Multistate Outbreak of *Salmonella* Mbandaka Infections Linked to Sweetened Puffed Wheat Cereal—United States, 2018

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Food Safety Summit

May 7, 2019
April 30, 2018: 12 ill people from 11 states

- Rare molecular subtype
- Not previously identified in any foods

Outbreak Detected
March–April, 2018: Initial Interviews

State and local health departments use questionnaires to collect exposures.
Initial Interviews (n=9)

- Limited detail was available from histories

- No common animal exposures
- Any leafy greens 44%
- Various chicken dishes 56%

- No common brands, or varieties of any item reported
- No common grocery stores noted among ill people
May 10, 2018: 38 ill people from 22 States

Number of ill people from 22 States

- Isolation Date: April 30
- Outbreak Detected: April 30

- 3/15/2018: 0 people
- 3/22/2018: 1 person
- 3/29/2018: 1 person
- 4/5/2018: 2 people
- 4/12/2018: 1 person
- 4/19/2018: 3 people
- 4/26/2018: 2 people
- 5/3/2018: 0 people
- 5/10/2018: 0 people
Demographics

~70% ill people are female

Median Age:

57 years
May 10, 2018: 38 ill people from 22 States

Isolation Date

April 30
Outbreak Detected

National Hypothesis Generating Questionnaire (NHGQ)
National Hypothesis Generating Questionnaire

- Standardized questionnaire used to collect information on >300 food, animal, and water exposures
May 31: Still no hypothesis (n=21)

Percentage of Ill People

- Eggs
- Frozen desserts
- Cereal
- Cheese
- Crackers
- Leafy greens
- Milk
- Chocolate
- Potato Chips
- Precut chicken

The percentages range from 40% to 100%.
May 31, 2018: 63 Illnesses in 27 States

- **Isolation Date**: May 10
- **National Hypothesis Generating Questionnaire (NHGQ)**: April 30
- **Outbreak Detected**: May 10
- **Open-Ended Interviews**
May 31–June 12, 2018: Open-Ended Interviews
Open-ended Interview Results

6 interviewees
Open-ended Interview Results

6 interviewees

6 ate cold cereal
Open-ended Interview Results

6 interviewees

6 ate cereal

2 ate Cereal A

4 unsure of cereal brands
Taking a closer look at the NHGQ

Percentage of Ill People

- Cereal: 72%
- Frozen desserts
- Eggs
- Milk
- Leafy greens
- Cheese
- Crackers
- Chocolate
- Potato Chips
- Precut chicken
Taking a closer look at the NHGQ

4 reported eating Cereal A
Open-ended Interview Results

6 interviewees

4 ate cereal but couldn’t remember brand
Open-ended Interview Results

6 interviewees

6 ate Cereal A
June 13–June 14, 2018: Investigation into Cereal A

- CDC and the Food and Drug Administration (FDA) contact manufacturer
- Produced at a single facility
- 1 year shelf life from date of production
June 14, 2018: Investigation into Cereal A

Production facility >80 prior *Salmonella* Mbandaka isolates within the production area between 2016 and 2018
Company Voluntarily Recalls Cereal Due to Possible Health Risk

For Immediate Release

June 14, 2018
Product Testing

3 opened samples

Montana  New York  Utah

27 unopened retail samples

Brand A Cereal

California
June–September, 2018: Industry and Regulatory Actions

- FDA performed inspection at manufacturing facility
  - Three samples yielded outbreak strain of *Salmonella* Mbandaka
  - Manufacturer had no protocol for dealing with contamination
- Manufacturer moved production of the cereal to another facility
June–September, 2018: Getting the Word Out

CDC Announcement: Salmonella Outbreak Linked to Kellogg’s Honey Smacks Cereal

Media Statement
For Immediate Release: June 15, 2018
Contact: Media Relations,
(404) 639-3286

CDC is investigating a multistate outbreak of Salmonella Mbandaka infections linked to Kellogg’s Honey Smacks cereal. Read the investigation announcement:
June–September, 2018: Getting the Word Out

“Cereal A Recalled Amid *Salmonella* Outbreak Investigation”

“Cereal A Recalled for Possible *Salmonella* Contamination”

“Cereal A Recalled After *Salmonella* Outbreak Investigation”

“Don't Eat Any Cereal A, CDC Warns As *Salmonella* Outbreak Continues”

“30 more illnesses from *Salmonella* linked to recalled Cereal A: CDC”
June–September, 2018: Getting the Word Out

Facebook

Twitter
People Infected with the Outbreak Strain of *Salmonella* Mbandaka, by Isolation Date (n=135)

Number of Ill People

Isolation Date

June 14 Product Recall
37 additional illnesses
People Infected with the Outbreak Strain of *Salmonella Mbandaka*, by State of Residence (n=135)
People Infected with the Outbreak Strain of *Salmonella Mbandaka*, by Isolation Date (n=135)

75% reported eating Cereal A
Conclusions

- Multiple investigation methods needed to identify a specific shelf-stable product
- Environmental contamination with *Salmonella* may be persistent and long-lasting
- Outbreaks involving shelf-stable foods pose challenges in public health messaging
- Children aren’t the only ones eating sweetened cereals!
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Multistate Outbreak of *Salmonella* Newport Infections Linked to Ground Beef, United States, August 2018 – March 2019

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Outbreak Response and Prevention Branch
Division of Foodborne, Waterborne and Environmental Diseases

Food Safety Summit
May 7, 2019
It’s Not Just STEC: *Salmonella* and Ground Beef

- *Salmonella* account for 45% of beef-attributed outbreaks reported to CDC during 2002-2011*

- Ground beef undercooking and cross-contamination are known risk factors for enteric illness

- Ground beef products can be widely distributed with a protracted shelf-life when frozen

2016-2017 *Salmonella Newport* Outbreak Linked to Ground Beef

- 106 cases from 21 states
- 80% reported eating ground beef at home in the week before illness began
- *Salmonella* bacteria found in patients, ground beef, and dairy cattle all highly related by WGS
Questions raised during the 2016-2017 Outbreak

- The outbreak strain was isolated from culled dairy cattle in 2017
  - Are dairy cattle a persistent reservoir for this strain of *Salmonella*?

- Dairy cattle comprise 18% of ground beef in the U.S., but have caused multiple outbreaks
  - Do dairy cattle carry a higher *Salmonella* load, potentially overwhelming HACCP systems?
Outbreak Detection

- **August 31, 2018:**
  - PulseNet identified cluster of 63 *Salmonella* Newport infections
  - Indistinguishable PFGE pattern (JJPX01.0010)
  - PFGE previously associated with 2017 outbreak linked to ground beef
  - Historical PFGE isolates from beef sources
- WGS requested for clinical isolates to determine relatedness to previous outbreak strains
- CDC Foodborne Outbreak Response Team initiated multistate outbreak investigation to identify the outbreak source
Hypothesis Generation

- **September 6 - 12, 2018:**
  - CDC coordinates the collection of epidemiological information using the National Hypothesis Generating Questionnaire ( >300 food and other exposure questions)
  - Particular interest in ground beef exposures given the history of this PFGE pattern

- **September 13-19, 2018:**
  - Retail sub-clusters are identified and shopper card records are collected

- **September 20, 2018:**
  - PulseNet confirms current isolates are highly related by WGS to 2017 *Salmonella* Newport outbreak linked to ground beef
  - WGS added to the case definition excluding some unrelated isolates

- **September 25, 2018:**
  - CDC Foodborne Outbreak Response Team coordinates a multistate call with state partners and FSIS
Hypothesis Generation

September 25, 2018:

- 43 illness from 17 states (case count declined from 63 based on WGS results)

- 21/22 (94%) of patients interviewed report ground beef consumption
  - Expected 40% baseline U.S. ground beef consumption

- Four grocery store or event sub-clusters identified in WY, MT, and SD
  - Ground beef either purchase from a common retailer or served at a common event
  - Shopper cards and beef grinding logs collected and reviewed

- NARMS Retail Ground Beef Sample
  - Beef sample purchased at retail in California yielded the PFGE outbreak strain
  - Intact package with lot and processor information
Ground Beef Traceback Investigation

- Beef Isolate
- Illness Sub-cluster
- Processing Facility
October 4, 2018: Initial Ground Beef Recall Announced
October 4, 2018: First CDC Food Safety Alert

Key Messages:
- Describing the outbreak and beef recall
- Return recalled beef to the store or throw it away
- Cook all ground beef thoroughly
November 15, 2018: The Outbreak Continues...

- 246 illnesses from 25 states
- 123/137 (90%) report ground beef exposure
- Leftover ground beef from AZ and NV yields the outbreak strain
- Traceback investigation identifies additional JBS beef production lines linked to illness
December 4, 2018: Expanded Ground Beef Recall Announced

JBS Tolleson, Inc. Recalls Raw Beef Products due to Possible Salmonella Newport Contamination

Class I Recall
Health Risk: High

Distribution List PDF
En Español

Congressional and Public Affairs
Autumn Caridad
(202) 720-9113
Press@fsis.usda.gov
People infected with *Salmonella* Newport, by state of residence, as of March 1, 2019 (n= 386)
People infected with *Salmonella* Newport by date of illness onset, as of March 1, 2019 (n=386)
Conclusions

- Largest ground beef associated *Salmonella* outbreak in U.S. history

- Large recall of 12.1 million pounds of raw beef products packaged between July 26, 2018 and September 7, 2018

- WGS linked current and historical outbreak to the same food commodity

- Reoccurring ground beef outbreaks of the same highly related strain of *Salmonella* Newport suggest a persistent cattle reservoir
But Questions Remain...

- What is the role of dairy cattle in maintaining a reservoir for this *Salmonella* strain and will an outbreak reoccur in 2019?

- Why was this outbreak so much larger than previous ground beef associated outbreaks?

- What are the root causes for such widespread *Salmonella* contamination leading to over 12 million pounds of recalled beef product?

- How is *Salmonella* potentially evading HACCP systems and are fatty tissue lymph nodes an important source of contamination?
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