

Outbreak Investigation and Response in Canada

Outbreak Management Division, Public Health Agency of Canada
Office of Food Safety and Recall, Canadian Food Inspection Agency

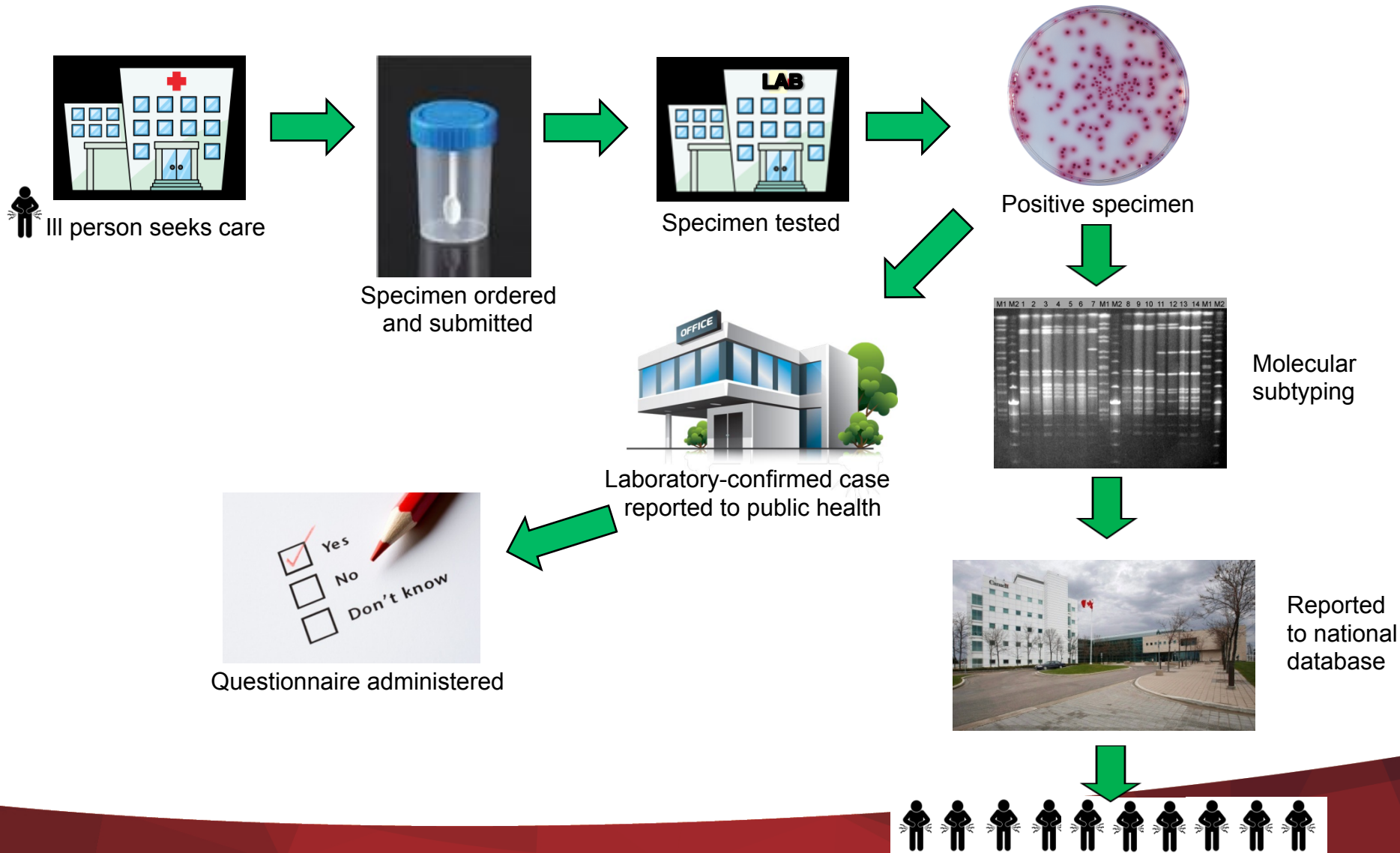
Ontario Food Protection Association Spring Technical Meeting
April 5th, 2018



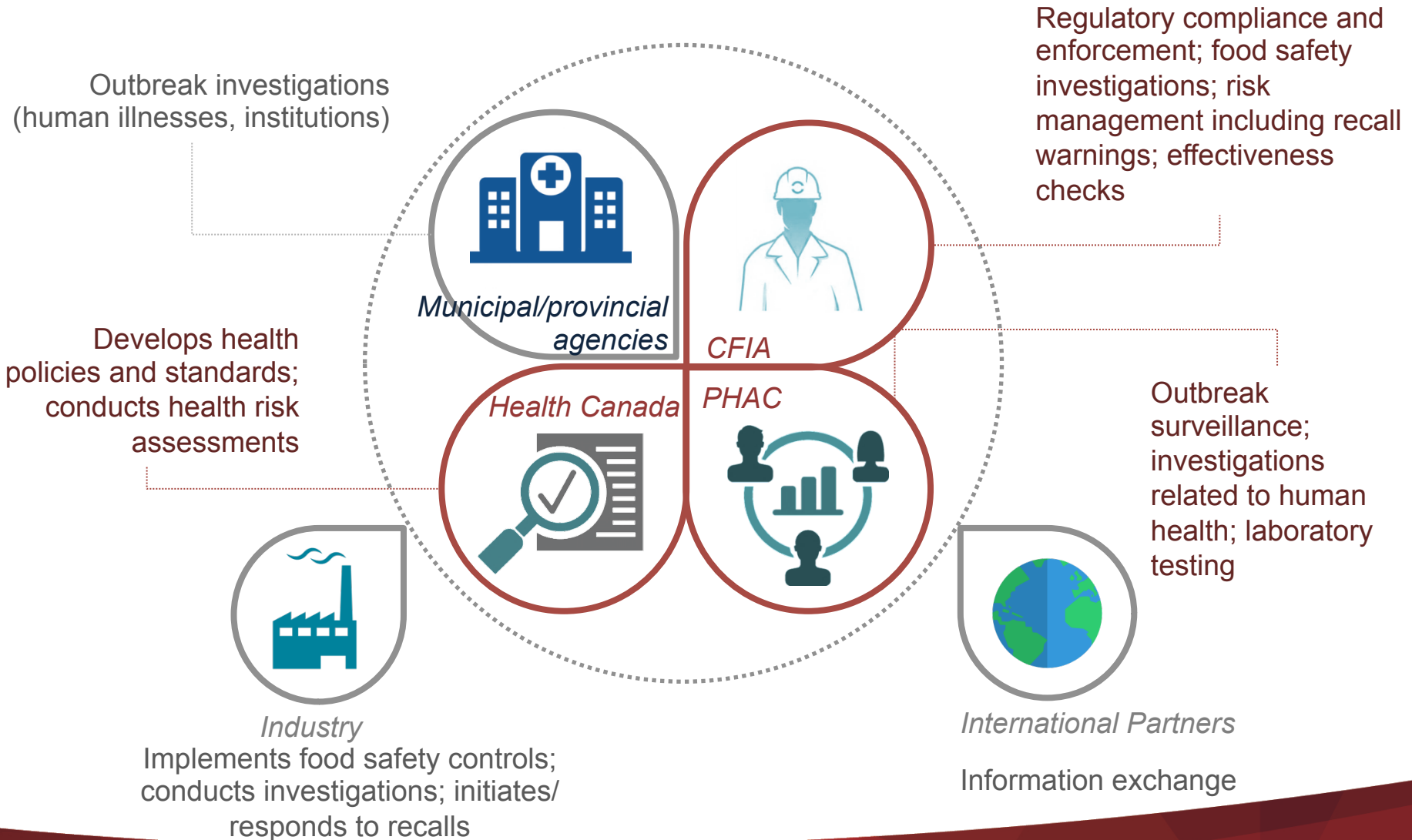
OUTLINE

- Foodborne illness outbreak detection and investigation
- Case study:
2017 *E. coli* O157:H7 outbreak associated with romaine lettuce exposure
 - What happened
 - Investigation challenges
 - What was learned

FOODBORNE ILLNESS OUTBREAK DETECTION



FOODBORNE ILLNESS OUTBREAK INVESTIGATION: Canadian Food Safety Partners



FOODBORNE ILLNESS OUTBREAK INVESTIGATION

Types of evidence:

EPIDEMIOLOGICAL

Determine existence of an outbreak and identify potential exposure(s) that caused illnesses.

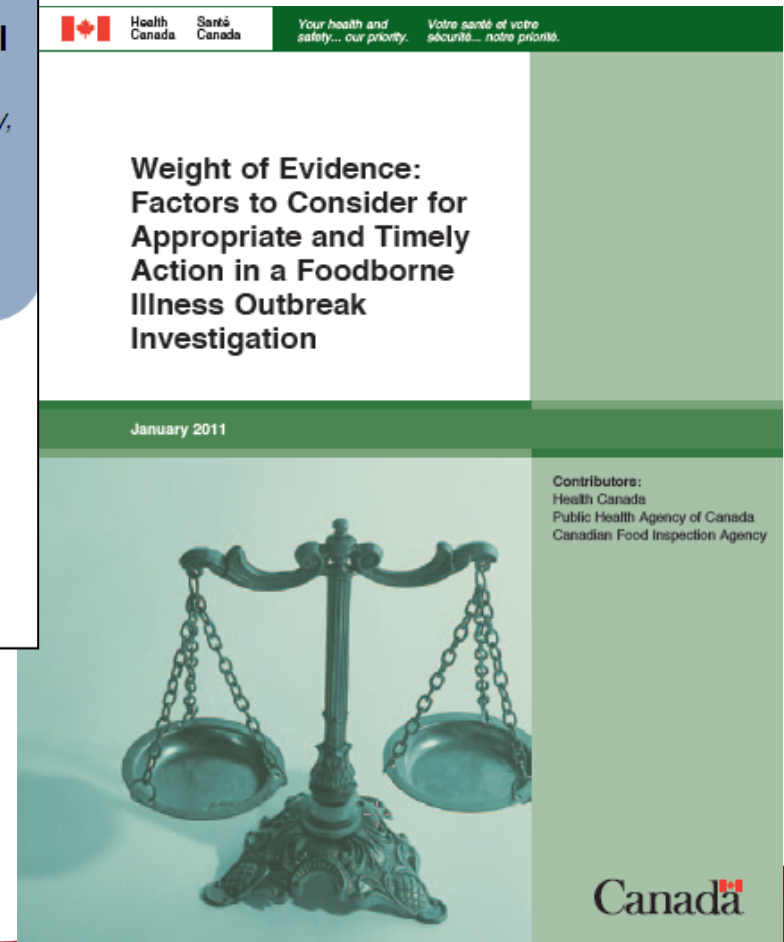
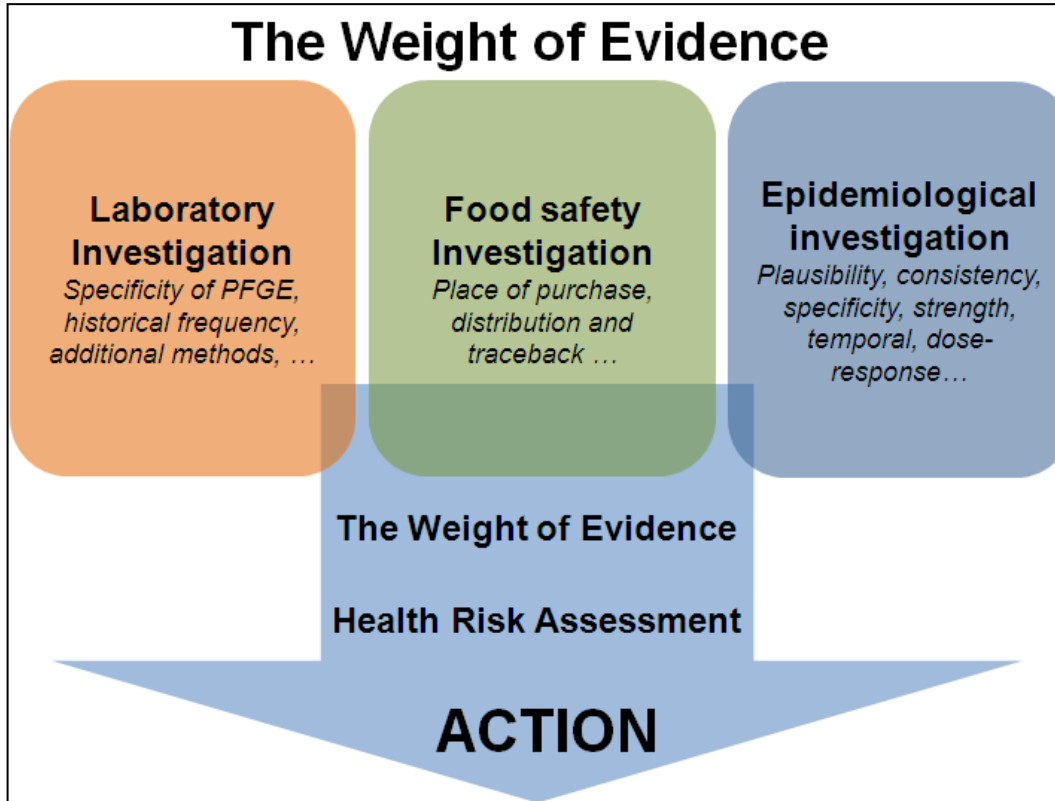
MICROBIOLOGICAL

Identify pathogen in human cases and suspected exposure that caused illnesses.

FOOD SAFETY

Identify distribution of suspected exposure and root cause of contamination.

FOODBORNE ILLNESS OUTBREAK INVESTIGATION



**OUTBREAK OF *E. COLI* O157:H7
ASSOCIATED WITH ROMAINE
LETTUCE EXPOSURE IN
EASTERN CANADA, 2017**

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Last illness onset (Nov 26)					1	



Alert issued to public health professionals of a cluster of 10 shiga toxin PCR positive reports in a single province.

Illness onsets: Nov 18 to 26

8/10 report consumption of Caesar salad purchased from a single retailer.

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Last illness onset (Nov 26)					1 10 cases	2 10 cases
3 10 cases	4 10 cases					



Possible cases identified in 2 other provinces.

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		Last illness onset (Nov 28)			1 10 cases	2 10 cases
3 10 cases	4 10 cases	5 21 cases				



National outbreak investigation launched.

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		Last illness onset (Nov 28)			1 10 cases	2 10 cases
3 10 cases	4 10 cases	5 * 21 cases	6 21 cases	7 21 cases		



Based on epidemiologic data, romaine lettuce is the source of the outbreak.

- Cases in one province report consumption of Caesar salad purchased from a single retailer.
- Cases in a second province report exposure to romaine lettuce purchased at a single location of a second retailer.

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1 10 cases	2 10 cases
3 10 cases	4 10 cases	5 Last illness onset * 21 cases	6 21 cases	7 21 cases	8 21 cases	9 21 cases
10 21 cases	11 21 cases	12 29 cases	13 30 cases	14 35 cases	15 37 cases	



Largest Canadian multi-jurisdictional *E. coli* O157:H7 outbreak in well over a decade.
 Romaine lettuce is the source of the outbreak.
 No convergence in the traceback investigation.
 Exposure appears to be ongoing.

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
3 10 cases	4 10 cases	5 * 21 cases	Last illness onset 6 21 cases	7 21 cases	8 21 cases	9 21 cases
10 21 cases	11 21 cases	12 29 cases	13 30 cases	14 35 cases	15 37 cases	16 37 cases
17 37 cases	18 39 cases	19 39 cases	20 40 cases	21 40 cases		



Public Health Notice is updated: there appears to be an ongoing risk of E. coli infections associated with the consumption of romaine lettuce. Individuals in ON, QC, NB, NS and NL are advised to consider consuming other types of lettuce, instead of romaine lettuce, until more is known about the outbreak and the cause of the contamination.

DECEMBER 2017

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
10 21 cases	11 21 cases	Last illness onset 12 29 cases	13 30 cases	14 35 cases	15 37 cases	16 37 cases
17 37 cases	18 39 cases	19 39 cases	20 40 cases	21 40 cases	22 40 cases	23 40 cases
24 40 cases	25 40 cases	26 40 cases	27 41 cases	28 41 cases		



US CDC is investigating a multistate outbreak of 17 *E. coli* O157:H7 infections that is closely related genetically to the Canadian outbreak. A source of infections in the US has not been identified. The CDC is unable to recommend whether US residents should avoid a particular food.

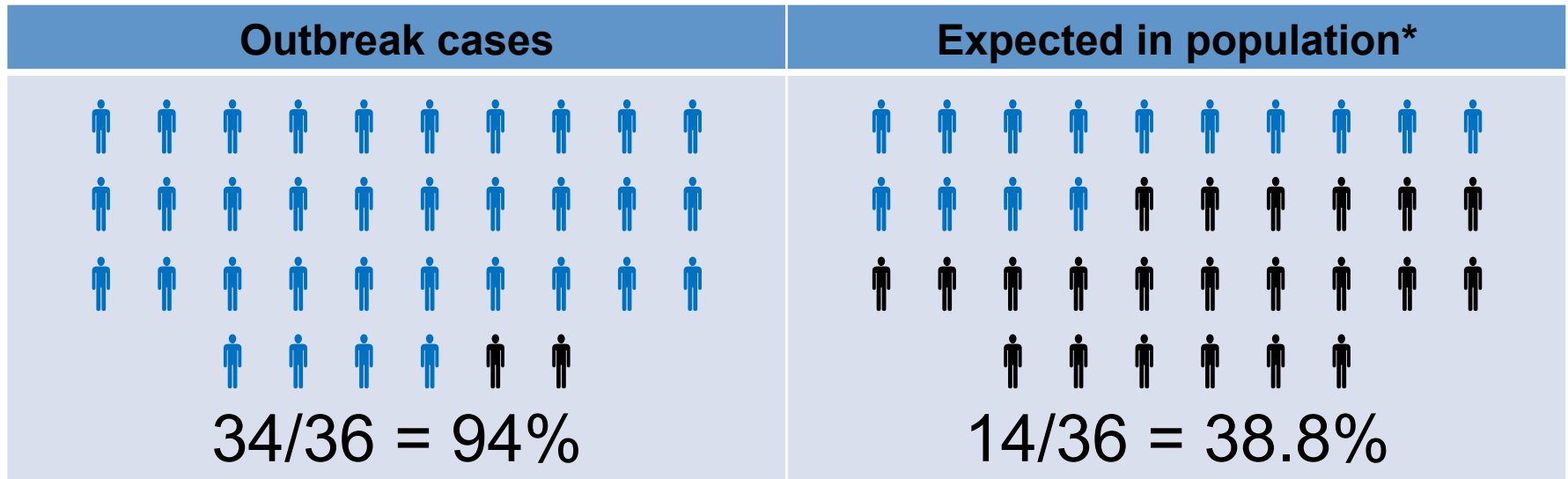
JANUARY 2018

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
31 42 cases	1 42 cases	2 42 cases	3 42 cases	4 42 cases	5 42 cases	6 42 cases
7 42 cases	8 42 cases	9 42 cases	10 42 cases			



The Canadian outbreak is declared over and the advisory is lifted. The US outbreak investigation is ongoing. 24 *E. coli* O157:H7 cases are under investigation. The likely source of the US outbreak appears to be leafy greens.

Romaine lettuce exposure

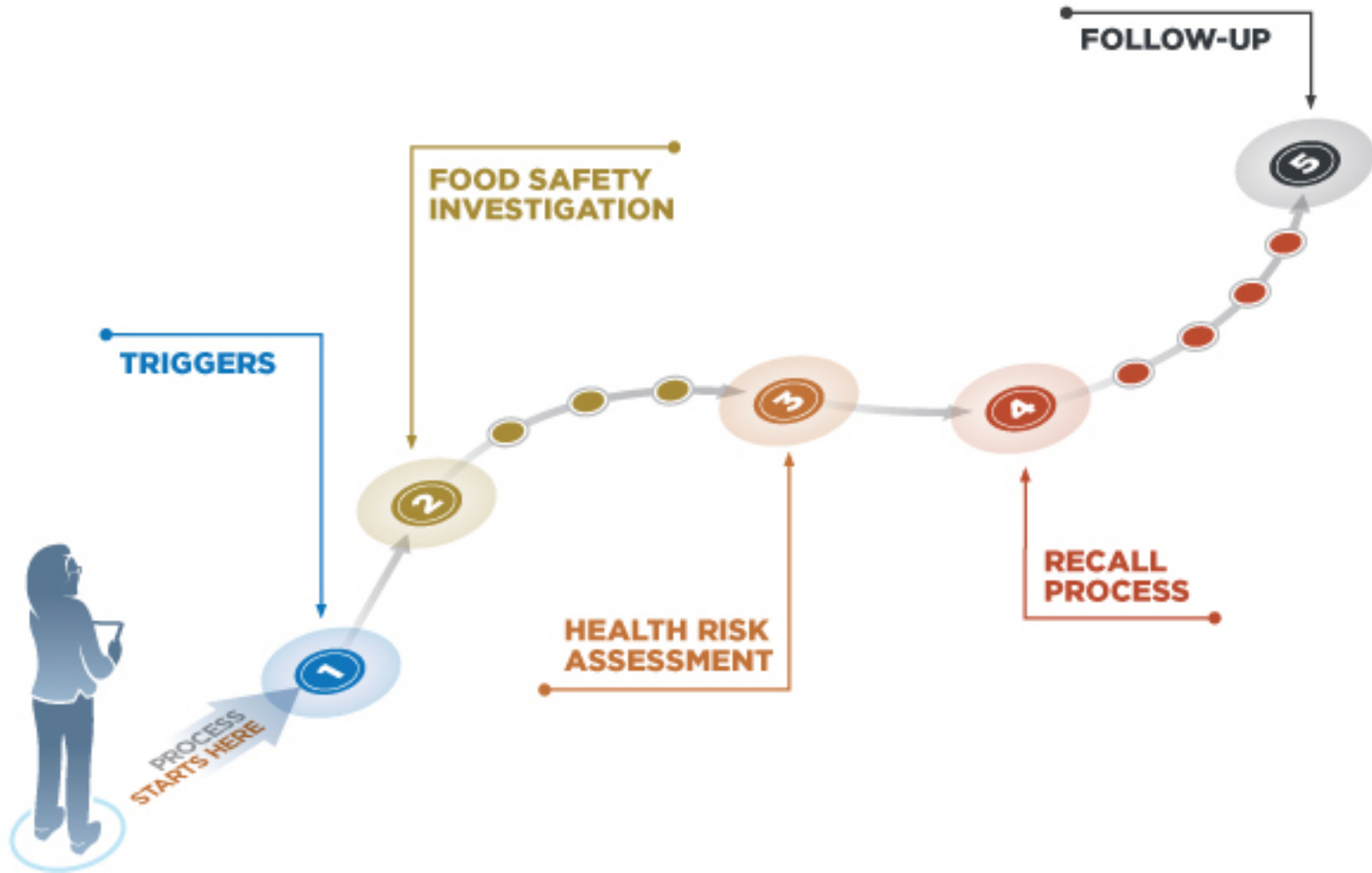


Exposure locations:

- Restaurants and other food establishments
- Purchased from a grocery store: loose, in three or four packs and in pre-packaged salad

*expected exposure in November and December in Eastern Canada

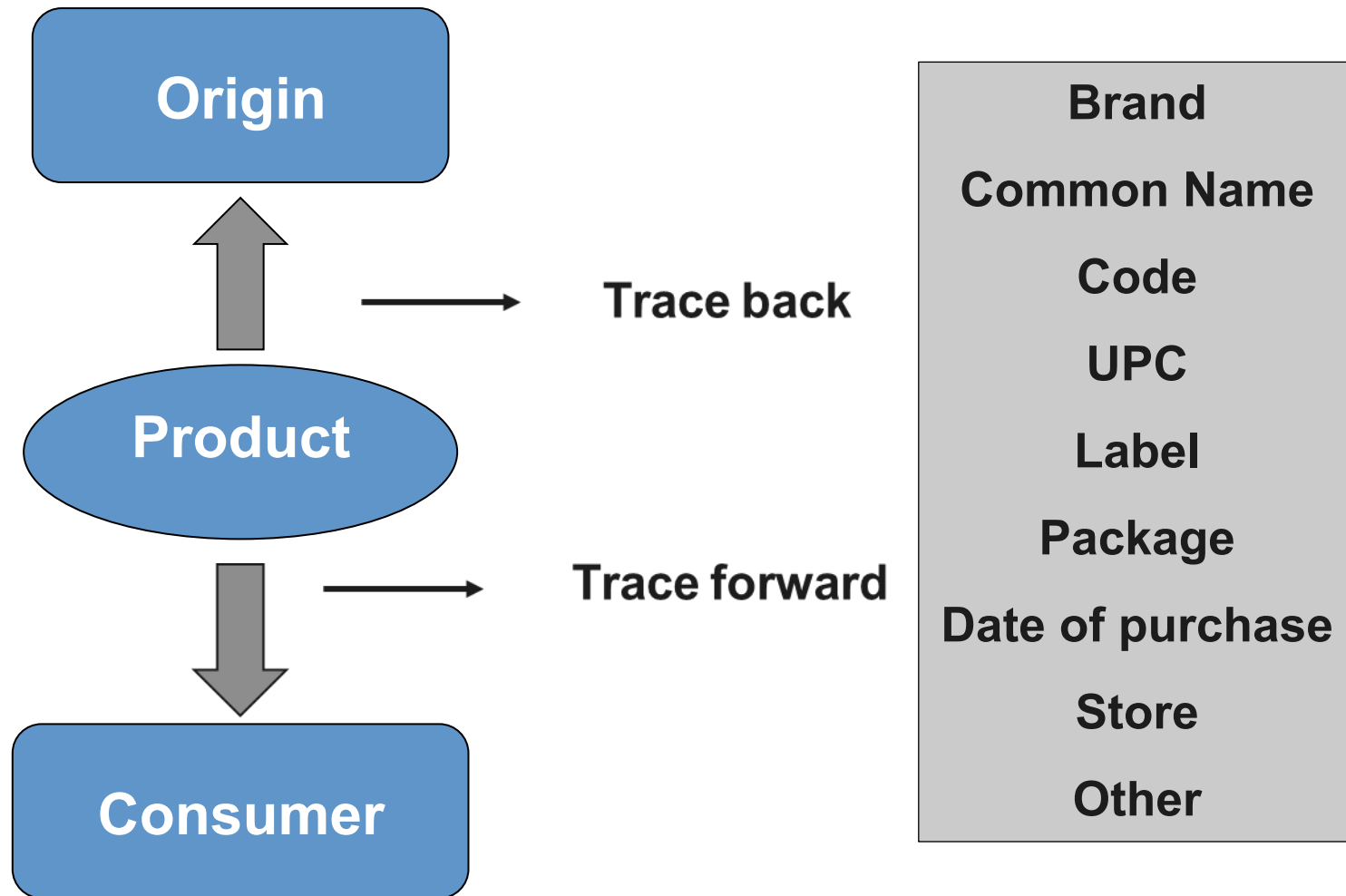
The Food Safety Investigation and Recall Process



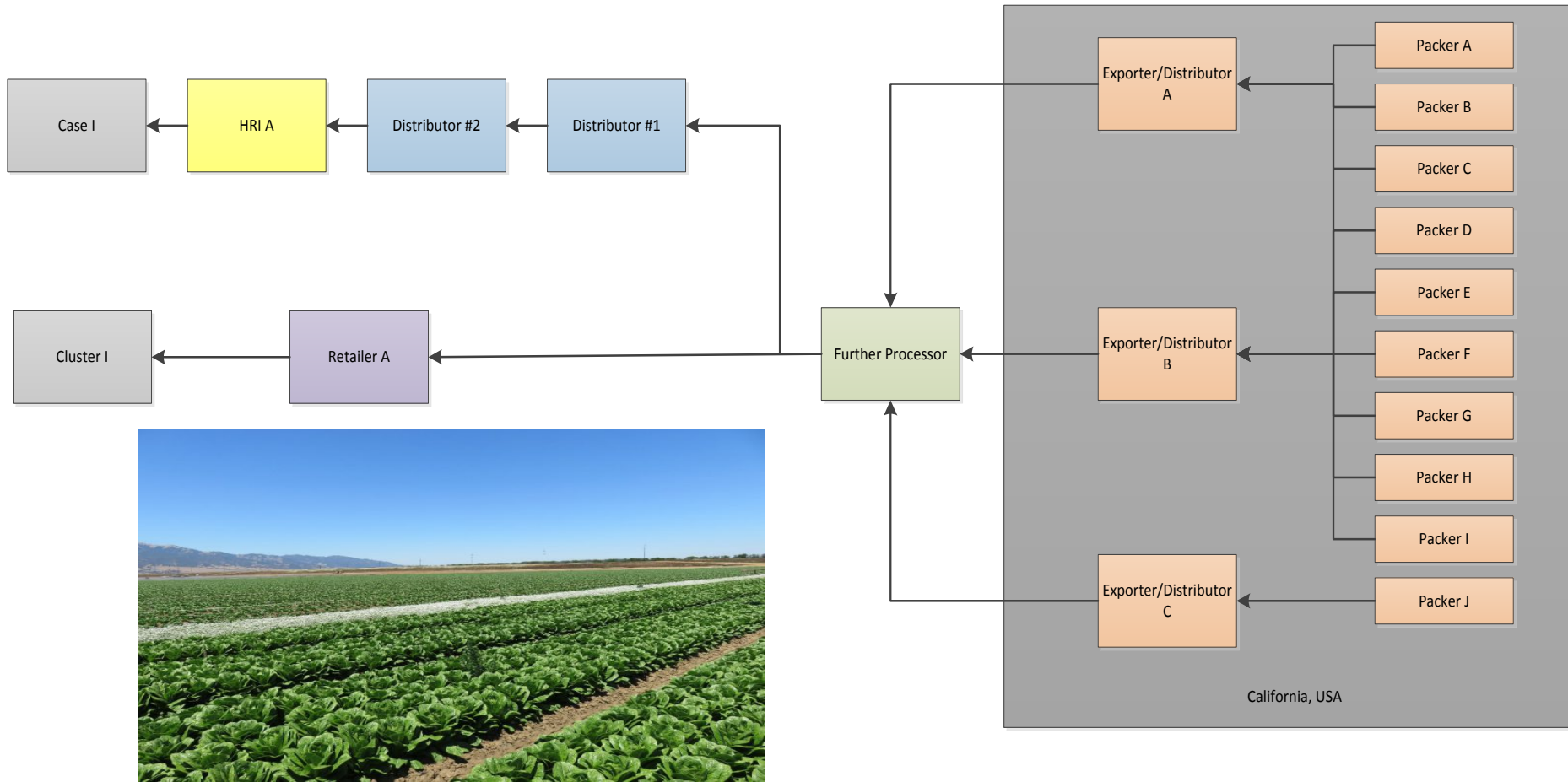
Goals of the food safety investigation

- Confirm the hazard and the nature / extent of the problem
- If possible, identify the underlying cause (i.e. the possible food safety deviation that caused the incident to occur)
 - E. coli O157:H7 is commonly found in the digestive tract of ruminants
 - Typically enters the food chain at the field level through improperly composted manure, contaminated irrigation water, or by the faeces of animals in the field
 - Lettuce is harvested and packaged in the field, and a slight spray of chlorinated water may be used to help slide the heads into the plastic packages.
 - Other potential sources of contamination include the harvesting equipment and wash water
- Collect information necessary for a Health Risk Assessment

Tracing the food

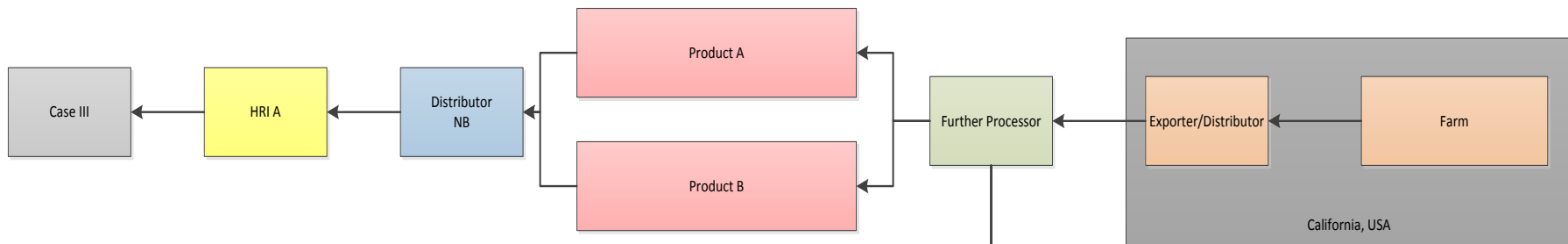


Romaine lettuce traceback – Example 1

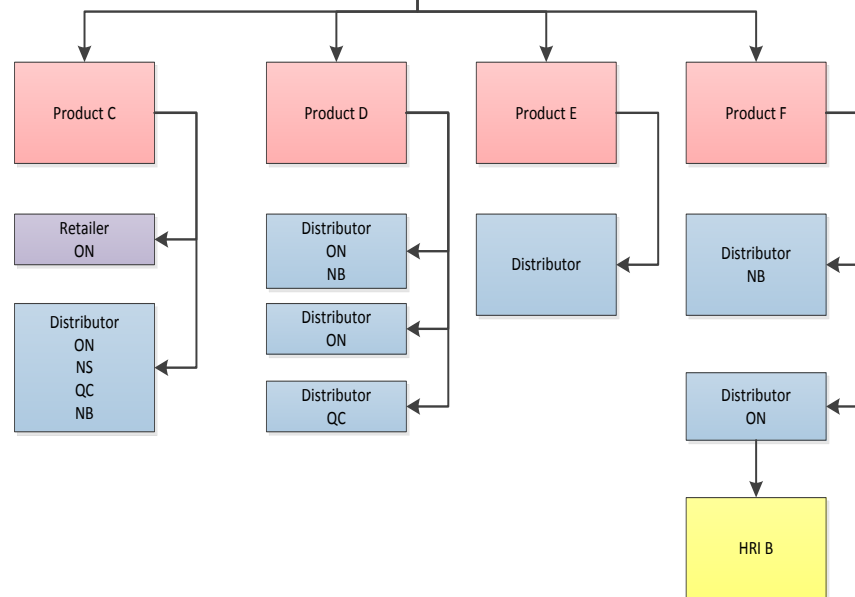


Romaine lettuce production in California. (photo: Trevor Suslow / UC Davis)

Romaine lettuce traceback – Example 2



Chopped Romaine lettuce – Food Safety News



Sampling and laboratory testing

- The purpose of the CFIA investigation was to confirm likely origin of suspect lettuce and to test romaine lettuce in the market to determine the extent of the food safety risk to Canadians through on-going exposure.
- Acknowledged that lettuce currently available on the market may not be representative of the lettuce that was consumed. Sampled most recent shipment and Romaine nearing the end of its shelf life
- Focused traceback and sampling activities on most recent (on-set dates) clusters and cases; three different brands of Romaine
- Laboratory Analysis:
 - A total of 8 samples (total of n=43) were tested
 - All samples were reported as E.coli O157 not-detected
 - The investigation was supported by 4 CFIA labs across the country

Risk management

- Public Health Notices informing consumers of the ongoing outbreak with recommendation to consider consuming other types of lettuce, instead of romaine lettuce, until more is known about the outbreak and the cause of contamination
- As the food safety investigation did not identify a specific brand, code, harvest date, etc. of concern, there were no food recalls conducted

International outbreak investigation

- Canadian and US food safety authorities have well established communication channels and good collaboration
 - Joint calls for information sharing
- Source of 2017 US E. coli O157:H7 outbreak appeared to be leafy greens but the investigation did not identify a specific type of leafy greens as the source of the outbreak
- Successfully solved outbreaks through collaboration in the past, e.g., multi-provincial outbreak of listeriosis linked to Dole packaged salad products (2015-16)

Multi-jurisdictional *E. coli* O157:H7 outbreaks, Canada, 2011 to present

Year	Source	# of <i>E. coli</i> O157:H7 cases	Estimated burden of illness
2011	Hazelnuts	3	60
2011	Walnuts	11	221
2011	Veal liver	3	60
2012	Ground beef	15	302
2012	Romaine lettuce	23	462
2012	Beef	18	362
2012	Hamburgers	8	161
2012	Shredded lettuce	31	623
2013	Unpasteurized cheese	28	563
2015	Leafy greens	13	261
2017	Romaine lettuce	42	844
Range		3 to 42	

Investigation challenges

- Food Safety Investigation
 - Common supplier identified for initial case cluster had more than 10 suppliers who were in turn supplied by numerous farms
 - Short shelf life of the product and multiple formats identified (heads, hearts, mixed greens or salad kits)
 - Lot coding and traceability: Most romaine lettuce bags do not have coding on them to indicate origin, UPC code linked to multiple brands
 - Harvest and supply practices: on a single harvest day, product may be sourced from multiple farms (both owned and leased)
 - Invoices associated with corporate office, not harvest location. Records are not maintained throughout distribution chain
 - Imported products require collaboration with foreign authorities to investigate
- Public Communications
 - Public health communication without product action
 - Strong epidemiologic evidence for outbreak source without product specificity

Lessons learned

- Public communications were successful
 - Extensive media pick-up and social media exposure
- Engagement of industry partners was helpful
 - Active engagement and willingness to work collaboratively
- Importance of strong cross-border collaborative relationships
 - Traceback and microbiologic comparisons to previous events
- Traceability improvements may improve the response to produce-related outbreaks
- The importance of adopting Good Agricultural Practices and Good Hygiene Practices all along the food continuum

Acknowledgements

All members of the national Outbreak Investigation Coordinating Committee are acknowledged for their contributions to this investigation:

- Local public health colleagues in Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland and Labrador;
- Public Health Ontario;
- Ontario Ministry of Health and Long Term Care;
- Ontario Ministry of Agriculture and Food;
- Ministère de la Santé et Services sociaux du Québec;
- Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec;
- New Brunswick Department of Health;
- Nova Scotia Department of Health and Wellness;
- Nova Scotia Department of Agriculture;
- Newfoundland and Labrador Health and Community Services;
- Canadian Food Inspection Agency;
- Health Canada;
- Public Health Agency of Canada.

Thank you.

Questions?