MICROBIOLOGICAL SURVEILLANCE OF CUSTARD PRODUCTS

FINAL REPORT, PREPARED APRIL 2O11

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GLOSSARY

CPS	Coagulase Positive *Staphylococcus*
EB	Enterobacteriaceae
EHO	Environmental Health Officer
SPC	Standard Plate Count

EXECUTIVE SUMMARY

The results presented here suggest that ready to eat custard products in the Eastern metropolitan region of Melbourne do not present a significant food safety risk to the consuming public, and the results obtained compare well with the findings of a recent NSW study including these products. However some products, particularly vanilla slices, demonstrated a higher proportion of unsuitable SPC and Enterobacteriaceae results. This suggests that food handling and storage practices in some premises could be improved.

INTRODUCTION

The Victorian Food Act 1984 specifies that councils should regularly sample foods retailed or manufactured in their local government authority (LGA) region as part of their food safety activities. Such sampling contributes to the safety of consumers in Victoria by allowing councils to identify microbiological or chemical hazards and take steps to address these issues. However, unless coordinated, food sampling can cover a vast range of foods of varying risk to consumers, and regional food surveillance groups have been convened under the auspices of some departmental Regional Environmental Health Officers (REHO) to coordinate council activities. The coordination aims of these regional sampling groups include:

- better targeting of high risk foods or high risk food premises for sampling
- more consistent sampling to provide a better picture of microbiological or chemical risk with certain foods
- sampling to provide data that can direct appropriate corrective actions where relevant in the food premises.

The regional sampling groups are responsive to local issues and problems, and are a valuable source of data for use by the Department of Health (the department) in monitoring food safety risks across the state. Often the local issues identified relate to the ready to eat foods available in the region.

Ready to eat foods are defined by FSANZ as "*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*". This survey was conducted by officers of the Eastern metropolitan regional sampling group to assess the hygiene and safety of a range of (ready to eat) custard-containing ready-to-eat foods sold in registered food premises in the region. Samples were collected for the survey by Boroondara, Knox, Manningham, Maroondah, Monash, Whitehorse and Yarra Ranges councils. Microbiological assessment was conducted in accordance with Australian Standard methods and conducted in laboratories accredited by NATA for these methods.
It is important to note that all council participants agreed to act where premises returned unsatisfactory sample results by revisiting the premises, requesting clean-up activities or re-sampling as appropriate.

A total of 252 samples of custard containing ready-to-eat foods were submitted for analysis. These samples included cannoli; custard tarts; Danishes; fruit flans; vanilla slices; custard cakes (various) and a group of apparently unrelated products which were classified as "miscellaneous".

METHODS

SAMPLE ANALYSIS

Samples were processed by analysts authorised under the Victorian Food Act 1984, and the three laboratories, OMIC, DTS and NMI, are NATA accredited for the testing methods applied in this survey, and the assumption was made that all laboratories were equally able to detect the organisms.

Analyses included

- Standard Plate Count (SPC)
- Enterobacteriaceae
- Coagulase positive *Staphylococci*
- *Bacillus cereus*
- *Salmonella* spp. (where raw egg custard was used).

The SPC and Enterobacteriaceae analyses provide a general guide to the hygienic status of the product, and as cooked products most of these custard products were compared against the level 1 standards, which apply to "ready-to-eat 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 (2). However for products such as cannoli, where manufacture involves some handling after cooking (such as adding cream), level 2 criteria were applied (2). Enterobacteriaceae describes a large group of bacteria including pathogens, potential pathogens and environmental contaminants: the presence of these organisms indicates "undesirable post processing contamination" of the food (1) but does not necessarily indicate faecal contamination or serve as an indicator for the presence of enteric pathogens. *Salmonella* spp. were included in the analyses of those products that were produced using raw egg, as the consumption or foods containing raw or lightly cooked eggs has been linked to human salmonellosis cases (5). The presence in foods of Coagulase positive *Staphylococci* (CPS) indicates poor food handling during preparation, as the presence of these organisms is almost exclusively due to human contact with the food. *Bacillus cereus (B.cereus)* is a foodborne pathogen that may contaminate various

foods, particularly including rice and pasta and processed foods including baked products (3).

STATISTICAL ANALYSIS

Results of analyses were converted to $\log_{10}$ cfu/g. The three laboratories varied in their reporting of the lower and upper limit of detection for different tests. Results expressed as less than the lowest limit of detection for a test were ascribed a value of half the lowest limit of detection (i.e. where values <10 cfu/g were reported, a value of 5 cfu/g was ascribed to the sample). Where the laboratories reported values greater than the upper limit of detection for the test (X), a value of X + 1/3X was ascribed to the result. The frequency distributions of samples according to the microbiological guidelines in Table 2 were performed using the Excel data analysis toolpack.

RESULTS

TABLE 1: TOTAL SAMPLES SUBMITTED

Product	**Number sampled**
Canoli	9
Custard various	17
Custard tarts	81
Various Danishes	11
Various fruit flans	17
Vanilla slices	80
Miscellaneous	13
Almond custard products	24

TABLE 2: SPC AND ENTEROBACTERIACEAE (EB) RESULTS FOR CANNOLI (N= 9)

	Satisfactory		**Marginal**		**Unsatisfactory**	
Parameter	SPC	EB	SPC	EB	SPC	EB
Guideline level (cfu/g)	$<10^6$	$<10^2$	$< 10^7$	$10^2 – 10^4$	$> 10^7$	$> 10^4$
Number of samples	6	5	1	1	2	3

TABLE 3: *B. cereus* RESULTS (INCLUDING PRODUCT TYPES)

	Satisfactory	**Marginal**	**Unsatisfactory**	**Potentially Hazardous**
	$< 10^2$	$10^2 – 10^3$	10^3 - 10^4	$> 10^4$
Number of samples (%)	253 (93%)	14 (5.5%)	0	5 (2%)
Types of products	n/a	Fruit tart (2) Custard tart (2) Cannoli (3) Vanilla slice (4) Miscellaneous (3)		Vanilla slice (3) Custard tart (1) Miscellaneous (1)

FIGURE 1: SPC RESULTS OF CUSTARD PRODUCTS (EXCLUDING CANNOLI)

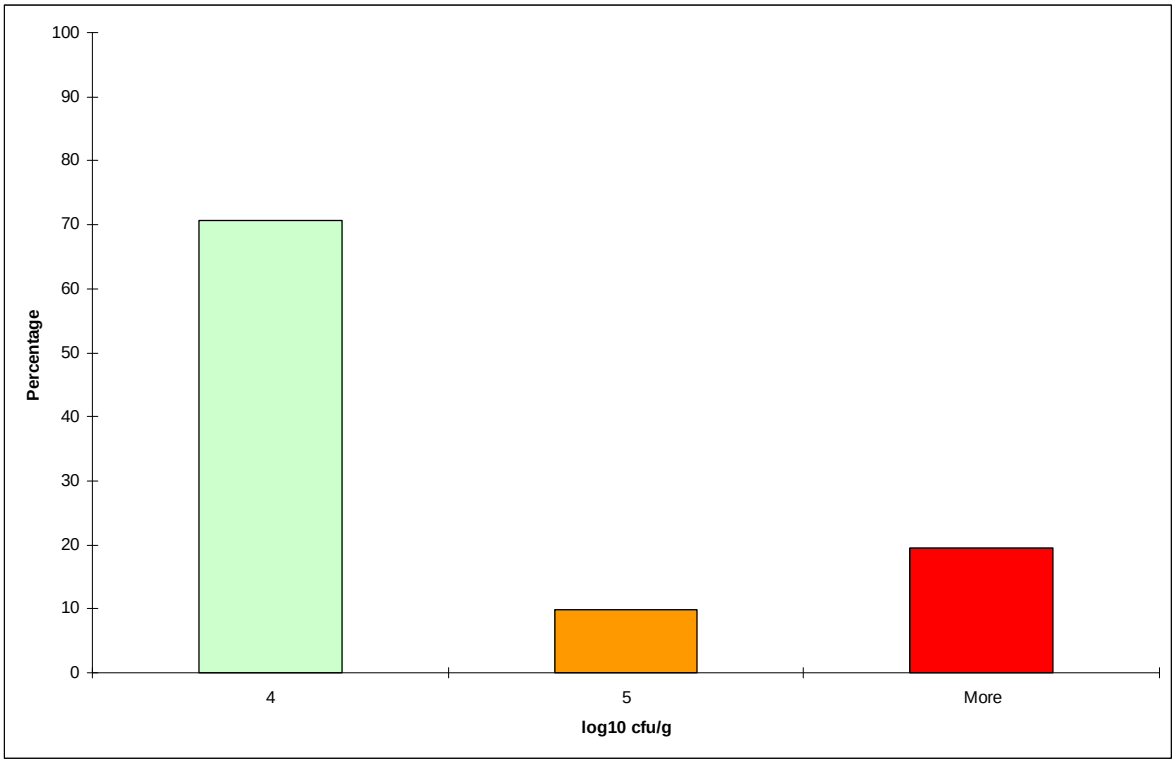


FIGURE 2: ENTEROBACTERIACEAE RESULTS OF ALL CUSTARD PRODUCTS (INCLUDING CANNOLI)

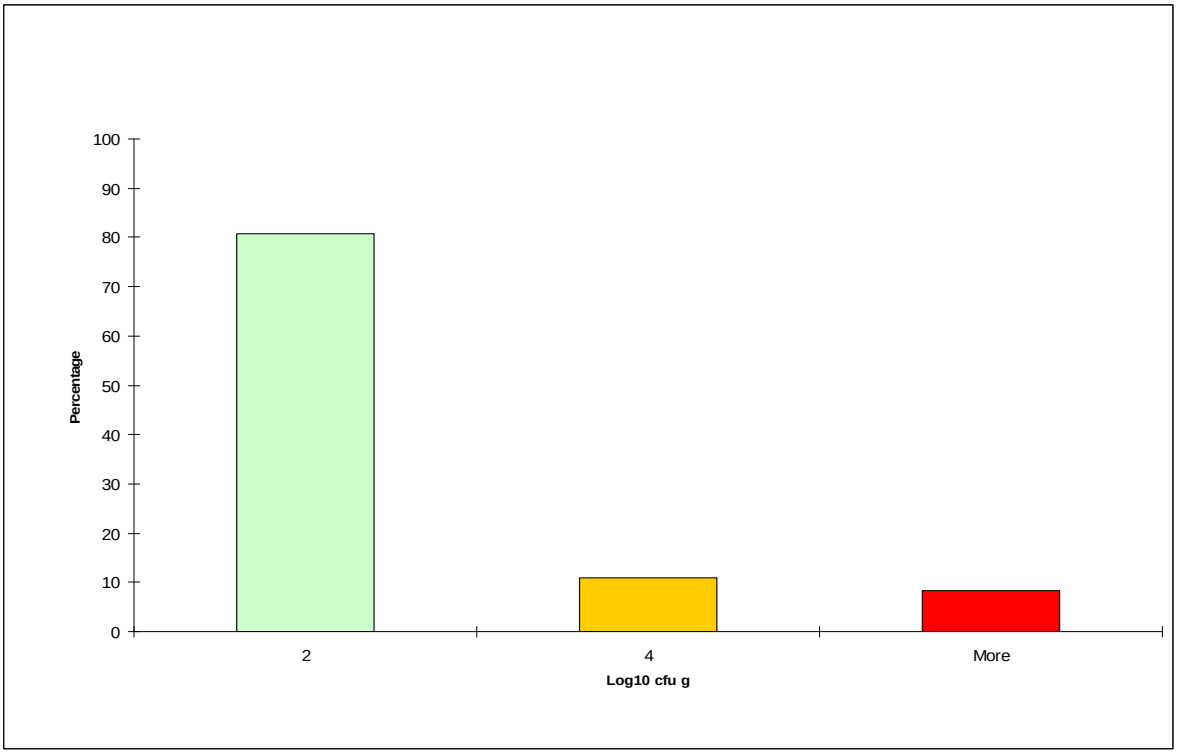


FIGURE 3: SPC RESULTS OF ALMOND SCROLLS (n = 23)

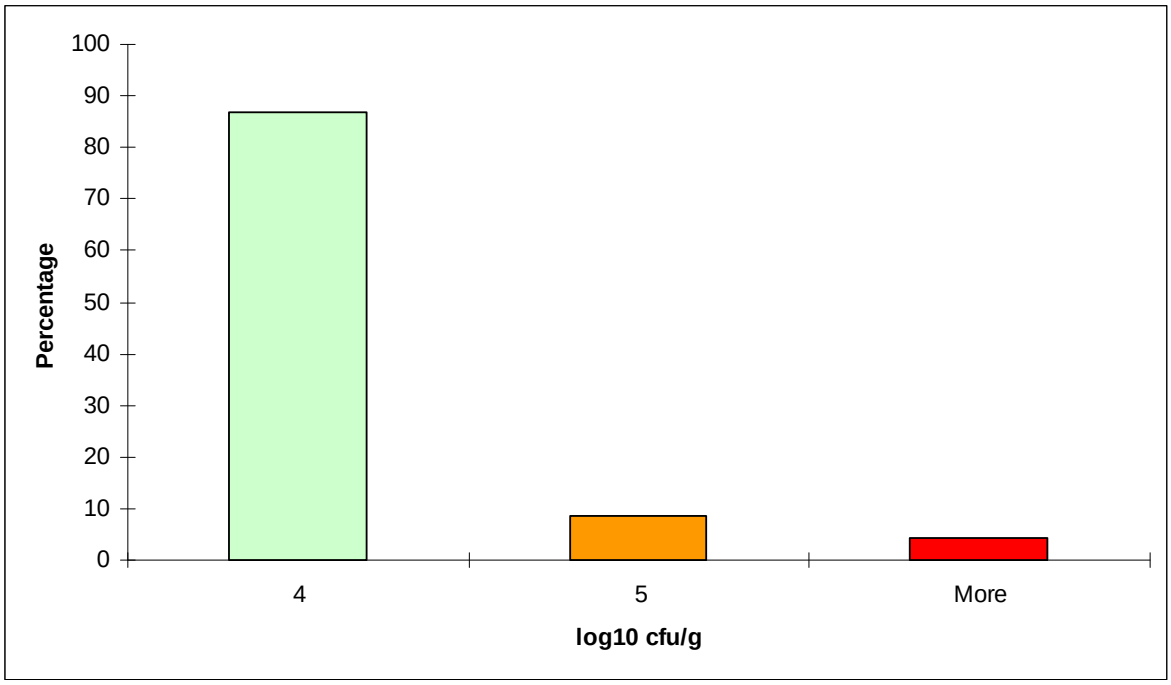


FIGURE 4: SPC RESULTS OF CUSTARD TARTS (n=80)

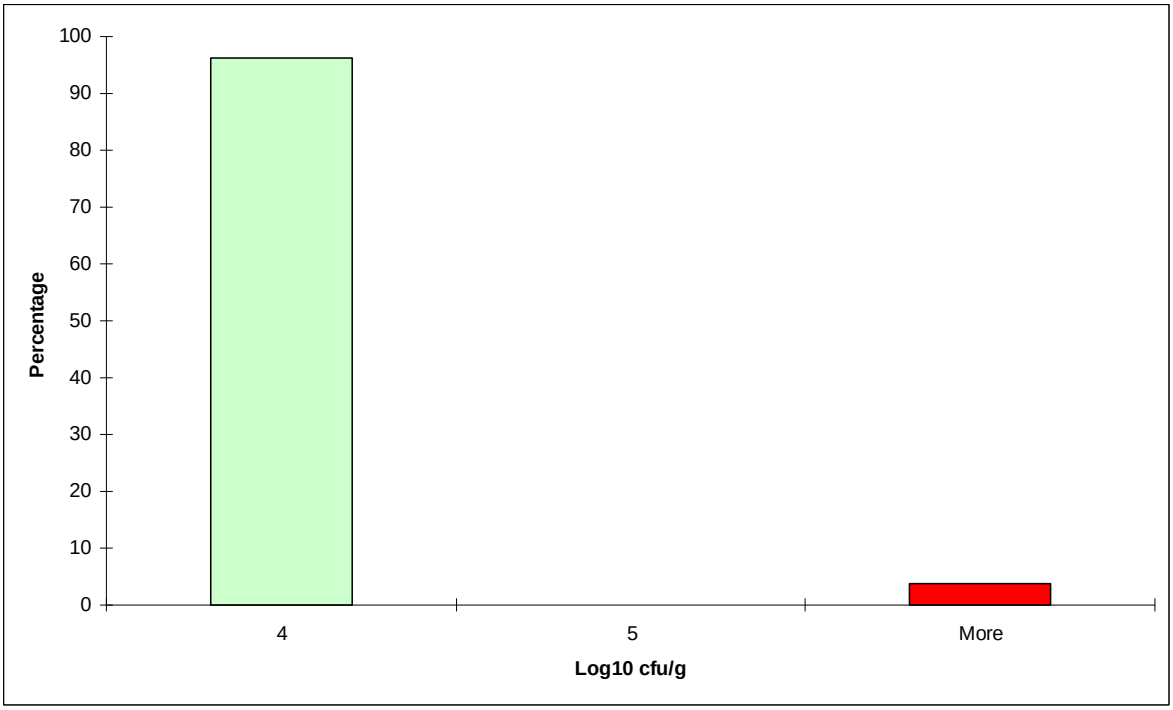


FIGURE 5: SPC RESULTS OF FRUIT TARTS (n=17)

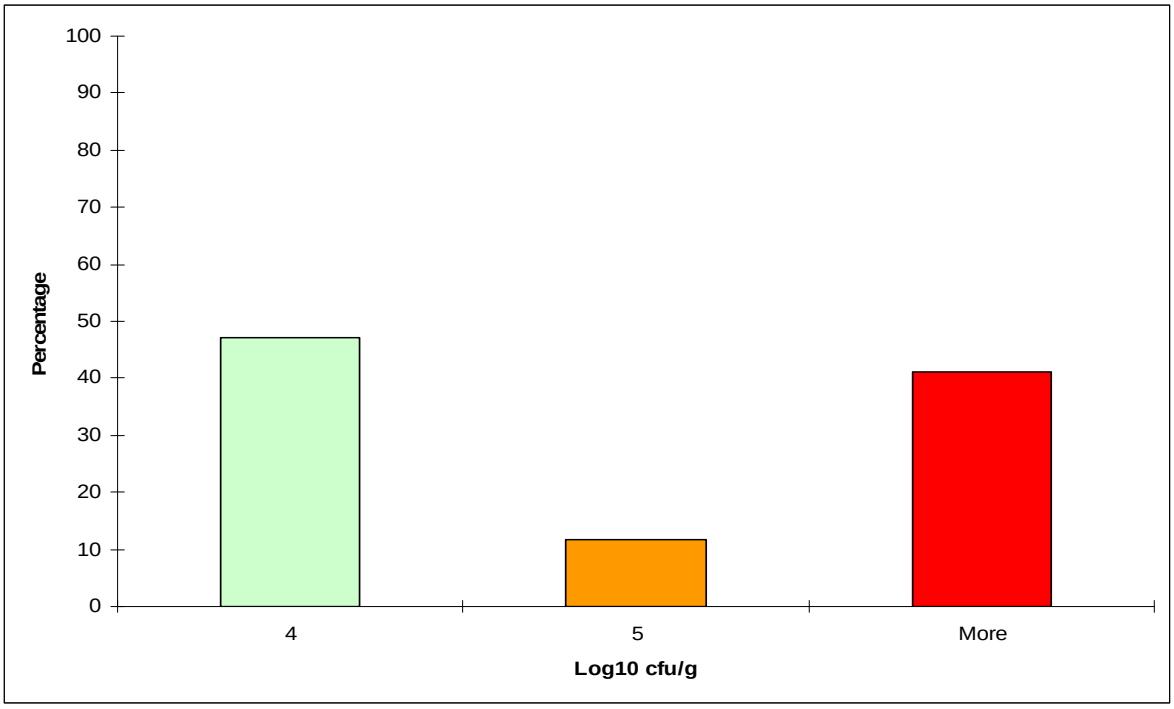


FIGURE 6: SPC RESULTS OF VANILLA SLICES (n=81)

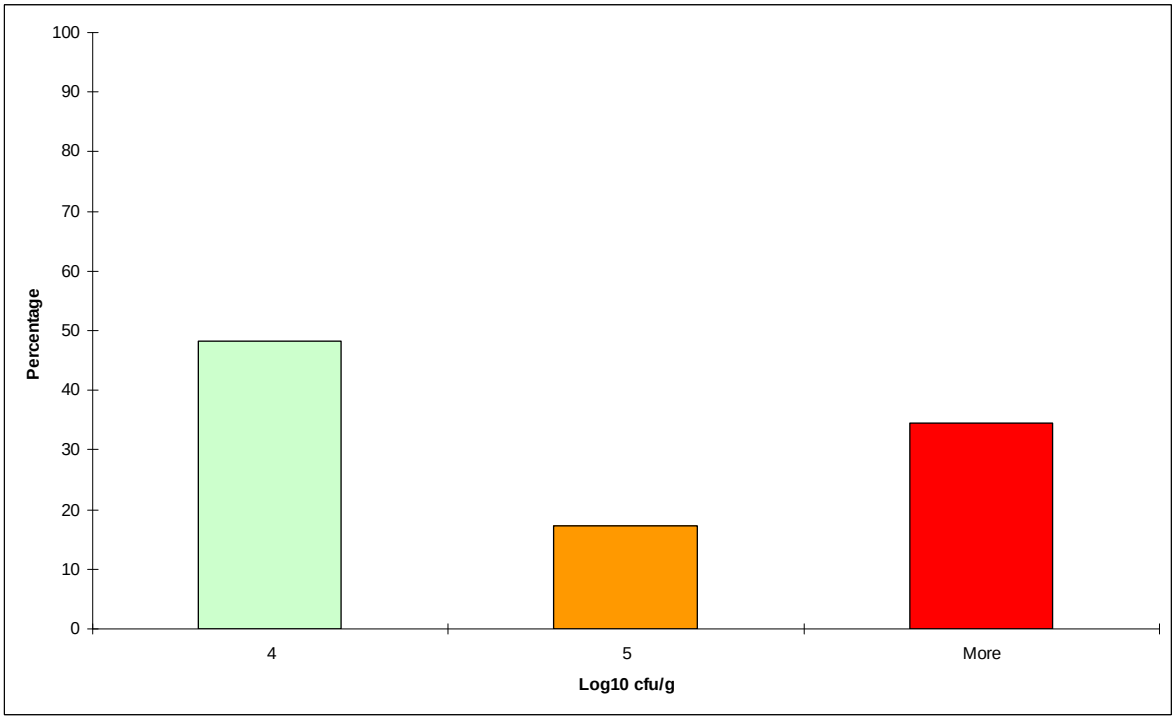
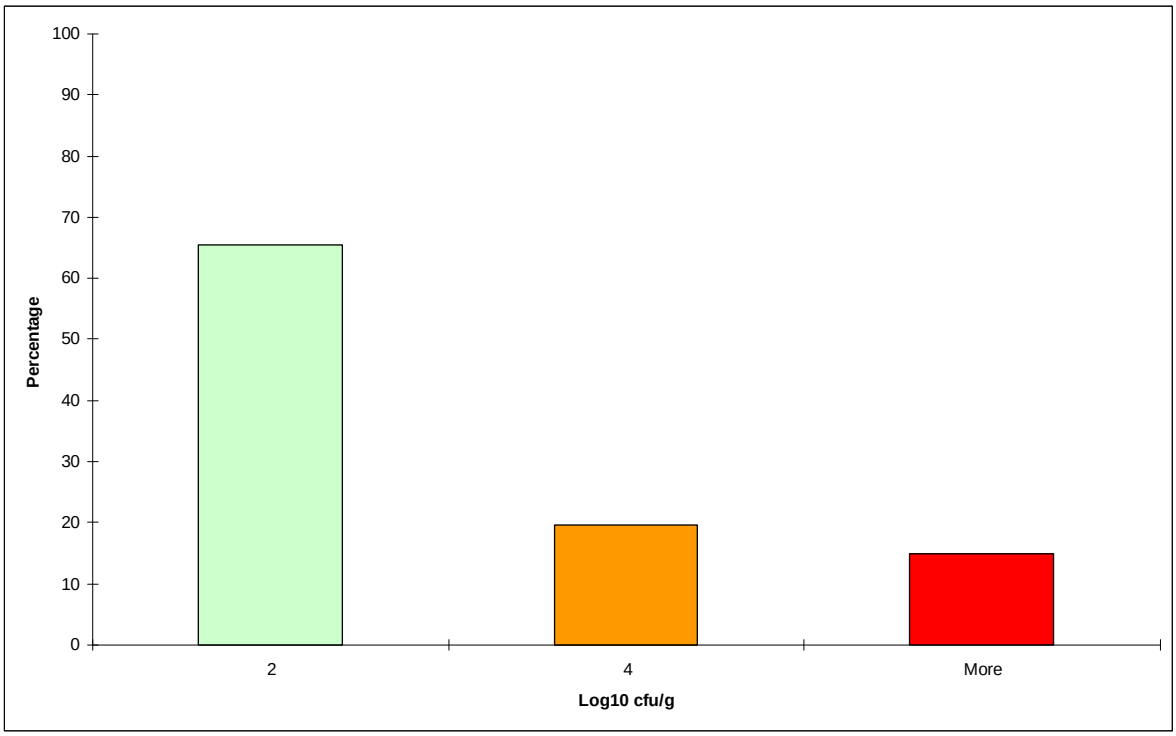


FIGURE 7: ENTEROBACTERIACEAE RESULTS OF VANILLA SLICES (n=81)



DISCUSSION

Results overall

These results suggest that the hygiene of ready to eat, custard-containing cakes in the eastern region are generally satisfactory. For the majority of samples, excluding cannoli, 80% of the products tested demonstrated satisfactory or marginal SPC results. Most of the cannoli sampled were also satisfactory or marginal for SPC, and these products were assessed against level 2 criteria (2). Approximately 90% of all samples were satisfactory or marginal for Enterobacteriaceae.

Potential pathogens such as *B.cereus, Salmonella* spp. and CPS were also rarely isolated from these products. Only 2% of the total products tested had unsatisfactory or potentially hazardous of *B.cereus*, and these findings could not be correlated to any manufacturing practice identified in the questionnaire. *Bacillus* spp., as spore forming organisms, can be resistant to heat, desiccation, and some disinfectants. Where the levels of *B.cereus* were unacceptable or hazardous, the organisms may have contaminated the food from the environment, from dry ingredients used to produce

these foods, or the food may have been subjected to a temperature abuse that wasn't identified as part of this survey. The best prevention of foodborne illness with these organisms is the prevention of the growth of the organism to high numbers, and efficient cooking and cooling of foods to prevent growth.

CPS were isolated from only 2 samples (both vanilla slices) and both samples had levels that could be considered marginal according to the FSANZ guidelines. This suggests that, overall, food handlers used tools or gloves to handle the product appropriately.

Only products that were prepared using a raw egg custard were tested for *Salmonella* spp.: no *Salmonella* were isolated.

Individual products

When results are viewed for individual products some products demonstrated less than satisfactory SPC and EB results, suggesting that improvements in manufacturing hygiene for individual products would improve the food safety and/or the shelf life of these ready to eat foods (see Figures 2 – 7). Although the proportion of samples with unsatisfactory SPC may reflect relatively low sample numbers (eg fruit tarts, Figure 5) where large numbers of samples were taken for products with relatively high levels of unsatisfactory results (Figures 6 and 7), such as vanilla slices, improvements in the hygiene and safety of these foods appear warranted. Neither the final shelf life, other preparation factors for the vanilla slices nor the volume of the custard made could be related to high SPC nor EB levels in these products. However, the survey did not address questions of cleaning and sanitising practices in the food premises, or the level of training of staff in safely handling these foods. Further information regarding the premises that had unsatisfactory results for vanilla slices will be sought at the next regional food surveillance meeting.

The results presented here suggest that ready to eat custard products in the Eastern metropolitan region of Melbourne do not present a significant food safety risk to the consuming public, and the results obtained compare well with the findings of a recent NSW study including these products (4). However, outbreaks of foodborne illness with ready to eat custard-containing products have been reported in the past (4) and at the time of writing an outbreak of salmonellosis in South Australia linked to custard

containing products was underway although the source of that outbreak had not been fully identified[1]. Such events emphasise the importance of proper temperature control, hygienic processing and handling, and good cleaning in reducing risk associated with these foods.

REFERENCES

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[1] http://www.abc.net.au/news/stories/2011/02/09/3134554.htm?site=news