

**Investigation Number 2012-2394 and
related investigations
Summary**

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**Summary of *Salmonella* Heidelberg outbreaks
involving PFGE Patterns SHEX-005 and 005a
Oregon, 2004–2012**

2004 Investigation

A blip in *Salmonella* Heidelberg cases was noted in the Public Health Division by routine surveillance on August 2, 2004; an investigation was begun. Four human cases were identified, one of whom proved to be a California resident. An outbreak case was defined as a person with lab-confirmed *Salmonella* Heidelberg and with pulsed-field gel electrophoresis (PFGE) patterns SHEX-005 and SHEB-017. The three Oregon cases had illness onset dates of 6/2/04, 7/17/04, and 7/20/04. Cases were 19–57 years of age; two were female. Two of the cases were interviewed to assess food and animal exposures; no obvious source emerged.

On 8/17/04, the Oregon State Public Health Laboratory (OSPHL) also identified PFGE-matching strains of *Salmonella* Heidelberg in 4 samples of Foster Farms brand chicken breast during regular, periodic testing of a convenience sample of retail meat samples performed for the National Antimicrobial Resistance Monitoring System (NARMS), funded by the federal government as part of our Emerging Infections Program cooperative agreement.

ACDP then traced the chicken consumption of the two interviewed cases. One case stated that she had eaten Foster Farms chicken purchased in a double-pack at Costco. ACDP purchased the same brand and package style of chicken from Costco; culture of this chicken sample by OSPHL yielded *Salmonella* Heidelberg with a two-enzyme match to the outbreak patterns SHEX-005 and SHEB-017.

On 8/23/04 the Oregon *S.* Heidelberg cluster patterns were posted to the national PulseNet database, and additional PFGE-matching cases were detected in Washington, California, Ohio, Hawaii, and Kansas. Washington had 13 cases, and the others had one each. Contact was initiated on 8/31/04 with the Washington State Department of Health (WSDOH) to ascertain the chicken consumption history of their cases. WSDOH did not have reliable poultry consumption histories and felt it too late to clarify this information; on 9/2/04, it was decided to not pursue the investigation unless new matching cases should surface.

Approximately one month later, a new Oregon case reported upon interview that she had eaten Foster Farms chicken purchased in a double-pack at Costco. ACDP purchased the same brand and package style of chicken from Costco; this chicken ultimately tested positive for *Salmonella* Heidelberg with double-enzyme PFGE match to the outbreak pattern. WSDOH reported four new cases of PFGE-matching *S.* Heidelberg infection during this month. The matching food specimens and temporal increase of cases led both states to report to the United States Department of Agriculture (USDA) the plausible association of outbreak cases with Foster Farms chicken.

During November–December 2004 the USDA’s Food Safety and Inspection Service (FSIS) conducted an investigation at Foster Farm’s Establishment P6164A. *S. Heidelberg* was cultured from six specimens obtained during this investigation; all six isolates matched the outbreak PFGE pattern combination (Table 1).

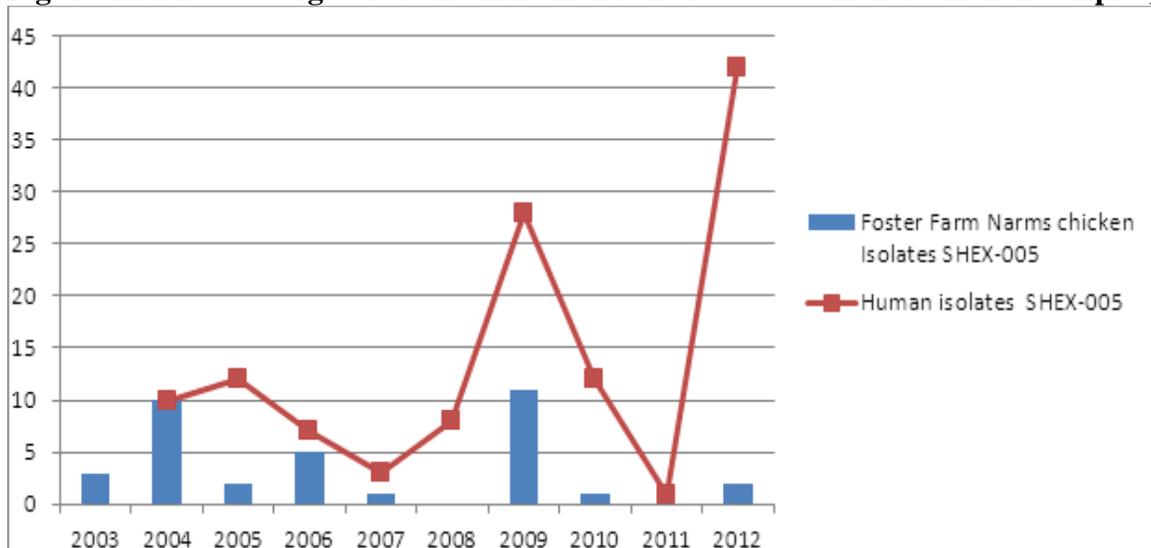
Table 1: *S. Heidelberg* isolates collected by USDA/FSIS at Establishment P-6164A

Isolate number	Pathogen	Serotype	OR pattern 1	CDC pattern 1	CDC pattern 2	Isolate date
USDA_OB050004	<i>Salmonella</i>	Heidelberg	SHEX-005	JF6X01.0047	JF6A26.0058	11/26/04
USDA_OB050012	<i>Salmonella</i>	Heidelberg	SHEX-005	JF6X01.0047	JF6A26.0059	12/14/04
USDA_OB050014	<i>Salmonella</i>	Heidelberg	SHEX-005	JF6X01.0047	JF6A26.0059	12/22/04
USDA_OB50004	<i>Salmonella</i>	Heidelberg	SHEX-005	JF6X01.0047	JF6A26.0058	Not available
USDA_OB50012	<i>Salmonella</i>	Heidelberg	SHEX-005	JF6X01.0047	JF6A26.0059NG	Not available
USDA_OB50014	<i>Salmonella</i>	Heidelberg	SHEX-005	JF6X01.0047	JF6A26.0059NG	Not available

The FSIS found that “poultry product at Est. P-6164A has been prepared, packed or held under unsanitary conditions whereby it may have been contaminated with filth, or whereby it may have been rendered injurious to health as defined in Section (g)(4) of the Poultry Products Inspection Act.” The USDA subsequently issued a Notice of Intended Enforcement (NOIE), indicating their intent to withhold the marks of inspection and suspend the assignment of FSIS personnel at Foster Poultry Farms Establishment P-6164A in Kelso, Washington.

Isolates with the outbreak pattern from both human cases and Foster Farms chicken samples were fewer during 2005–2008 but rose during 2009 (Figure 1).

Figure 1: *S. Heidelberg* isolates from humans and food surveillance chicken samples, 2003–2012



2009 Investigation

In March of 2009, a Benton County (Oregon) resident became ill with *Salmonella* Heidelberg, PFGE pattern SHEX-005a, after having eaten a chicken dish at a Mexican-style restaurant in Philomath. Environmental health specialists learned that the restaurant purchased poultry from Sysco. During early March the restaurant had not bought chicken from Sysco for a period of 3 weeks. During this time a supermarket across the street from the restaurant had Foster Farms chicken for sale at \$0.99/lb. — significantly less than the Sysco price. The restaurant denied having purchased chicken from the supermarket but could not explain what would have been a gap in the delivery of chicken. Culture at OSPHL of 3 packages of Foster Farms brand chicken from this supermarket yielded *S. Heidelberg* strains with PFGE *XbaI* patterns SHEX-005 and SHEX-005a. At the same time, culture of three samples of chicken purchased from different Oregon grocery stores as part of NARMS yielded isolates of *S. Heidelberg* with the same PFGE pattern; these three chicken samples proved to have been produced and distributed by Foster Farms.

During 2009, totals of 22 human cases and 12 chicken samples tested positive for *S. Heidelberg* with *XbaI* PFGE patterns SHEX-005 and SHEX-005a (Table 2).

Table 2: Human cases of *S. Heidelberg* infection, by *XbaI* PFGE pattern type Oregon, 2009

Month of specimen collection	SHEX-005	SHEX-005a
March		1
April	1	2
May		
June	3	2
July	1	1
August	1	5
September		2
October		3
November		1

All *Salmonella* Heidelberg human isolates in 2009 were tested with a second enzyme to determine relatedness; three *BlnI* patterns surfaced among human case isolates with PFGE patterns XbaI SHEX-005 or SHEX- 005a (Table 3).

Table 3: Human cases of *S. Heidelberg* infection with *XbaI* patterns SHEX-005 or SHEX-005a, by *BlnI* PFGE pattern — Oregon, 2009

Month of specimen collection	SHEB-017	SHEB-025	SHEB-056
March		1	
April	2	1	
May			
June	2	1	2
July		1	1
August	3	2	1
September	1		
October	2	1	
November	1		

ACDP contacted Patsy White, DVM, MPVM, of FSIS regarding these findings. FSIS reviewed its log of sample collection and *Salmonella* identification. No action was taken by FSIS at this time, because *Salmonella* had not been isolated in >21% of samples tested.

2012 Investigation

During 2007–2011, an average of 27 cases of *Salmonella* Heidelberg infection were reported annually in Oregon. During 2012, a notable increase was seen: ultimately, 56 cases were reported in that year. *XbaI* PFGE pattern SHEX-005(a) was identified in isolates of 43 of these cases. During 2012 OSPHL also identified PFGE-matching strains of *S. Heidelberg* in two samples of Foster Farms brand chicken breast as part of NARMS. Since 2004, *Salmonella* Heidelberg with *XbaI* PFGE pattern SHEX-005 or SHEX-005(a) had been isolated a total of 35 times from chicken parts through NARMS; 33 (94%) of these isolates were from Foster Farms brand chicken or chicken produced by Foster Farms and sold under different brand names (e.g., Safeway, Albertson’s).

During 2012 Washington State noted an increase in human cases as well. An investigation shepherded by CDC reviewed 134 cases in 13 states with the outbreak strain of *Salmonella* Heidelberg identified during June 1, 2012 – June 30, 2013; most were from Washington (57), Oregon (40), Alaska (13) and California (11). Of 70 Washington and Oregon cases interviewed using a structured questionnaire, 55 (79%) reported having consumed chicken in the week before illness onset — significantly higher than historic background rate (65%) of chicken consumption ($P=0.01$). Shopper-card records were available from nine patients; WSDOH and ACDP worked with FSIS to trace back chicken purchased using these cards. Records indicated that all nine had purchased Foster Farms chicken before illness onset. Four unopened packages of chicken from three Washington patients’ homes were cultured; all yielded the outbreak strain and were traced back to two Foster Farms slaughter establishments. Nationally, NARMS testing had isolated strains of *S. Heidelberg*, with PFGE results matching this outbreak’s pattern, from

48 retail chicken samples; 47 (98%) were from chicken produced by Foster Farms. This investigation has been summarized by CDC.¹

As a result of the multi-state investigation, FSIS visited Establishment P-6164A on 12/11/12. FSIS indicated that it would not be collecting samples in the facility. FSIS has not informed ACDP about sources of Foster Farms chickens or processing methods. FSIS has not classified Salmonella Heidelberg as an “adulterant” on Foster Farms chicken in the wake of this outbreak.

The Oregon Health Authority issued a press release warning consumers about potential hazards associated with poultry on February 14, 2013.²

¹ CDC. MMWR 2013; 62:553–6. Available at www.cdc.gov/mmwr/preview/mmwrhtml/mm6227a3.htm.

² www.oregon.gov/oha/news/Documents/2013-0214-salmonella-final-web.pdf