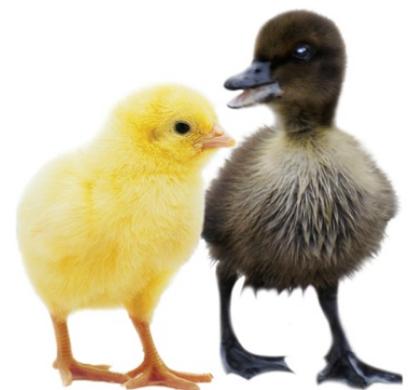


Investigation of Kansas Cases in a Multistate  
Outbreak of Salmonella Infections Associated  
with Live Poultry – Kansas, 2013

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## Background

On April 12, 2013, the Kansas Department of Health and Environment Bureau of Epidemiology and Public Health Informatics (KDHE) was notified by the Centers for Disease Control and Prevention (CDC) that four Kansas residents with cases of salmonellosis were associated with a multistate cluster of illnesses suspected to be caused by exposure to live baby poultry. KDHE worked with local health departments to investigate all Kansas cases of poultry-associated Salmonellosis.

## Methods

### *Epidemiologic Investigation*

CDC led the investigation of this multistate outbreak with support from state and local public health departments. An outbreak case was defined as laboratory evidence of *Salmonella* with a pulsed-field gel electrophoresis (PFGE) pattern indistinguishable from the outbreak strain of *Salmonella*. CDC requested that all case-patients involved in this outbreak be interviewed with a specific two-part poultry supplemental questionnaire. Part one, the case-patient component, was to be utilized for all cases reporting live poultry exposure; part two was a brief feed store section to be utilized upon identification of poultry exposure from a feed store. State and local health department investigators worked together to interview ill individuals associated with this salmonellosis outbreak with the supplemental questionnaire in addition to the hypothesis-generating questionnaire utilized for all Kansas salmonellosis case investigations.

### *Laboratory Analysis*

Stool specimens were cultured at the Kansas Health and Environmental Laboratories (KHEL). *Salmonella* isolates were serotyped and Pulsed-field gel electrophoresis (PFGE) was performed.

### *Traceback and Environmental Assessment*

Traceback was conducted by federal agencies using purchase history to determine whether a particular agricultural feed store or poultry hatchery was significantly associated with illness. Environmental assessment was the conducted at the identified hatchery<sup>1</sup>.

## Results

### *Multistate Epidemiologic Investigation*

Investigators used PulseNet to identify persons that were a part of this outbreak based on PFGE analysis of *Salmonella* isolates. The outbreak strain was serotyped as *Salmonella* Typhimurium; all isolates from patients included in this outbreak were of a single PFGE pattern (JPXX01.0286).

Nationally, 356 cases of salmonellosis in 39 states were identified as part of this outbreak [Figure 1]. Illness onset dates ranged from March 4 to October 12, 2013. Among the 240 ill individuals for whom clinical information was available, sixty-two (26%) hospitalizations occurred and no deaths were reported. Many ill persons (57%) were children 10 years of age or younger (median age = 7 years; range <1 to 87 years). Most (76%) ill persons reported poultry exposure in the week prior to becoming ill; of these, 95% reported purchasing the live poultry from an agricultural feed store<sup>1</sup>.

Figure 1. Case Count Map, Baby Poultry Salmonella Outbreak – United States 2013<sup>1</sup>

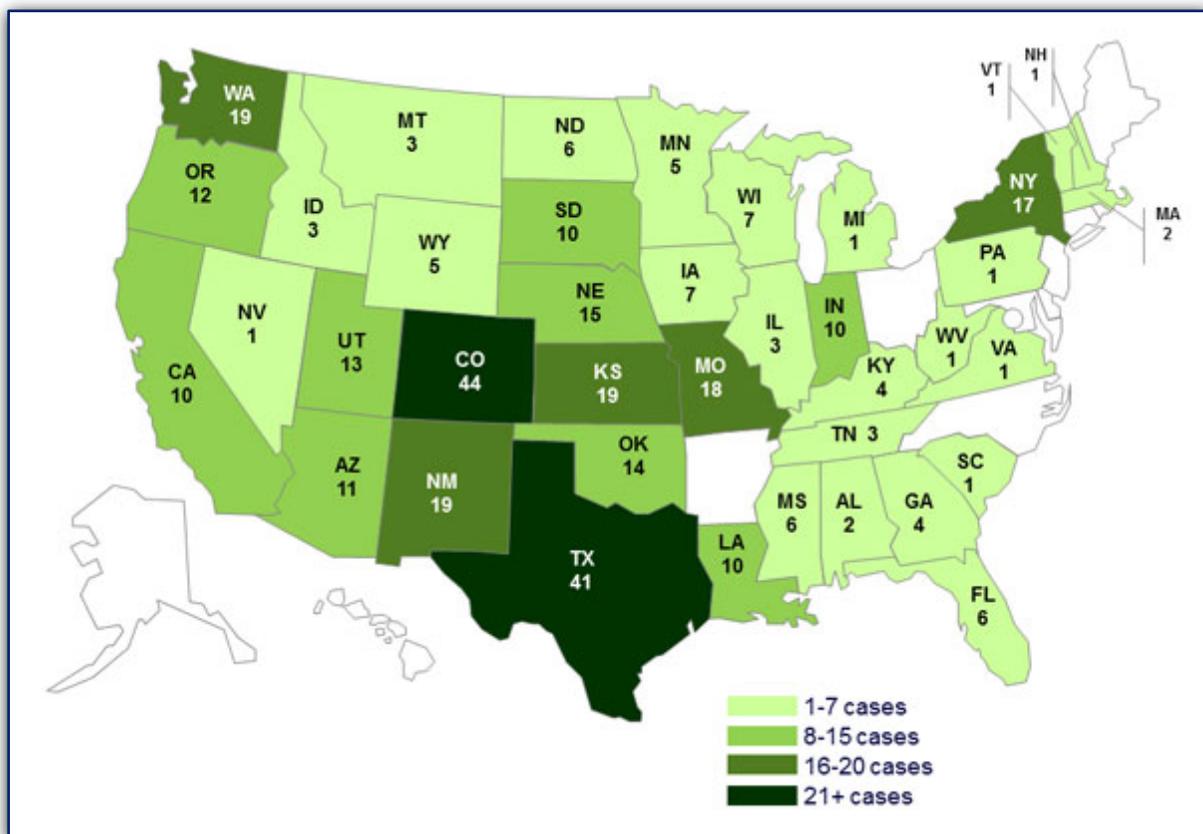
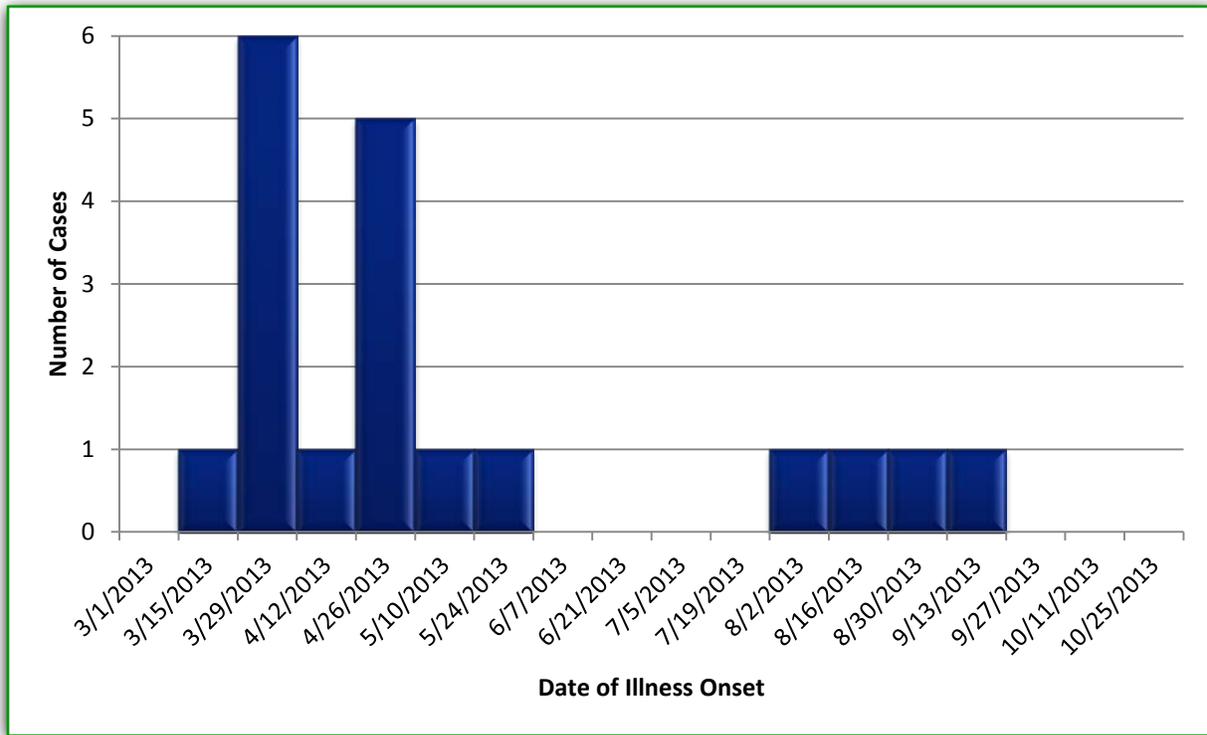




Figure 3. Epidemic Curve, Baby Poultry Salmonella Outbreak – Kansas 2013



### *Traceback and Environmental Assessment*

Individuals interviewed with the outbreak-specific questionnaire who reported purchasing live poultry from an agricultural feed store were asked to provide purchase information; 116 feed store locations representing 33 feed store companies were identified as purchase locations for live poultry associated with this salmonellosis outbreak. Traceback investigations of feed store records revealed that poultry was supplied to these feed store locations by eighteen mail-order hatcheries. Further traceback identified Privett Hatchery in Portales, New Mexico as the source of the majority of live birds linked to this outbreak; Privett Hatchery owners have fully cooperated with the investigation<sup>1</sup>.

Environmental samples that were collected during an investigation at Privett Hatchery yielded the outbreak strain of *Salmonella* Typhimurium. The outbreak strain was identified from a sample collected in a duck pen. One (2.5%) of 40 samples collected from this hatchery yielded the outbreak strain<sup>1</sup>.

## Discussion

This multistate salmonellosis outbreak began in March 2013 and continued for seven months, affecting more than 350 individuals across the country. Investigators from the CDC, the United States Department of Agriculture (USDA), and state and local health departments worked cooperatively to identify the cause and determine the scope of outbreak-related illnesses. The outbreak investigation linked these illnesses to contact with live chicks, ducklings, and other baby poultry, and revealed that Privett Hatchery in Portales, New Mexico was the source of the majority of the poultry purchased by ill individuals<sup>1</sup>.

### *Live Poultry-Associated Salmonella*

Chickens, ducks, and other poultry are well-known carriers of *Salmonella* bacteria. *Salmonella* naturally lives in the intestines of many animals, including poultry; it does not always cause illness in poultry, but can cause serious illness in humans who have contact with birds or their surroundings. *Salmonella* can be found in fecal matter (droppings) from birds as well as on the outside of their bodies (including on their feathers, feet, and beaks), even when birds appear healthy and clean. *Salmonella* can also be found where live poultry lives or roams, including in and on chicken coops, cages, feed dishes, soil, and plants; *Salmonella* is also commonly found on the hands, shoes, and clothing of people who handle the birds or spend time in places where live poultry has been<sup>2, 3</sup>.

People become infected with *Salmonella* when they put their hands or other things that have been in contact with feces in or around their mouth. Young children are especially at risk for illness because their immune systems are still developing and because they are more likely than others to put their fingers or other items into their mouths<sup>2, 3</sup>.

Due to the likelihood of environmental contamination in areas where live poultry has been, direct contact with live birds is not always necessary to cause illness; cases have been connected with visiting festivals, fairs, or feed stores where baby chicks or other poultry has been on display.

### *Outbreak Investigations*

Since 2011, seven large multistate outbreaks of salmonellosis caused by contact with live poultry have occurred in the United States. In these outbreaks, 1307 outbreak-associated cases of salmonellosis have been reported, with 263 hospitalizations and three deaths (Table 1).

Table 1. Multistate Outbreaks of Live Poultry-Associated Salmonellosis since 2011<sup>4,5,6,7</sup>

<b>Year</b>	<b><i>Salmonella</i> serotype(s)</b>	<b>Number of Cases</b>	<b>Number of Hospitalizations</b>	<b>Number of Deaths</b>
<b>2011</b>	Altona, Johannesburg	96	28	0
<b>2012</b>	Hadar	46	13	0
<b>2012</b>	Montevideo	93	21	1
<b>2012</b>	Infantis, Newport, Lille	195	34	2
<b>2013</b>	Infantis, Lille, Newport, Mbandaka	158	29	0
<b>2013</b>	Typhimurium	356	62	0
<b>2014</b>	Infantis, Newport, Hadar	363	76	0

The practice of drop-shipping adds another layer of complexity to live poultry-associated outbreak investigations. Drop-shipping is used by many mail-order hatcheries to fill orders for other hatcheries based on the type or number of birds each location has available for sale. These orders are shipped under the name of the hatchery with which the order was originally placed, and customers may not be aware that the birds they received came from a different hatchery<sup>1</sup>.

### *Prevention of Baby Chick Salmonella*

Privett Hatchery, where many of the birds related to this particular outbreak originated, is a participant in the USDA's National Poultry Improvement Plan (NPIP) program. The NPIP program is intended to eliminate certain strains of *Salmonella* that cause illness in poultry breeding flocks and hatcheries, but this program currently does not certify that these poultry are free from other strains of *Salmonella* that may cause human illness<sup>1</sup>. Consumers and stores which show or sell live poultry must be aware of the risk of live poultry-associated salmonellosis and take action accordingly in order to prevent illnesses. Illness-prevention recommendations are applicable to all live poultry regardless of the age of the birds or where they were purchased.

Mail-order hatcheries, agricultural feed stores, and others who sell or display chicks, ducklings, and other live poultry should provide health-related information to owners and potential purchasers of these birds prior to the point of purchase. This should include information about the risk of acquiring a *Salmonella* infection from contact with live poultry. Agricultural feed store staff should clean and disinfect live poultry display areas routinely, especially before new live poultry are added to the display<sup>1</sup>.

Many ill persons in this outbreak reported bringing live poultry into their homes or reported kissing or cuddling with the birds. These behaviors increase a person's risk of a *Salmonella* infection from contact with live poultry. Always wash hands thoroughly with soap and water right after touching live poultry or anything in the area where they live and roam. Adults should supervise hand washing for young children<sup>1,3</sup>.

This investigation was aided by the quick response and cooperation of many federal, state, and local health agencies, feed stores, and hatcheries. Continuing to educate the public on the risk of illness associated with live poultry will be helpful in mitigating the effects of this important source of illness.

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<sup>1</sup> Centers for Disease Control and Prevention. Multistate Outbreak of Human *Salmonella* Typhimurium Infections Linked to Live Poultry in Backyard Flocks (Final Update). 1 November 2013. Retrieved January 2014 from <http://www.cdc.gov/salmonella/typhimurium-live-poultry-04-13/index.html>.

<sup>2</sup> Centers for Disease Control and Prevention. Keeping Backyard Poultry. 4 December 2013. Retrieved January 2014 from <http://www.cdc.gov/features/salmonellapoultry>.

<sup>3</sup> Centers for Disease Control and Prevention. Risk of Human *Salmonella* Infections from Live Baby Poultry. 3 June 2013. Retrieved January 2014 from <http://www.cdc.gov/features/salmonellababybirds>.

<sup>4</sup> Centers for Disease Control and Prevention. Reports of Closed *Salmonella* Outbreak Investigations from 2011. 9 October 2012. Retrieved January 2014 from <http://www.cdc.gov/salmonella/outbreaks-2011.html>.

<sup>5</sup> Centers for Disease Control and Prevention. Reports of *Salmonella* Outbreak Investigations from 2012. 9 October 2012. Retrieved January 2014 from <http://www.cdc.gov/salmonella/outbreaks-2012.html>.

<sup>6</sup> Centers for Disease Control and Prevention. Reports of *Salmonella* Outbreak Investigations from 2013. 7 October 2013. Retrieved January 2014 from <http://www.cdc.gov/salmonella/outbreaks-2013.html>.

<sup>7</sup> Centers for Disease Control and Prevention. Multistate Outbreak of Human *Salmonella* Infections Linked to Live Poultry in Backyard Flocks (Final Update). 21 October 2014. Retrieved February 2015 from <http://www.cdc.gov/salmonella/live-poultry-05-14/index.html>.