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ML MIDDLESEX-LONDON
HEALTH UNIT

Investigation of a *Salmonella* Outbreak at Western University

IPAC Southwestern Ontario
Friday June 13, 2014

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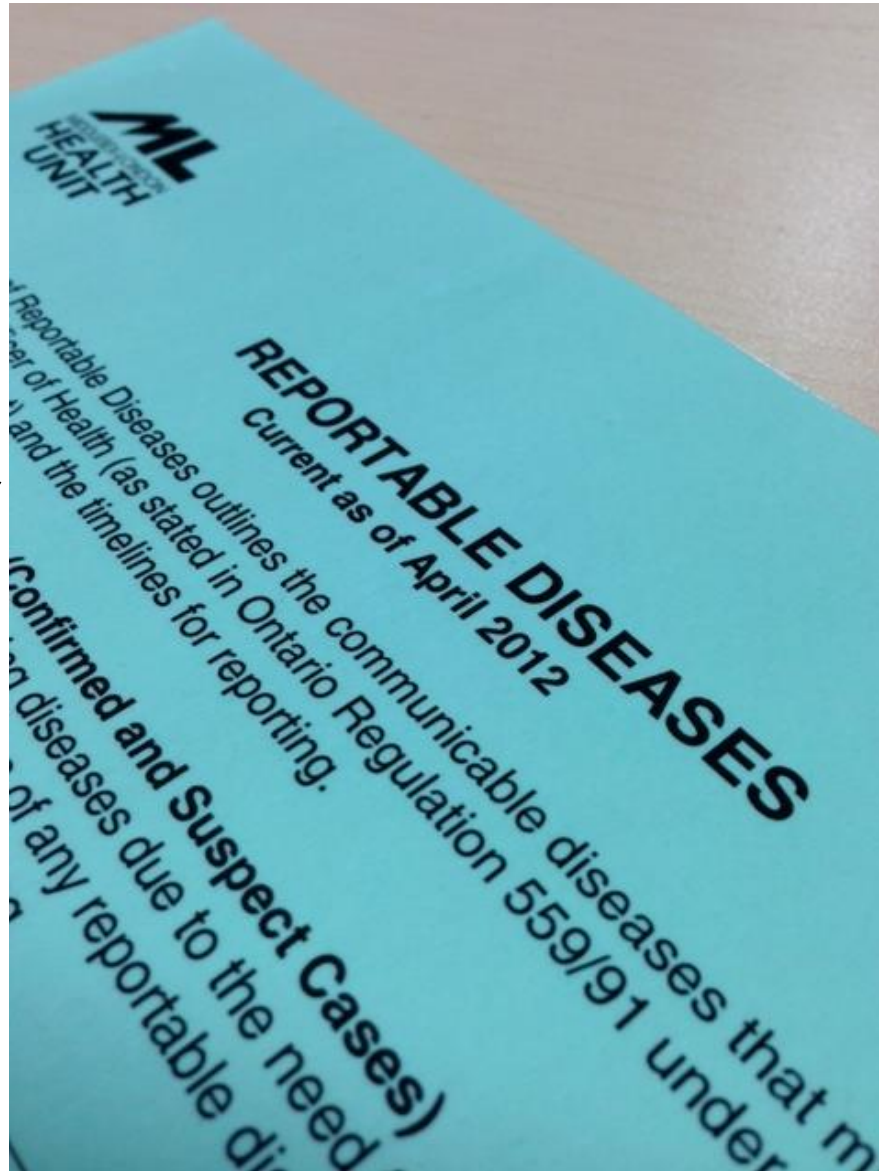
Outline

- Background – Reportable diseases
- Chronology of the outbreak
- Overview of investigation components
 - Understanding the kitchen
 - Food samples
 - Food handler testing
 - Analysis of meal plan data and case control studies
- Recommendations and Conclusions
- Acknowledgements

Reportable Diseases

Health Protection and Promotion Act

- ~ 75 reportable diseases or conditions
- Must be reported by:
 - physicians and other health care providers
 - laboratories
 - school principals
 - hospitals
 - directors of institutions



Reason for Reportable Diseases

- Prevent spread of the communicable disease to others by:
 - counseling and treatment of person
 - contact tracing
 - vaccination of contacts
 - antibiotics for contacts
- Surveillance data to establish baselines and identify outbreaks
- Identify trends and risk factors in order to design prevention programs

Disease Follow-up

- Contact the physician
- Contact client
 - Determine that they understand the disease and treatment (if available)
 - Discuss methods of preventing transmission
 - Determine the source of infection
 - Discuss contact tracing (if applicable)

Detecting a Reportable Disease Outbreak

- *E. coli* O157:H7 at the petting zoo
 - 3 cases in three days
 - normal 3 per month
- Meningococcal cases
 - 6 cases in three months
 - normal 6 cases per year
- Salmonella
 - 6 cases in an hour
 - normal 6 cases per month

Salmonella at the University

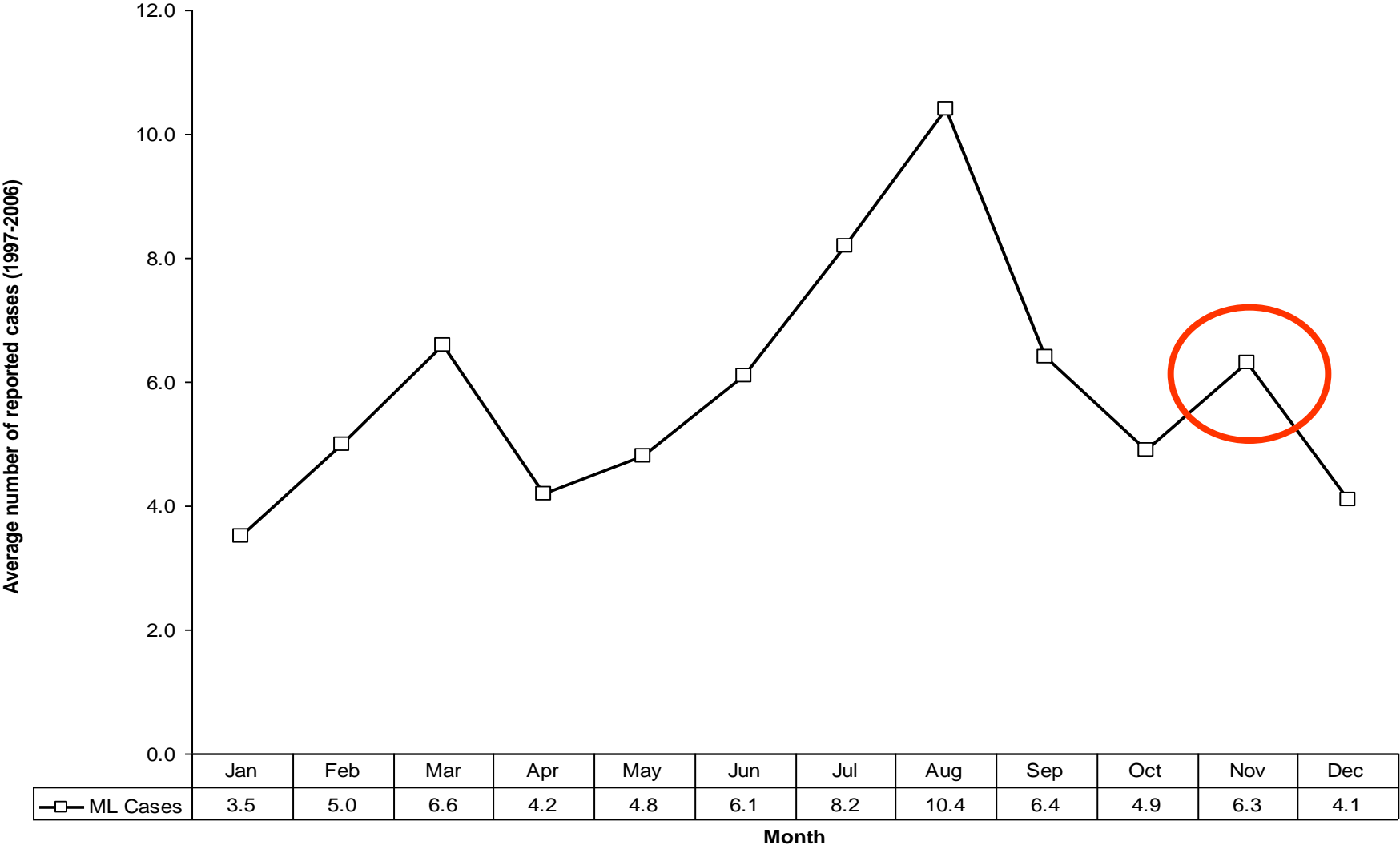
Salmonella

- Symptoms:
 - Diarrhea, sometime bloody
 - Fever
 - Headache
 - Nausea, sometimes vomiting
- Duration 4 - 7 days
- Carriage can be prolonged:
 - At 12 weeks, 5% still carry
 - At 1 year, 1% still carry

Salmonella

- Complications:
 - Dehydration
 - Septicemia
 - Extra-intestinal infections
- Incubation - 6 - 72 hours (usual 12 - 36)
- Communicable - while organism in stool
- Infectious dose - varies by serotype

Average Salmonella by Month 1997-2006



How Did We Know There Was an Outbreak?

- Salmonella
 - Normally six cases per month in November
 - On Thursday November 8, 2007, MLHU was notified of six cases in an hour



REPORTABLE DISEASE Notification Form

Disease: Salmonella

Reporting Information
Type of reporting source:
(Name of hospital, school, laboratory, etc.)

Disease: Salmonella

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Reporting Information
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Administrative Assistant Use
 New Client
 Existing Client

Date Reported to Health Unit: Nov 3, 2007

STP
Update

Client Demographics
Last Name: _____
Date of birth: _____
Address: _____
City: _____

Age: _____
Gender: Male Female Other Specify: _____
First Name: _____
Health Card Number: _____

Phone: Home- _____
Cell- _____
Workplace/School: _____
Relationship: _____
Workplace/School phone number: _____
Phone Number: _____

Phone: Home- _____
Cell- _____
Work- _____
Date of Laboratory Result: _____

Occupation: _____
Workplace/School address: _____
Postal Code: _____

Family Physician: _____
Next of Kin: _____

Family Phys: _____
Workplace/S: _____
Occupation: _____
City: _____

City: _____
Date: _____
Result: _____

Laboratory Results
Specimen Type: _____
Collection Date: _____

Name of Hospital: _____
Date Admitted: _____
Seen in emergency: _____
Attending Physician: _____

Comments: _____

Date Discharged: _____
Phone Number: _____

Name of HC: _____
Date Admit: _____
Attending F: _____
Comments: _____

Date: _____

Date: _____

Signature: _____

Alter Name Date

Con

Date

Date

Signature

Chronology of the Outbreak

- By end of day:
 - 4 lab-confirmed cases reached
 - All Western students
 - 3 ate at pita outlet at Western Centre Spot (UCC)
- 4 non-lab confirmed case reached
 - 2 Western students
 - 1 ate at pita outlet

Chronology of the Outbreak

- Pita outlet closed for night
- Not allowed to open until inspected in morning
- Processes reviewed
- Individuals interviewed
- No food on site from previous week
- Allowed to re-open November 9

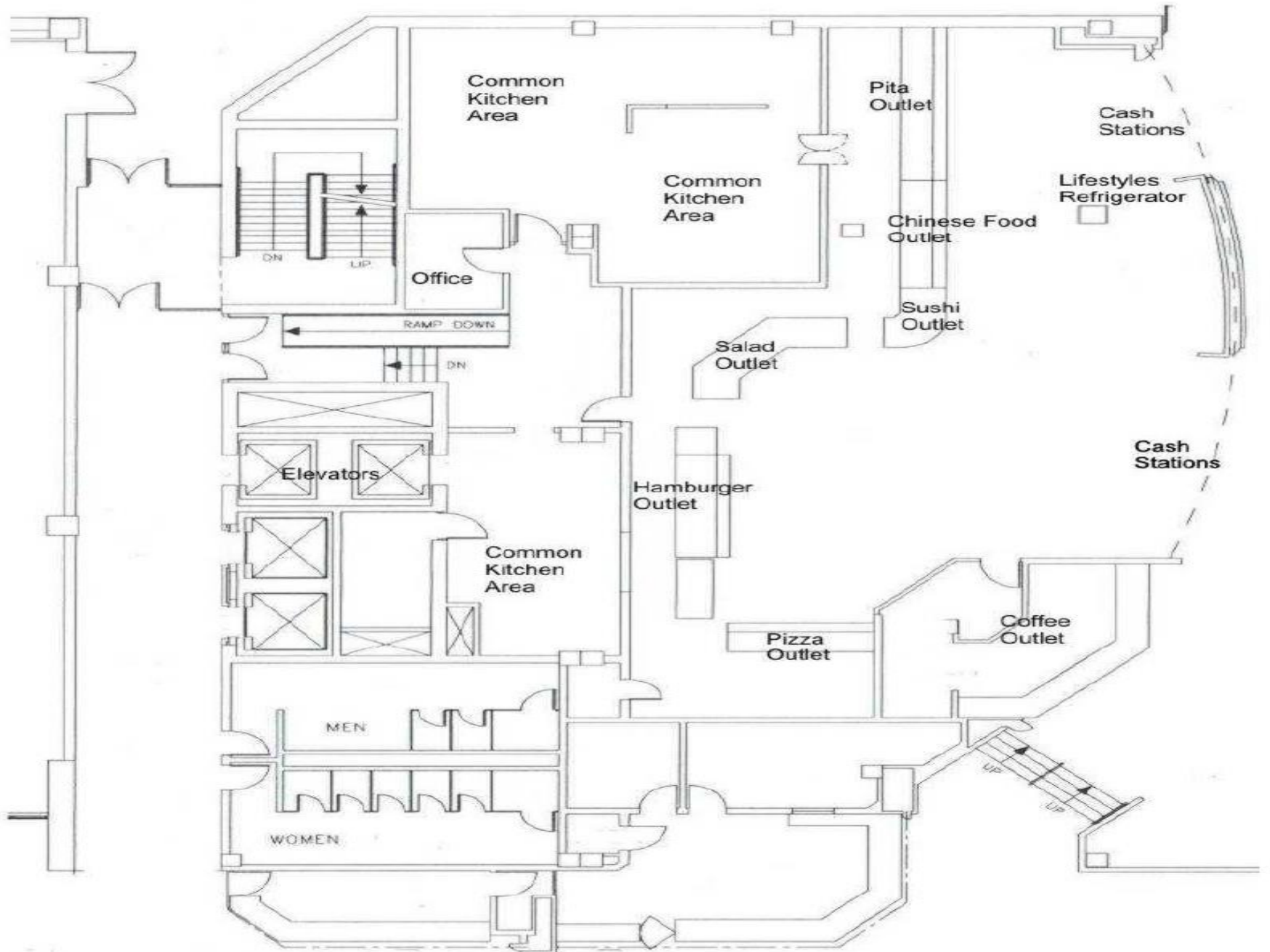
Understanding the Kitchen

UCC Centre Spot at Western

- Western: 30,000 students; 3,500 faculty
- Food court in the University Community Centre (UCC) - Centre Spot
- Seven fast food outlets
- Common preparation area at the back
- At night, do baking and prepare foods for Lifestyle fridges across campus
“Production Centre”

Pita Outlet

- Between wall and Chinese food outlet
- Mostly pitas and some salads; many toppings and sauces
- 2 counters
- 3-4 staff per counters



Understanding the Kitchen

- Sources of food for pita outlet – all distributed widely
- Chicken at pita outlet – precooked, frozen, thawed, chopped, reheated and held food
- Raw frozen chicken at food outlet next door
- Potential for cross-contamination

Understanding the Kitchen

- Pita preparation
 - Slide pitas down from one person to the other adding ingredients
 - Wrapped at the end
- Production centre and lifestyle refrigerators
- Space and lay out
- Shipping and receiving

Chronology of Outbreak

- By early Saturday, November 10, 2007
- 7 laboratory confirmed cases
 - 6 reached
 - 5 ate at pita outlet
- 2 non-lab confirmed ate at pita outlet
- Based on information available, a press release was issued

Salmonella Cases Linked to Food Outlet

FOR IMMEDIATE RELEASE

November 10, 2007

LONDON, ON - The Middlesex-London Health Unit has received seven laboratory reports of salmonella between November 8th and 9th, 2007.

The Health Unit is advising students and staff at The University of Western Ontario who currently have symptoms compatible with salmonella to contact a health care provider. Students and staff who have been ill with diarrhea since November 2nd, 2007 are also advised to contact the Middlesex-London Health Unit

Case Investigations

- Obtained all available meal items from pita outlet - including toppings and sauces
- Detailed questionnaire for all lab-confirmed and non-lab confirmed cases (3 stools in 24 hours)
 - Symptoms
 - Health care
 - Meals eaten on campus
 - Details of meal eaten at pita outlet

F. Specific Food Consumption History: Pita Pit (continued)

10. Please indicate whether or not you ate the following food items from Pita Pit:

Pitas

- | | | | |
|------------------------|------------------------------|-----------------------------|------------------------------------|
| a) Assorted | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| b) Black forest ham | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| c) BLT | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| d) Chicken Caesar | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| e) Chicken breast | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| f) Club | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| g) Dagwood | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| h) Falafel | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| i) Gyro | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| j) Philly steak | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| k) Rib fest | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| l) Roast beef | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| m) Seafood | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| n) Souvlaki | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| o) Tuna | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| p) Turkey | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| q) Vegetarian (Garden) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| r) Other type of pita | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |

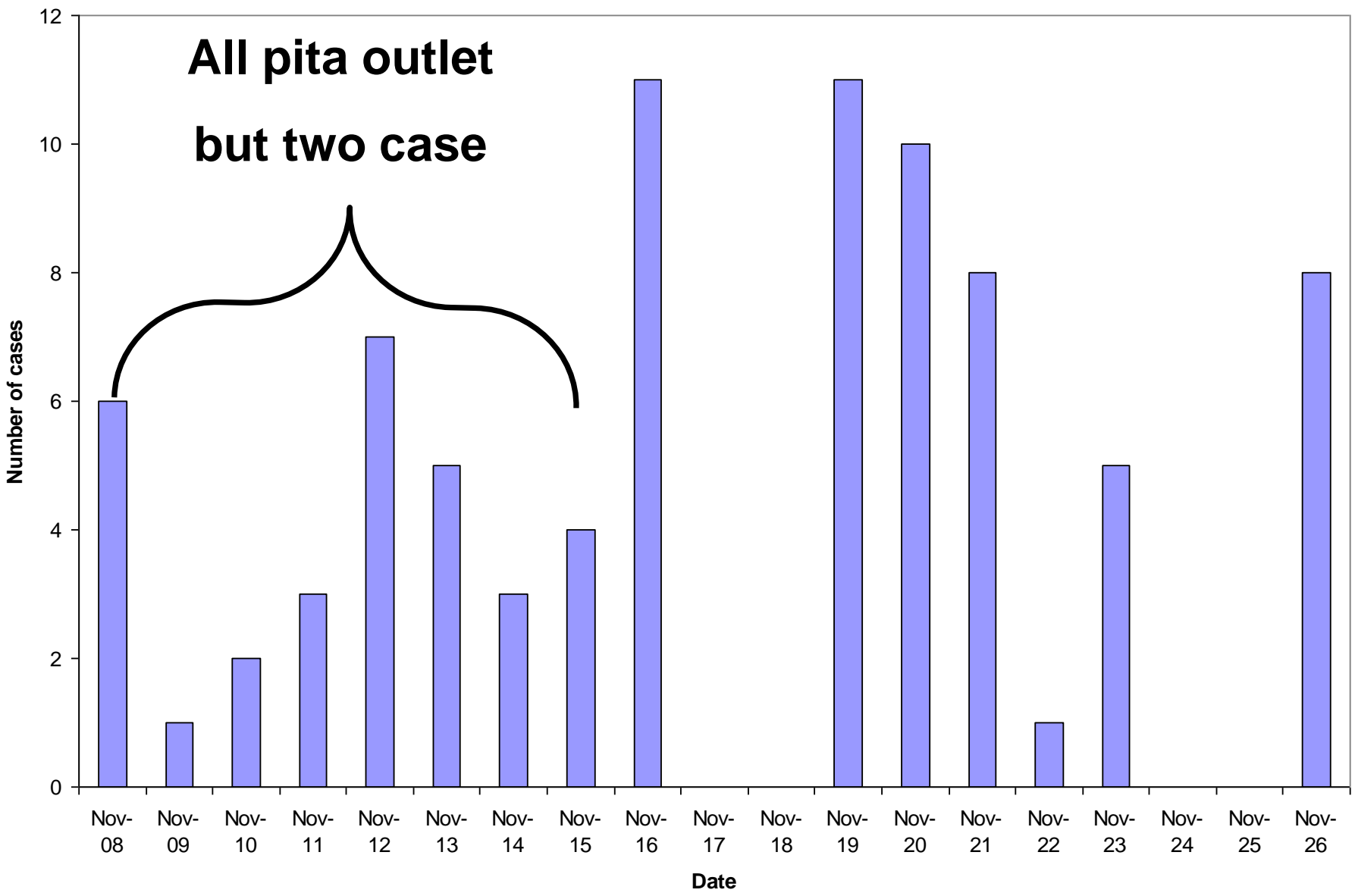
If 'Yes', please specify _____

+ Toppings

- | | | | |
|------------------|------------------------------|-----------------------------|------------------------------------|
| a) Baba ganoush | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| b) Cucumbers | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| c) Hummus | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| d) Lettuce | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| Iceberg | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| Romaine | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| e) Mushrooms | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| f) Black olives | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| g) Green olives | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| h) Onions | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| i) Green peppers | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| j) Hot peppers | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| k) Pickles | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| l) Pineapple | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| m) Tomatoes | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |

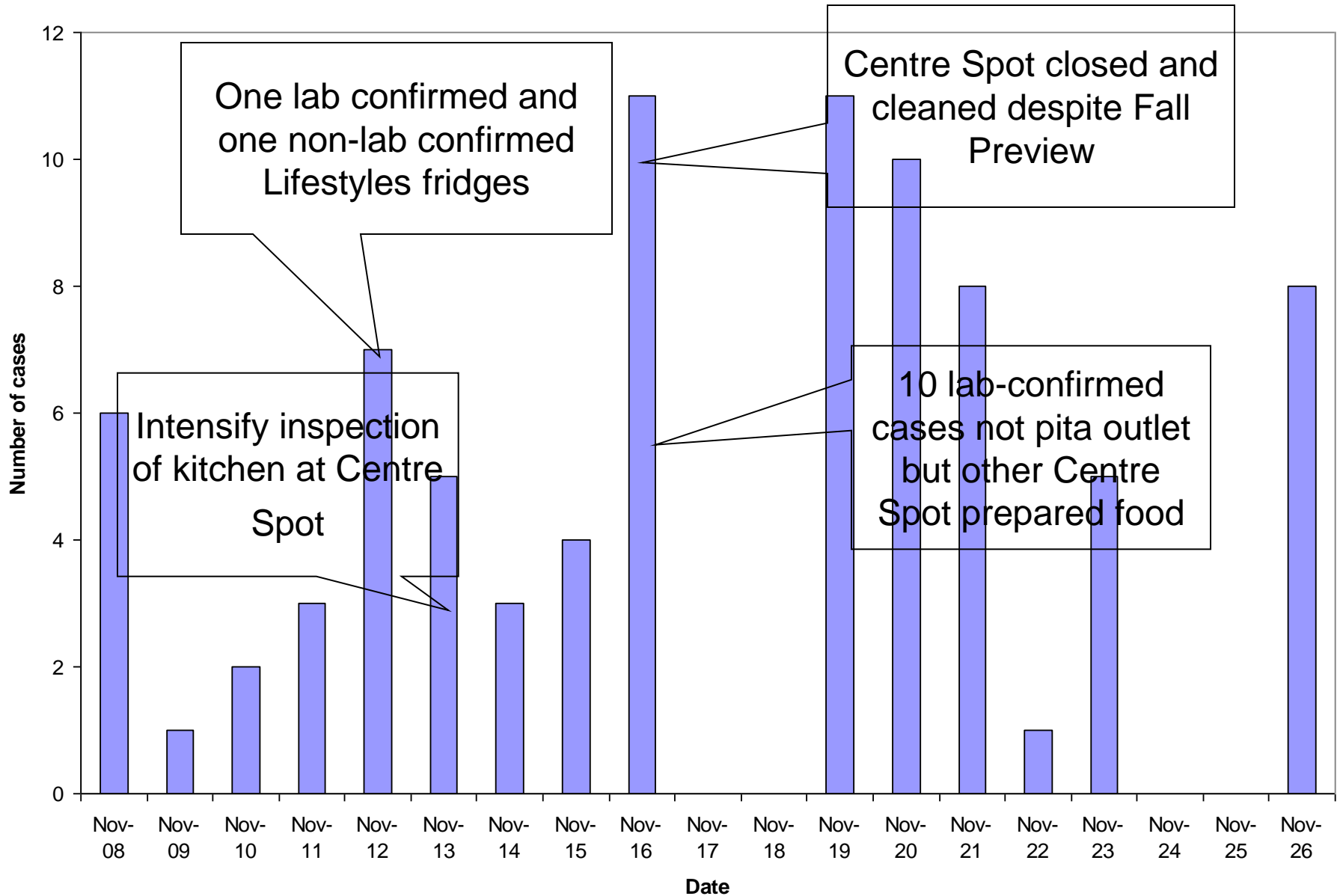
Salmonella Outbreak - November 9 - December 11, 2007

Approximate Number of Cases Reported Per Day

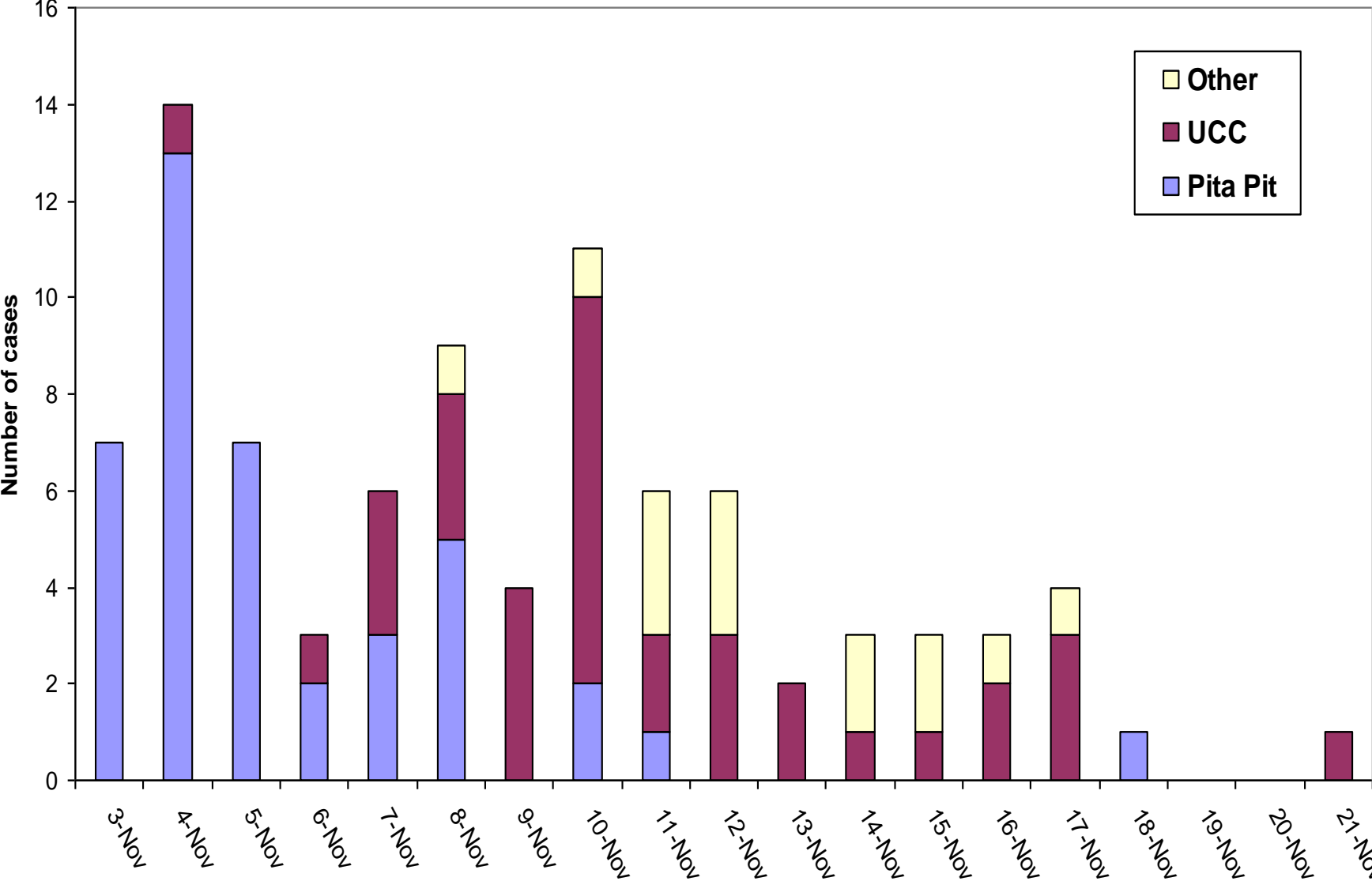


Salmonella Outbreak - November 9 - December 11, 2007

Approximate Number of Cases Reported Per Day

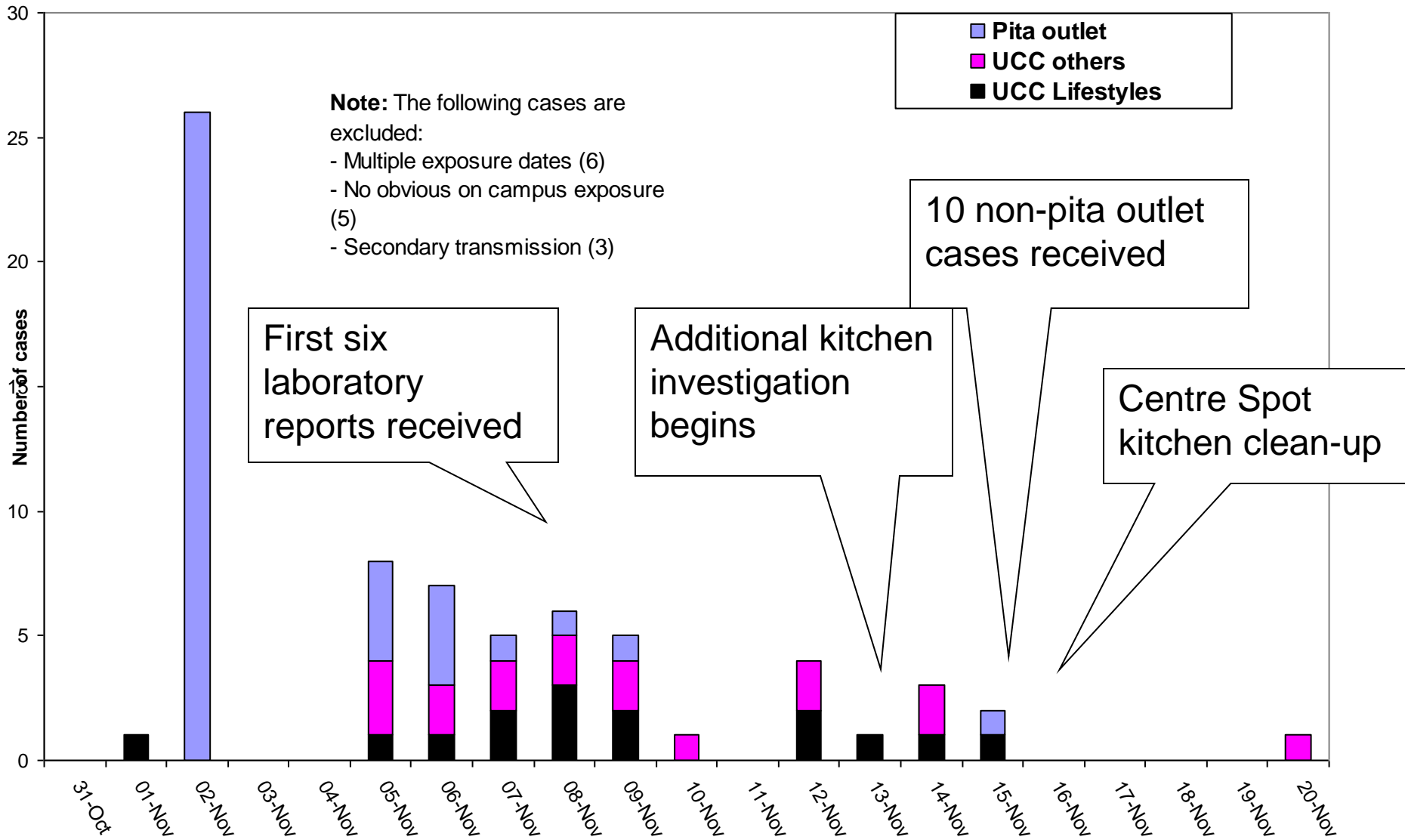


Onset Dates of Laboratory Confirmed Salmonella Typhimurium 90 Cases



Exposure dates laboratory-confirmed cases

76 cases



Hypotheses

- Hypotheses:
 - Food brought in contaminated
 - Contaminated through infected foodhandler
 - Contaminated through cross contamination
- Likely never be sure

Testing the Hypothesis

- Analysis of meal plan data
- Analysis compared to cash register sales
- Case control study of people who ate at pita outlet – web based
- Case control study of people to assess usual eating patterns related to UCC – web based

Chicken Problems

- Not everyone ate chicken
- November 2, lab confirmed only
 - 12 / 26 (46%) did not eat chicken
- Chicken for pita location arrived cooked and frozen; then thawed, chopped, reheated, hot held
- Other explanations:
 - Tong bath with chicken-serving tongs
 - Chicken server
 - Place on cutting board where chicken pitas prepared

Collection of Food and Environmental Samples

Collection of Food and Environmental Samples

- November 9, 2007
 - 5 food samples pita outlet
 - *Bacillus Cereus* in chicken and some evidence of bacteria on tomatoes and lettuce
- November 13, 2007
 - 35 food samples pita outlet – negative
 - 14 environment samples - negative
- November 18, 2007
 - Two drippy chickens
 - *Salmonella Heidelberg* on one

Testing of Food Handlers

Testing of Stool from Pita Outlet Food Handlers

- 27 staff identified for testing related to pita outlet
- 24 tested – 2 positive but onset after outbreak started

Where Did We Land?

- Raw chicken contaminated pita outlet around November 2
 - Contaminated product
 - Hands of a food handler
 - Contaminated cutting board
- Subsequently spread from either pita outlet or original contamination to other surfaces in Centre Spot kitchen

Kitchen Recommendations

Prevent Cross-Contamination

- No raw chicken
- Pita on wrapping paper
- No utensils in sink with raw produce
- Change cutting board and sanitize
- Sanitize utensils
- Allow dishes to air dry
- Sanitize all bins for transporting food
- Install handwashing sinks and dispensers
- Review steps where hands should be washed

Temperature Recommendations

- Calibration of thermometers
- Record temperatures and respond appropriately
- Maintenance of refrigerators
- Ensure dishwashers reach appropriate temperatures

Simplification of Processes

- Moved Production Centre
- Close Centre Spot 15 minutes each day to reset
- Enhanced food handler training and use of checklists
- Audits by outside consultants
- Modify dishwashing area, food storage, locker rooms
- Install dispenser for disinfectants and waterless handwash

Descriptive Epidemiology

- 90 laboratory confirmed cases
- Pita outlet **41 (45.6%)**
 - Pita outlet exclusively **26**
 - Pita outlet plus other UCC exposures **15**
- Food prepared at UCC, not pita outlet **35 (38.9%)**
 - Lifestyle fridges **15**
 - Other food Centre Spot food **20**
- Other **14 (15.6%)**
 - Cannot decide **6**
 - Nothing on campus **5**
 - Person-to-person **3**

Descriptive Epidemiology

- Mean age: 22 years
- Age range: 17 - 51 years
- Female 57.8%; Male 42.2%
- 15 food handlers - victims not source
 - 2 of these were pita outlet employees

Descriptive Epidemiology

- 7 hospitalizations
- 60% had bloody diarrhea
- Diarrhea severe
 - mean 17 and median 15 times on worst day
- For 37 people where duration known
 - Mean 8 and median 7 days duration
 - Range 3 - 21 days

Descriptive Epidemiology

- All laboratory confirmed cases were:
 - Salmonella Typhimurium
 - PT 108, STXAI.0312
- Same type as causing large provincial outbreak in 2007 with 198 cases
- ?? Linked to chicken

What Did We Learn?

- Many issues identified and improved in kitchen
- Recall of foods are not as good as electronic records
- Web based technology for conducting studies is great

Want to Read More?

- Report available at:
 - www.healthunit.com/uploads/mlhu-salmonella-outbreak-uwo.pdf

Acknowledgements

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