FOOD SAFETY KNOWLEDGE AND ATTITUDES: INVESTIGATING THE POTENTIAL BENEFITS OF ON-SITE FOOD SAFETY TRAINING FOR FOLKLORAMA, A TEMPORARY FOOD SERVICE EVENT

Roberto Mancini
I hear and I forget. I see and I remember. *I do and I understand.*
**FOLKLORAMA**

- 14-day temporary food service event that explores the many different cultural realms of food, food preparation, and entertainment.
- Temporary Food Service Event: defined as *any place where food is prepared or provided for consumption at a fixed location for 14 consecutive days or less in conjunction with a single event.*
FOLKLORAMA

- 2011- 46 pavilions with approximately 440,000 visits. There were ~ 600,000 meals served and 1,000,000 beverages poured throughout the event

- July 31st-August 13th, 2011

- In 2010, the Russian pavilion at Folklorama was implicated in a foodborne outbreak of *E. coli* O157 causing 37 illnesses and 18 hospitalizations
FOLKLORAMA

- Manitoba Health and Folklorama Board of Directors – revise food safety training.
- Folklorama employs volunteers with *minimal* food safety experience.
- This study attempted to determine the benefits of this enhanced, specific food safety training by assessing the number of critical infractions incurred through public health inspection reports.
10 pavilions were randomly chosen to participate in the study (Provincial jurisdiction of Manitoba).

Five pavilions (A-E) received on-site, hands-on food safety training. A control group (five pavilions A1-E1) did not receive the enhanced training.

None of the inspectors were apprised of which pavilions were trained on-site to reduce bias.
FOLKLORAMA

- 2-hour food safety course tailored for Folkorama was mandatory for food operators and event coordinators in 2011.
- The course covered food holding temperatures, food safe internal temperatures, personal hygiene, cleaning and sanitation, pest control, and chemical testing.
- The 10 pavilions chosen for the study participated in a food safety survey, after the delivery of the 2-hour food safety course, to attain baseline food safety knowledge.
FOLKLORAMA

- Pavilions A-E submitted their menus to the researcher in advance for review. Each menu was assessed to establish CCP-s for perishable foods along with corrective procedures discussed on-site.

### Main Course

- **Combination Russian Plate**
  Salad, Borscht, Pelmeni, Cabbage Cake, Plov, Mors .......................... $15.00

- **Pelmeni**
  Ground beef in a thin dough pocket. Typically eaten with butter, sour cream, and vinegar. .......................................................... $5.00

- **Cabbage Pie**
  Unsweetened pie with a cabbage and boiled egg filling. ...................... $4.00

- **Salad "Summer"**
  Cabbage, peas, gill, green onion, vinegar ........................................ $3.00

- **Salad "Moscow"**
  Russian style potato salad .............................................................. $3.00

- **Plov (vegetarian)**
  Rice with dried apricots and raisins ................................................. $4.00

- **Blini (2 pieces)**
  Cottage cheese crepe wraps with jam and sour cream or crepe wraps with beef. ...................................................... $5.00

- **Russian Borsch**
  Vegetarian soup (beets, cabbage, peas, potatoes) Served with sour cream. ................................................................. $4.00

- **“Podzjarka”**
  Beef stew with vegetables in red sauce ............................................. $7.00

### Desserts

- **Sweet Russian Plate**
  Samples of Russian sweets ............................................................... $7.00

- **Cake Biscuit or Apple Cake**
  Served with whipping cream ........................................................... $4.00

- **Pryanik**
  Traditional Russian ginger honey cookie with fruit fillings ................ $1.00

- **Cheesecake variety (individually wrapped)** .................................. $3.00

- **Ice-cream (individually wrapped)** ................................................ $4.00

### Soft Drinks & Juices

- **Coffee 6 oz** ................................................................. $1.50

- **Mors** - Traditional Russian cold drink made from fresh berries .......... $1.50
FOLKLORAMA- i.e **CCP PELMENI**

**Process**
- Product purchased from an approved source **frozen** that was pre-made and pre-cooked. Product placed in freezer on-site. Pelmeni are small dumplings made from a thin layer of dough with a filling, typically meat.

**Process CCP**
- Product placed in boiling water, covered, and cooked for 3-4 minutes. Water drained via colander. Internal temperature of the pelmeni must be at or above **74°C (165°F)**. Re-heating provides an adequate reduction of vegetative cells to safe level. Pelmeni pre-cooked, therefore *Escherichia coli* inactivated.

**Process CCP**
- Pelmeni immediately placed on steam table, covered, and held at or above **60°C (140°F)** to prevent the growth of pathogenic bacteria. Verify with a metal stem probe thermometer that the hot holding unit is maintaining the product at or above this required temperature.
FOLKLORAMA

- On-site training regimen:
  - Food holding temperatures
  - How to use a metal stem thermometer
  - Hand-washing
  - Sanitizer preparation
  - Cooler organization to prevent cross-contamination
  - How to document food/cooler temperatures
  - How to take food samples for microbiological analysis
  - Proper cooling
  - Personal hygiene
  - 3-compartment sink technique
**FOLKLORAMA- RESULTS**

- Survey-administered in person after 2-hr. course.
- All answers were rated by the researcher as excellent, good, fair, or poor.
- The highest attainable score per question was 3 points for a total overall score of 33 points.

<table>
<thead>
<tr>
<th>Excellent (3pts.)</th>
<th>Good (2 pts.)</th>
<th>Fair (1 pt.)</th>
<th>Poor (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All food preparation surfaces must be washed with soap and water, rinsed, then sanitized using an approved sanitizer</td>
<td>Surfaces sanitized with an approved sanitizer i.e. chlorine, quaternary ammonia or iodine</td>
<td>Wash with soap and water</td>
<td>I do not know</td>
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</table>
**Folklorama - Results**

Total score out of 33 and percentage results from food safety questionnaire survey for pavilions A-E; A1-E1 after the 2-hour food safety course and before on-site, hands-on training.

<table>
<thead>
<tr>
<th>Pavilions</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>A1</th>
<th>B1</th>
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<th>E1</th>
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<tr>
<td><strong>Total/33 points</strong></td>
<td>13</td>
<td>17</td>
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<td>19</td>
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<td>7</td>
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<td><strong>Percentage</strong></td>
<td>39</td>
<td>52</td>
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<td>58</td>
<td>61</td>
<td>39</td>
<td>7</td>
<td>15</td>
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<td>64</td>
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<td>Food Safety Survey Question</td>
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<td><strong>2. How would you properly cool hot foods down to 4 °C?</strong></td>
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<td><strong>3. Hot foods should be maintained at what temperature?</strong></td>
<td>(T) 2.0</td>
<td>0.59</td>
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<td><strong>4. Cold foods should be maintained at what temperature?</strong></td>
<td>(T) 1.8</td>
<td>0.73</td>
<td>0.58</td>
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<td><strong>6a. How do you clean and sanitize food preparation surfaces?</strong></td>
<td>(T) 1.6</td>
<td>0.45</td>
<td>0.54</td>
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<tr>
<td><strong>6b. What type of sanitizer is approved for use on food contact surfaces?</strong></td>
<td>(T) 1.4</td>
<td>0.60</td>
<td>1.00</td>
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<tr>
<td><strong>6c. What is the required concentration for your sanitizer on food preparation surfaces?</strong></td>
<td>(T) 0.0</td>
<td>0.42</td>
<td>0.35</td>
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<tr>
<td><strong>7. What temperature must you cook ground beef to consider it safe for consumption?</strong></td>
<td>(T) 0.8</td>
<td>0.62</td>
<td>0.66</td>
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<td><strong>8. What temperature must you cook boneless chicken to consider it safe for consumption?</strong></td>
<td>(T) 1.0</td>
<td>0.53</td>
<td>0.45</td>
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<td><strong>9. How long can food be left sitting out?</strong></td>
<td>(T) 1.6</td>
<td>0.59</td>
<td>0.38</td>
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<td><strong>10a. What is the required temperature when re-heating soup?</strong></td>
<td>(T) 0.4</td>
<td>0.51</td>
<td>0.79</td>
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<td><strong>10b. What is the required temperature when re-heating meat?</strong></td>
<td>(T) 1.8</td>
<td>0.59</td>
<td>0.13</td>
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<td>2. How would you properly cool hot foods down to 4°C?</td>
<td>1.1</td>
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<td>3. Hot foods should be maintained at what temperature?</td>
<td>1.5</td>
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<td>4. Cold foods should be maintained at what temperature?</td>
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<td>6b. What type of sanitizer is approved for use on food contact surfaces?</td>
<td>1.4</td>
<td>0.43</td>
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<td>6c. What is the required concentration for your sanitizer on food preparation surfaces?</td>
<td>0.3</td>
<td>0.30</td>
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<td>7. What temperature must you cook ground beef to consider it safe for consumption?</td>
<td>1.0</td>
<td>0.44</td>
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<td>8. What temperature must you cook boneless chicken to consider it safe for consumption?</td>
<td>0.7</td>
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<td>9. How long can food be left sitting out?</td>
<td>1.2</td>
<td>0.42</td>
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<td>10a. What is the required temperature when re-heating soup?</td>
<td>0.5</td>
<td>0.36</td>
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<td>1.6</td>
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<td>4. Potentially hazardous foods maintained below 5°C (41°F) or above 60°C (140°F).</td>
<td>0.53</td>
<td>0.77</td>
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<tr>
<td>5. Food is protected from contamination at all times while being stored or displayed.</td>
<td>n/a</td>
<td>n/a</td>
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<td>6. Thermometers used to verify food preparation and storage temperatures.</td>
<td>1.11</td>
<td>0.29</td>
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<td>7. Adequate supply of potable water is provided for duration and type of event.</td>
<td>1.11</td>
<td>0.29</td>
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<td>8. Operator has provided suitable handwashing station for booth workers.</td>
<td>1.11</td>
<td>0.29</td>
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<td>9. Garbage is stored in suitable receptacles.</td>
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<td>10. Food handlers are maintaining good personal hygiene practices.</td>
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<td>11. Food contact surfaces washed / rinsed / sanitized after each use and following any operations when contamination may have occurred.</td>
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<td>4. Potentially hazardous foods maintained below 5°C (41°F) or above 60°C (140°F).</td>
<td>2.50</td>
<td>0.29</td>
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The study attempted to determine the potential benefits of on-site food safety training for Folklorama pavilions.

During on-site training for the selected five pavilions, operators were confused with certain food safe practices, such as temperature control.

Operators did not know how to properly use a metal stem thermometer to test and verify internal food safe temperatures.
Operators were unable to recall safe internal food temperatures for their food products served.

During the training, the operator had indicated that there were too many temperatures to remember and as such they were left confused.

Food operators were thankful for the food safe poster left on-site that referenced food safe internal temperatures for different food products.
**PROPER HAND WASHING** is one of the most important food safety practices in reducing the incidence of foodborne illness.

1. Wet Hands

2. Soap and Scrub
   For 10 to 15 seconds

3. Rinse

4. Dry Hands with Paper Towel

5. Turn off taps with towel

There have been many outbreaks associated with **TEMPERATURE ABUSE**. Use a probe thermometer to make sure foods are cooked to safe **INTERNAL TEMPERATURES**.

- **71°C 160°F** ground meat
- **74°C 165°F** poultry including stuffing and egg products
- **71°C 160°F** pork
- **63°C 145°F** fish
- **74°C 165°F** reheat foods

Reduce **CROSS CONTAMINATION** by using colored cutting boards. One board for meat and the other cutting board for ready-to-eat foods such as fruits and vegetables.

Food holding temperatures:
**KEEP HOT FOODS HOT AT OR ABOVE 60°C AND COLD FOODS COLD AT OR BELOW 5°C**

The temperature danger zone for food:
- **60°C**
- **Heat or Chill Food Quickly**
- **WARNING Temperature Danger Zone**
- Keep Cold Food Cold Below 5°C or 40°F
Results of the current study suggest no statistical significant difference in food inspection scores between the trained group and control groups for both inspections.

May be due to the small sample size used in the study. Inspection report results increased for both the control and trained groups from the first inspection to the second.

Survey results suggest limited food safety knowledge retention, this was not reflected on health inspection reports.
FOLKLORAMA - DISCUSSION

- Trained pavilions fared better with item 4-critical food violation:

  “Potentially hazardous foods must be maintained below 5°C (41°F) or above 60°C (140°F)”

- Survey revealed that questions 3 and 4 (temperature questions) were high- however, greatest number of infractions on inspection reports.
Research suggests that knowledge acquired from traditional food safety training programs does not necessarily translate into positive food safety behaviors (Seaman and Eves, 2006).

There is a need for further research in thoroughly assessing the effectiveness of training, taking into consideration personal and physical barriers that impede on translating knowledge into positive food safe behaviors.

Inspections snap shot in time.
Basic Food Safety Training Summary

May 07 & 08, 2012

Red River College
FOLKLORAMA
FOLKLORAMA

8 Stations
Station 1 - Personal Practices. Food borne illness and proper hygienic practices were discussed. Demonstration on how to properly wear a hairnet.
Hands-on training
HANDS-ON TRAINING
Station 2 - Hand washing. Participants learned the steps required to properly wash hands. “Glo-Germ” Demonstration.
HANDS-ON TRAINING
Station 3 – Three Compartment Sink. Participants learned how to follow the three compartment sink method and how to use and check a commercial dishwasher.
Each pavilion was given sanitizer test strips and labels for their 3-compartment sink and sanitizer buckets.
Station 4- Temperature Control Part 1. Participants learned how to calibrate a thermometer and how to properly check the temperature of food.
HANDS-ON TRAINING
Station 5- Temperature Control Part 2. Participants learned how to safely cool food and take samples. Demonstration on thawing foods.
Station 6- Refrigerator Organization. Participants learned how to properly organize a refrigerator to avoid cross-contamination. They participated in a dynamic exercise to spot the problems in the staged refrigerator. Allergens were also discussed.
HANDS-ON TRAINING
Station 7 – Sanitation. The trainer instructed how to effectively prepare and check the concentration of a sanitizer solution. Hands-on demonstration.
**HANDS-ON TRAINING**

**Sanitizer Bucket**

100 ppm
Dip and remove compare immediately. Parts Per Million

10 50 100 200

**Sanitizer Bucket**

200 ppm
Dip and remove compare immediately. Parts Per Million

0 150 200 400 500

**Sanitizer Dishwashing**

50 ppm
Dip and remove compare immediately. Parts Per Million

10 50 100 200
Participants received a log book where they will record temperature of foods, concentration of sanitizer and other important food safety practices. Station 8 – Record Keeping explained in detail how to complete this material to be submitted by the end of the festival.
Food Safety Log Book provided to each pavilion.
COOLER TEMPERATURE RECORD

Refrigeration/Cooler Temperature Record

Pavilion Name: ____________________________

Instructions: Check the thermometer in the fridge and write the temperature inside the corresponding box below. If not less than 5 degrees Celsius (<5°C), try to determine what happened and correct the situation.

Note: Temperature of the cooler will fluctuate due to constant opening and closing of the cooler door. Ensure that a metal stem thermometer is inserted into the top of a water bottle to attain a more accurate read of the ambient air temperature.

<table>
<thead>
<tr>
<th>AM Check (&lt;5°C)</th>
<th>PM Check (&lt;5°C)</th>
<th>Corrective Action/Comments</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Day 3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Day 4</td>
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<td></td>
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<tr>
<td>Day 5</td>
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<tr>
<td>Day 6</td>
<td></td>
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<td></td>
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<tr>
<td>Day 7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Food Holding Temperatures

## Food Holding Temperature Record

**Pavilion Name:**

**Instructions:** Check thermometer in the holding units and write the temperature inside the corresponding box below. For hot holding units if less than 60 degrees Celsius (<60°C), try to determine what happened and correct the situation. For cold holding units if more than 5 degrees Celsius (>5°C), try to determine what happened and correct the situation.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Hot Holding Unit (&gt;60°C)</th>
<th>Cold Holding Unit (&lt;5°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Show 1</td>
<td>Show 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Name of Responsible Person:**

**Deviation and Corrective Action:**

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**Folklorama**

**Manitoba**
# Food Preparation Record

**Pavilion Name:**

**Instructions:** Check that internal temperature of the food has reached 74 °C or more (>74 °C) and write the temperature inside the corresponding box below. When cooking a whole turkey or chicken, the temperature must read 85 °C. Also, check daily the concentration of your sanitizer, the temperature or concentration of your dishwasher, and calibrate your thermometer. Write the concentrations or temperature and include a check mark \( \checkmark \) after calibrating the thermometer.

<table>
<thead>
<tr>
<th>Food Type</th>
<th>Food Temperature (cooking &gt;74 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sanitizer Solution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration (100-200 ppm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dishwasher</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature/Concentration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Probe Thermometer Calibrated</strong></th>
</tr>
</thead>
</table>

*Note: Chlorine-based sanitizer must be at 100 ppm. Quaternary ammonia sanitizer must be at 200 ppm.

**Note: High Temperature Dishwasher must have a rinse temperature of 71 °C for 10 seconds. Chemical dishwashers must have a rinse with 50 ppm available chlorine.*

**Name of Responsible Person:**

**Deviation and Corrective Action:**

**Folklorama**

**Manitoba**
**Advance Food Preparation Record**

**Pavilion Name:**

Instructions: Check that the appropriate internal temperature of the food has been reached (see chart provided) and write the temperature inside the corresponding box below. Also check daily the concentration of your sanitizer, the temperature or concentration of your dishwasher and calibrate your thermometer. Write the concentrations or temperature and include a check mark \ after calibrating the thermometer.

Remember: Food prepared in advance must be stored in a permitted facility.

<table>
<thead>
<tr>
<th>Food Type</th>
<th>Food Temperature (cooking &gt; 74 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sanitizer Solution Concentration (100-200 ppm)*

**Dishwasher Temperature/Concentration**

Probe Thermometer Calibrated

*Note: Chlorine-based sanitizer must be at 100 ppm. Quaternary ammonia sanitizer must be at 200 ppm.*

**Note: High Temperature Dishwasher must have a rinse temperature of 71°C for 10 seconds. Chemical dishwashers must have a rinse with 50 ppm available chlorine.*

**Name of Responsible Person:**

**Deviation and Corrective Action:**

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![Folklorama](image1)

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![Manitoba](image2)
Certificate of Participation

Basic Food Safety Practices Training

This certificate is awarded to

Charles Powell

In recognition of their participation in the Basic Food Safety Practices Training.
Winnipeg, Manitoba
May 02, 2012

Wayne Lees
Director
CVO/Food Safety Knowledge Centre
Manitoba Agriculture, Food and Rural Initiatives

Peter Parys
Director
Environment Health & Emergency Preparedness
Manitoba Health

Manitoba
EVALUATION FORMS RESULTS

98 attendees
43 pavilions
**Typical evaluation forms**

**Training Evaluation Form**

**Date:** 07 May, 2012

**Pavilion:** Punjab Pavilion

Please indicate your impression of the items listed below.

<table>
<thead>
<tr>
<th>1. Overall training</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The time-slot was convenient (evening).</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B. This training will make your food safer</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C. Presentations were organized and easy to follow</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>D. Required records are clear and simple to follow</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>E. Food safety expectations are clear and concise</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>F. I will be able to apply the knowledge learned</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>G. Demonstrations are relevant and easily understood</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>H. The venue is satisfactory (clean, comfortable)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

I. Were all your questions answered? O Yes O No

J. Did you like the interactive format of the training? O Yes O No

K. Did you learn anything new? O Yes O No

Comments: Improve the quality of life and provide clean environment.

2. In regards to food safety, what changes do you expect to make to your pavilion?

 يجب تحسين الأطعمة الصحية في جميع المعالم، ويتوجب عليكم تقديم الأطعمة الصحية.

3. Was the timing and pace of the 8 stations adequate? O Yes O No

Comments: All the instructors were very well qualified and gave us a good understanding of food.

4. Other topics that should be covered or improvements for future training.

Thank you for your comments and suggestions!!!
The time-slot was convenient

This training will make your food safer
Presentations were organized and easy to follow

Required records are clear and simple to follow
Food safety expectations are clear and concise

I will be able to apply the knowledge learned
Demonstrations are relevant and easily understood

The venue is satisfactory (clean and comfortable)
Were all your questions answered?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>0</td>
</tr>
</tbody>
</table>

Did you like the interactive format of the training?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>10</td>
</tr>
</tbody>
</table>
Did you learn anything new?

- Yes: 70 respondents
- No: 10 respondents

Was the time and pace of the 8 stations adequate?

- Yes: 80 respondents
- No: 0 respondents
PARTICIPANTS’ COMMENTS
- Liked the interaction approach
- Overall very refreshing
- Better than classroom sessions
- A great learning-hand-on training!
- It was a nice interactive workshop, easy to follow and very friendly.
It’s amazing how many new things I learned. It’s very educational and an eye opener.

I think this was definitely needed. The course was hands-on and very easy to follow. THANK YOU FOR THE LOG BOOK.

Fridge demo was an eye opener for some.

Awesome! Really enjoyed the hands-on. Instructors were very knowledgeable.
Very nice, should do it for more people especially the volunteers that work in the kitchen.

Provide a short version CD so we can show to all our volunteers.

Extend this kind of interaction rather than sitting in an eight hour course doing listening and watching to slides on a projector! More power! Keep this up!
FOOD SAFETY TRAINING

Questions?

E-mail: robert.mancini@gov.mb.ca
Ph: 204-945-0911