Food Safety and Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Salmonella Newport Outbreaks Associated with Ground Beef

Outbreak Investigation After-Action Report, 2016-2019

Highlights

- A strain of *Salmonella* Newport caused reoccurring human infections and two outbreaks associated with ground beef.
- There were over 100 illnesses for each outbreak (106 in outbreak 1 and 436 in outbreak 2), which is unusual for ground beef outbreaks.
- The investigations prompted a government-industry collaboration on innovative methods of obtaining shopper history. Shopper history best practices and success stories are highlighted in an article on the Association of Food and Drug Officials webpage.

Outbreaks at a Glance

Illnesses	542
States included	36
Hospitalizations	163
Deaths	1

Response at a Glance

Ill people with documentation to identify foods	40
Recall or Public Health Alert	Yes

Process improvement

- This *Salmonella* Newport strain associated with ground beef has been characterized as a reoccurring strain because it has caused repeated outbreaks of human illnesses with similar epidemiologic characteristics. Every month, FSIS monitors selected *Salmonella* serotypes, including Newport, for directional changes and trends, and compares them to a 3-year historical average for that particular serotype.

What Happened?

From 2016 to 2019, in collaboration with public health partners, the Food Safety and Inspection Service (FSIS) investigated two *Salmonella* Newport outbreaks:

- The majority of reported ill people lived in the Southwestern area of the United States.
- The analyzed isolates did not show any predicted antimicrobial resistance.
- At least 80% of the ill people had eaten ground beef in the week before illness. At least one ground beef sample tested positive for *Salmonella* Newport and was closely related by whole genome sequencing (WGS) to clinical isolates.
- Ill people reported eating or possibly eating undercooked ground beef.

How Do the Two Outbreaks Compare?

The first outbreak, with illness onset dates ranging from October 4, 2016 to July 19, 2017, included 106 people from 21 states. The second outbreak had illness onset dates from August 5, 2018 to February 17, 2019 and included 436 cases from 31 states. The age range was similar (<1-88 and <1-99) for both outbreaks with a median age of 44 for the first outbreak and 42 years for the second outbreak. Forty eight percent (42/88) of the cases were hospitalized in the first outbreak, with one reported death, and 33% (121/363) of cases in the second outbreak were hospitalized. In both outbreaks, no antimicrobial resistance was predicted by WGS in isolates.

Ground beef was a suspected vehicle in both outbreaks. When asked about exposure prior to illness, 80% (52/65) of respondents for the first outbreak and 86% (258/301) of respondents for the second outbreak reported consuming ground beef in the week prior to illness. In the first outbreak, three cattle isolates were collected by public health partners, one leftover ground beef, and one cecal isolate matched the outbreak strain by WGS. In the second, seven isolates from ground beef matched the outbreak strain.

Traceback investigations were conducted for both outbreaks. In the first outbreak, traceback records did not conclusively converge on a single establishment. In the second outbreak, Establishment A was identified as the source of ground beef for 23/29 (79%) cases. Of the seven isolates that matched the outbreak strain, three samples (two unopened, one leftover) also traced to Establishment A. The first outbreak did not lead to recall because no specific establishment could be linked; the second outbreak led to recall of over 12 million pounds of ground beef.

What's Next?

Consumers

Undercooking ground beef was reported in both outbreaks. In 2021, the National Cattleman's Beef Association published a report highlighting the need for continued consumer food safety education. FSIS and the Centers for Disease Control and Prevention (CDC) will consider new ways to educate consumers regarding undercooking of ground beef and cross-contamination.

Collaboration

FSIS will continue to monitor strains causing reoccurring human illnesses to support government-industry collaboration for rapid and effective response during investigations. As appropriate, FSIS will involve industry and state partners in future investigations, including ones that may involve this reoccurring strain.

Preharvest

Reoccurring strains may be an indication of an environmental or animal reservoir for that pathogen. Industry and government partners are collaborating to develop a National Veterinary Accreditation Program training module. The intent of the module is to promote adoption of preharvest practices that might enhance food safety through preharvest pathogen reduction.

Helpful Links

- CDC Morbidity and Mortality Weekly Report Protracted Outbreak of *Salmonella* Newport Infections Linked to Ground Beef: Possible Role of Dairy Cows — 21 States, 2016–2017, April 20, 2018.
- CDC Outbreak of *Salmonella* Infections Linked to Ground Beef Food Safety Alert, October 4, 2018 (final version March 22, 2019).
- Association of Food and Drug Officials webpage: Leveraging Food Purchase History to Solve Foodborne Outbreaks.
- Shopper History Outbreak Partnership (2020): Shopper History: Best Practices for Use During Foodborne Illness Investigations.
- FSIS webpage: Resources for Public Health Partners (includes information helpful to FSIS during foodborne illness investigations).
- USDA Animal and Plant Health Inspection Service National Veterinary Accreditation Program.
- National Cattlemen's Beef Association (NCBA, 2021): Consumer Perceptions and Insights on Food Safety.