Canadian Multi-jurisdictional Enteric Illness Outbreak Investigations: Highlights from 2023/2024

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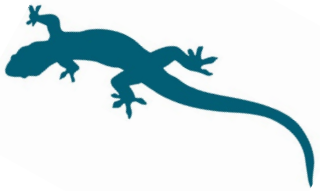
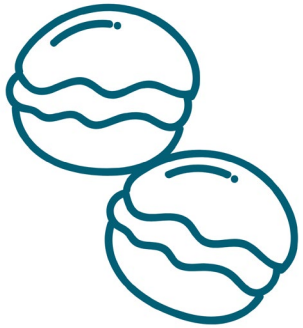


Outline



- Introduction to the Outbreak Management Division
- Highlights from 5 multi-jurisdictional outbreak investigations:
    1. *Salmonella* linked to Snakes and Feeder Rodents
    2. *Salmonella* linked to Cantaloupes
    3. *Salmonella* linked to Geckos
    4. *Listeria* linked to Plant-based Refrigerated Beverages
    5. *Salmonella* linked to Imported Pastries

FOOD-RELATED ILLNESSES, HOSPITALIZATIONS & DEATHS IN CANADA

1 IN 8 PEOPLE
(4 MILLION CANADIANS)
GET SICK EACH YEAR FROM **CONTAMINATED FOOD.**

OVER 11,500 HOSPITALIZATIONS AND 240 DEATHS OCCUR EACH YEAR DUE TO FOOD-RELATED ILLNESSES.

* Includes both estimates for 30 foodborne pathogens and unknown causes of acute gastrointestinal illness.

THE COMMON CULPRITS IN CANADA ARE:

**Estimated number each year*

NOROVIRUS
The leading cause of food-borne illnesses and hospitalizations.

Illnesses: **1 million**
Hospitalizations: **1,180**
Deaths: **21**

LISTERIA
The leading cause of deaths related to food-borne illness each year.

Illnesses: **178**
Hospitalizations: **150**
Deaths: **35**

SALMONELLA
Contributes to 1 in 4 hospitalizations of all food-borne illnesses.

Illnesses: **88,000**
Hospitalizations: **925**
Deaths: **17**

E. COLI O157
One of the top food-borne bacteria causing severe illness.

Illnesses: **12,800**
Hospitalizations: **245**
Deaths: **8**

CAMPYLOBACTER
The third leading cause of food-borne illnesses and hospitalizations.

Illnesses: **145,000**
Hospitalizations: **565**
Deaths: **5**

FOOD SAFETY TIPS

CLEAN your hands, kitchen surfaces and utensils with warm, soapy water.

SEPARATE raw foods, like meat and eggs, from cooked foods, fruit and veggies to avoid cross-contamination.

COOK food to safe internal temperatures – use a digital food thermometer.

CHILL food and leftovers within 2 hours.

In Canada, there are an estimated 85,000 enteric illnesses related to **animal contact** each year[1]

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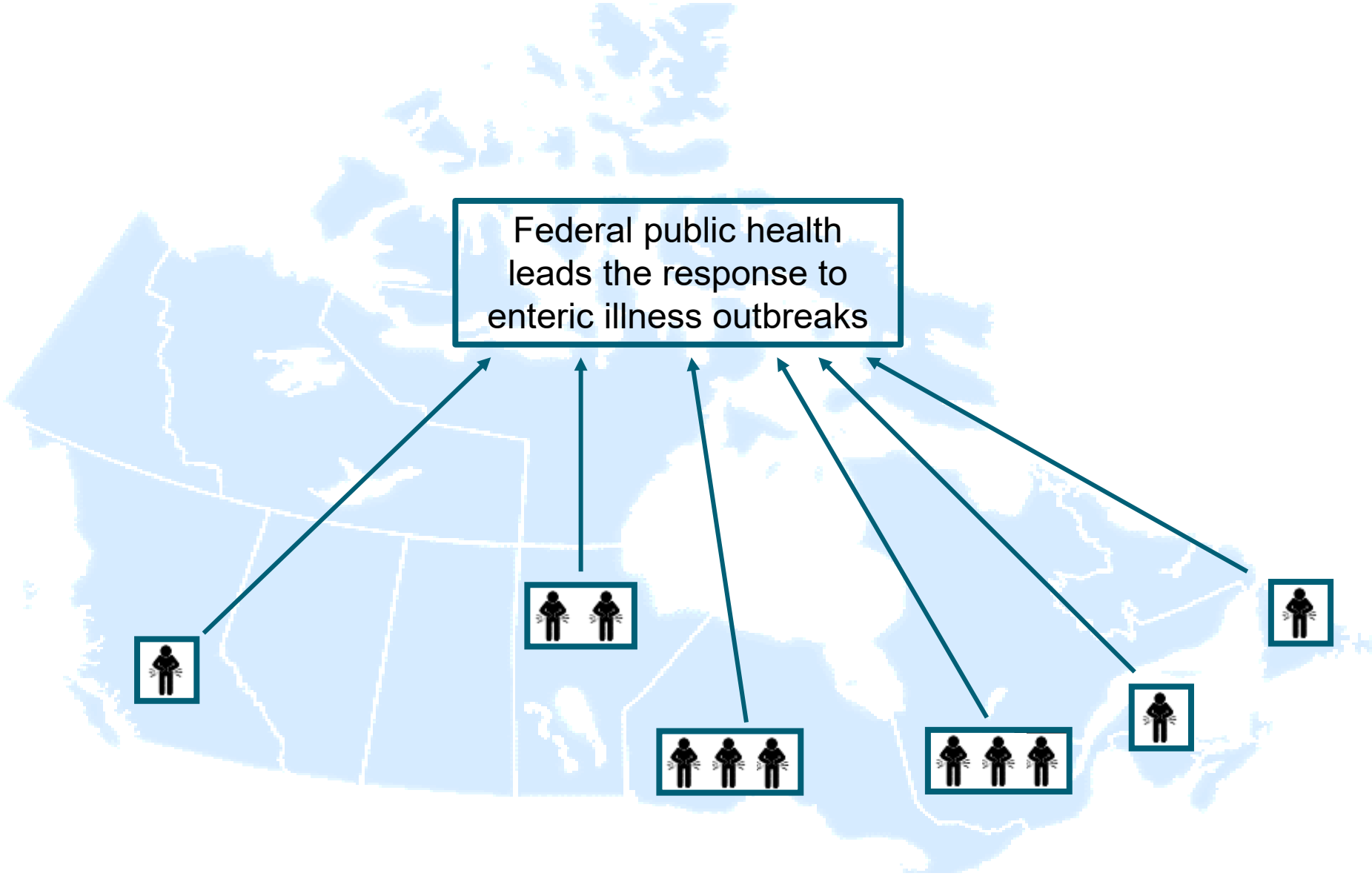
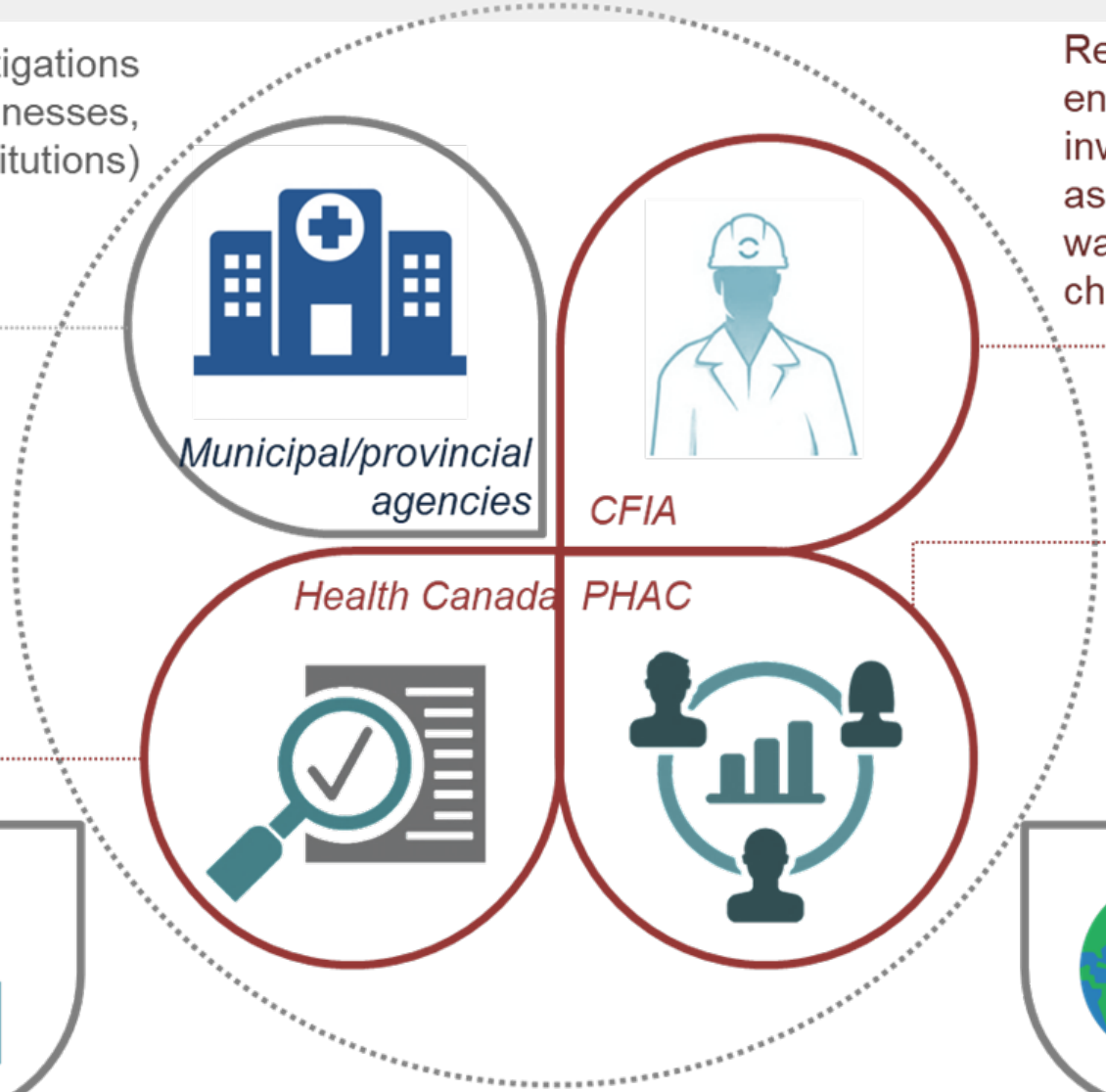

Federal public health leads the response to enteric illness outbreaks



Outbreak investigations (human illnesses, institutions)

Municipal/provincial agencies

Regulatory compliance and enforcement; food safety investigations; risk assessment; recall warnings; effectiveness checks

CFIA

Develops health policies and standards; conducts health risk assessments

Health Canada

PHAC

Outbreak surveillance; investigations related to human health; laboratory testing

Industry

Implements food safety control investigations; initiates/ responds to recalls

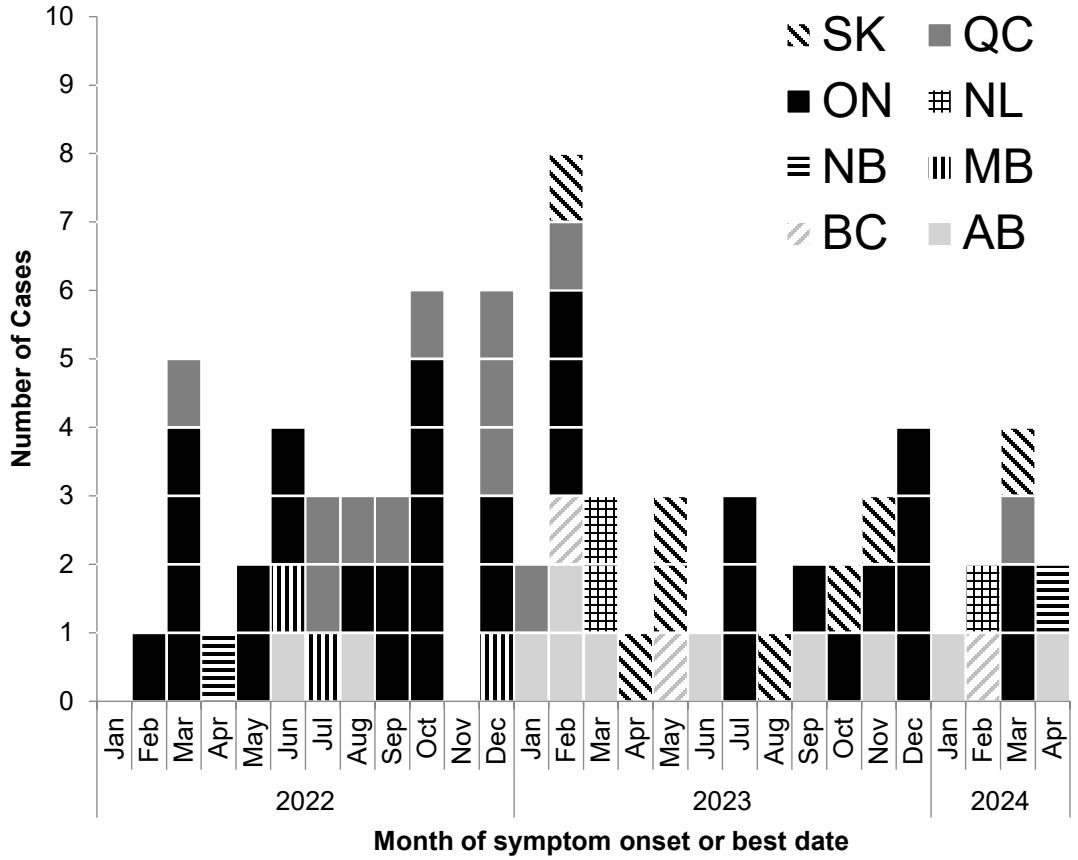
International Partners

Information exchange

Salmonella I 4,[5],12:i:- & *Salmonella* Typhimurium linked to snakes and feeder rodents

Epidemiological Summary

Salmonella in Snakes		
Cases	76	
P/T breakdown	BC = 3 AB = 11 SK = 8 MB = 3	ON = 34 QC = 12 NB = 2 NL = 3
Sex	50% female	
Age Range	0-96	
Median	23.5	
Illness Onset	February 17, 2022 – April 12, 2024	
Exposure to source	52/62 (84%)	



Epidemiological Information

- A questionnaire focused on reptiles, rodents and feeder rodents was deployed to gather both behavioral information and exposure information.
- This outbreak disproportionately affected children.
  - 17% of cases were aged 5 years or younger.
  - 26% of cases were aged 10 years or younger.
- In addition to case interviews, pet stores, suppliers and breeders were also interviewed to better understand the industry, behaviours and practices.

Traceback and Sampling

- The outbreak strains of *Salmonella* were found in samples collected from two cases homes, including swabs from snakes, their enclosure, and frozen mice.
- The outbreak strains of *Salmonella* were also found in frozen feeder mice from two suppliers.
- Cases were asked where they purchased their snakes and feeder rodents.
  - The traceback investigation identified a complex network of pet stores, suppliers, and breeders linked to cases' reported reptile and feeder rodent exposures.
  - While there were some commonalities, a single common supplier of snakes or feeder rodents was not identified.

Public Health Action

- A **Public Health Alert** (PHA) was posted to the Canadian Network for Public Health Intelligence (CNPHI) on April 11, 2023.
- A **Public Health Notice** (PHN) and social media messaging was posted on April 13, 2023 to inform people in Canada about the outbreak and provide health protection advice.
  - The PHN was updated on Mar 19 and May 14.
- Communication with pet industry partners focused on working collaboratively to find opportunities to increase awareness and education among reptile owners and industry partners.
- A webinar was held for pet industry members, including breeders, suppliers and retailers, to share the key findings of the investigation.

Key Takeaways

- **44% of cases** had only indirect contact with reptiles
- **52% of cases** reported not knowing about the risk of *Salmonella* from reptiles.
- **71% of cases** report not knowing about the risk of *Salmonella* from feeder rodents.
- Cases continue in this outbreak because these strains of *Salmonella* exist in snakes and feeder rodents in Canada. We continue to work on longer term strategies to prevent illnesses related to reptiles and feeder rodents.

Salmonella Soahanina, *Salmonella* Oranienburg & *Salmonella* Newport linked to cantaloupes

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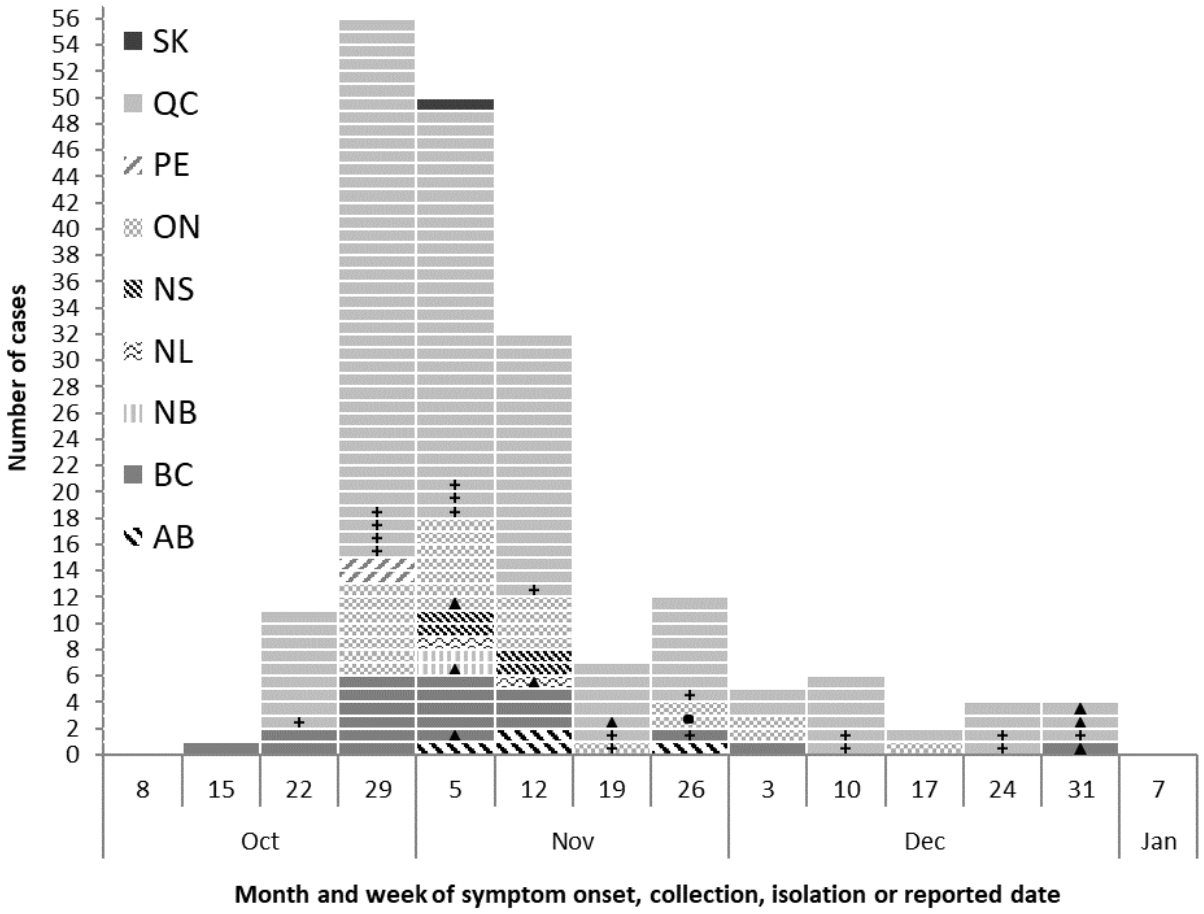
Epidemiological Summary

Salmonella in Cantaloupes		
Cases	190	
P/T breakdown	BC = 20 AB = 4 SK = 1 ON = 24 QC = 131	NB = 2 NS = 4 NL = 2 PE = 2
Sex	55% female	
Age Range	0-100+	
Median	59.5	
Illness Onset	October 21, 2023 – January 6, 2024	
Exposure to source	105/143 (73%)	



Epidemiological Information

- Because the source of illnesses was already known, a focused questionnaire was used for 145 cases.
- There were many subclusters identified in this investigation, including at 2 daycares, 3 retirement residences and 4 restaurants.
- This outbreak was more severe than most *Salmonella* outbreaks and affected vulnerable age groups at higher rates.
  - 39% of cases were hospitalized
  - 5% of cases died
  - 33% of cases were 5 years old or younger
  - 45% of cases were 65 years or older
- A related outbreak occurred in the US at the same time, with 407 cases across 44 states.

Food Safety Investigation

- *Salmonella* was detected in a cantaloupe through CFIA's National Microbiological Monitoring Program. That specific brand of cantaloupe was recalled.
- Additional sampling and traceback activities began and additional brands of cantaloupe were identified and recalled.
- The recalled cantaloupes were imported from a single grower in Mexico.
- The root cause of contamination was not identified.

Public Health Action

- A **Public Health Alert** (PHA) was posted to the Canadian Network for Public Health Intelligence (CNPHI) on November 17, 2023.
  - The PHA was updated on Nov 24.
- A **Public Health Notice** (PHN) and social media messaging was posted on November 17, 2023 to inform people in Canada about the outbreak and to link to the food recall warnings.
  - The PHN was updated on Nov 22, Nov 24, Dec 1, Dec 7, Dec 15, and Jan 29.
- Nine **food recall warnings** were issued:
  - Malichita and Rudy brand cantaloupes, along with secondary recalls for fruit trays, fruit salads, pre-cut fruits and smoothies, were recalled between November 1 and December 8, 2023.

Key Takeaways

- This is the largest outbreak of *Salmonella* linked to cantaloupe to have occurred in North America.
- Starting the investigation with a positive sample of cantaloupe saved a significant amount of time by eliminating the need for hypothesis generation. This likely prevented illnesses and possibly saved lives.
- This outbreak demonstrated the utility of the CFIA NMMP.
- New communications products were created to target messaging to daycares, retirement homes and long-term care facilities during multi-jurisdictional enteric illness outbreak investigations.

Salmonella Lome & *Salmonella* Muenchen linked to geckos

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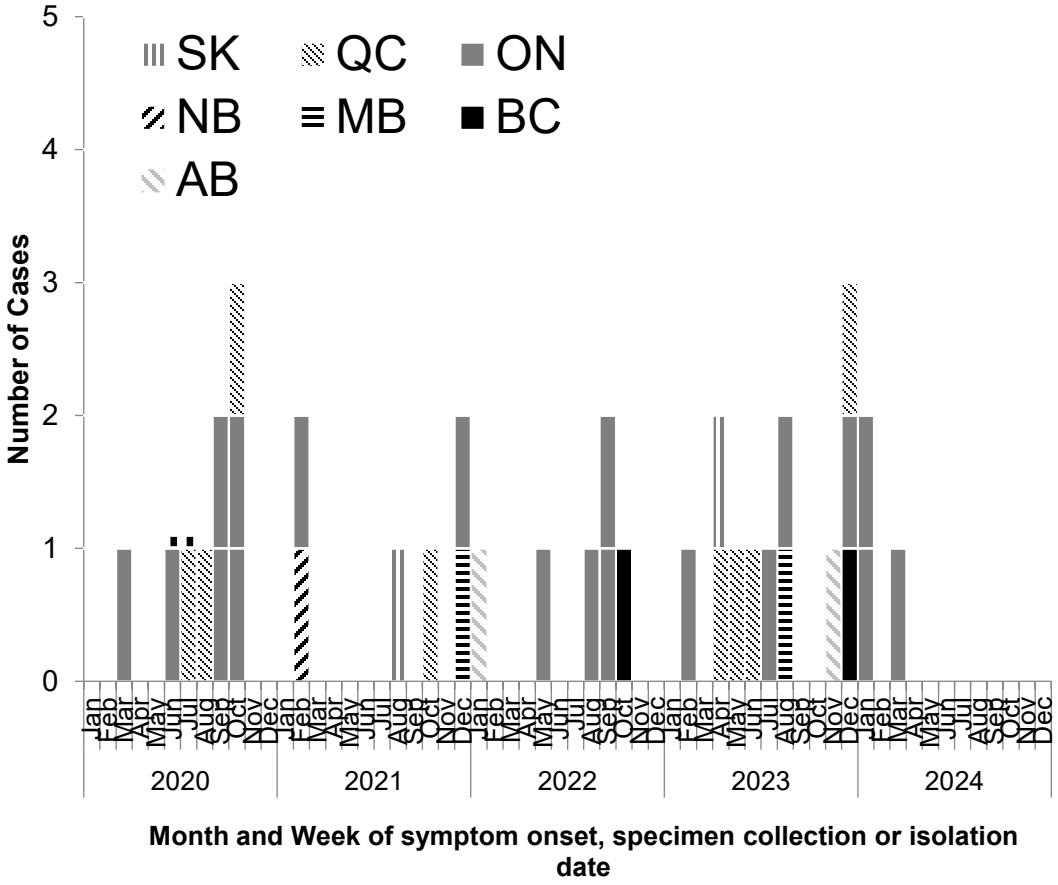
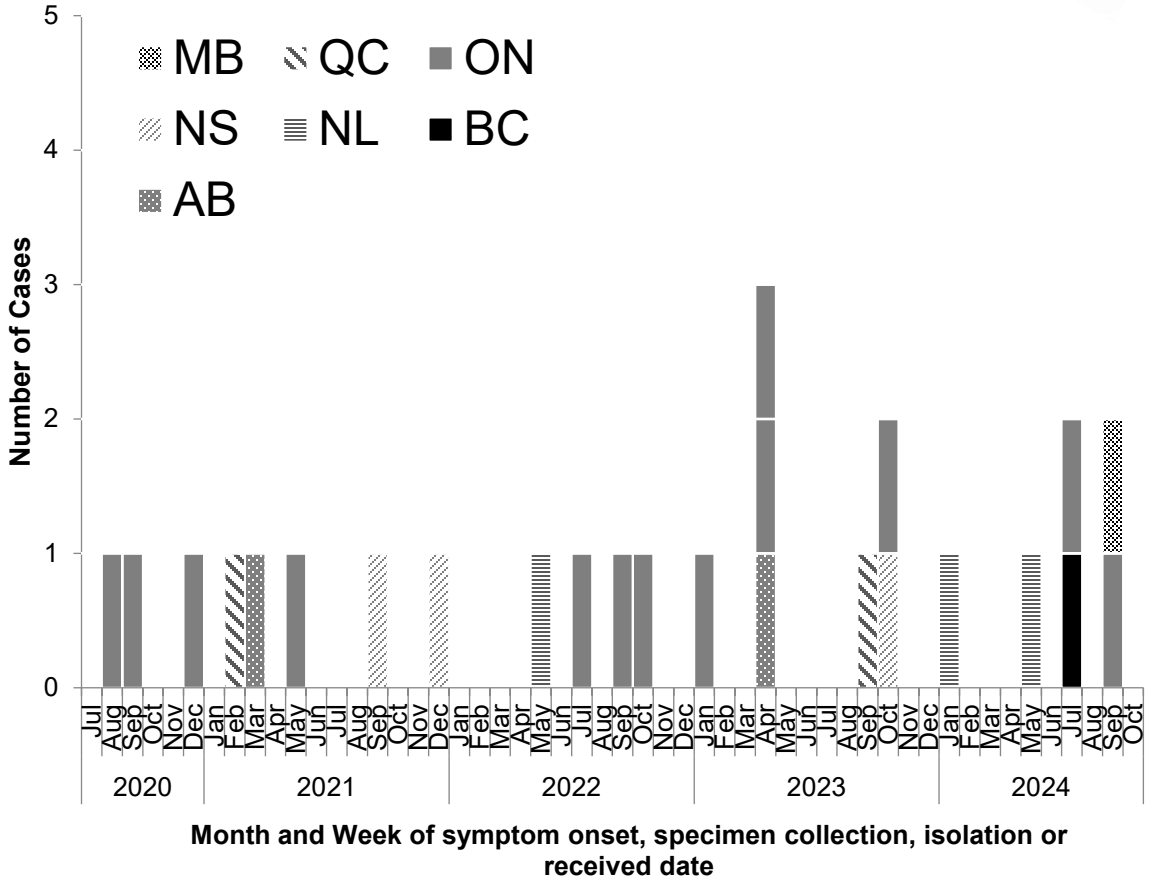
Epidemiological Summary

Salmonella Lome in Geckos		
Cases	36	
P/T breakdown	BC = 2 AB = 2 SK = 2 MB = 2	ON = 19 QC = 8 NB = 1
Sex	64% female	
Age Range	0-84	
Median	27.5	
Illness Onset	March 25, 2020 – March 17, 2024	
Exposure to source	14/22 (64%)	

Salmonella Muenchen in Geckos		
Cases	25	
P/T breakdown	BC = 1 AB = 2 MB = 1 ON = 13	QC = 2 NS = 3 NL = 3
Sex	64% female	
Age Range	1-100+	
Median	39	
Illness Onset	August 12, 2020 – September 7, 2024	
Exposure to source	12/20 (60%)	

Epidemiological Summary





Epidemiological Information

- A questionnaire focused on reptiles was deployed early in both investigations to gather both behavioral information and exposure information.
- Both outbreaks disproportionately affected children, though *S.* Lome more so.
  - 22% of cases were aged 5 years or younger in the *S.* Lome outbreak.
  - 16% of cases were aged 10 years or younger in the *S.* Muenchen outbreak.

Traceback and Sampling

- Samples of a gecko enclosure were taken from a case home.
  - One sample was positive for *Salmonella*.
- Cases were asked where they purchased their geckos. While there were some commonalities, there was no single source identified.

Public Health Action

- A **Public Health Alert** (PHA) was posted to the Canadian Network for Public Health Intelligence (CNPHI) on March 7, 2024 for the *S.* Lome investigation, and September 11, 2024 for the *S.* Muenchen investigation.
- A **Public Health Notice** (PHN) and social media messaging was posted was posted on March 22, 2024 for the *S.* Lome investigation and September 27, 2024 for the *S.* Muenchen investigation. The goal for both was to inform people in Canada about the outbreaks and share public health messaging.
- Communication with various pet industry partners in both investigations to amplify public health messaging.

Key Takeaways

- **About 50% of cases** had only indirect contact with reptiles.
- **67% and 57% of cases** reported not knowing about the risk of *Salmonella* from reptiles.
- There was no clear pattern between duration of gecko ownership and illness onset. Some cases had their gecko for a few days while others had their geckos for over a year.
  - Geckos and reptiles can carry *Salmonella* in their digestive systems without appearing ill.
  - Stress or other factors can cause the reptiles to shed more, possibly leading to human illness.

Listeria monocytogenes linked to plant-based refrigerated beverages

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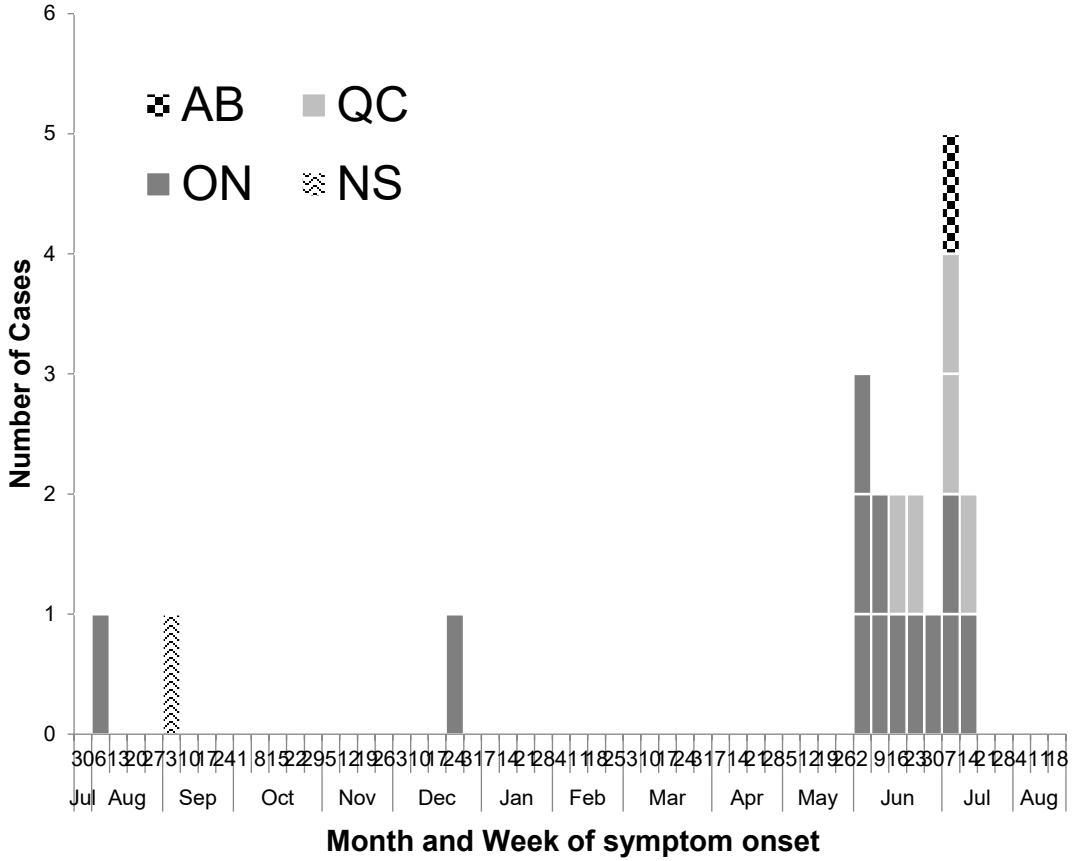
Epidemiological Summary

Listeria in plant-based milk	
Cases	20
P/T breakdown	AB = 1 ON = 13 QC = 5 NS = 1
Sex	65% female
Age Range	7-89
Median	58
Illness Onset	August 11, 2023 – July 15, 2024
Exposure to source	19/19 (100%)



Epidemiological Information

- Leftover products were sampled when available as cases in Ontario were interviewed during the June increase in case reporting.
- An open sample of unsweetened coconut milk was collected from a case home and tested positive for the outbreak strain of *Listeria*.

Food Safety Investigation

- Once the open sample of plant-based milk tested positive for *Listeria*, closed samples were also tested to ensure it was not a result of cross contamination.
- The food safety investigation included product and environmental sampling.
- The presence of the *L. monocytogenes* outbreak strain was confirmed within the production environment.
- The primary site of the contamination within the environment was not identified.

Public Health Action

- A **Public Health Alert (PHA)** was posted on the Canadian Network for Public Health Intelligence (CNPHI) on June 27, 2024.
- A **Public Health Notice (PHN)** and social media messaging was posted on July 17, 2024 to inform people in Canada about the outbreak and to link to the food recall warning.
  - The PHN was updated on Jul 20, Aug 12 and Oct 11.
- A **food recall warning** was issued on July 8, 2024 for 18 Great Value and Silk brand plant-based milk products.

Key Takeaways

- This was the first known outbreak of *Listeria* associated with plant-based refrigerated beverages.
  - Local public health investigators kept an open mind about possible sources, and considered plant-based refrigerated beverages even though this was not a typical source for *Listeria*.
- Local and provincial public health worked to swiftly investigate the outbreak, including timely data collection and prompt product sampling.
- The quick identification of the source allowed for prompt public health action.

Salmonella Enteritidis linked to imported pastries

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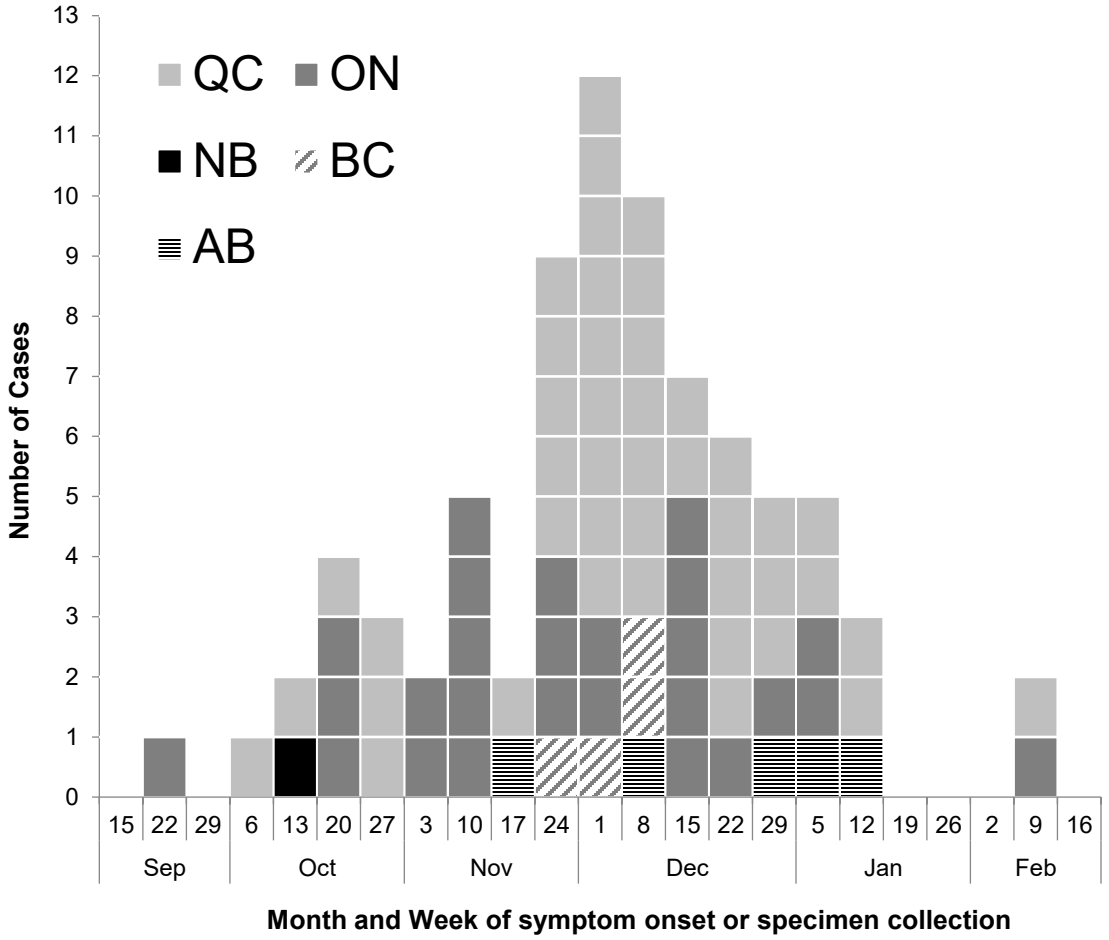
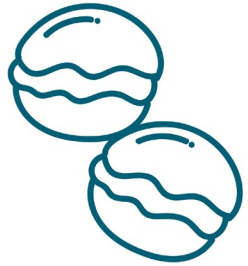
Epidemiological Summary

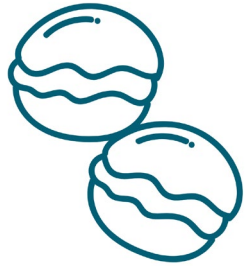
Salmonella in Imported Pastries	
Cases	79
P/T breakdown	BC = 4 AB = 5 ON = 26 QC = 43 NB = 1
Sex	59% female
Age Range Median	3-88 52
Illness Onset	September 27, 2024 – February 14, 2025
Exposure to source	46/64 (72%)





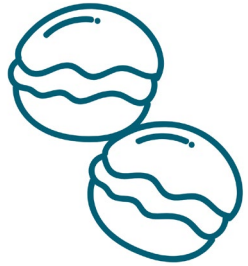
Epidemiological Investigation

- Hypothesis-generating case interviews were conducted initially to collect data about all exposures prior to illness onset.
- Garlic was highly reported, and an early suspect source.
- Many cases reported attending catered events, such as weddings, Christmas parties, funerals, conferences, etc.
- Menus and invoices from the various catered events were the key to identifying imported pastries as the outbreak source.



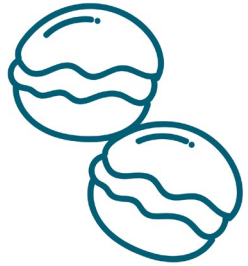
Food Safety Investigation

- Invoices from the catered events were collected by local investigators.
- Upon review, the same item appeared on invoices for a number of locations: “Pastry Mini Ital Asst”.
- This item was a carton that contained 12 different mini pastries, for a total of 120 items per carton.
- The item was imported by one company, and distributed to AB, BC, ON, QC and NS.
- Further epidemiological and food safety investigation uncovered additional contaminated pastries from the same manufacturer.



Public Health Action

- A **Public Health Alert (PHA)** was posted on the Canadian Network for Public Health Intelligence (CNPHI) on December 13, 2024.
- A **Public Health Notice (PHN)** and social media messaging was posted on January 19, 2025 to inform people in Canada about the outbreak and to link to the food recall warning.
  - The PHN was updated on Jan 29 and Mar 19.
- Three **food recall warnings** were issued**:**
  - Sweet Cream brand Mini Patisserie on January 18, 2025.
  - D. Effe T. brand Lemon Delight and Tartlet with Forest Fruits on January 29, 2025.
  - Sweet Cream brand and D. Effe T. brand frozen pastries (Mini Lobster Tail, Big Lobster Tail, Big Sfoglia Napoli, Mini Sfogliatelle, Mini Chocolate Sfogliatele) on April 19, 2025.

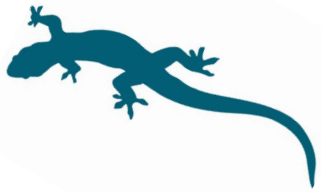


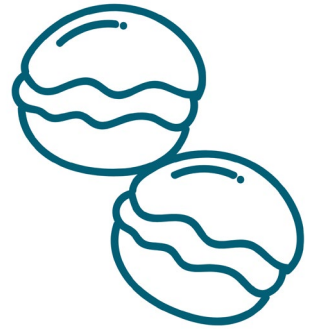
Key Takeaways

- The source was challenging to identify, because many cases did not recall the mini pastry items on initial interview as it was a one off exposure.
  - Subsequently, the national Hypothesis Generating Questionnaire has been updated to include more questions about dessert items.
- The collection of invoices from caterers was critical to solving the outbreak.
- 8 of the 12 types of pastries in the carton tested positive for *Salmonella*.

Keys to Success

- Rapid response results in rapid public health action
- Keeping an open mind is crucial to identifying new or unusual outbreak sources
- A variety of hypothesis-generation approaches may be necessary
- Outbreaks are an opportunity to collect data that informs longer-term health protection approaches
- Collaboration is critical





Thank you!

Questions?

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