



BC Centre for Disease Control
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY

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Food Safety Contacts
Directors of Health Protection

Food Quality Sampling Program – 2005

Brief History of the Food Quality Sampling Program

The food quality sampling program has been available in BC for 15 years, since 1991. It was promoted by several current and past Medical Health Officers and Chief Public Health Inspectors, Andy Hazelwood (Ministry of Health), and Dr. John Angus Smith (formerly Provincial Laboratories, now BCCDC). The program is currently co-managed by Food Protection Services, BCCDC and the 5 Health Authority Directors of Health Protection. The laboratory component is managed by Dr. Judy Isaac-Renton, Laboratory Services, BCCDC.

The intent of the program was to allow a “market basket survey” of products available to consumers. More importantly it also allowed Environmental Health Officers (EHO's) to collate bacteriological results on food samples collected during inspections and to use bacteriological results for various purposes including food handling education.

The yearly reports on the Food Quality Sampling Program are designed to provide summary information to EHO's about “at risk” foods. The results are based on the foods sampled and submitted to the BCCDC Food Laboratory by EHO's.

EXECUTIVE SUMMARY

The results in this report are extracted from a newly implemented computerized data-base. For ease of interpretation the results are presented in log values. Under this new computer system 65 separate line item food categories, grouped into 17 broad categories are used to describe the foods.

35% of foods sampled failed to meet aerobic plate count sanitary guidelines; 4% failed to meet *E. coli* sanitary guidelines; and, as with previous years, foods failing to meet *S. aureus* sanitary guidelines were very low (0.4%). Cooked ready-to-eat foods failing to meet the aerobic sanitary guideline of less than log 5 (100,000 bacteria per gram) included casseroles and turkey. *E. coli* was detected in an array of cooked or pasteurized foods (chicken, pork, milk, ice cream mix), cooked prepared dishes (asian foods, casseroles, hummus and other ethnic foods) and higher levels were found in raw vegetables and salads.

EHO's made more use of pH and water testing in 2005, a total of 166 samples were submitted, up 57% over 2004. Twelve food items were identified as potentially hazardous, one of which (pumpkin pies) was assessed externally by the Bureau of Microbial Hazards (Ottawa) and found safe for room temperature storage.



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Computerization of the Food Quality Sampling Program

This report is compiled from data entered into the LIS (laboratory information system). During 2003 and 2004 a computerized data-base for the Food Quality program was created and the initial “go live” date was in October 2004. Previous to this hand-counting of results caused tedious and very limited information to be retrieved on food quality sampling results conducted in BC. Data entered through-out 2005 into the LIS now allows for more detailed and rapid analysis of information collected from the food quality samples submitted by EHO’s. The results presented in this report will be in a slightly different format from previous years: interpretative data will make up the bulk of the report and detailed summary data will be presented in tables in appendices.

Reporting Bacteriological Data in Food Samples as Log Values

Another change from previous years is the method for reporting bacterial counts. In the past, summaries have listed the colony forming units per gram (CFU/g) as whole counts. For this report bacterial counts are reported as base log₁₀ values.

This conversion has been applied to allow visually easier identification of significant results. The numbers reported relate directly to the exponent value of the bacterial count. For example, 7.3×10^6 and 7.3×10^2 , are reported as 6.86 and 2.86 respectively.

This change reflects the standard practice of reporting bacterial counts in the literature.

Table 1: Conversion of Bacterial Counts to Log Values

Numerical Value	Exponential value	Log value
1	1.0×10^0	0.0
10	1.0×10^1	1.0
100	1.0×10^2	2.0
1,000	1.0×10^3	3.0
10,000	1.0×10^4	4.0
100,000	1.0×10^5	5.0
1,000,000	1.0×10^6	6.0

Applying this conversion to the numerical values in the Sanitary Quality Guidelines¹ results in the log values listed below in Table 2.

Table 2: Sanitary Quality Guidelines for Ready to Eat Foods

Sanitary Guideline	Numerical Value	Log Value
Aerobic Plate Count (APC)	< 100,000 per gram	< 5.0
Total coliform Count (TC)	< 1000 per gram	< 3.0
Fecal coliform Count (FC)	< 3 per gram	< 0*
<i>Escherichia coli</i> Count (EC)	< 3 per gram	< 0*
<i>Staphylococcus aureus</i> Count (SA)	< 100 per gram	< 2

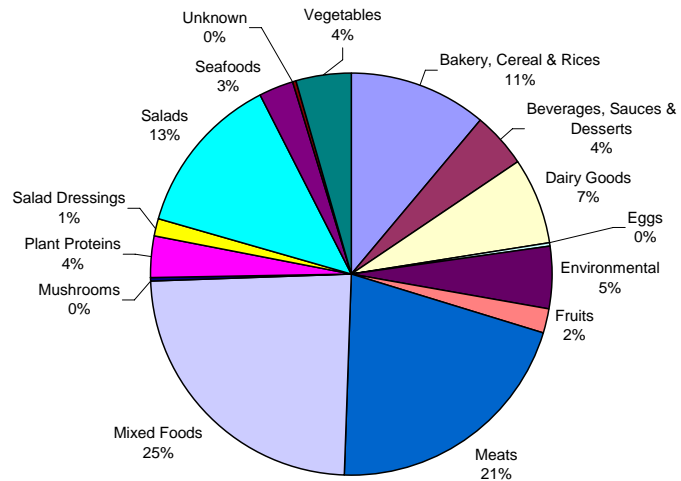
* The standard of less than 3 per gram reflects the detection limit of the test applied. For analysis purposes numerical values of <3 per gram were converted to 1, resulting in a log value of 0. It is important to state that this does not mean zero bacteria were detected. All log values reported as 0 can be interpreted as follows: APC log 0= \leq 5 CFU/g; TC, FC and EC log 0= \leq 3 CFU/g; SA log 0= \leq 10 CFU/g.

New Food Categories under the Food Quality Sampling Program

Chart 1a: Broad Category Breakdown of Raw and Cooked Foods Sampled in 2005

Food categories have also been expanded, currently there are 65 line item categories grouped into 17 broader category headings (see Appendix 1 for details). Chart 1a describes the broader category of foods collected in 2005.

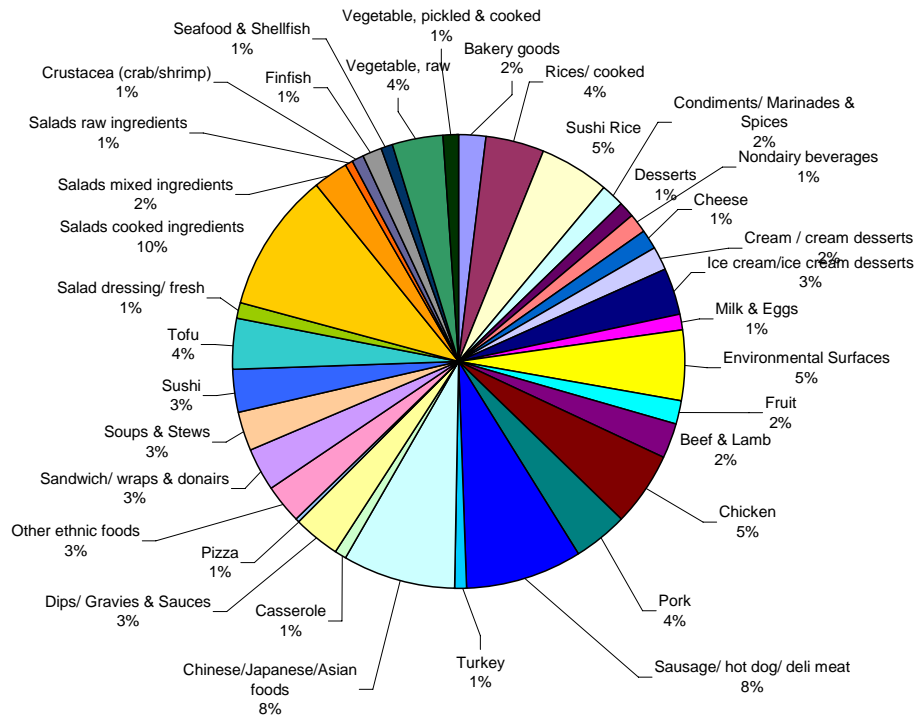
Broad Categories of Foods Sampled in the Food Quality Sampling Program, 2005



Grouping foods into practical categories is a challenge: most food attribution studies group foods by commodity (grain, dairy, meat) and source lot testing is done by commodity group. Outside of the food industry setting, however, foods items are rarely consumed in isolation, and are usually mixed into dishes (pizza, apple pie etc). Creating these categories was a challenge, and although based on a reference system², modifications were made to fit BC's ethnic diversity.

For 2005, sampled foods fell into 35 of the potential line item categories, as illustrated in the Chart 1b below. Any foods sampled on less than two occasions were grouped into another like category, for example, "Milk and Eggs" were pooled into a single category, likewise "Vegetables, pickled and cooked". The full breakdown of foods sampled is shown in Appendix 2.

Chart 1b: Line item Categories of Foods Sampled in the Food Quality Sampling Program, 2005



Summary of Bacteriological Results

In 2005, 587 food samples were submitted and tested, an 8% increase in the total number of samples tested in 2004. The sanitary quality guidelines are based on 5 indicator bacteria according to the guidelines listed in Table 2 above. Applying these criteria across all the food categories for all foods tested demonstrates failure to meet the guidelines as follows:

Aerobic Plate Count	35.1%
Total coliform Count	12.5%
Fecal coliform Count	10%
<i>E. coli</i> Count	4.0%
<i>S. aureus</i> Count	0.4%

Table 3: Percentage of foods failing to meet Sanitary Quality Guidelines

A detailed description of values obtained for all food categories in each of these guidelines is reported in Appendix 3a and 3b.

Descriptive Data: Where and Why Foods Sampled

The data collected under the new LIS reflects the information gathered from the Food Quality Sampling Requisitions filled out by EHO's. Items that can now be tracked include reasons for sampling and where EHO's collected samples for foods submitted under the Food Quality Program (see Charts 2a and 2b below). Most food quality samples were collected during routine surveillance from FSEs (food service establishments) and restaurants, with fewer samples taken in retail stores, processing plants, and institutions (schools, hospitals and long term care facilities (LTCF)). One major purpose of the Food Quality Sampling program is to provide EHO's with an opportunity to assess foods in response to complaints, when improper food handling is witnessed, and for targeted sampling of suspected potentially hazardous foods.

Chart 2a: Sampling Reasons for foods submitted by EHOs

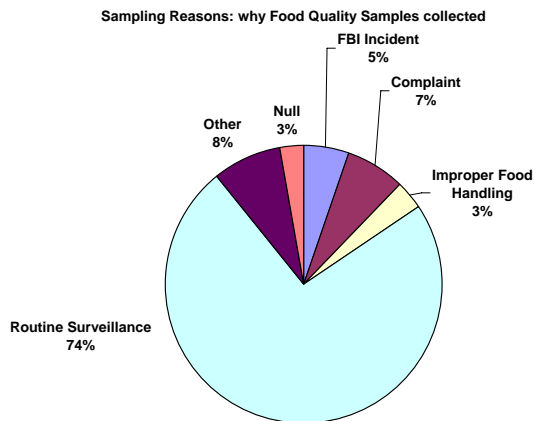
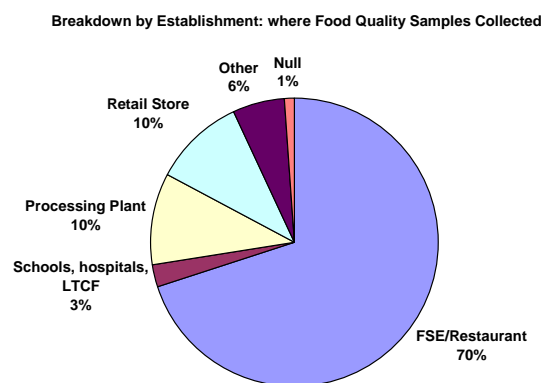


Chart 2b: Establishments where foods sampled by EHOs



In the future, tracking of these items should allow for assessment of trends in where food quality sampling is focused.

Aerobic Plate Counts

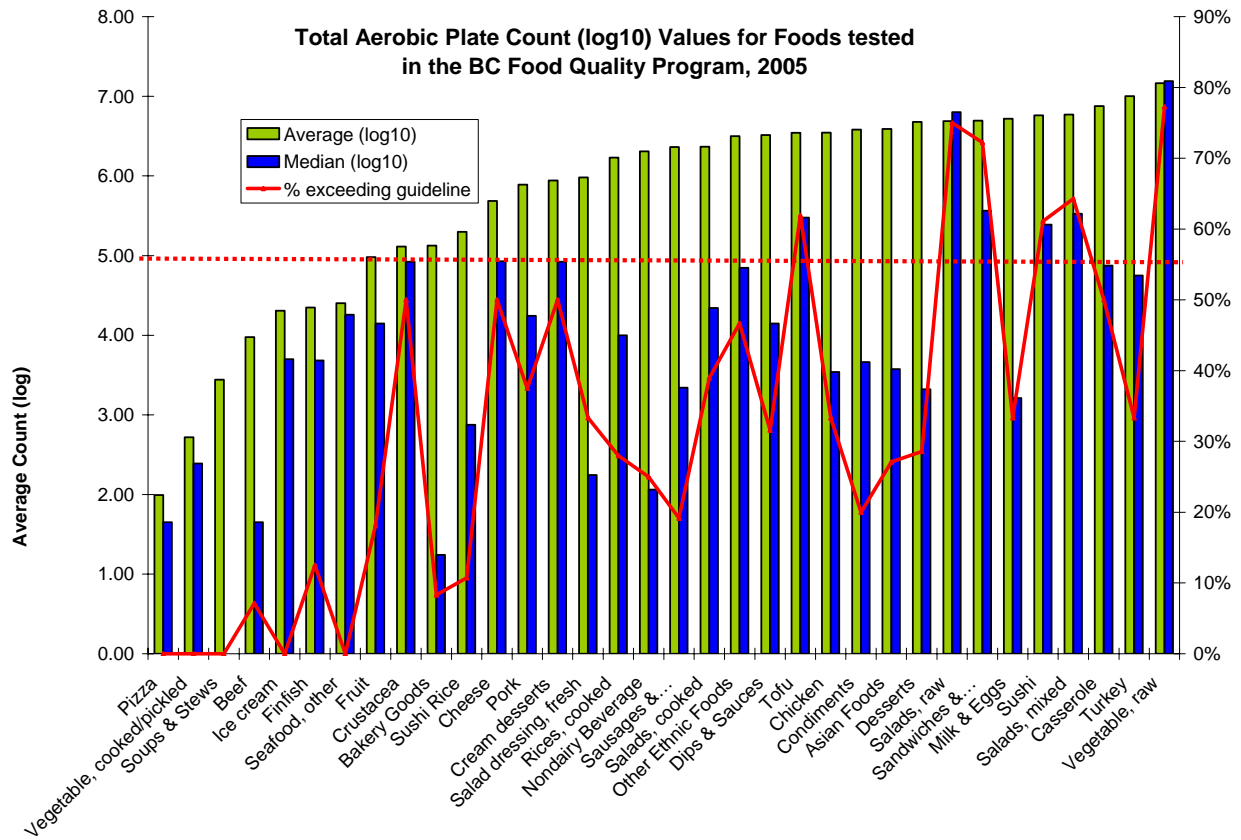
The top 5 food categories exceeding Aerobic Plate Count guidelines (greater than 10^5 CFU per gram or, > log 5) are sushi, mixed salads, casseroles, turkey and raw vegetables. It's surprising that 2 of these categories are sourced from cooked ready to eat foods (turkey and casseroles). In Chart 3, line item food categories are sorted by highest average aerobic plate count (median results and percentage failing to meet this sanitary guideline are also shown). The red line indicates the percentage of foods failing to meet the standard in each category; expected to be high are raw salads and raw vegetables, however, 72% of sandwiches also failed to meet this guideline, likely because of salad vegetable (for eg, lettuce or tomato in the sandwich) contributing to high background bacterial levels (refer to Appendix 3a for details).

Aerobic Plate Count (APC) as an Indicator also known as

- Heterotrophic plate count (HPC)
- Total plate count (TPC)
- Aerobic colony count (ACC)
- Aerobic mesophilic count

Purpose: The aerobic plate count gives the total number of bacteria able to grow in an oxygenated or aerobic environment. Cooked foods should have little to no bacteria present; this result provides a guide for shelf-life of foods – the higher the count, the more likely the foods have been stored for too long, or inadequately cooked. This is not a useful indicator for fermented foods (which have naturally occurring high levels of bacteria), or fresh ready-to-eat raw fruits and vegetables, which also have naturally occurring high levels of bacteria present.

Chart 3: Average and Median Total Aerobic Plate Counts for Foods (by Line Item Category)



E. coli Results

E. coli (the best indicator of fecal contamination) was detected in both cooked and raw ready-to-eat foods (refer to Table 4 and Chart 4).

E. coli was detected in raw vegetables, such as parsley and green onions on several occasions; in fresh salads (coleslaw), as well as cooked salads (macaroni), and dips (hummus). Surprisingly, cooked foods accounted for the majority of detections, such as in moussaka, chicken cannelloni, minced pork, sticky rice and sweet & sour pork dishes. *E. coli* was also detected in one ice cream mix and sheep milk collected directly from the processing plant.

E. coli as an Indicator

E. coli is in the family *Enterobacteriaceae*. Enteric bacilli (rods) from this family are in part characterized by the fermentation of **glucose**. Glucose fermenters of interest in this family include *Salmonella* and *Shigella*. *E. coli* is also called a fecal coliform (and is a **lactose** fermenter). There are four groups of fecal coliforms:

- *Enterobacter*
- *Klebsiella*
- *Escherichia*
- *Citrobacter*

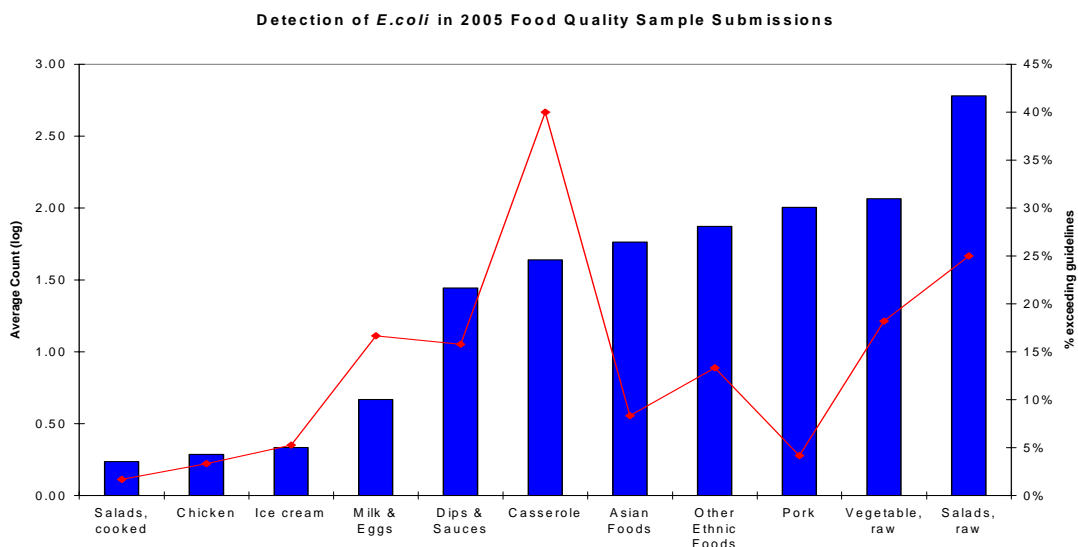
It is important to remember that many fecal coliforms are found not only in the gut of warm blooded mammals, but also in the gut of insects and reptiles, and therefore become part of the natural soil microbial flora. For this reason, discussion of total & fecal coliform results in foods sampled have been eliminated in this report (results are summarized in Appendices 3a and 3b).

E. coli is the **best indicator of fecal sanitation problems**.

Table 4: Detection of *E. coli* in Food Quality Sample Submissions in 2005

Food Category	Number of Samples	Average Counts (log10)	# exceeding guideline	% exceeding guideline
Asian Foods	48	1.76	4	8.3
Casserole	5	1.64	2	40.0
Chicken	30	0.29	1	3.3
Dips & Sauces	19	1.44	3	15.8
Ice cream	19	0.33	1	5.3
Milk & Eggs	6	0.67	1	16.7
Other Ethnic Foods	15	1.87	2	13.3
Pork	24	2.00	1	4.2
Salads, cooked	59	0.24	1	1.7
Salads, raw	4	2.78	1	25.0
Vegetable, raw	23	2.06	4	18.2

Chart 4: Detection of *E. coli* in Food Quality Sample Submissions in 2005



S. aureus Results

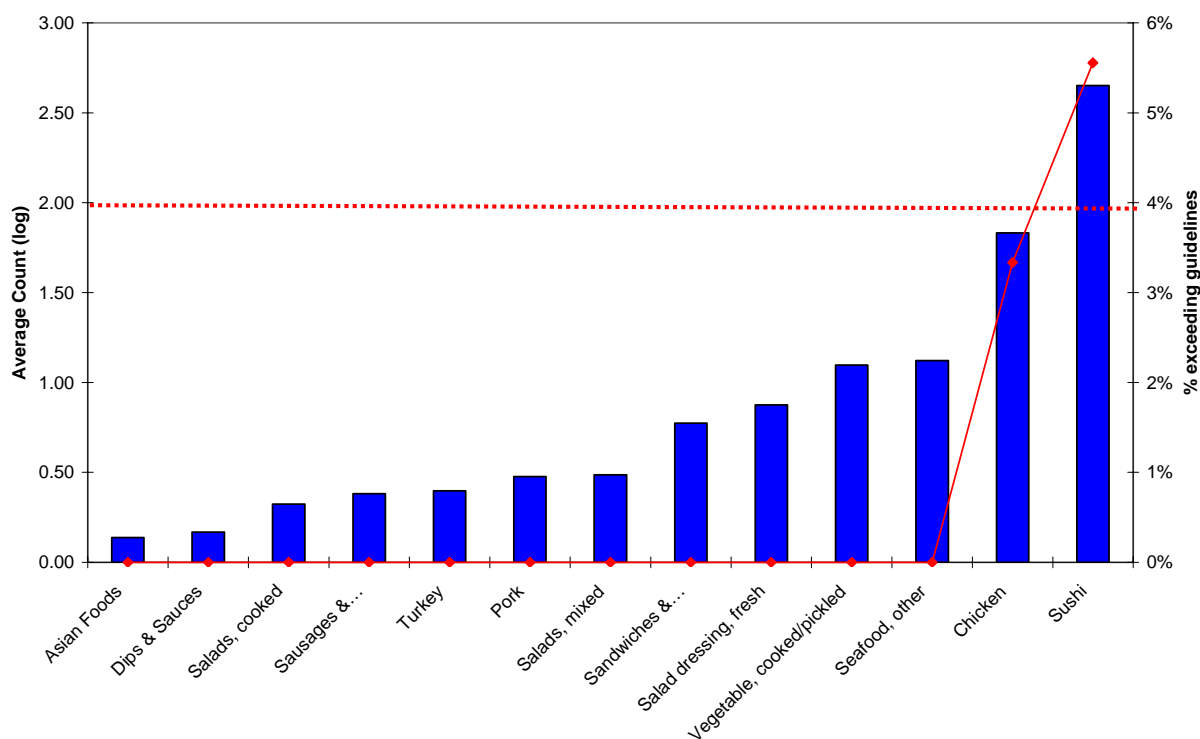
Only 2 samples exceeded the guideline of 100 *S. aureus* CFU per gram ($> \log 2$), a sample of barbequed chicken and a California roll prepared with imitation crab meat. Smaller numbers of *S. aureus* were also detected in other food groups as depicted in Chart 5.

Table 5: Detection of *S. aureus* in Food Quality Sample Submissions in 2005

Food Category	Number of Samples	Average Counts (log10)	# exceeding guideline	% exceeding guideline
Asian Foods	48	0.14	0	0.0%
Bakery Goods	11	0.00	0	0.0%
Chicken	30	1.83	1	3.3%
Dips & Sauces	19	0.17	0	0.0%
Pork	24	0.48	0	0.0%
Salad dressing, fresh	7	0.88	0	0.0%
Salads, cooked	59	0.32	0	0.0%
Salads, mixed	14	0.49	0	0.0%
Sandwiches &...	18	0.77	0	0.0%
Sausages &...	47	0.38	0	0.0%
Seafood, other	3	1.12	0	0.0%
Sushi	18	2.65	1	5.6%
Turkey	6	0.40	0	0.0%
Vegetable, cooked/pickled	3	1.10	0	0.0%

Chart 5: Detection of *S. aureus* in Food Quality Sample Submissions in 2005

Detection of *S. aureus* in 2005 Food Quality Sample Submissions



Water Activity and pH Results

There were a total of 166 pH and water activity tests conducted on foods submitted during 2005, an increase of 57% over the number of samples submitted in 2004. Paired results for foods receiving both pH and water activity tests are shown in Table 6, with detailed results for all testing shown in Appendices 4a and 4b.

General guidelines are that foods should either be acidified (below pH 4.6) and/or have reduced water activity (below 0.85) before they are considered safe to store at room temperature. If the foods fail to meet the criteria they are considered potentially hazardous foods (PHFs). Cured meat products are also acceptable when meeting the following criteria³:

<i>Cured meat products are shelf stable at room temperature when these conditions are met</i>	pH	Aw
	< 4.6	> 0.9
	> 5.4	< 0.85
	< 5.4	< 0.9

Most of the items in Table 6 fail to meet these criteria and are considered PHFs (result highlighted in pink columns). These foods should either be refrigerated, stored at room temperature for only short periods, or investigated further in terms of their processing and risk. One item investigated in 2005 was the safety of room temperature storage of commercially prepared pumpkin pies. A request was sent to the Bureau of Microbial Hazards in Ottawa to assess the safety of this product. The result of the assessment considered these products safe for room temperature storage because of the nature of the product (filling was properly canned to eliminate risks of pathogens, and crust was baked and pies assembled in commercial setting); notification of this assessment was circulated to BC's Food Safety contacts⁴.

Table 6: pH and Aw results for selected Food Quality sample submissions, 2005

Food Description	No. of samples	pH		Water Activity (Aw)			PHF (yes or no)
		pH <4.6	pH >4.6	Aw <0.85	Aw >0.85 <0.9	Aw >0.9	
Antipasto	1		1			1	Yes
Beef jerky / Back fat	3		3	3			No
Canned mincemeat	1	1				1	No
Cheeses	5		5			5	Yes
Crab meat	1		1			1	Yes
Fried onions in oil	1		1	1			No
Pepperoni	5		5	1		4	4 Yes 1 No
Prosciutto	1		1	1			No
Pumpkin pies	2		2			2	Yes
Rice cakes	8		8			8	Yes
Salami	3		3**	1	1	1	1 Yes 2 No
Sausage Roll	1		1			1	Yes
Sausages	6		6	1		5	5 Yes 1 No
Smoked fish	4		4			4	Yes
Smoked pork	5		5	5			No
Sushi	1		1			1	Yes
Sushi Rice	2		2			2	Yes

** one sample met further criteria of pH >5.4 with Aw <0.85

Special Pathogen Testing

Occasionally, EHO's make special requests for further testing on foods suspected of being contaminated with specific pathogens such as *Salmonella*, *Clostridium perfringens*, *E. coli* 0157 and *Bacillus cereus*. In 2005, 69 specific pathogen tests were conducted. In 21 of these tests, no pathogens were detected in any of the tests on foods for *Listeria monocytogenes*, *Salmonella* and *Clostridium perfringens*. These foods included cheeses, meats, fish, tofu and milk.

Chart 6: Detection of *B. cereus* in Food Quality Sample Submission in 2005

The remaining 44 tests were in a variety of foods assessing the presence of *Bacillus cereus*. Overall, 34% of all the foods tested contained this potential pathogen. Just over half of the foods positive for *B. cereus* were greater than log 2 (*B. cereus* has been given the same sanitary guideline as *S. aureus*). One investigation involving strawberries led to a broader surveillance of this product in the Spring of 2006 (reported elsewhere)⁵. A detailed summary of special pathogen testing is located in Appendix 5.



The Food Quality Sampling Program continues to provide EHOs with an important tool in educating operators on the hazards associated with poor food handling practices. Special thanks to our Food Laboratory, the computer programming consultants who created this LIS (Michael Zacharias and Doug Ruissard) and to all the EHOs that have participated in this program. Should you have any questions on this report, please do not hesitate to contact me at (604) 775-0763.

Yours truly,

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Judy Isaac-Renton
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2. Fraser, AM, CA Sawyer, SA Andrews, JP Youatt, and P Kirkwood. 1995. A Food Classification Scheme to Summarize Epidemiological Patterns of Food-borne Illness. *Dairy, Food and Environmental Sanitation* 15(5):292-300.
3. Green, P. David. 2005. Canadian Food Inspection Agency and BC Centre for Disease Control. Processed Meat Training CD Manual, v1.0.1 CFIA Animal Products Program Network - West, Victoria, BC, Canada
4. Safety of Packaged Commercial Pumpkin Pies Sold at Room Temperature. Sent by e-mail to FS Contacts November 30, 2005
5. Strawberry Surveillance Study, 2006. Sent by e-mail to FS Contacts May 5, 2006

Appendix 1: Food Category Listings

Category	Description	Category	Description	
1. Bakery, Cereals & Rices	Bakery Goods	9. Mixed Foods	Casserole	
	Cereal		Chinese / Japanes/ Asian Foods	
	Potatoes		Dips, Gravies & Sauces	
	Rices, cooked		East Indian Foods	
	Sushi Rice		Italian Foods	
2. Beverages, Desserts & Sauces	Carbonated beverages		10. Mushrooms	Mushrooms - domestic
	Condiments, Marinades & Spices			Mushrooms - wild
	Desserts			
	Nondairy beverages			
	Snacks / Candy			
3. Chemicals	Caustic chemicals		11. Plant Proteins	Legumes
	Heavy metals	Nuts & Seeds		
	Organic chemicals	Tofu		
	Other chemicals			
4. Dairy Goods	Butter	12. Salad Dressing	Salad dressing - commercial	
	Cheese			
	Cream / cream desserts	Salad Dressing - fresh		
	Ice cream / ice cream desserts			
	Milk			
	Other dairy			
5. Eggs	Eggs	13. Salads	Salads – cooked ingredients	
			Salads – mixed ingredients	
			Salads – raw ingredients	
6. Environmental	Surface & Physical samples (swabs, sponges)	14. Seafoods	Crustacean	
			Finfish	
			Seafood, other	
			Shellfish	
7. Fruits	Fruit juice	15. Unknown	Unknown	
	Fruit salad			
	Fruit			
8. Meats	Beef	16. Vegetables	Vegetable – cooked	
	Chicken		Vegetable – juice	
	Lamb		Vegetable – pickled	
	Pork		Vegetable - raw	
	Sausage, hot dog, deli meat			
	Turkey			
	Wild game			
		17. Water	Water – bottled	
			Water - ice	
			Water - liquid	

Appendix 2: Category Breakdown for Food Quality Sample Submission in 2005

Category	Sub-category Description	No. Tested
Baked Goods, cereals, rices	Bakery goods Count	11
	Potatoes Count	1
	Rices / cooked Count	25
	Sushi Rice Count	28
Beverages, Desserts & Sauces	Condiments / Marinades & Spices Count	10
	Desserts Count	6
	Nondairy beverages Count	7
	Snacks / Candy Count	2
Dairy Goods	Cheese Count	8
	Cream / cream desserts Count	10
	Ice cream / ice cream desserts Count	19
	Milk Count	4
Eggs	Eggs Count	2
Environmental	Environmental Surface & Physical Count	29
Fruits	Fruit Count	11
	Fruit juice Count	1
Meat	Beef Count	13
	Chicken Count	30
	Lamb Count	1
	Pork Count	24
	Sausage / hot dog / deli meat Count	47
	Turkey Count	6
Mixed Foods	Casserole Count	5
	Chinese / Japanese / Asian foods Count	48
	Dips / Gravies & Sauces Count	19
	East Indian food Count	2
	Italian foods Count	13
	Pizza Count	3
	Sandwich / Wraps & Donairs Count	18
	Soups & Stews Count	16
	Sushi Count	18
Mushrooms	Mushroom–domestic Count	1
Plant Proteins	Tofu Count	21
Salad Dressing	Salad dressing / fresh Count	7
Salads	Salads cooked ingredients Count	59
	Salads mixed ingredients Count	14
	Salads raw ingredients Count	4
Seafood	Crustacea (crab/shrimp) Count	5
	Finfish Count	8
	Seafood / other Count	3
	Shellfish (clam/oyster) Count	1
Unknown	Unknown (crackling) Count	1
Vegetables	Vegetable COOKED Count	1
	Vegetable PICKLED Count	2
	Vegetable RAW Count	23

Appendix 3a: Average, Median and Percentage of Foods Exceeding Guidelines for Aerobic Plate Count, *E. coli* and Total Coliform Count

Line Item Food Category	No. in category	Aerobic Plate Count				<i>E. coli</i> Count				Total Coliforms Count			
		Average (log10)	Median (log10)	no. exceeding guideline	% exceeding guideline	Average (log10)	Median (log10)	no. exceeding guideline	% exceeding guideline	Average (log10)	Median (log10)	no. exceeding guideline	% exceeding guideline
Asian Foods	48	6.59	3.57	13	27%	1.76	0	4.00	8.3%	2.55	0	8	16.7%
Bakery Goods	11	5.13	1.24	1	8%	0.00				0.00			
Beef	14	3.98	1.65	1	7%	0.00	0	0.00	0.0%	1.02	0	0	0.0%
Casserole	5	6.88	4.88	2	50%	1.64	0	2.00	40.0%	1.72	0.85	0	0.0%
Cheese	8	5.68	4.93	4	50%	0.00				0.00			
Chicken	30	6.54	3.54	10	33%	0.29	0	1.00	3.3%	2.56	0	5	16.7%
Condiments	10	6.58	3.66	2	20%	0.00				2.60	0	2	20.0%
Cream desserts	10	5.94	4.92	5	50%	0.00				2.68	0	2	20.0%
Crustacea	5	5.11	4.92	2	50%	0.00				1.23	0	0	0.0%
Desserts	7	6.68	3.32	2	29%	0.00				1.87	0	0	0.0%
Dips & Sauces	19	6.51	4.15	6	32%	1.44	0	3.00	15.8%	2.51	0	3	15.8%
Finfish	8	4.35	3.68	1	13%	0.00				1.14	0	0	0.0%
Fruit	11	4.98	4.15	2	18%	0.00				2.34	0	1	9.1%
Ice cream	19	4.31	3.70	0	0%	0.33	0	1.00	5.3%	0.72	0	0	0%
Milk & Eggs	6	6.72	3.21	2	33%	0.67	0	1.00	16.7%	2.60	0	1	16.7%
Nondairy beverages	8	6.31	2.06	2	25%	0.00				1.56	0	0	0%
Other Ethnic Foods	15	6.50	4.85	7	47%	1.87	0	2.00	13.3%	3.04	2.66	7	46.7%
Pizza	3	1.99	1.65	0	0%	0.00				0.00			
Pork	24	5.89	4.24	9	38%	2.00	0	1.00	4.2%	2.36	0	2	8.3%
Rices, cooked	25	6.23	4.00	7	28%	0.00				2.61	0	4	16.0%
Salad dressing, fresh	6	5.98	2.24	2	33%	0.00				0.00			
Salads, cooked	25	6.37	4.34	23	39%	0.24	0	1.00	1.7%	2.47	0.60	7	11.9%
Salads, mixed	14	6.77	5.53	9	64%	0.00				2.65	1.92	2	14.3%
Salads, raw	4	6.69	6.80	3	75%	2.78	0	1.00	25.0%	3.06	3.04	3	75.0%
Sandwiches &...	18	6.69	5.56	13	72%	0.00				2.44	0.40	2	11.1%
Sausages &...	47	6.36	3.34	9	19%	0.00				0.07	0	0	0.0%
Seafood, other	4	4.40	4.26	0	0%	0.00				1.49	1.18	0	0.0%
Soups & Stews	16	3.44	0.00	0	0%	0.00				0.23	0.00	0	0.0%
Sushi	18	6.76	5.39	11	61%	0.00				2.78	1.83	5	27.8%
Sushi Rice	28	5.30	2.88	3	11%	0.00				0.80	0	0	0.0%
Tofu	21	6.54	5.48	13	62%	0.00				2.47	0.95	2	9.5%
Turkey	6	7.00	4.75	2	33%	0.00				2.61	0.70	1	16.7%
Vegetable, cooked/pickled	6	2.72	2.39	0	0%	0.00				0.00			
Vegetable, raw	22	7.17	7.19	17	77%	2.06	0	4.00	18.2%	2.98	2.54	8	36.4%

Appendix 3b: Average, Median and Percentage of Foods Exceeding Guidelines for Fecal coliform Count, and <i>S. aureus</i> Count									
Line Item Food Category	No. in category	Fecal Coliforms				<i>Staphylococcus aureus</i>			
		Average (log10)	Median (log10)	no. exceeding guideline	% exceeding guideline	Average (log10)	Median (log10)	no. exceeding guideline	% exceeding guideline
Asian Foods	48	1.77	0	5	10.4%	0.14	0	0	0.0%
Bakery Goods	12	1.27	0	1	8.3%	0.00			
Beef	14	0.00				0.00			
Casserole	4	0.18	0	1	25.0%	0.00			
Cheese	8	0.00				0.00			
Chicken	30	1.11	0	3	10.0%	1.83	0	1	3.3%
Condiments	10	0.51	0	1	10.0%	0.00			
Cream desserts	10	0.72	0	1	10.0%	0.00			
Crustacea	5	0.00				0.00			
Desserts	7	0.00				0.00			
Dips & Sauces	19	2.12	0	3	15.8%	0.17	0	0	0.0%
Finfish	8	0.00				0.00			
Fruit	11	0.00				0.00			
Ice cream	19	0.33	0	1	5.3%	0.00			
Milk & Eggs	6	0.67	0	1	16.7%	0.00			
Nondairy Beverage	8	0.30	0	1	12.5%	0.00			
Other Ethnic Foods	15	2.57	0	7	46.7%	0.00			
Pizza	3	0.00				0.00			
Pork	24	2.10	0	5	20.8%	0.48	0	0	0.0%
Rices, cooked	25	1.49	0	5	20.0%	0.00			
Salad dressing, fresh	6	0.00				0.88	0	0	0.0%
Salads, cooked	25	0.36	0	4	6.8%	0.32	0	0	0.0%
Salads, mixed	14	0.20	0	1	7.1%	0.49	0	0	0.0%
Salads, raw	4	2.78	0	1	25.0%	0.00			
Sandwiches &...	18	0.43	0	2	11.1%	0.77	0	0	0.0%
Sausages &...	47	0.00				0.38	0	0	0.0%
Seafood, other	4	0.00				1.12	0	0	0.0%
Soups & Stews	16	0.00				0.00			
Sushi	18	1.79	0	1	5.6%	2.65	0	1	5.6%
Sushi Rice	28	0.03	0	1	3.6%	0.00			
Tofu	21	0.06	0	1	4.8%	0.00			
Turkey	6	0.90	0	1	16.7%	0.40	0	0	0.0%
Vegetable, cooked/pickled	6	0.00				1.10	0	0	0.0%
Vegetable, raw	22	2.36	0	5	22.7%	0.00			

Appendix 4a. Summary of Water Activity Results for Foods Tested in 2005

Line Item Food Category (food names indicated in brackets when n=1)	Number tested	< 0.85	> 0.85 < 0.9	> 0.9
Bakery goods (sausage rolls)	1			1
Beef	2	2		
Cheese	7		1	6
Condiments	2		1	1
Crustacea (crab meat)	1			1
Desserts	3			3
Finfish	4			4
Pork (smoked)	9	9		
Cooked Rice (rice cakes)	8			8
Salad, crab	1			1
Sausage, hot dogs, deli meats	31	8	2	21
Snacks/candy (energy bar)	1	1		
Sushi Rice	3			3
Vegetables, cooked (fried onions in oil)	1	1		

Appendix 4b. Summary of pH Results for Foods Tested in 2005

Line Item Food Category (food names indicated in brackets when n=1)	Number tested	< 4.6	> 4.6
Asian foods (udon noodles)	1	1	
Bakery goods (sausage rolls)	1		1
Beef (beef jerky)	1		1
Casserole (chicken curry)	1	1	
Cheese	5		5
Condiments	2		2
Cream	1	1	
Crustacea (crab meat)	1		1
Desserts (pumpkin pies)	3		3
Finfish	4		4
Mushrooms (marinated)	1	1	
Nondairy beverages (strawberry ginko)	1	1	
Pork (smoked)	5		5
Rice, cooked (rice cakes)	8		8
Salad dressings, fresh	4	4	
Salads, cooked	2		2
Sausage, hot dogs, deli meats	19	1	18
Sushi (crab meat with mayo)	1		1
Sushi Rice	24	18	6
Vegetables, cooked (fried onions in oil)	1		1
Vegetables, pickled	2	2	
Vegetables, raw (carrot pate)	1	1	

Appendix 5: Special Pathogen Testing for Foods Tested in 2005

Line Item Food Category (food names indicated in brackets when n=1)	Number tested	Pathogen	Not detected (L10 CFU/g)	Detected
Dessert (Mango tapioca cup)	2	<i>C. perfringens</i>	2	
Asian Foods (bean curd)	1	<i>L. monocytogenes</i>	1	
Beef (beef jerky)	1	<i>L. monocytogenes</i>	1	
Cheese	5	<i>L. monocytogenes</i>	5	
Finfish	2	<i>L. monocytogenes</i>	2	
Milk (sheep milk)	1	<i>L. monocytogenes</i>	1	
Sausage & Pepperoni	2	<i>L. monocytogenes</i>	2	
Tofu	7	<i>L. monocytogenes</i>	7	
Turkey	2	<i>L. monocytogenes</i>	2	
Bakery goods (egg tart)	1	<i>Salmonella</i>	1	
Milk (sheep milk)	1	<i>Salmonella</i>	1	
Beef (beef jerky)	1	<i>B. cereus</i>		1
Cheese	5	<i>B. cereus</i>	5	
Asian Foods	7	<i>B. cereus</i>	5	2
Desserts (Mango tapioca cup)	2	<i>B. cereus</i>	2	
Fruits (strawberries)	14	<i>B. cereus</i>	5	9
Milk (sheep milk)	1	<i>B. cereus</i>	1	
Pork (fried pork)	1	<i>B. cereus</i>	1	
Rice, cooked	4	<i>B. cereus</i>	3	1
Rice, sushi	3	<i>B. cereus</i>	2	1
Sausages &...(pepperoni)	1	<i>B. cereus</i>	1	
Snacks & Candy (sugar)	1	<i>B. cereus</i>	1	
Sushi Roll	1	<i>B. cereus</i>	1	
Vegetables, raw (lettuce)	3	<i>B. cereus</i>	2	1