MICROBIOLOGICAL QUALITY OF READY-TO-EAT FOODS

ACT HEALTH PROTECTION SERVICE

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Report prepared by
Radomir Krsteski and
Simon Rockliff

EXECUTIVE SUMMARY

Ready-to-Eat (RTE) food is food that is ordinarily consumed in the same condition in which it is sold or distributed. Sandwiches, rolls, stir-fries, baked goods as well as various other RTE foods are widely available in the Australian Capital Territory (ACT). The survey of RTE products was undertaken to determine the compliance of products available in the ACT market to Food Standards Australia New Zealand (FSANZ) Guidelines for the Microbiological Examination of RTE Foods 2001 (FSANZ RTE Guidelines).

This survey was conducted between July 2014 and June 2015. A total of 246 samples were collected from 50 different ACT retail outlets.

The samples were collected in such a manner as to cover a wide range of the available RTE food ranging from dips to grilled chicken. All of the samples were tested for the hygiene indicators Standard Plate Count and *Escherichia coli,* and the food pathogens coagulase positive *Staphylococci,* Salmonella species and *Listeria monocytogenes*. Foods containing pasta or rice were also tested for *Bacillus cereus*. A total of 1284 tests were performed for the initial surveyed samples.

Nine premises reported a marginal result for hygiene indicator *Escherichia coli* with none reporting unsatisfactory initial result. A total of 56 re-samples were collected from seven outlets. All of the 56 re-samples were due to marginal *Escherichia coli* results. There were no pathogens found in any of the samples tested. In conclusion, the results of this survey show a very high level of compliance with the FSANZ RTE Guidelines for the surveyed samples in the ACT.

BACKGROUND/OBJECTIVE

Ready-to-Eat (RTE) food is food that is ordinarily consumed in the same condition in which it is sold or distributed. RTE food does not include nuts in the shell and whole, raw fruits and vegetables that are intended for hulling, peeling or washing by the consumers.

Sandwiches, rolls, stir-fries, baked goods as well as various other RTE foods are widely available in the Australian Capital Territory (ACT) with approximately 280 different licensed outlets. Due to the diverse nature and popularity of these foods it was considered prudent to perform ongoing surveys on these products. The survey of RTE products was undertaken for three main reasons:

1. To determine the bacteriological status of ready-to-eat food products available on the ACT market.
2. To determine the compliance of these products to Food Standards Australia New Zealand (FSANZ) Guidelines for the Microbiological Examination of Ready-to-Eat (RTE) Foods 2001 (FSANZ RTE Guidelines).
3. To complement and focus audits of high-risk food producing establishments.

STANDARDS

The FSANZ RTE Guidelines identify four categories of microbiological quality ranging from satisfactory to potentially hazardous. Table 1 details the recommended guidelines. Table 1 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 1

Test	Microbiological Quality (colony forming units per gram(cfu/g))			
	Satisfactory (S)	Marginal (M)	Unsatisfactory (U)	Potentially Hazardous (PH)
Standard Plate Count (SPC)				
Level 1*	$<10^4$	$<10^5$	$\geq 10^5$	
Level 2*	$<10^6$	$<10^7$	$\geq 10^7$	
Level 3*	NA	NA	NA	
Indicators				
Escherichia coli (E.coli)	<3	3-100	>100	**
Pathogens				
Coagulase positive staphylococci (*Staph*)	$<10^2$	10^2-10^3	10^3-10^4	$\geq 10^4$ SET +ve
Bacillus cereus (B.cerues)	$<10^2$	10^2-10^3	10^3-10^4	$\geq 10^4$
Salmonella	not detected in 25g			detected
Listeria monocytogenes (L. monocytogenes)	not detected in 25g	detected but $<10^{2\,\#}$		$\geq 10^{2\,\#\#}$

NOTE:
*see below "Standard Plate Counts" for definition of level.

** Pathogenic strains of *E. coli* should be absent.
# Foods with a long shelf life stored under refrigeration should have no *L. monocytogenes* detected in 25g.
The detection of *L. monocytogenes* in ready-to-eat-foods prepared specifically for "at risk" population groups (the elderly, immuno-compromised and infants) should also be considered as potentially hazardous.
SET +ve: Staphylococcus enterotoxin positive.
NA – SPC testing not applicable. This applies to foods such as fresh fruits and vegetables (including salad vegetables), fermented foods and foods incorporating these (such as sandwiches and filled rolls).
Level 1 – applies to RTE foods in which all components of the food have been cooked in the manufacturing process/preparation of the final food product and, as such, microbial counts should be low i.e. fried chicken.
Level 2 – applies to RTE foods which contain some components which have been cooked and then further handled (stored, sliced or mixed) prior to preparation of the final food or where no cooking process has been used i.e. custard slice.
Level 3 – SPC not applicable. This applies to foods such as fresh fruits and vegetables (including salad vegetables), fermented foods and foods incorporating these (such as sandwiches and filled rolls). It would be expected that these foods would have an inherent high SPC because of the normal microbial flora present.
An examination of the microbiological quality of a food should not be based on SPC alone. The significance of high (unsatisfactory) SPC cannot truly be made without identifying the predominant microorganisms or other microbiological testing.

SURVEY

This survey was conducted between July 2014 and June 2015. A total of 246 samples were collected from 50 different ACT retail outlets. A total of 56 re-samples were also collected from seven outlets. The samples were randomly collected by the Public Health Officers (PHO) and processed by the Microbiology Unit of the Health Protection Service (HPS). The survey collected multiple samples from single outlets and in general outlets were only tested once.

The samples were collected in such a manner as to cover a wide range of the available RTE food ranging from dips to grilled chicken. All of the samples were tested for the hygiene indicators SPC and *E. coli,* and the food pathogens coagulase positive *Staphylococci,* Salmonella species and *L. monocytogenes*. Foods containing pasta or rice were also tested for *B. cereus*.

Where the HPS identifies non compliance issues in food businesses, corrective actions are addressed through a graduated and proportionate response. Unsatisfactory results, excluding those for SPC are re-sampled. Marginal results may be re-sampled; this is dependent on resources as these foods are still considered compliant. Unsatisfactory SPC results are not re-sampled unless pathogens are also isolated.

MICROBIOLOGICAL METHOD OF ANALYSIS

- *Salmonella* species AS 5013.10 – 2009 (modified).
- SPC AS 5013.5 – 2004.
- *B. cereus* AS 5013.2 – 2007.
- Coagulase positive *staphylococci* AS 5013.12.2 – 2004.
- *E. coli* ISO 16649.2 – 2001.
- *L. monocytogenes* AS 5013.24.1 – 2009 (modified).

The sample preparation for SPC, *E. coli,* coagulase positive *staphylococci* and *B. cereus* consisted of:

- 25g of sample being homogenised with 225mL of 0.1% peptone diluent
- subsequent serial dilutions were prepared for use in enumeration.

***B. cereus* enumeration:** Spread plates (using a 100µl of each dilution) on a solid selective medium containing egg yolk and mannitol (MYP agar) were prepared and incubated at 30 ºC for 48 hours. Typical large, pink colonies, with or without lecithinase action were counted and a proportion of the colonies confirmed by a haemolysis test and spore staining. *B. cereus* cells are rods 4-5 µm long and 1-1.5 µm wide and stain red. The cells contain black-stained lipid globules. The spores stain green, are ellipsoidal in shape, central to sub central in position, and do not swell the sporangium.

Coagulase positive *Staphylococci* enumeration: Pour plates (using 1.0 ml of each dilution) of Baird Parker medium with rabbit plasma fibrinogen added were prepared in duplicate and incubated at 37°C for 48 hours. Typical black colonies, surrounded by a halo of precipitation were counted.

***E. coli* enumeration:** Pour plates using 1.0 ml in each plate of Tryptone Bile X-Glucuronide (TBX) media were prepared and incubated at 37 ºC for 4 hours and then 44 ºC for 18-24 hours. Typical blue/green colonies were counted.

***Salmonella* detection:** 25g of sample was weighed out aseptically and homogenised with 225mL buffered peptone water (non-selective enrichment) and incubated at 37°C/16-20 hours. Aliquots were then transferred into Brain Heart Infusion broth (BHI) and incubated for 3 hours. DNA was extracted from 200uL of enriched BHI. This was screened for the presence of salmonella using a BAX cyber green Polymerase Chain Reaction (PCR) and a BAX Q7. No confirmation testing was performed as there were no samples that screened positive.

SPC: Pour plates (using a 1.0ml of each dilution or 0.1ml at the -6 dilution) of plate count agar where incubated at 30 ºC/72 hours. Plates from the dilution on which there are >15 and <300 colonies visible were counted. Counts outside this range were considered estimate counts only.

***L. monocytogenes* detection:** 25g of sample was weighed out aseptically and homogenised with 225mL half Fraser broth (selective enrichment) and incubated at 30°C/24 hours. Aliquots were then transferred into a single tube of Fraser broth incubated for 37°C/48 hours and MOPS BLEB broth incubated for 37°C/24 hours. DNA was extracted from 200uL of enriched MOPS BLEB broth. This was screened for the presence of *L. monocytogenes* using a BAX cyber green PCR and a BAX Q7. Confirmation testing was performed using the incubated Fraser broth tubes. A loopful of each positive sample was streaked out onto Oxford and Palcam agar and incubated for 37°C/48 hours. Up to ten typical colonies (appear in the form of green colonies about 1.5 to 2.0 mm in diameter, with a central depression and surrounded by a black halo) on Oxford agar and Palcam agar were streaked each onto a CAMP plate (Sheep blood agar) and incubated for 37°C/24 hours. Positive CAMP isolates are then inoculated in a Rhamnose and Xylose broths and incubated at 37°C for up to five days. A positive reaction usually occurs within 24 hours to 48 hours. *L. monocytogenes* is positive for Rhamnose (Yellow) and negative (Blue-green) for Xylose.

RESULTS

Test	Coagulase positive staphylococci (n=241)	*Listeria monocytogenes* (n=246)	*Salmonella sp* (n=246)	*E. coli* (n=246)	SPC (n=246)	*Bacillus cereus* (n=59)
Number of marginal samples	3	1	NA	9	3	8
Number of unsatisfactory samples	Nil	Nil	NA	Nil	3	Nil
Number of Potentially Hazardous samples	Nil	Nil	Nil	NA	NA	Nil

Detailed results are tabled in Appendix A.

DISCUSSION

SPC

Two hundred and forty six samples were tested for SPC. The results for all the samples ranged between <50 and 2.2 x 10^{10} cfu/g. A total of three samples were in the marginal range (1.2% of the total SPC tests) and a total of seven samples were in the unsatisfactory range (1.6% of the total SPC tests).

Sixty seven samples were assessed as being in the Level 1 category. The results for these products ranged from <50 to 7.1 x 10^{4} cfu/g. Two samples (2.9% of Level 1 category samples) were in the marginal category. No samples were in the unsatisfactory category.

Thirty nine samples were assessed as being in the level 2 category. The results for these products ranged from <50 to 5.1 x 10^{8} cfu/g. One sample was in the marginal category (2.5% of Level 2 category samples). Three samples (7.7% of Level 2 category samples) were in the unsatisfactory category: vegetable frittata, vanilla slice and another vanilla slice. High SPC for cooked products suggests that the handling or storage of these foods may have been less than optimal. No re-samples were taken of these foods as no pathogens or *E. coli* were detected at the time of testing.

A total 140 samples were assessed as applying to the Level 3 SPC category. The SPC test is not applicable to these products. The results for these products ranged from as low as <50 cfu/g to 2.2 x 10^{10} cfu/g.

E. coli

All samples (246) were tested for *E. coli*. The presence of *E. coli* in RTE foods is undesirable because it indicates that the food has possibly been prepared under poor hygienic conditions. Ideally *E. coli* should not be detected and as such a level of <3 cfu/g has been set for satisfactory samples. Two hundred and thirty seven (96.3%) of the samples tested in this survey had <3 cfu/g of *E. coli* and met the satisfactory criterion. There were nine (3.7%) samples in the marginal category. There were no samples in the unsatisfactory category. Six

of the marginal samples (see appendix A) were re-sampled from six premises and tested for *E. coli*. The re-samples from two of the six re-sampled premises reported marginal results for *E. coli*. Corrective action was advised and further re-samples collected from both premises and were tested for *E. coli* to verify the corrective action taken. One premises reported satisfactory results while the other reported unsatisfactory results. A thorough investigation was conducted on the premises that reported the unsatisfactory result and a further fifteen re-samples were collected on three different occasions (see appendix B) and found that the particular food that was implicated was grated carrot. The last two separate re-samples where satisfactory and confirmed that the issue had been resolved. The detection of *E. coli* in foods is not a direct indication that the food is unsafe rather it is an indication of potential problems involving the preparing and handling of foods.

Coagulase positive *Staphylococci*

Two hundred and forty one samples were tested for coagulase positive *Staphylococci,* five were not tested due to testing media availability. Three tested samples were reported as marginal (1.2 %) and 238 were reported as satisfactory (98.8%). No samples were reported as unsatisfactory. Two of the three marginal samples were re-sampled and tested. The re-samples reported satisfactory results.

Salmonella

Salmonella spp. was not detected in any of the 246 samples tested. RTE foods should be free of *Salmonella* as consumption of food containing this pathogen may result in food borne illness. All RTE foods are tested for the presence of *Salmonella* in 25g.

L. monocytogenes

The detection of *L. monocytogenes* in such foods indicates the food was inadequately prepared or the food was contaminated post preparation. The detection of higher levels ($>10^2$ cfu/g) of *L. monocytogenes* in RTE foods indicates a failure of food handling controls and is also considered a public health risk.

All RTE foods are tested for the presence of *L. monocytogenes* in 25g. If *L. monocytogenes* is detected, a PHO will inspect the premises and re-sample the food item if it is available. This re-sample will be tested semi-quantitatively to measure the level of *L. monocytogenes* in the food.

Two hundred and forty six samples were analysed for *L. monocytogenes*. One sample reported positive for *L. monocytogenes* (0.4%). There were no samples in the unsatisfactory category. The positive result was re-sampled and tested semi-quantitatively. All re-samples reported satisfactory results.

B. cereus (Tested for in RTE foods containing rice only)

Fifty nine samples containing rice or pasta were tested for *B. cereus.* No samples reported unsatisfactory results. Eight samples reported marginal results (13.6%). There were no samples in the unsatisfactory category. Follow-up action was taken for three marginal samples and re-samples were taken from these premises. The re-samples for two of the premises reported satisfactory results and one of the premises reported a borderline

marginal result (100cf/g) for one of the re-tested foods. No further follow up action was taken.

CONCLUSION

The microbiological quality of the RTE foods surveyed in the ACT is very good. Raw results of the analysis are attached at Appendix A. The raw results for re-sampled businesses are attached at Appendix B. The percentage of satisfactory samples in the SPC Level 1 category was very good and though the Level 2 category reported a 7.7% unsatisfactory rate. Three of the items were desserts which may indicate poor temperature control and/or handling.

The unsatisfactory re-sampled *E. coli* results from one of the premises may be attributed to a lapse in hygiene and/or proper food preparation related to a particular food item grated carrot. That premises in cooperation with HPS identified the cause and rectified the problem.

The overall results reported for pathogens were very good with no unsatisfactory results. In conclusion, the results of this survey show a very high level of compliance with the FSANZ RTE Guidelines.

BIBLIOGRAPHY

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Appendix A

Sample	Level	SPC	*E. coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample Reference
Tuna pasta salad	3	170000	<3	<50	Absent	Absent	<50	S	
Italian style potato salad	3	650000	<3	<50	Absent	Absent	NA	S	
Chicken pesto pasta salad	3	580000	<3	<50	Absent	Absent	<50	S	
Chicken mushroom	1	7600	<3	<50	Absent	Absent	<50	S	
Bolognese	1	71000*	<3	<50	Absent	Absent	<50	M#	
Chilli con carne	1	700*	<3	<50	Absent	Absent	NA	S	A
South west chicken salad	3	4600000*	<3	<50	Absent	Absent	NA	S	A
Falafel & couscous salad	3	760000000*	60*	<50	Absent	Absent	NA	M	A
Chicken & avocado salad	3	1700000*	<3	<50	Absent	Absent	NA	S	A
Pesto chicken & avocado salad	3	9500000*	<3	<50	Absent	Absent	NA	S	A
Chicken avocado sandwich	3	55000*	<3	<50	Absent	Absent	NA	S	
Tandoori salad sandwich	3	100000*	<3	<50	Absent	Absent	NA	S	
Egg & lettuce sandwich	3	85000*	<3	<50	Absent	Absent	NA	S	
Turkey salad sandwich	3	7200000*	<3	<50	Absent	Absent	NA	S	
Ham, cheese & salad wrap	3	21000000	<3	<50	Absent	Absent	NA	S	
Steak pie	1	200*	<3	<50	Absent	Absent	NA	S	
Quiche	1	200*	<3	<50	Absent	Absent	NA	S	
Chicken pie	1	150*	<3	<50	Absent	Absent	NA	S	
Fruit flan	3	26000000	<3	<50	Absent	Absent	NA	S	
Custard puff	2	4800000*	<3	<50	Absent	Absent	NA	M#	
Seaweed salad sushi	3	<50	<3	<50	Absent	Absent	<50	S	
Prawn sushi roll	3	1600	<3	<50	Absent	Absent	<50	S	
Chicken sushi roll	3	1200*	<3	<50	Absent	Absent	<50	S	
Tuna sushi roll	3	3800	<3	<50	Absent	Absent	<50	S	
Salmon sushi roll	3	15000	<3	<50	Absent	Absent	<50	S	
Dry fish	2	700*	<3	NP	Absent	Absent	NA	S	
Dry smoked fish	2	50*	<3	NP	Absent	Absent	NA	S	
Mixed sweets	1	1700	<3	NP	Absent	Absent	NA	S	
Mixed sweets	1	7000	<3	NP	Absent	Absent	NA	S	
Galub jamun	1	700*	<3	NA	Absent	Absent	NA	S	
Bacon, egg, tomato croissant	2	30000*	<3	<50	Absent	Absent	NA	S	
Ham, cheese, croissant	2	300*	<3	<50	Absent	Absent	NA	S	
Vanilla slice	2	510000000*	<3	<50	Absent	Absent	NA	U#	
Sausage roll	1	250*	<3	<50	Absent	Absent	NA	S	
Quiche bacon	1	350*	<3	<50	Absent	Absent	NA	S	
Chicken korma	1	<50	<3	<50	Absent	Absent	NA	S	
Lamb rogan josh	1	<50	<3	<50	Absent	Absent	NA	S	
Beef vindaloo	1	<50	<3	<50	Absent	Absent	NA	S	
Butter chicken	1	50*	<3	<50	Absent	Absent	NA	S	
Basmati rice	1	<50	<3	<50	Absent	Absent	<50	S	
Chicken and lettuce roll	3	11000	<3	<50	Absent	Absent	NA	S	B
Chicken caesar roll	3	5200	<3	<50	Absent	Absent	NA	S	B
Roast beef & corn relish roll	3	2200000	3	<50	Absent	Absent	NA	M	B
Ham & salad Roll	3	350000	<3	<50	Absent	Absent	NA	S	B
Southern fried chicken salad roll	3	15000	<3	<50	Absent	Absent	NA	S	B
Curry chicken	1	3400	<3	<50	Absent	Absent	NA	S	

Sample	Level	SPC	*E. coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample Reference
Beef & black bean	1	50000*	<3	<50	Absent	Absent	NA	M[#]	
Chicken cashew	1	150*	<3	<50	Absent	Absent	NA	S	
Chicken satay	1	1800	<3	<50	Absent	Absent	NA	S	
Fried rice	1	2300	<3	<50	Absent	Absent	NA	S	
Prawn sushi	3	9600	<3	<50	Absent	Absent	<50	S	
Prawn & avocado sushi	3	40000*	<3	<50	Absent	Absent	<50	S	
Salmon & avocado suhi	3	160000	<3	<50	Absent	Absent	<50	S	
Seaweed salad sushi	3	17000	<3	<50	Absent	Absent	<50	S	
Crab sushi	3	6000	<3	<50	Absent	Absent	<50	S	
Ham, cheese & salad roll	3	32000000	<3	<50	Absent	Absent	NA	S	
Spicy tuna sushi	3	4800	<3	<50	Absent	Absent	<50	S	
Caesar wrap	3	260000	<3	<50	Absent	Absent	NA	S	
Ham & cheese sandwich	3	15000	<3	<50	Absent	Absent	NA	S	
Chicken avocado & salad sandwich	3	1200000	<3	<50	Absent	Absent	NA	S	
Sausage Roll	1	100*	<3	<50	Absent	Absent	NA	S	
Steak pie	1	<50	<3	<50	Absent	Absent	NA	S	
Vegetarian baguette	3	200000	<3	<50	Absent	Absent	NA	S	
Chicken salad baguette	3	39000*	<3	<50	Absent	Absent	NA	S	
Lemon pie	2	350*	<3	<50	Absent	Absent	NA	S	
Spinach quiche	1	850*	<3	<50	Absent	Absent	NA	S	
Vegetable pastie	1	900*	<3	<50	Absent	Absent	NA	S	
Sausage roll	1	350*	<3	<50	Absent	Absent	NA	S	
Potato pie	1	<50	<3	<50	Absent	Absent	NA	S	
Beef and mushroom pie	1	<50	<3	<50	Absent	Absent	NA	S	
Roast cream potato	1	250*	<3	<50	Absent	Absent	NA	S	
Tuna & salad sandwich	3	69000*	<3	<50	Absent	Absent	NA	S	
Caesar salad	3	130000*	<3	<50	Absent	Absent	NA	S	
Potato pumpkin salad	3	1100000	<3	<50	Absent	Absent	NA	S	
Turkey & salad roll	3	38000000	<3	<50	Absent	Absent	NA	S	
Teriyaki chicken sushi	3	3500	<3	<50	Absent	Absent	200	M	C
Grilled salmon sushi	3	420000	<3	<50	Absent	Absent	<50	S	C
Avo, Crab, Prawn Sushi	3	1600000	<3	200	Absent	Absent	100	M	C
Salmon Nigiri Sushi	3	34000*	<3	<50	Absent	Absent	200	M	C
California Roll Sushi	3	1500000	<3	<50	Absent	Absent	650	M	C
Custard Tart	2	800*	<3	<50	Absent	Absent	NA	S	
Beef Pie	1	1800	<3	<50	Absent	Absent	NA	S	
Salad roll & hummus	3	1100000	<3	<50	Absent	Absent	NA	S	
Ham and Salad	3	940000	<3	<50	Absent	Absent	NA	S	
Chicken caesar	3	18000	<3	<50	Absent	Absent	NA	S	
Custard Tart	2	<50	<3	<50	Absent	Absent	NA	S	
Sausage Roll	1	<50	<3	<50	Absent	Absent	NA	S	
Pie Plain	1	<50	<3	<50	Absent	Absent	NA	S	
Pie Curry	1	50*	<3	<50	Absent	Absent	NA	S	
Pastie meat/ vegetable	1	150*	<3	<50	Absent	Absent	NA	S	
Rice paper rolls chicken	3	3300000*	<3	<50	Absent	Absent	100	M	No resample
Steamed Dim Sim	1	<50	<3	<50	Absent	Absent	NA	S	
Sweet and sour pork	1	200*	<3	<50	Absent	Absent	NA	S	
Spring Rolls	1	50*	<3	<50	Absent	Absent	NA	S	

Sample	Level	SPC	*E. coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample Reference
Fried rice	1	250*	<3	<50	Absent	Absent	<50	S	
Coleslaw	3	1700	<3	<50	Absent	Absent	NA	S	
Tabouleh	3	11000000	<3	<50	Absent	Absent	NA	S	
Cranberry cous-cous	3	5800	<3	<50	Absent	Absent	NA	S	
German potato salad	3	6800	<3	<50	Absent	Absent	NA	S	
Potato salad	3	15000	<3	<50	Absent	Absent	NA	S	
Black pepper pork	1	400*	<3	<50	Absent	Absent	NA	S	
Szechuan chilli chicken	1	200*	<3	<50	Absent	Absent	NA	S	
Fried Rice	1	250*	<3	<50	Absent	Absent	<50	S	
Curried chicken	1	<5000	<3	<50	Absent	Absent	NA	S	
Beef black bean	1	2600	<3	<50	Absent	Absent	NA	S	
Salmon & avocado sushi Roll	3	33000*	<3	<50	Absent	Absent	<50	S	
Chicken & avocado sushi Roll	3	330000	<3	<50	Absent	Absent	50	S	
Beef sushi roll	3	340000	3	<50	Absent	Absent	50	M	No resample
Prawn sushi roll	3	27000	<3	<50	Absent	Absent	<50	S	
Tuna sushi roll	3	130000*	<3	<50	Absent	Absent	<50	S	
Salmon sushi roll	3	38000*	<3	<50	Absent	Absent	<50	S	
Seafood salad	3	47000*	<3	<50	Absent	Absent	NA	S	
Coleslaw	3	14000	<3	<50	Absent	Absent	NA	S	
Chickpea salad	3	94000*	<3	<50	Absent	Absent	<50	S	
Potato salad	3	45000*	<3	<50	Absent	Absent	NA	S	
Tabouleh	3	580000	<3	<50	Absent	Absent	NA	S	
Salmon avocado sushi	3	420000	<3	<50	Absent	Absent	50	S	
Chicken tempura sushi	3	300000	<3	<50	Absent	Absent	<50	S	
Prawn avocado sushi	3	20000	<3	<50	Absent	Absent	<50	S	
Tuna cucumber sushi	3	8200000*	<3	<50	Absent	Absent	<50	S	
Egg roll sushi	3	120000	<3	<50	Absent	Absent	100	M	No resample
Smoked chicken pesto pasta	3	16000000	<3	<50	Absent	Absent	<50	S	
Carrot cake	2	650*	<3	<50	Absent	Absent	NA	S	
Banana bread	2	100*	<3	<50	Absent	Absent	NA	S	
Passion danish	2	9800	<3	<50	Absent	Absent	NA	S	
Croissant chocolate	2	3600	<3	<50	Absent	Absent	NA	S	
Chicken schnitzel & salad roll	3	120000*	<3	<50	Absent	Absent	NA	S	
Chicken caesar wrap	3	2800000	<3	<50	Absent	Absent	NA	S	
Chicken schnitzel & salad wrap	3	6600000*	<3	<50	Absent	Absent	NA	S	
Ham & cheese croissant	2	70000*	<3	<50	Absent	Absent	NA	S	
Chicken & salad sandwich	3	210000*	<3	<50	Absent	Absent	NA	S	
Tandoori chicken & salad wrap	3	660000	<3	<50	Absent	Absent	NA	S	
Salmon & lettuce wrap	3	6700000*	<3	<50	Absent	Absent	NA	S	
Ham, cheese & lettuce sandwich	3	25000000	<3	<50	Absent	Absent	NA	S	
Chicken, mayonnaise & lettuce sandwich	3	32000*	<3	<50	Absent	Absent	NA	S	
Chicken caesar salad	3	5800000*	<3	<50	Absent	Absent	NA	S	
Seaweed & black rice sushi	3	5500000*	<3	<50	Absent	Absent	<50	S	
Salmon sushi roll	3	8500000*	<3	<50	Absent	Absent	<50	S	
Salmon sushi	3	360000	<3	<50	Absent	Absent	<50	S	

Sample	Level	SPC	*E. coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample Reference
Prawn sushi	3	340000	3	<50	Absent	Absent	<50	M	No resample
Vegetarian black rice sushi	3	7900000*	3	<50	Absent	Absent	<50	M	No resample
Salmon Frittata	1	2000	<3	<50	Absent	Absent	NA	S	
Chicken focaccia	3	560000	<3	<50	Absent	Absent	NA	S	
Beef lasagne	1	300*	<3	<50	Absent	Absent	<50	S	
Vanilla slice	2	46000000	<3	<50	Absent	Absent	NA	U#	
Apple crumble	2	1900	<3	<50	Absent	Absent	NA	S	
Custard danish	2	1000*	<3	<50	Absent	Absent	NA	S	
Cream bun	2	38000*	<3	<50	Absent	Absent	NA	S	
Custard tart	2	600*	<3	<50	Absent	Absent	NA	S	
Cheesecake	2	11000	<3	<50	Absent	Absent	NA	S	
Potato pie	1	1000*	<3	<50	Absent	Absent	NA	S	
Spinach quiche	1	1200	<3	<50	Absent	Absent	NA	S	
Salad sandwich	3	12000000	<3	<50	Absent	Absent	NA	S	
Egg & lettuce sandwich	3	500000	<3	<50	Absent	Absent	NA	S	
Roast beef sandwich	3	630000	<3	<50	Absent	Absent	NA	S	
Chicken & avocado sandwich	3	220000	<3	<50	Absent	Absent	NA	S	
Passionfruit slice	2	900*	<3	<50	Absent	Absent	NA	S	
Choc fudge slice	2	350*	<3	<50	Absent	Absent	NA	S	
Vanilla slice	2	47000*	3	<50	Absent	Absent	NA	M	No resample
Pumpkin salad	3	25000000	<3	<50	Absent	Absent	NA	S	
Citrus tart	2	<50	<3	<50	Absent	Absent	NA	S	
Pork & black bean	1	1500*	<3	<50	Absent	Absent	NA	S	
Spicy pork and mango	1	6400	<3	<50	Absent	Absent	NA	S	
Chicken with potato	1	5200	<3	<50	Absent	Absent	NA	S	
Fish with tomato	1	150*	<3	<50	Absent	Absent	NA	S	
Fish with ginger	1	100*	<3	<50	Absent	Absent	NA	S	
Caesar salad	3	460000	<3	<50	Absent	Absent	NA	S	
Ham & cheese croissant	3	240000000	<3	<50	Absent	Absent	NA	S	
Roast beef & salad roll	3	90000000	<3	<50	Absent	Absent	NA	S	
Chicken schnitzel & salad roll	3	110000*	<3	<50	Absent	Absent	NA	S	
Turkey & salad roll	3	24000000	<3	<50	Absent	Absent	NA	S	
Chicken & salad sandwich	3	280000	<3	<50	Absent	Absent	NA	S	D
Ham, carrot & salad sandwich	3	1300000	13	<50	Absent	Absent	NA	M	D
Ham, carrot & salad wrap	3	18000000	10	<50	Absent	Absent	NA	M	D
Chicken salad wrap	3	22000000000*	<3	<50	Absent	Absent	NA	S	D
Salmon salad wrap	3	7000000*	<3	<50	Absent	Absent	NA	S	D
Ham, cheese, tomato sandwich	3	320000	<3	<50	Absent	Absent	NA	S	
Bacon Lettuce Tomato roll	3	160000	<3	<50	Absent	Absent	NA	S	
Salmon salad bagel	3	2900000	<3	<50	Absent	Absent	NA	S	
Chicken, salad & avocado roll	3	4100000*	<3	650	Absent	Absent	NA	M	No resample
Roasted vegetable & salad roll	3	680000	<3	<50	Absent	Absent	NA	S	
Beef & roasted pumpkin salad	3	420000000*	<3	<50	Absent	Absent	NA	S	E
Southern style chicken salad	3	21000000	<3	<50	Absent	Absent	NA	S	E

Sample	Level	SPC	*E. coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample Reference
Chicken basil pesto salad	3	32000*	3	<50	Absent	Absent	150	M	E
Chicken caesar salad	3	12000000*	<3	<50	Absent	Absent	NA	S	E
Chicken and Avocado salad	3	480000	<3	<50	Absent	Absent	NA	S	E
Dahl yellow lentil	1	<50	<3	<50	Absent	Absent	NA	S	
Rice paper rolls chicken	3	960000	<3	<50	Absent	Absent	<50	S	
spinach and chicken curry	1	400*	<3	<50	Absent	Absent	NA	S	
egg plant curry	1	<50	<3	<50	Absent	Absent	NA	S	
madras beef	1	600*	<3	<50	Absent	Absent	NA	S	
Coleslaw Salad	3	860000	<3	<50	Absent	Absent	NA	S	
Chicken Breast salad	3	7100000*	<3	<50	Absent	Absent	NA	S	
Potato Salad	3	220000	<3	<50	Absent	Absent	NA	S	
Egg Salad	3	31000000*	<3	<50	Absent	Absent	NA	S	
Chicken schnitzel	1	50*	<3	<50	Absent	Absent	NA	S	
Prawn Salad	3	340000	<3	<50	Absent	Absent	NA	S	
Beef Dim Sims	1	100*	<3	<50	Absent	Absent	NA	S	
Beef Gravy	1	450*	<3	<50	Absent	Absent	NA	S	
Deep fried potatoes	1	50*	<3	<50	Absent	Absent	NA	S	
Chicken Skewers	1	350*	<3	<50	Absent	Absent	NA	S	
Sausage roll	1	150*	<3	<50	Absent	Absent	NA	S	
Steak, cheese, bacon pie	1	<50	<3	<50	Absent	Absent	NA	S	
Vanilla slice	2	10000*	<3	<50	Absent	Absent	NA	S	
Egg sandwich	3	23000	<3	<50	Absent	Absent	NA	S	
Custard tart	2	1400*	<3	<50	Absent	Absent	NA	S	
Caesar salad	3	200000	<3	<50	Absent	Absent	NA	S	F
Chicken & avocado salad	3	11000000*	<3	<50	Absent	Present	NA	M	F
South west chicken salad	3	7600000*	<3	<50	Absent	Absent	NA	S	F
Pesto chicken salad	3	16000000	<3	<50	Absent	Absent	NA	S	F
Roast beef & salad	3	18000000	<3	<50	Absent	Absent	NA	S	F
Ham, cheese & tomato sandwich	3	110000*	<3	<50	Absent	Absent	NA	S	
Apricot cake	2	1500	<3	<50	Absent	Absent	NA	S	
Napoleon cake	2	3600	<3	<50	Absent	Absent	NA	S	
turkey salad sandwich	3	5500000*	<3	<50	Absent	Absent	NA	S	
chicken salad sandwich	3	10000000*	<3	<50	Absent	Absent	NA	S	
Berry cheese cake	2	400*	<3	<50	Absent	Absent	NA	S	
Chicken & salad wrap	3	2800000	<3	<50	Absent	Absent	NA	S	
Egg & lettuce wrap	3	65000*	<3	<50	Absent	Absent	NA	S	
Ham & salad sandwich	3	6900000*	<3	<50	Absent	Absent	NA	S	
Custard roll	2	33000*	<3	<50	Absent	Absent	NA	S	
Vegetable frittata	2	50000000	<3	<50	Absent	Absent	NA	U[#]	
Chicken caesar wrap	3	1800000	<3	<50	Absent	Absent	NA	S	
Coconut slice	2	5400	<3	<50	Absent	Absent	NA	S	
Roast beef & salad roll	3	3300000*	<3	<50	Absent	Absent	NA	S	
Beef lasagne	1	200*	<3	<50	Absent	Absent	NA	S	
Lemon slice	2	4000	<3	150	Absent	Absent	NA	M	G
Apricot slice	2	4200	<3	<50	Absent	Absent	NA	S	G
Apple pie	2	100*	<3	<50	Absent	Absent	NA	S	G
Carrot cake	2	900*	<3	<50	Absent	Absent	NA	S	G
Banana bread	2	50*	<3	<50	Absent	Absent	NA	S	G
Dark honey roll	2	2000	<3	<50	Absent	Absent	NA	S	

Sample	Level	SPC	*E. coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample Reference
Caramel roll	2	650*	<3	<50	Absent	Absent	NA	S	
Corn dog	1	<50	<3	<50	Absent	Absent	NA	S	
Chiko roll	1	<50	<3	<50	Absent	Absent	NA	S	
Battered sav	1	<50	<3	<50	Absent	Absent	NA	S	
Tandoori chicken salad	3	100000000	<3	<50	Absent	Absent	NA	S	
Chicken, egg & salad box	3	1000000000*	<3	<50	Absent	Absent	NA	S	
Chicken, bacon, lettuce & tomato roll	3	840000	<3	<50	Absent	Absent	NA	S	
Ham, cheese, tomato sandwich	3	740000	<3	<50	Absent	Absent	NA	S	
Grain salad	3	38000000	<3	<50	Absent	Absent	NA	S	
Chicken & salad rice paper roll	3	540000	3	<50	Absent	Absent	100	M	H
Chicken & salad rice paper roll	3	1200000	<3	<50	Absent	Absent	<50	S	H
Soft shell crab rice paper roll	3	340000	<3	<50	Absent	Absent	<50	S	H
Tofu & salad roll	3	580000	<3	<50	Absent	Absent	<50	S	H
Barramundi & salad rice paper roll	3	540000	<3	<50	Absent	Absent	50	S	H

* = estimate count only, # = refers to SPC compliance, NP = Not Performed, NA = Not Applicable.

Appendix C (Re-sampled results)

Sample	Level	SPC	*E.coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample reference
Couscous	3	1000000	<3	<50	Absent	Absent	<50	S	A
Falafel	1	650*	<3	<50	Absent	Absent	NA	S	A
Pumpkin cooked	1	3600	<3	<50	Absent	Absent	NA	S	A
Falafel & couscous salad	3	1900000	<3	<50	Absent	Absent	<50	S	A
Roast beef & BBQ sauce	NA	NA	<3	NA	NA	NA	NA	S	B
Chicken caesar	NA	NA	<3	NA	NA	NA	NA	S	B
Turkey	NA	NA	<3	NA	NA	NA	NA	S	B
Teriyaki chicken sushi roll	NA	NA	NA	<50	NA	NA	<50	S	C
Avocado, crab & prawn sushi	NA	NA	NA	<50	NA	NA	50	S	C
Salmon sushi	NA	NA	NA	<50	NA	NA	<50	S	C
Tuna sushi	NA	NA	NA	<50	NA	NA	<50	S	C
Cooked rice	NA	NA	NA	<50	NA	NA	<50	S	C
Ham & salad wrap	3	2000000	10	NA	NA	NA	NA	M	D1
Ham & salad sandwich	3	600000	<3	NA	NA	NA	NA	S	D1
Sliced meat ham	NA	NA	<3	NA	NA	NA	NA	S	D1
Sliced cucumber	NA	NA	<3	NA	NA	NA	NA	S	D1
Grated carrot	NA	NA	90	NA	NA	NA	NA	M	D1
Sliced tomato	NA	NA	3	NA	NA	NA	NA	M	D1
Ham & salad wrap	NA	NA	120	NA	NA	NA	NA	U	D2
Whole carrot	NA	NA	<3	NA	NA	NA	NA	S	D2
Whole tomato	NA	NA	<3	NA	NA	NA	NA	S	D2
Grated carrot	NA	NA	4400	NA	NA	NA	NA	U	D2
Sliced tomato	NA	NA	<3	NA	NA	NA	NA	S	D2
Grated carrot	NA	NA	15000*	NA	NA	NA	NA	U	D3
Grated carrot	NA	NA	6800*	NA	NA	NA	NA	U	D3
Ham & salad wrap	NA	NA	320	NA	NA	NA	NA	U	D3
Salad sandwich	NA	NA	290	NA	NA	NA	NA	U	D3
Alfalfa sprouts	NA	NA	<3	NA	NA	NA	NA	S	D3

Sample	Level	SPC	*E.coli*	Staph	*Salmonella*	*L. monocytogenes*	*B. cereus*	Assessment	Resample reference
Chopped carrot	NA	NA	<3	NA	NA	NA	NA	S	D4
Whole carrot	NA	NA	<3	NA	NA	NA	NA	S	D4
Lettuce	NA	NA	<3	NA	NA	NA	NA	S	D4
Tomato sliced	NA	NA	<3	NA	NA	NA	NA	S	D4
Ham & salad wrap	NA	NA	<3	NA	NA	NA	NA	S	D4
Ham & salad sandwich	NA	NA	<3	NA	NA	NA	NA	S	D4
Grated carrot	3	230000	<3	<50	Absent	Absent	NA	S	D5
Salad sandwich	3	2400000	<3	<50	Absent	Absent	NA	S	D5
Egg lettuce sandwich	3	1500000	<3	<50	Absent	Absent	NA	S	D5
Salmon & salad roll	3	35000*	<3	<50	Absent	Absent	NA	S	D5
Chicken schnitzel & salad wrap	3	5700000*	<3	<50	Absent	Absent	NA	S	D5
Basil pesto chicken pasta salad	NA	NA	<3	NA	NA	NA	<50	S	E1
Chicken shredded	NA	NA	<3	NA	NA	NA	<50	S	E1
Sun dried tomato	NA	NA	<3	NA	NA	NA	<50	S	E1
Lettuce	NA	NA	NA	NA	NA	Absent	NA	S	F1
Roasted pumpkin	NA	NA	NA	NA	NA	Absent	NA	S	F1
Cooked chicken	NA	NA	NA	NA	NA	Absent	NA	S	F1
Capsicum	NA	NA	NA	NA	NA	Absent	NA	S	F1
Pumpkin salad	NA	NA	NA	NA	NA	Absent	NA	S	F1
Avocado	NA	NA	NA	NA	NA	Absent	NA	S	F1
Honey lime coriander - original package	NA	NA	NA	NA	NA	Absent	NA	S	F1
Honey lime coriander - sauce bottle	NA	NA	NA	NA	NA	Absent	NA	S	F1
Lemon slice	NA	NA	<3	<50	NA	NA	NA	S	G1
Carrot cake	NA	NA	<3	<50	NA	NA	NA	S	G1
Passion fruit cake	NA	NA	<3	<50	NA	NA	NA	S	G1
Chicken & salad roll	NA	NA	17	NA	NA	NA	50	M	H1
Chicken & salad roll	NA	NA	<3	NA	NA	NA	<50	S	H2
Cooked Chicken	NA	NA	<3	NA	NA	NA	<50	S	H2
Barramundi & salad roll	NA	NA	<3	NA	NA	NA	100	M	H2

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