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Investigation Update: Multistate Outbreak of Human *Salmonella* Enteritidis Infections Associated with Shell Eggs

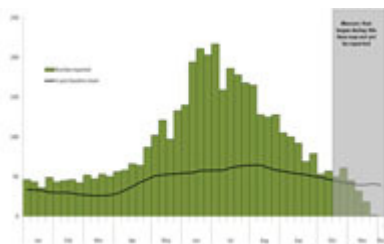
December 2, 2010 (FINAL Update)

Today's Highlights



- From May 1 to November 30, 2010, approximately 1,939 illnesses were reported that are likely to be associated with this outbreak.
- As human *Salmonella* Enteritidis infections have now returned to baseline levels, it is likely that this outbreak has ended.
- While this particular outbreak appears to be over, *Salmonella* Enteritidis is still an important cause of human illness in the United States. Consumers, egg producers, and others should take care to reduce the risk of spreading *Salmonella* Enteritidis and other foodborne diseases by following **food safety guidelines**.

Number of *Salmonella* Enteritidis cases matching PFGE pattern JEGX01.0004 reported to PulseNet, United States, 2010



Click graph to view a larger image.

CDC collaborated with public health officials in multiple states, the U.S. Department of Health and Human Services' Food and Drug Administration (FDA), and the U.S. Department of Agriculture's Food Safety and Inspection Service to investigate a nationwide increase of *Salmonella* Enteritidis (SE) infections with an indistinguishable pulsed-field gel electrophoresis (PFGE) pattern JEGX01.0004. This is the most common PFGE pattern for SE in the PulseNet database. Investigators used DNA analysis of SE bacteria obtained through diagnostic testing to identify cases of illness and restaurant or event clusters (where more than one ill person with the outbreak strain had eaten) that

may have been part of this outbreak. Because the SE PFGE pattern commonly occurs in the United States, some of the cases identified may not have been related to this outbreak.

Investigation of the Outbreak

In July 2010, CDC identified a nationwide sustained increase in the number of *Salmonella* Enteritidis isolates with PFGE pattern JEGX01.0004 **uploaded to PulseNet**, the national subtyping network made up of state and local public health laboratories and federal food regulatory laboratories that performs molecular surveillance of foodborne infections. An increase in reports beginning in May, peaking in July, and returning to baseline in November, is evident in the **epidemic curve, or epi curve**. From May 1 to November 30, 2010, a total of 3,578 illnesses were reported. However, some cases from this period may not have been reported yet, and some of these cases may not be related to this outbreak. Based on the previous 5 years of reports to PulseNet, we would expect approximately 1,639 total illnesses to occur during this same period. This means there are approximately 1,939 reported illnesses that are likely to be associated with this outbreak. Because of the large number of expected cases during this period, standard methods of molecular subtyping alone are not sufficient to determine which reported cases might be outbreak-associated.

Human *Salmonella* Enteritidis infections that occurred after October 28, 2010 might not yet be reported due to the time it takes between when a person becomes ill and when the illness is reported. This typically takes two to three weeks for *Salmonella*, but can take up to six weeks. For more details, please see the ***Salmonella* Outbreak Investigations: Timeline for Reporting Cases**.

Epidemiologic investigations conducted by public health officials in 11 states since April identified 29 restaurants or event clusters where more than one ill person with the outbreak strain had eaten. Data from these investigations suggest that shell eggs were a likely source of infections in many of these restaurants or event clusters. Wright County Egg, in Galt, Iowa, was an egg supplier in 15 of these 29 restaurants or event clusters. Traceback investigations were completed for several of these clusters. A formal traceback was conducted by state partners in California, Colorado, and Minnesota, in collaboration with FDA and CDC, to find a common source of shell eggs. Wright County Egg in Iowa was found as the common source of the shell eggs associated with four of the clusters. Through traceback and FDA investigational findings, Hillandale Farms of Iowa, Inc., was identified as another potential source of contaminated shell eggs contributing to this outbreak. FDA has now completed its on-site investigations of both Iowa farms and an evaluation of the investigational data, including review of sampling results and records. FDA's inspectional observations, in addition to sample results, indicate substantial potential for *Salmonella* to have persisted in the environment and to have contaminated eggs (see **483 Inspectional Observations on the Egg Recall**).

Laboratory Testing of Environmental Samples

FDA collected nearly 600 samples from Wright County Egg and Hillandale Farms of Iowa during this investigation. Samples underwent subtyping testing. FDA's testing of 11 environmental samples identified *Salmonella* with PFGE patterns indistinguishable from the outbreak strain. Samples were collected from manure, as well as traffic areas such as walkways, equipment, other surfaces in and around the farm, and from the feed mill at Wright County Egg in Iowa. The feed was provided to pullets (young female chickens or hens) raised at Wright County Egg facilities in Iowa. Pullets were distributed to all premises at Wright County Egg in Iowa and Hillandale Farms in Iowa. A positive sample was also collected from egg water wash in a packing facility at Hillandale Farms of Iowa.

These findings indicate that Wright County Egg and Hillandale Farms of Iowa were the likely sources of the contaminated shell eggs. FDA did not find that this feed was distributed to any companies other than Wright County Egg and Hillandale Farms of Iowa.

Recall Information

On August 13, 2010, Wright County Egg of Galt, Iowa, conducted a **nationwide voluntary recall** of shell eggs. On August 18, 2010, Wright County Egg **expanded its recall**. On August 20, 2010, Hillandale Farms of Iowa conducted a **nationwide voluntary recall** of shell eggs. At this point, it is long past the expiration date of any eggs affected by the recall.

Clinical Features/Signs and Symptoms

While this particular outbreak appears to be over, *Salmonella* Enteritidis is still an important cause of human illness in the United States. A person infected with *Salmonella* Enteritidis usually has fever, abdominal cramps, and diarrhea beginning 12 to 72 hours after consuming a contaminated food or beverage. The illness usually lasts 4 to 7 days, and most persons recover without antibiotic treatment. However, the diarrhea can be severe, and hospitalization may be required. The elderly, infants, and those with impaired immune systems may have a more serious illness. In these patients, the infection may spread from the intestines to the blood stream, and then to other body sites and can cause death unless the person is treated promptly with antibiotics. For more information, visit **CDC's *Salmonella* Enteritidis** website.

Back to Top

Advice to Consumers

- Like other foods, keep eggs refrigerated at $\leq 40^{\circ}$ F ($\leq 4^{\circ}$ C) at all times.
- Discard cracked or dirty eggs.
- Wash hands and all food contact surface areas (counter tops, utensils, and cutting boards) with soap and water after contact with raw eggs. Then, disinfect the food contact surfaces using a sanitizing agent, such as bleach, following label instructions.
- Eggs should be cooked until both the white and the yolk are firm and eaten promptly after cooking.
- Do not keep eggs warm or at room temperature for more than 2 hours.
- Refrigerate unused or leftover egg-containing foods promptly.
- Avoid eating raw eggs.
- Individuals wishing to further reduce their risk may consider using pasteurized, in-shell eggs.
- Avoid restaurant dishes made with raw or undercooked, unpasteurized eggs. Restaurants should use pasteurized eggs in any recipe (such as Hollandaise sauce or Caesar salad dressing) that calls for raw eggs.
- Consumption of raw or undercooked eggs should be avoided, especially by young children, elderly persons, and persons with weakened immune systems or debilitating illness.

Advice to Egg Producers

- Flock-based SE-control programs that include routine microbiologic testing are mandatory for

producers with more than 50,000 hens, as of July 9, 2010, under **FDA's egg safety rule**.

Advice to Retail and Food Service Establishments and Institutional Settings


- In retail and food service establishments, pasteurized egg products or pasteurized in-shell eggs are recommended in place of pooled eggs or raw or undercooked shell eggs. If used, raw shell eggs should be fully cooked. If shell eggs are served undercooked, a consumer advisory should be posted in accordance with the local Food Code.
- In hospitals, nursing homes, adult or childcare facilities, schools, senior centers, and other facilities, pasteurized egg products or pasteurized in-shell eggs should be used in place of pooled eggs or raw or undercooked eggs.
- Eggs should be purchased or received from a distributor refrigerated and stored refrigerated at $\leq 45^{\circ}\text{F}$ ($\leq 7^{\circ}\text{C}$) at all times.

Back to Top

General Information

- **CDC FAQs: *Salmonella* Enteritidis**
- **FoodSafety.gov**
- **Description of the Steps In a Foodborne Outbreak Investigation**
- **CDC's Role During a Multi-State Foodborne Outbreak Investigation**

Additional Resources

- ***Salmonella* Enteritidis Outbreak in Shell Eggs [FDA]**
- **FDA 483 Inspectional Observations on the Egg Recall**
- **FDA Recalls, Market Withdrawals & Safety Alerts**
- **Tips to Reduce Your Risk of *Salmonella* from Eggs [CDC PODCAST – 4:00 minutes]**
- **Keeping Live Poultry [CDC Feature]**
- **Timeline: Nationwide Outbreak of *Salmonella* Enteritidis (SE), Infections Associated with Shell Eggs, United States, 2010  (PDF - 427KB)**

CDC's Role in Food Safety

As an agency within the U.S. Department of Health and Human Services (HHS), CDC leads federal efforts to gather data on foodborne illnesses, investigate foodborne illnesses and outbreaks, and monitor the effectiveness of prevention and control efforts. CDC is not a food safety regulatory agency but works closely with the food safety regulatory agencies, in particular, with HHS' Food and Drug Administration (FDA) and the Food Safety and Inspection Service within the U.S. Department of Agriculture. CDC also plays a key role in building state and local health department epidemiology, laboratory, and environmental health capacity to support foodborne disease surveillance and outbreak response. Notably, CDC data can be used to help document the effectiveness of regulatory interventions.

Previous Updates

- **October 19, 2010**
- **September 20, 2010**
- **September 9, 2010**
- **September 2, 2010**
- **August 27, 2010**
- **August 26, 2010**
- **August 23, 2010**
- **August 19, 2010**
- **August 16, 2010**

Back to Top

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Page Located on the Web at <http://www.cdc.gov/salmonella/enteritidis/index.html>

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