in 25g	*E.coli* count in food cfu per gram	*Assessment*
Fried ice cream	10	Absent	<3	S
Fried ice cream	1	Absent	<3	S
Fried ice cream	1	Absent	7	M
Fried ice cream	2	Absent	17	M
Fried ice cream	3	Absent	7	M
Fried ice cream	4	Absent	53	M
Fried ice cream	5	Absent	10	M
Fried ice cream	6	Absent	10	M
Fried ice cream	1	Absent	<3	S
Fried ice cream	2	Absent	<3	S
Fried ice cream	3	Absent	<3	S
Fried ice cream	4	Absent	<3	S
Fried ice cream	5	Absent	<3	S
Fried ice cream	6	Absent	<3	S
Fried ice cream	7	Absent	<3	S
Fried ice cream	8	Absent	<3	S
Fried ice cream	9	Absent	<3	S
Fried ice cream	10	Absent	<3	S

Appendix B: Resample Raw Data

Assessment: S = satisfactory, M = marginal, U = unsatisfactory, PH= Potentially Hazardous. All fried ice cream samples were cooked unless otherwise stated.

Resample Description	Sample number from Each premises	*Salmonella* in food Presence / Absence in 25g	*E.coli* count in food cfu / g per gram	*Assessment*
Fried ice cream	1	Not tested	3	M
Fried ice cream	2	Not tested	<3	S
Fried ice cream	1	Not tested	17	M
Fried ice cream	2	Not tested	<3	S
Fried ice cream	1	Not tested	<3	S
Fried ice cream	2	Not tested	<3	S