

# Food Quality Check Program (FQC) Report for 2008

*Environmental Microbiology*  
*BCCDC Public Health Microbiology and Reference Laboratory*  
*PHSA Laboratories*

October 2009

# Food Quality Check Program

## HISTORY:

- Began in 1991
- Funded by BCCDC Public Health & Reference Laboratory's Environmental Microbiology Program
- Co-managed by BCCDC's Environmental Microbiology Program and Food Protection Services together with the five Health Authority Directors of Health Protection

# Food Quality Check Program

## INTENT:

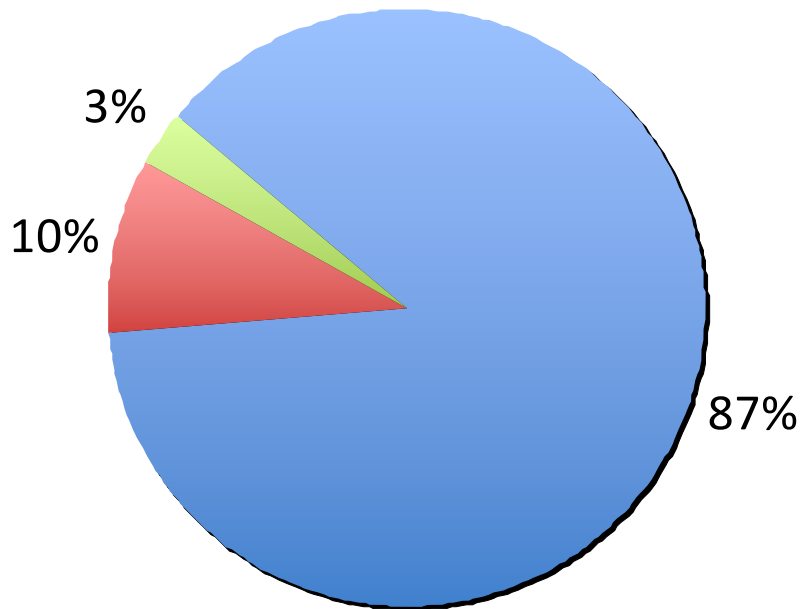
- A tool for Environmental Health Officers (EHO's)
- To educate food handlers about the hazards associated with poor food handling and sanitation
- To follow up observed infractions or foodborne complaints or illnesses by collecting food or environmental samples
- Provides a “market basket survey” of products available to consumers

# Food Quality Check Program

NOT INTENDED TO BE USED FOR:

- Surveillance
- Policy advice and decisions
- Trend analysis

# Summary of FQC Sample Types Collected in 2008

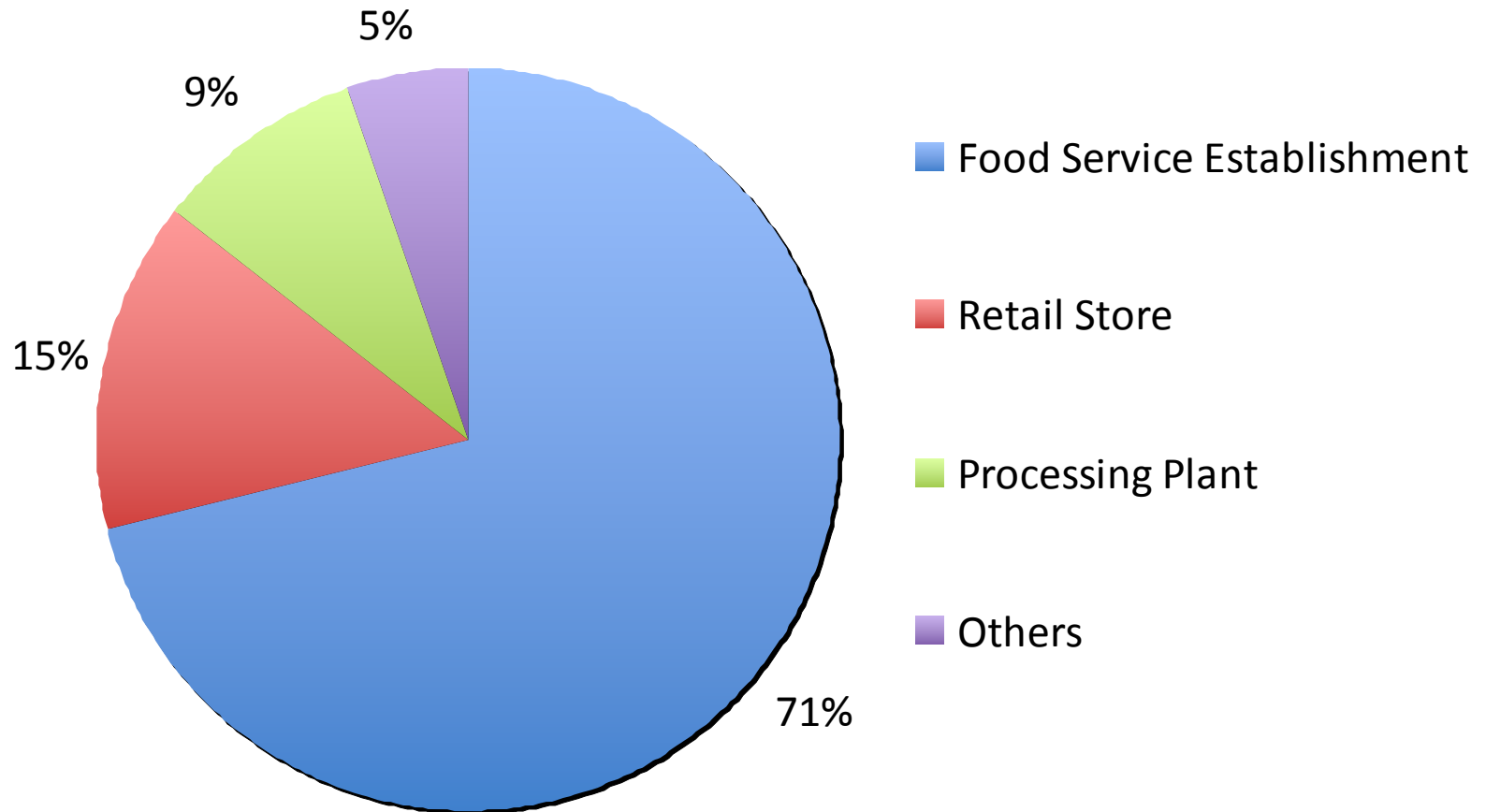


Three Sample Types:

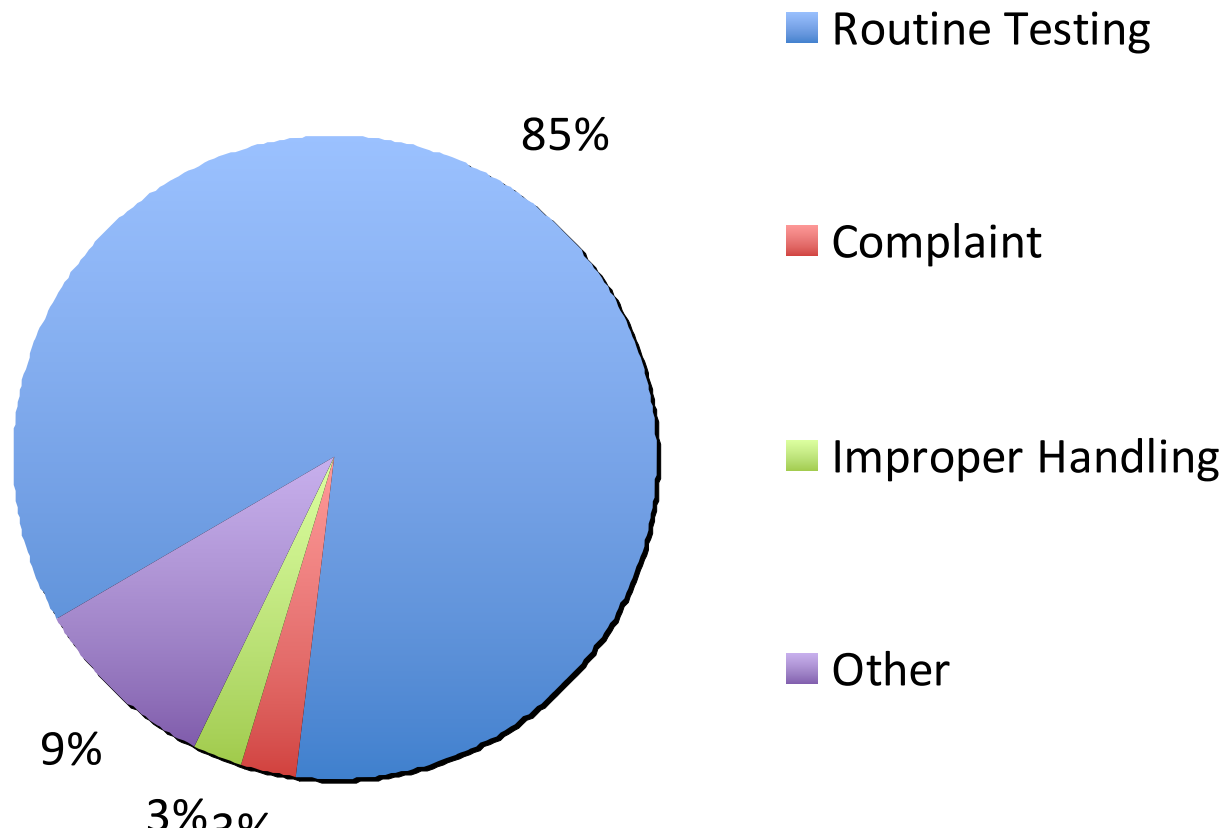
- -A. Cooked and Ready-to-Eat Food
- B. Raw and Ready-to-Eat Food
- C. Environmental Swabs for Microbial Analyses

**Food Quality Check:**  
**A. Cooked Ready-to-Eat Foods**

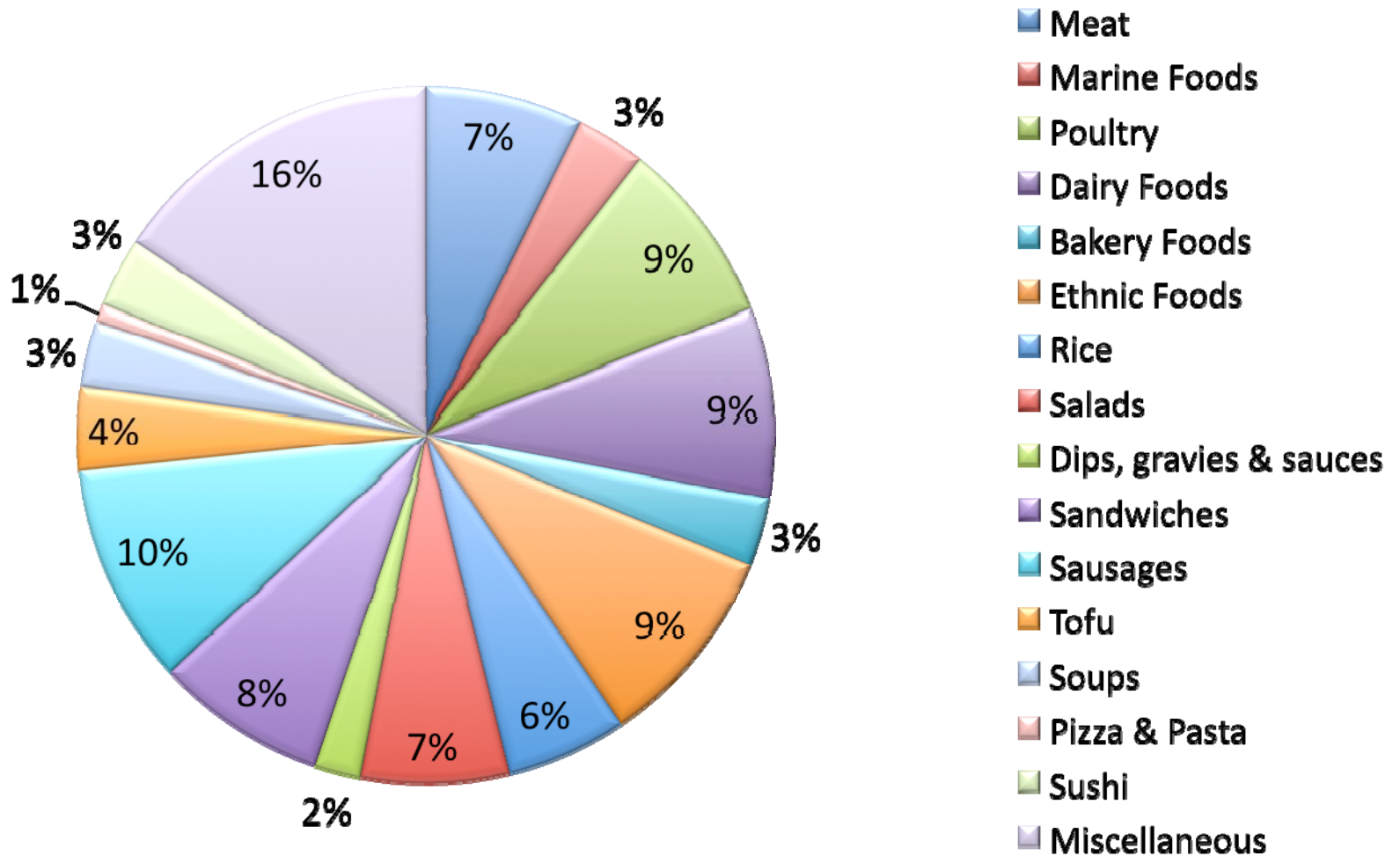
# Sampling Locations for Cooked Ready-to-Eat Foods



# Sampling Reasons for Cooked Ready-to-Eat Foods

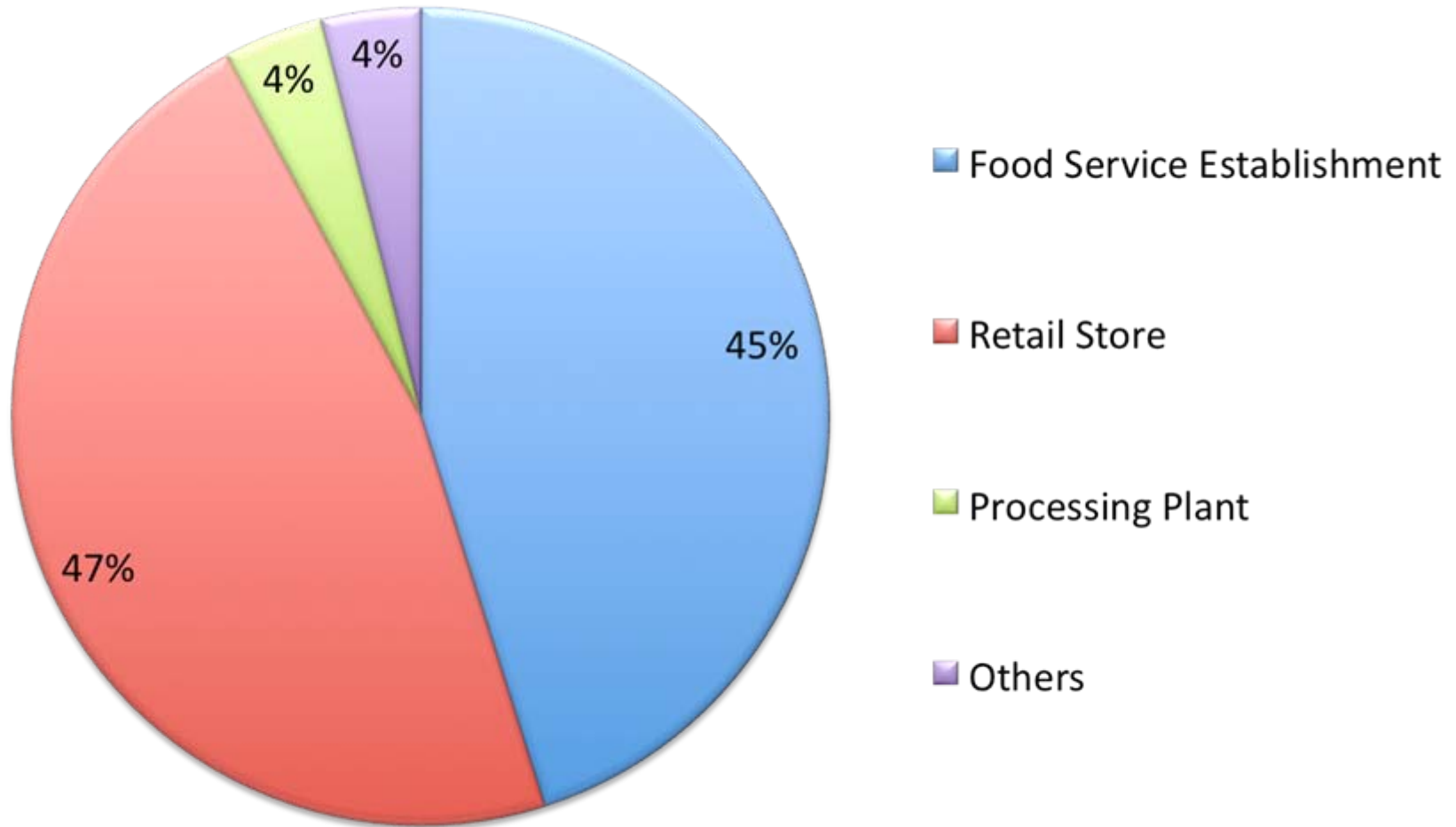


# Breakdown of Cooked Ready-to-Eat Food Samples

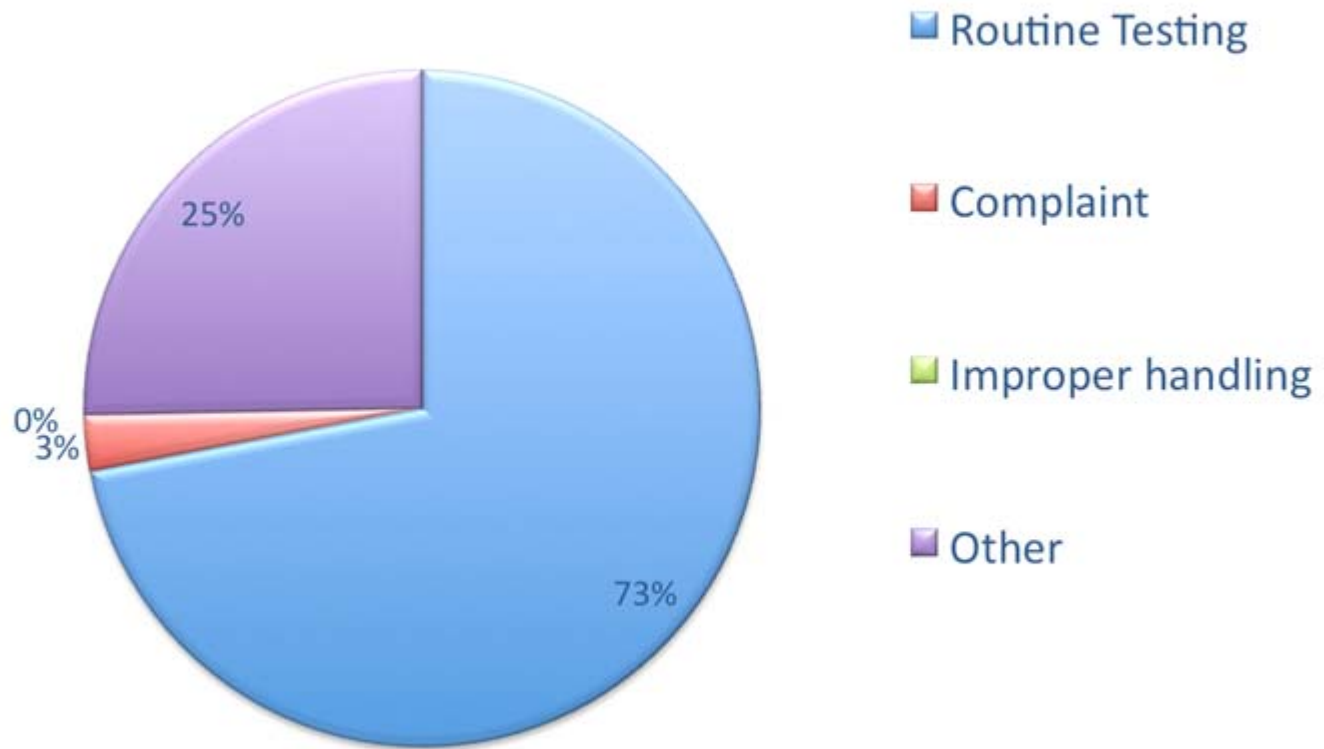


**Food Quality Check:**  
**B. Raw Ready-to-Eat Foods**

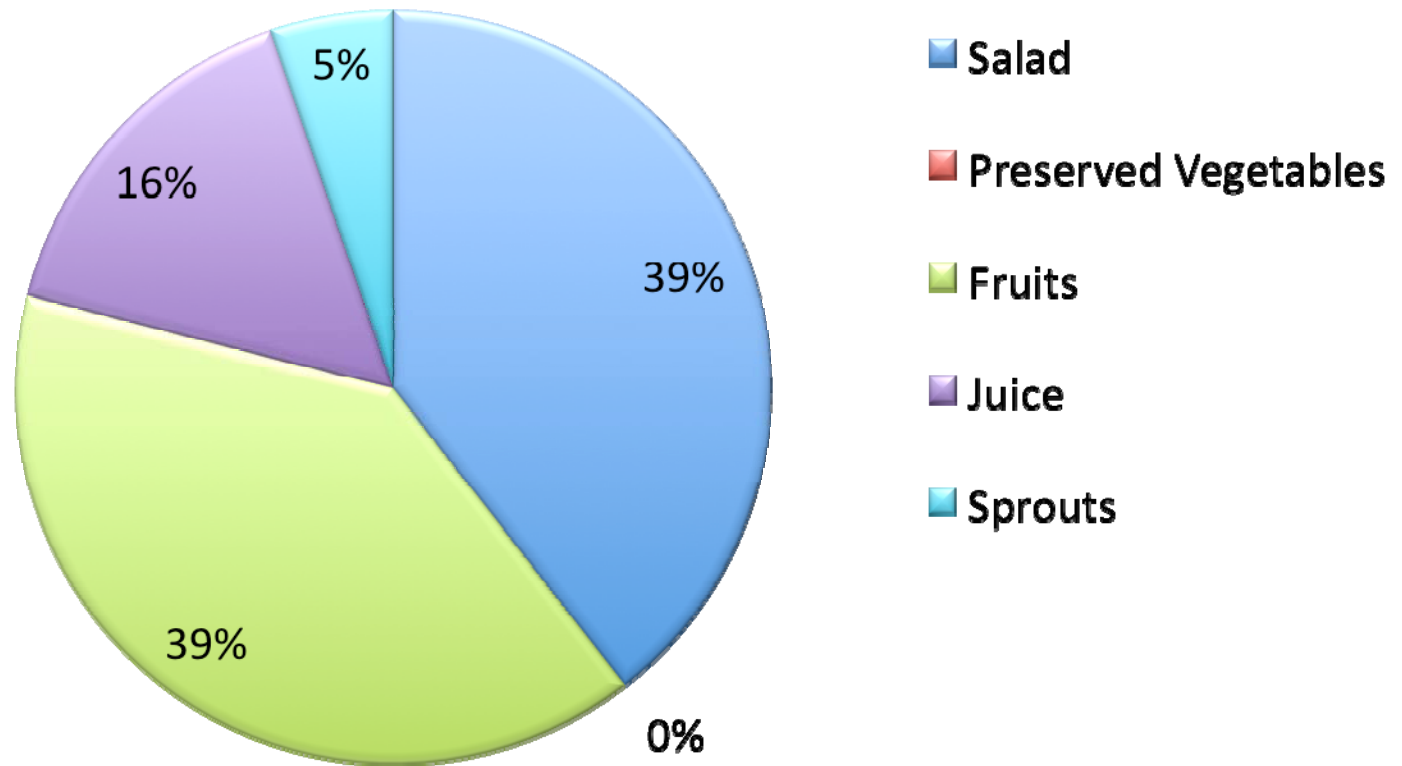
# Sampling Locations For Raw Ready-to-Eat Foods



# Sampling Reasons for Raw Ready-to-Eat Foods



# Breakdown of Raw Ready-to-Eat Food Samples



# **Food Quality Check:**

## **C. Microbial Analyses**

# Microbial Indicators for Food Quality Testing

- Testing for indicator organisms, rather than pathogens, is the preferred method
- Microbial indicators used in FQC are:
  1. Aerobic Colony Count (ACC)
    - By pour plate method
  2. Total Coliform Testing
    - By most probable number (MPN) method
  3. Fecal Coliform Testing
    - By MPN
  4. *E. coli* Testing
    - By MPN

# 1. Aerobic Colony Count (ACC)

- Estimates the total number of bacteria able to grow in an oxygenated or aerobic environment
- Reported per gram or mL of food examined
- High ACC counts are indicative of:
  - Inappropriate cooking or storage temperatures
  - Foods stored too long
  - Inadequate cooking
  - Exceptions are fresh fruit and vegetables and fermented foods

# 1. Aerobic Colony Count (ACC)

## *Acceptable Limits*

<b>Food Categories</b>	<b>Unsatisfactory ACC (CFU/gram)</b>
Canned foods & cooked hot-held food (e.g. soup, samosa, hamburger patty)	>5
Cooked chilled food no handling (e.g. sausage roll, ice cream)	>1,000
Cooked chilled food with handling & preserved foods (e.g. smoked/pickled foods, spices)	>1,000,000
Long shelf life fish products, meat products, fruit and vegetable products (e.g. MAP or vacuum packed products)	>100,000,000
Fermented foods & fresh fruits and vegetables (e.g. yoghurts, fermented sausages, soft cheese)	Not Applicable

# Summary of Test Results for FQC Samples With Unsatisfactory ACC

Food Category	# of Samples Tested	# of Samples With Unsatisfactory ACC Results (%)
Meat	34	20 (58.8)
Marine Foods	15	4 (28.6)
Poultry	40	21 (70.0)
Dairy Foods	41	3 (12.5)
Bakery Foods	15	1 (6.7)
Ethnic Foods	44	22 (50.0)
Rice	26	8 (34.8)
Salads	32	7 (23.3)
Dips, gravies & sauces	10	2 (20.0)
Sandwiches	37	N/A
Sausages	48	N/A
Tofu	18	7 (38.9)
Soups	14	4 (33.3)
Pizza & Pasta	4	2 (66.7)
Sushi	15	0 (0)
Miscellaneous	73	13 (17.8)
<b>Total</b>	<b>466</b>	<b>114 (27.1)</b>

## 2. Total Coliform (TC) Count

- Rod-shaped Gram negative, non-spore forming
- Includes aerobes and facultative anaerobes that ferment glucose and lactose and produce gas within 48 hours, at 35°C
- Presence of total coliforms in food is indicative of:
  - Inadequate food product processing
  - Post processing contamination due to poor handling practices

# Total Coliform (TC) Count

## *Acceptable Limits*

<b>Food Category</b>	<b>Satisfactory TC Result (count/gram)</b>	<b>Unsatisfactory TC Result (count/gram)</b>
All food except fresh fruits and vegetables and foods that contain them	<100	>1000

# Summary of Test Results for FQC Samples With Unsatisfactory Total Coliform (TC) Counts

Sample Type	# of Samples Tested	# of samples with unsatisfactory TC results (%)
Meat	34	2 (5.9)
Marine Foods	15	0 (0)
Poultry	40	2 (5.0)
Dairy Foods	41	6 (14.6)
Bakery Foods	15	1 (6.7)
Ethnic Foods	44	7 (15.9)
Rice	26	4 (15.4)
Salads	32	7 (21.9)
Dips, gravies & sauces	10	2 (20.0)
Sandwiches	37	8 (21.6)
Sausages	48	1 (2.1)
Tofu	18	4 (22.2)
Soups	14	0 (0)
Pizza & Pasta	4	1 (25.0)
Sushi	15	3 (20.0)
Miscellaneous	73	3 (4.1)
<b>Total</b>	<b>466</b>	<b>51 (10.9)</b>

# 3. Fecal Coliform (FC) and *E. coli* (EC) Testing

- Fecal coliforms are a subset of total coliforms that:
  - Ferment lactose and glucose with gas and acid production within 48 hours at 44.5°C
- *E. coli* is the only coliform found exclusively in human or animal feces and therefore the best indicator of the potential presence of enteric pathogens
  - Distinguished by hydrolysis of 4-methylumbelliferyl- $\beta$ -D-glucuronide (MUG) to form a fluorescent product
- Detection of FC or EC in food samples indicates:
  - Possible fecal contamination (direct or indirect)
  - Possible presence of enteric pathogens

# Fecal Coliform (FC) and *E.coli* (EC) Count

## *Acceptable Limits*

### FC Criteria

<b>Food Category</b>	<b>Satisfactory FC Result (count/gram)</b>	<b>Unsatisfactory FC Result (count/gram)</b>
All food except fresh fruits and vegetables and foods that contain them	<3	>3

### EC Criteria

<b>Food Category</b>	<b>Satisfactory EC Result (count/gram)</b>	<b>Unsatisfactory EC Result (count/gram)</b>
All food except fresh fruits and vegetables and foods that contain them	<3	>3

# Summary of Test Results for FQC Samples With Unsatisfactory FC and EC Results

Sample Type	# of Samples Tested	# of Samples with FC ≥ 3/g (%)	# of Samples with EC ≥ 3/g (%)
Meat	34	0 (0)	0 (0)
Marine Foods	15	0 (0)	0 (0)
Poultry	40	4 (10.0)	3 (7.5)
Dairy Foods	41	3 (7.3)	2 (4.9)
Bakery Foods	15	0 (0)	0 (0)
Ethnic Foods	44	6 (13.6)	1 (2.3)
Rice	26	4 (15.4)	0 (0)
Salads	32	4 (12.5)	0 (0)
Dips, gravies & sauces	10	1 (10.0)	0 (0)
Sandwiches	37	4 (10.8)	3 (8.1)
Sausages	48	0 (0)	0 (0)
Tofu	18	0 (0)	0 (0)
Soups	14	0 (0)	0 (0)
Pizza & Pasta	4	0 (0)	0 (0)
Sushi	15	4 (26.7)	0 (0)
Miscellaneous	73	2 (2.7)	0 (0)
<b>Total</b>	<b>466</b>	<b>32 (6.7)</b>	<b>9 (1.9)</b>

# Raw Ready-To-Eat Foods

## ACC, TC, FC & EC: *Acceptable Limits*

Raw (uncooked) ready-to-eat foods have different acceptable limits, due to the microbiological nature of uncooked foods

Microbiological Test	Unsatisfactory Result (count/gram)
ACC	n/a
TC	1000
FC	1000
EC	3

# Raw Ready-To-Eat Samples With Unsatisfactory TC/FC/EC Results

Sample Type	# Samples Tested	Samples with TC $\geq$ 1000/g (%)	Samples with FC $\geq$ 1000/g (%)	Samples with EC $\geq$ 3/g (%)
Salads	15	4 (27)	4 (27)	1 (7)
Fruits	15	0	0	0
Juice	6	4 (67)	0	0
Sprouts	2	1 (50)	0	0
Total	38	9 (24)	4 (11)	1 (3)

# Specialized Tests

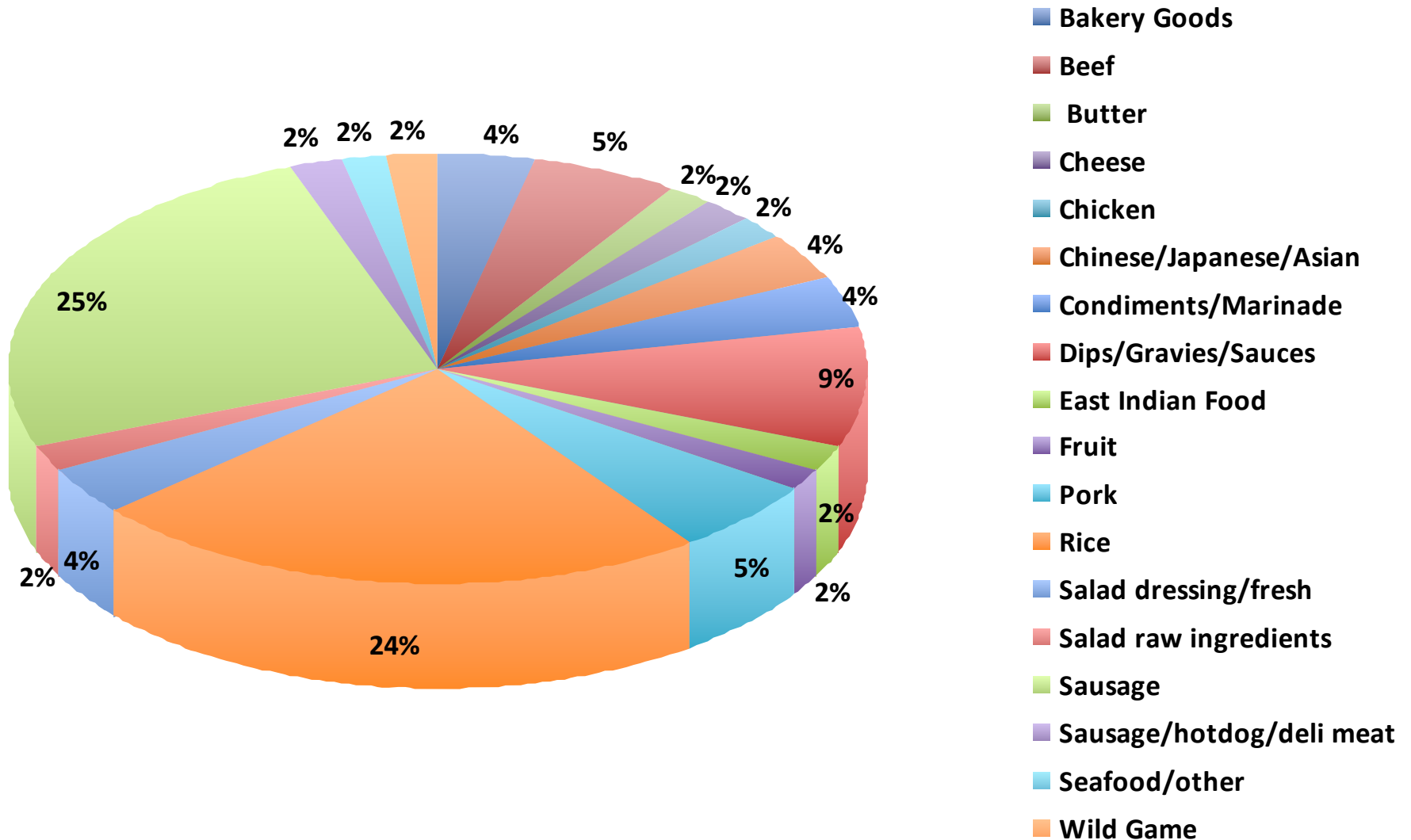
5. pH
6. Water activity ( $a_w$ )
7. Environmental Hygiene
8. Pathogen Specific Testing
9. Ice Testing

# Microbial Indicators

## pH and Water Activity ( $a_w$ ) Testing

- pH
  - Affects rate of microbial growth in food
  - Measured using pH meter by direct immersion of an electrode into food
- Water Activity
  - A measure of water in food that is available for microbial growth and metabolism
  - Significantly affects shelf-life, quality and safety
- Foods should have a pH  $<4.6$  and  $a_w <0.85$  to be considered shelf stable

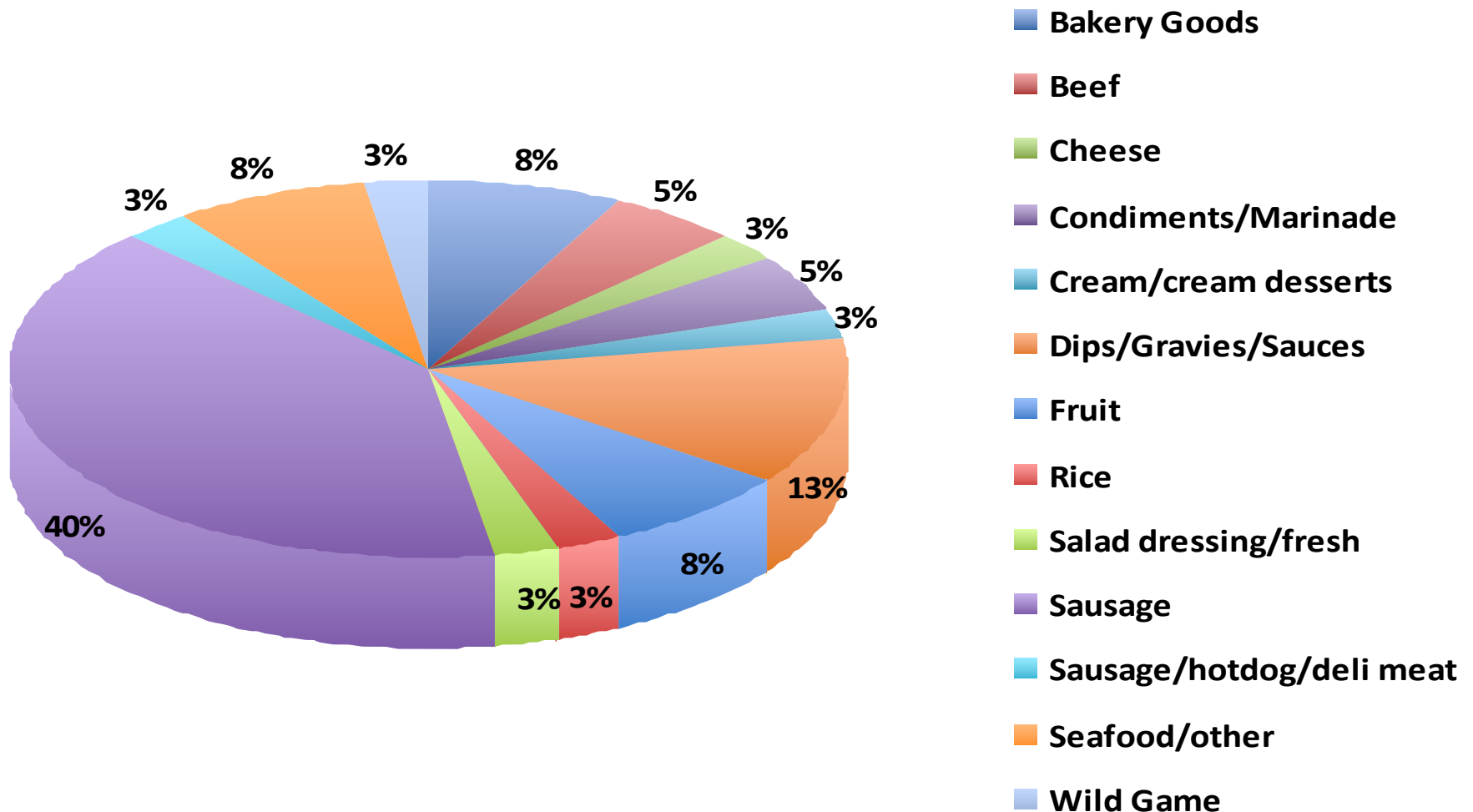
# 5. Types of Food Samples Tested for pH



# Summary of pH Results

Food Category	# Tested	< 4.6	> 4.6
Bakery Goods	2		2
Beef	3		3
Butter	1	1	
Cheese	1		1
Chicken	1		1
Chinese/Japanese/Asian	2		2
Condiments/Marinade	2	2	
Dips/Gravies/Sauces	5	1	4
East Indian Food	1		1
Fruit	1	1	
Pork	3		3
Rice	13	9	4
Salad dressing/fresh	2	2	
Salad raw ingredients	1	1	
Sausage	14	1	13
Sausage/hotdog/deli meat	1		1
Seafood/other	1		1
Wild Game	1		1

# 6. Types of Food Samples Tested for $a_w$

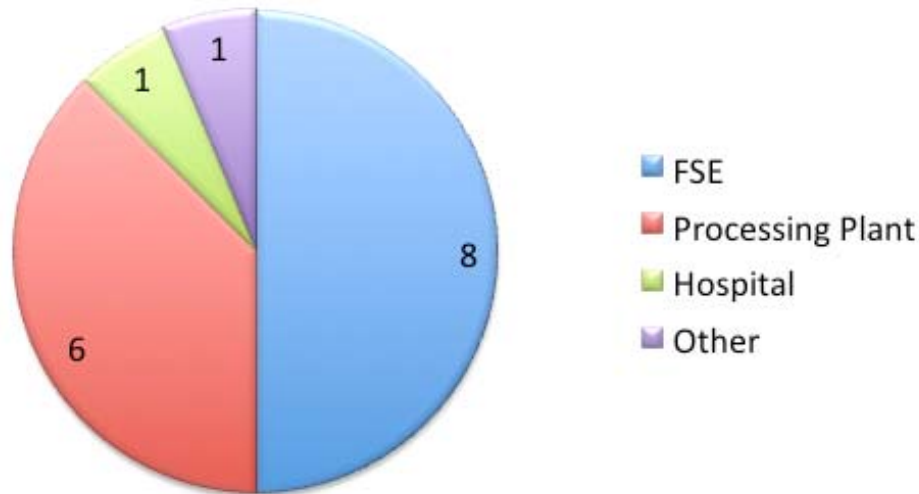


# Summary of $a_w$ Results

Food category	# Tested	<0.85	>0.85 <0.9	>0.9
Bakery Goods	3			3
Beef	2	1	1	
Cheese	1			1
Condiments/Marinade	2			2
Cream/cream desserts	1	1		
Dips/Gravies/Sauces	5			5
Fruit	3	2		1
Rice	1	1		
Salad dressing/fresh	1			1
Sausage	16	6		10
Sausage/hotdog/deli meat	1			1
Seafood/other	3	1		
Wild Game	1	1		

# 7. Environmental Hygiene

- 16 environmental swabs collected from variety of locations:



Number of Swabs	Test Performed	Results
6	<i>Listeria monocytogenes</i>	Not Detected
	Total Coliforms	Ranged from L3 to 12,000 CFU/g
10	Aerobic Colony Count	Ranged from L5 to 3.5x10 <sup>5</sup> CFU/g

# 8. Pathogen Specific Testing

3 pathogens were tested for in 2008:

- *Bacillus cereus*
- *Listeria monocytogenes*
- *Salmonella spp.*

Testing performed primarily at EHO's request to follow-up after a confirmed foodborne disease outbreak or to identify the source/vehicle of infection

# 8. Pathogen Specific Testing

Organism	Food Category	Number of Samples	Not Detected	Detected
<i>Bacillus cereus</i>	Rice, cooked	3	2	1
	Vegetables, cooked	2	2	0
	Tofu	1	1	0
	Crustacea (shrimp, crab)	1	1	0
	Asian Food	1	1	0
<i>Listeria monocytogenes</i>	Cheese	7	7	0
	Chicken	23	23	0
<i>Salmonella</i>	Eggs	26	24	2

# 9. Ice Testing

- Ice collected from food service establishments or retail stores

Total Number of Samples	Unsatisfactory ACC	Unsatisfactory TC	Unsatisfactory FC	<i>Unsatisfactory E. coli</i>
52	1	1	1	0

# FQC Program Summary for 2008

- 466 food samples tested for microbial indicators
- 132 samples submitted for specialized testing

<b>Indicator</b>	<b>Cooked Ready-To-Eat Food Exceeding Limit</b>	<b>Raw Ready-To-Eat Food Exceeding Limit</b>
Aerobic Colony Count	27.1%	N/A
Total Coliform	10.9%	23.7%
Fecal Coliform	6.7%	10.5%
<i>E.coli</i>	1.9%	2.6%
<b>Total Exceeding Limit</b>	<b>11.0%</b>	<b>12.2%</b>

# FQC Data

- Interpretation of FQC Data
  - FQC is an educational tool for EHOs
  - FQC is not a surveillance tool
  - FQC should not be used for trend or risk analysis as:
    - Number of samples is too small
    - Sampling bias inherently present
    - Not meant to be a systematic collection of data

# FQC: 2009 Program News

- New Food Laboratory phone number  
**604-707-2611**
- New website & requisition forms  
[www.phsa.ca/bccdcpublichealthlab](http://www.phsa.ca/bccdcpublichealthlab)
- New Food Microbiology collection jars

