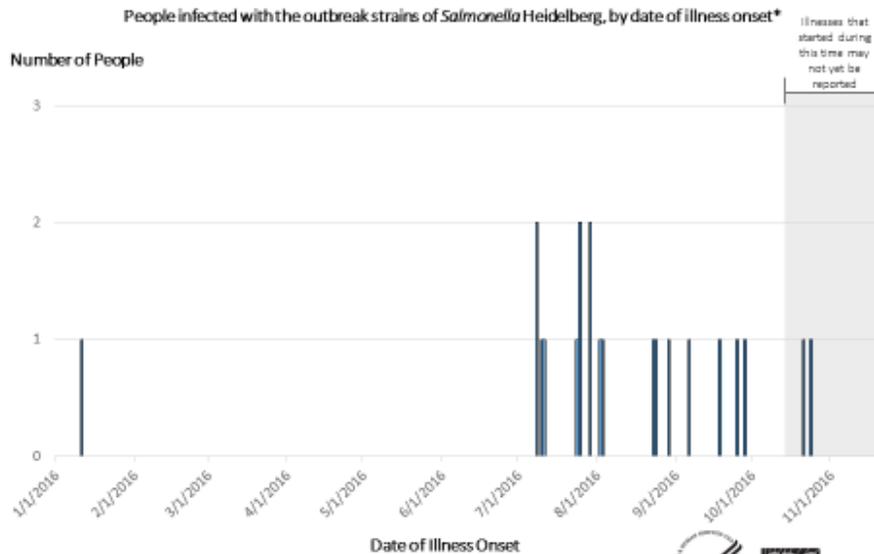


Multistate Outbreak of Multidrug-Resistant *Salmonella* Heidelberg Infections Linked to Contact with Dairy Bull Calves

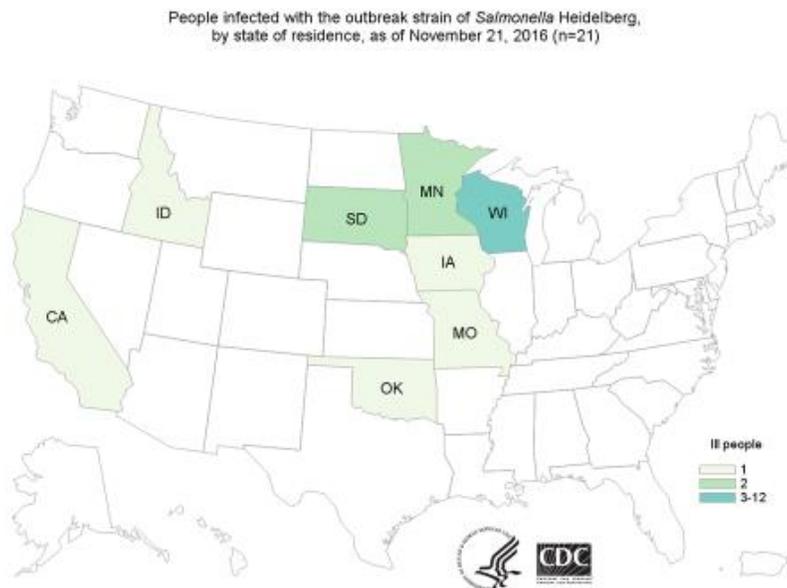
November 28, 2016

<http://www.cdc.gov/salmonella/heidelberg-11-16/index.html>



n=21 for whom information was reported as of 11/21/2016. Some illness onset dates have been estimated from other reported information.

Illnesses that started after 10/24/2016 might not yet be reported due to the time it takes between when a person becomes ill and when the illness is reported. This takes an average of 2 to 4 weeks.



State	Case Count
California	1
Iowa	1
Idaho	1
Minnesota	2
Missouri	1
Oklahoma	1
South Dakota	2
Wisconsin	12

At a Glance

- Case Count: 21
- States: 8
- Deaths: 0
- Hospitalizations: 8

Highlights

- **Read the Advice to Livestock Handlers and Veterinarians »**
- **Read information for Health Care Providers »**
- CDC, several states, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) are investigating a multistate outbreak of multidrug-resistant *Salmonella* Heidelberg infections.
 - Twenty-one people infected with an outbreak strain of *Salmonella* Heidelberg have been reported from 8 states.
 - Illness onset dates range from January 11, 2016 to October 24, 2016.
 - Eight ill people were hospitalized, and no deaths have been reported.

- Epidemiologic, traceback, and laboratory findings have linked this outbreak to contact with dairy bull calves purchased from livestock markets in Wisconsin. Dairy bull calves are young, male cattle that may be raised for meat.
- The Wisconsin State Laboratory of Hygiene and CDC's [National Antimicrobial Resistance Monitoring System](#) (NARMS) laboratory conducted [antibiotic-resistance testing](#) on clinical isolates collected from ill people infected with an outbreak strain of *Salmonella* Heidelberg.
 - All isolates were multidrug resistant.
 - Antibiotic resistance may be associated with increased risk of hospitalization, development of a bloodstream infection, or treatment failure in patients.
- Follow these steps to prevent illness when working with any livestock, such as dairy bull calves:
 - Always wash your hands thoroughly with soap and water right after touching livestock, equipment for animals, or anything in the area where animals live and roam. This is especially important to do before preparing or consuming food or drink for yourself or others.
 - Use dedicated clothes, shoes, and work gloves when working with livestock. Keep and store these items outside of your home.
 - Work with your veterinarian to keep your animals healthy and prevent diseases.
- This investigation is ongoing. This outbreak is a reminder to use a [One Health](#) approach to preventing illness, which recognizes that the health of people is connected to the health of animals and the environment.

November 28, 2016

Initial Announcement

Introduction

CDC is working with Wisconsin health, agriculture, and laboratory agencies, several other states, and the U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) to investigate a multistate outbreak of multidrug-resistant *Salmonella* Heidelberg infections.

Public health investigators used the [PulseNet](#) system to identify illnesses that may have been part of this outbreak. PulseNet, coordinated by CDC, is the national subtyping network of public health and food regulatory agency laboratories. PulseNet performs DNA fingerprinting on *Salmonella* bacteria isolated from ill people by using techniques called [pulsed-field gel electrophoresis](#) (PFGE) and [whole genome sequencing](#) (WGS).

CDC PulseNet manages a national database of these DNA fingerprints to identify possible outbreaks.

Twenty-one people infected with an outbreak strain of *Salmonella* Heidelberg have been reported from eight states. A list of states and the number of cases in each can be found on the Case Count Map page.

Among 19 people with available information, illnesses started on dates ranging from January 11, 2016 to October 24, 2016. Ill people range in age from less than 1 year to 72, with a median age of 21. Sixty-two percent of ill people are female. Among 19 ill people with available information, 8 (42%) reported being hospitalized, and no deaths have been reported.

WGS showed that isolates from ill people are closely related genetically to one another. This close genetic relationship means that people in this outbreak are more likely to share a common source of infection.

This outbreak can be illustrated with a chart showing the number of people who became ill each day. This chart is called an epidemic curve or epi curve. Illnesses that occurred after October 24, 2016 might not be reported yet because reporting takes an average of 2 to 4 weeks. Please see the [Timeline for Reporting Cases of *Salmonella* Infection](#) for more details.

Investigation of the Outbreak

Epidemiologic, traceback, and laboratory findings have identified dairy bull calves from livestock markets in Wisconsin as the likely source of infections. Dairy bull calves are young, male cattle that have not been castrated and may be raised for meat. Dairy bull calves in this outbreak have also been purchased for use with 4-H projects.

In interviews, ill people answered questions about any contact with animals and foods eaten in the week before becoming ill. Of the 19 people interviewed, 15 (79%) reported contact with dairy bull calves or other cattle. Some of the ill people interviewed reported that they became sick after their dairy bull calves became ill or died.

One ill person's dairy calves were tested for the presence of *Salmonella* bacteria. This laboratory testing identified *Salmonella* Heidelberg in the calves. Further testing using WGS showed that isolates from ill people are closely related genetically to isolates from these calves. This close genetic relationship means that the human infections in this outbreak are likely linked to ill calves.

As part of routine surveillance, the Wisconsin State Laboratory of Hygiene, one of seven regional labs affiliated with [CDC's Antibiotic Resistance Laboratory Network](#), conducted antibiotic resistance testing on clinical isolates from the ill people associated with this outbreak. These isolates were found to be resistant to antibiotics and shared the same DNA fingerprints, showing the isolates were likely related to one another.

WGS identified multiple antimicrobial resistance genes in outbreak-associated isolates from fifteen ill people and eight cattle. This correlated with results from standard [antibiotic resistance testing](#) methods used by CDC's [National Antimicrobial Resistance Monitoring System \(NARMS\)](#) laboratory on clinical isolates from two ill people in this outbreak. The two isolates tested were susceptible to gentamicin, azithromycin, and meropenem. Both were resistant to amoxicillin-clavulanic acid, ampicillin, cefoxitin, ceftriaxone, chloramphenicol, nalidixic acid, streptomycin, sulfisoxazole, tetracycline, and trimethoprim-sulfamethoxazole and had reduced susceptibility to ciprofloxacin. Antibiotic resistance limits treatment options and has been associated with increased risk of hospitalization, bloodstream infections, and treatment failures in patients.

Traceback information available at this time indicates that most calves in this outbreak originated in Wisconsin. Wisconsin health and agriculture officials continue to work with other states to identify herds that may be affected.

This investigation is ongoing. CDC will provide updates when more information is available.

Advice for Livestock Handlers

This outbreak is a reminder to use a [One Health](#) approach to preventing illness, which recognizes that the health of people is connected to the health of animals and the environment. Follow these steps prevent illness when handling any livestock, like dairy bull calves:

- **Always wash hands thoroughly with soap and water right after touching livestock, equipment for animals, or anything in the area where animals live and roam.**
 - This is especially important to do before preparing or consuming food or drink for yourself or others.
 - Adults should supervise hand washing for young children.
 - Use hand sanitizer if soap and water are not available right away.

- **Use dedicated shoes, work gloves, and clothing that you only use when working with livestock. Keep these items outside of your home.**
 - Do not eat or drink in the areas where livestock live and roam.
 - Do not allow toys, pacifiers, spill-proof cups, baby bottles, strollers, or similar items in livestock areas.
 - Wash hands after removing any clothes and shoes you wore while working with livestock.
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- **Work with your veterinarian to keep your livestock healthy.**
 - If you think your livestock are sick, talk to your veterinarian as soon as possible and take extra care to wash your hands after working with the animals and use separate clothes when caring for them.
 - Children, adults over age 65, and people with compromised immune systems should limit their contact with sick animals.

Advice for Veterinarians

- **If veterinarians recognize ill dairy bull calves with laboratory-confirmed *Salmonella* Heidelberg, they should report the illness to their State Animal Health Official.**
 - Laboratory testing, to include antimicrobial susceptibility testing, is recommended among dairy bull calves diagnosed with *Salmonella* Heidelberg, especially those associated with human illness.
 - A list of State Animal Health Officials can be found at <http://www.usaha.org/Portals/6/StateAnimalHealthOfficials.pdf>
- **If you suspect that a calf has a *Salmonella* infection, collect a fecal sample and submit it to a state or university veterinary diagnostic laboratory for culturing and pulsed-field gel electrophoresis (PFGE) testing.**
 - For testing, the American Association of Veterinary Laboratory Diagnosticians (AAVLD) recommends submitting fecal samples to a state or university veterinary diagnostic laboratory for *Salmonella* culturing and PFGE.
 - If the laboratory isolates *Salmonella* but cannot perform PFGE, the isolate may be forwarded to a laboratory that can perform the procedure. This may be one of the AAVLD labs in your area. To locate an AAVLD laboratory in your area, go to [AAVLD Accredited Labs](#), or go to the [AAVLD's home page](#) and click on the "Accreditation" link on the top menu bar.
 - Isolates may also be sent to USDA [National Veterinary Services Laboratories](#) (NVSL). To submit isolates to NVSL, complete Form VS 10-3 indicating whether serotyping, PFGE, or both are requested.

- **Talk to your clients about reducing the risk of transmission of *Salmonella* illness from cattle to their family.**
 - Be sure to tell clients that *Salmonella* infections are a [zoonotic disease](#), meaning that the infection can spread between animals and people. If the client or any of their family members are ill, encourage them to contact a health care provider immediately.
 - Direct clients to the Advice for Livestock Handlers above.

Information for Health Care Providers

Salmonella bacteria live in the intestinal tracts of animals, including cattle. Cattle may become ill from *Salmonella*, but usually have no signs of illness. Young calves are more susceptible to being ill. The primary mode of transmission to humans is fecal-oral and is associated with contact with animals or their environments.

Clinicians should consider multidrug-resistant (MDR) *Salmonella* Heidelberg infection in the differential diagnosis of patients with exposure to cattle, farms, or farm workers and symptoms compatible with salmonellosis (e.g., diarrhea, fever, and abdominal cramps).

Guidance for clinicians whose patients have suspected or confirmed *Salmonella* Heidelberg infection related to this outbreak:

- Testing
 - Obtain a culture (stool or blood, as indicated by symptoms and signs).
 - Request antimicrobial susceptibility testing.
- Treatment
 - Most patients with nontyphoidal *Salmonella* do not require antibiotic treatment (exceptions may include patients <6 months, >50 years, and those who are immunocompromised or severely ill; please refer to [treatment guidelines](#) for additional information).
 - If treatment is indicated and MDR *Salmonella* Heidelberg infection is suspected, clinicians should begin treatment with azithromycin until susceptibility results of the patient's isolate are available.
- Follow up
 - Obtain follow-up stool cultures for patients who have culture-confirmed MDR *Salmonella* Heidelberg and who are:
 - Food handlers
 - Health care workers
 - Childcare workers or attendees
- Patient counseling
 - Counsel patients to follow prevention practices. Key messages for counseling patients with salmonellosis:
 - Wash hands carefully with soap after going to the bathroom.
 - Don't prepare food for others while ill. After you recover, wash hands carefully with soap before preparing food for others.

- Before returning to work or childcare, these patients should have two consecutive negative stool cultures taken at least 24 hours apart and at least 48 hours after resolution of symptoms.

Signs and Symptoms

What are the signs and symptoms of *Salmonella* infection?

Most people infected with *Salmonella* develop the following signs and symptoms 12-72 hours after being exposed to the bacteria:

- Diarrhea
- Fever
- Abdominal cramps

How long does the illness last?

- The illness usually lasts 4 to 7 days, and most people recover without treatment.
- In some people, the diarrhea may be so severe that the patient needs to be hospitalized. *Salmonella* infection may spread from the intestines to the bloodstream and then to other places in the body.
- In rare cases, *Salmonella* infection can cause death unless the person is treated promptly with antibiotics.

Who is more likely to have a severe illness?

- Children younger than 5 years
- Adults older than 65
- People with weakened immune systems

More information about *Salmonella* and steps people can take to reduce their risk of infection with *Salmonella* in general can be found on the CDC [Salmonella](#) website.

Key Resources

- [Healthy Pets Healthy People: Farm Animals](#)
- [Antibiotic Use in Food-Producing Animals](#)
- [Zoonotic Diseases \(Diseases Spread between People and Animals\)](#)
- [National Antimicrobial Resistance Monitoring System \(NARMS\) Glossary](#)
- [One Health](#)