A microscopic image of Salmonella bacteria, showing two rod-shaped cells with numerous flagella. The bacteria are highlighted in a bright yellow color against a dark, textured background. The text is overlaid on the image in a matching yellow color.

# Salmonella Update

## NPIP 2019

Doug Waltman

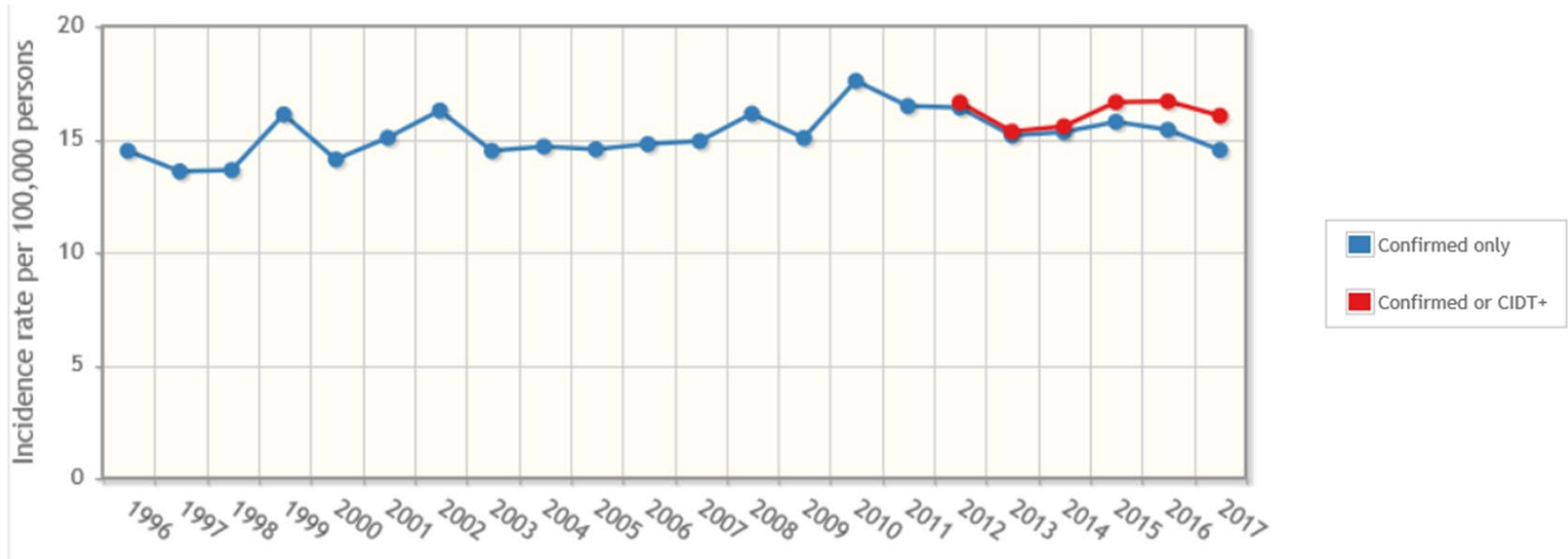
Georgia Poultry Laboratory Network

# Human Salmonella Data

CDC



# No Change in Incidence of Salmonellosis Since 1996



Data courtesy of Dr. Matthew Wise - CDC

# Culture-Independent Diagnostic Tests (CIDT)

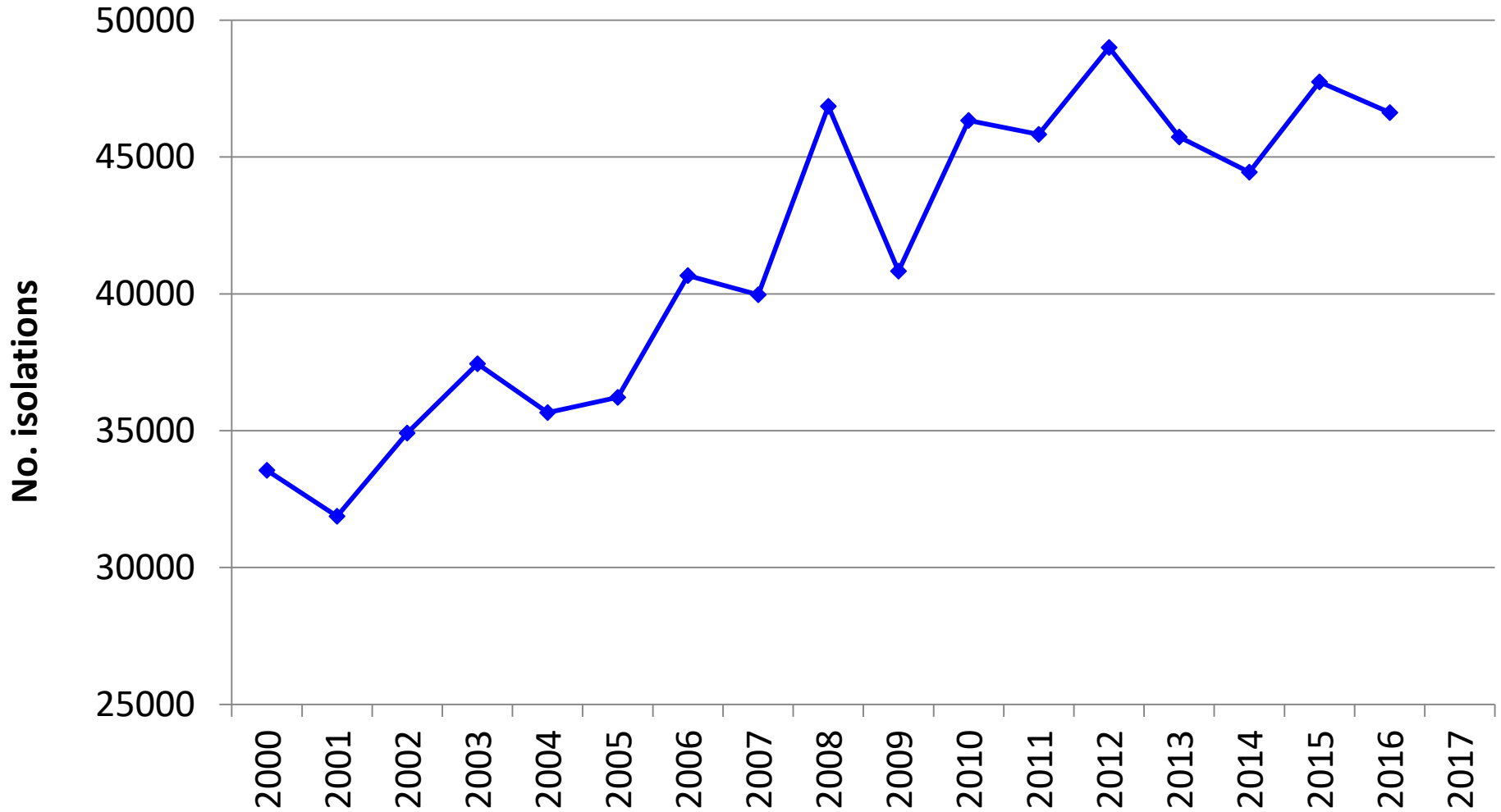
*Taken from CDC MMWR Weekly/April 21, 2017/66(15);397-403*

The incidence of infections transmitted commonly through food has remained largely unchanged for many years. Culture-independent diagnostic tests (CIDTs) are increasingly used by clinical laboratories to detect enteric infections.

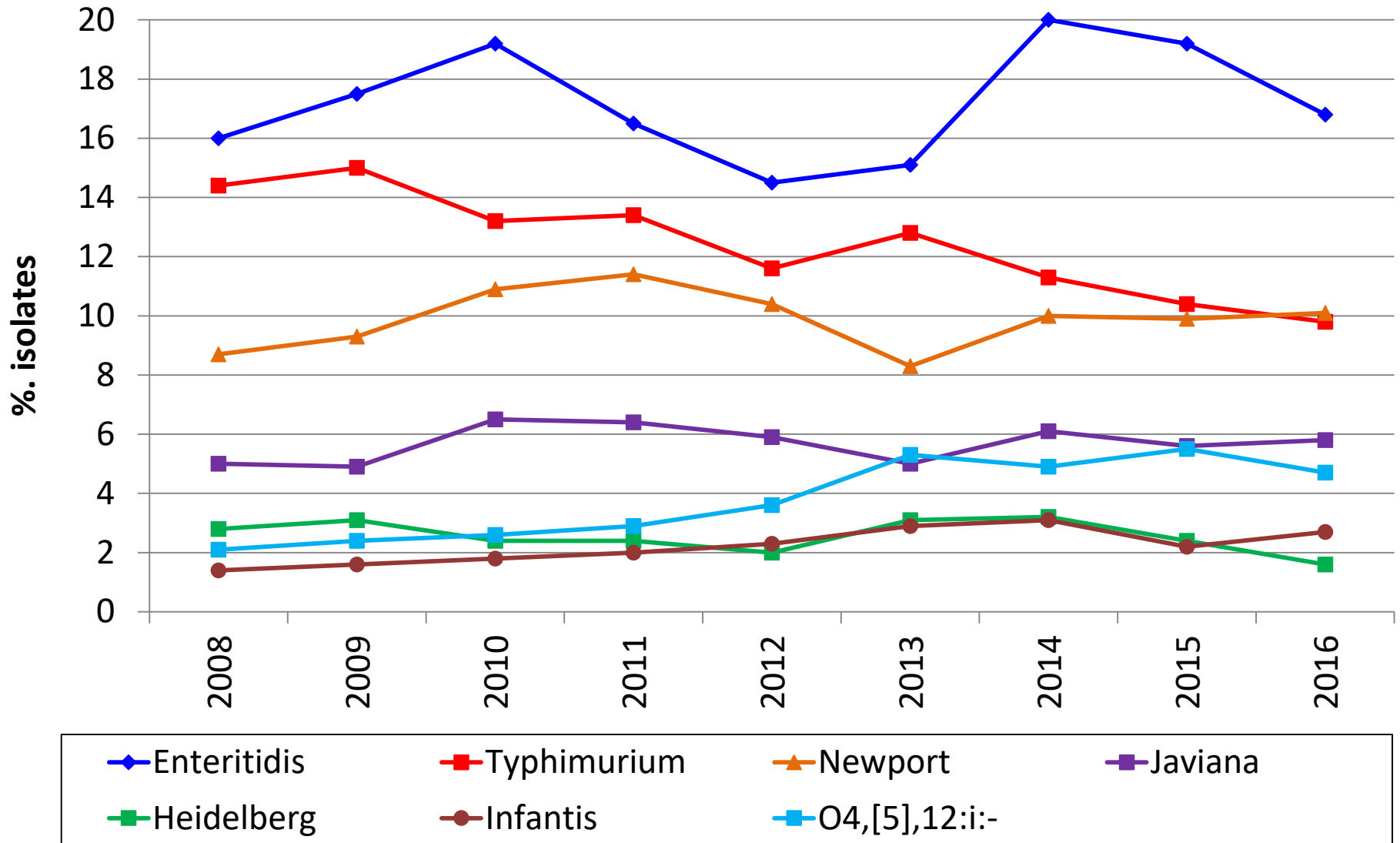
Compared with the 2013–2015 average annual incidence, the 2016 incidence of confirmed *Campylobacter* infections was lower, incidences of confirmed Shiga toxin-producing *Escherichia coli* (STEC), *Yersinia*, and *Cryptosporidium* infections were higher, and incidences of confirmed or CIDT positive–only STEC and *Yersinia* infections were higher. However, CIDTs complicate the interpretation of surveillance data; testing for pathogens might occur more frequently because of changes in either health care provider behaviors or laboratory testing practices. A large proportion of CIDT positive specimens were not reflex cultured, which is necessary to obtain isolates for distinguishing pathogen subtypes, determining antimicrobial resistance, monitoring trends, and detecting outbreaks.

Some information about the bacteria causing infections, such as subtype and antimicrobial susceptibility, can only be obtained for CIDT positive specimens if reflex culture is performed. Increasing use of CIDTs affects the interpretation of public health surveillance data and ability to monitor progress toward prevention measures.

# Number of *Salmonella* isolations from Humans (CDC – National Salmonella Surveillance)



# Top Serotypes in Humans



# CDC – Salmonella “Foodborne” Outbreaks 2016 - 2019

Multistate foodborne outbreak investigations involving Salmonella where CDC was the lead public health agency  
[www.cdc.gov/salmonella/outbreaks.html](http://www.cdc.gov/salmonella/outbreaks.html)

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Shell eggs (Good Earth Egg Company)	Oranienburg	8	2016
Gravel Farm shell eggs	Enteritidis	44	2018
Shell eggs	Braenderup	45	2018
Raw chicken products	Infantis	128	2018
Chicken	I 4,[5],12:i:-	25	2018
Raw turkey products	Reading	358	2018

# CDC – Salmonella “Foodborne” Outbreaks 2016 - 2019

Multistate foodborne outbreak investigations involving Salmonella where CDC was the lead public health agency  
[www.cdc.gov/salmonella/outbreaks.html](http://www.cdc.gov/salmonella/outbreaks.html)

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Ground beef	Newport	403	2018
Frozen raw tuna	Newport	15	2019
Hy-Vee spring pasta salad	Sandiego, IIIb	101	2018
Chicken salad	Typhimurium	265	2018
Kelloggs Honey Smacks cereal	Mbandaka	135	2018
Duncan Hines cake mix	Agbeni	7	2018



# CDC – Salmonella “Foodborne” Outbreaks 2016 - 2019

Multistate foodborne outbreak investigations involving Salmonella where CDC was the lead public health agency  
[www.cdc.gov/salmonella/outbreaks.html](http://www.cdc.gov/salmonella/outbreaks.html)

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Alfalfa sprouts	Reading, Albony	36	2016
Alfalfa sprouts	Muenchen, Kentucky	26	2016
Raw sprouts	Montevideo	10	2018
Tahini	Concord	8	2018
Organic shake and meal products	Virchow	33	2016
Pistachios	Montevideo, Senftenberg	11	2016
Kratom	14,[5],12:i:-	199	2018

# CDC – Salmonella “Foodborne” Outbreaks 2016 - 2019

Multistate foodborne outbreak investigations involving Salmonella where CDC was the lead public health agency  
[www.cdc.gov/salmonella/outbreaks.html](http://www.cdc.gov/salmonella/outbreaks.html)

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Maradol Papayas	Urbana	7	2017
Maradol Papayas	Newport, Infantis	4	2017
Maradol Papayas	Anatum	20	2017
Maradol Papayas	Thompson, Kiambu, Agona, Gaminara, Senftenberg	220	2017
Pre-cut Melon	Adelaide	77	2018
Pre-cut Melon	Carrau	137	2019
Dried Coconut	Typhimurium	14	2018
Frozen shredded coconut	Agbeni	27	2018

# CDC – Salmonella “Contact” Outbreaks 2013 - 2019

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Backyard Poultry	Braenderup, Montevideo	52	2019
Live Poultry	Senftenberg, Montevideo, Infantis, Enteritidis, Indiana, Litchfield	334	2018
Live Poultry	Braenderup, Enteritidis, Hadar, I 4,[5],12:i:-, Indiana, Infantis, Litchfield, Mbandaka, Muenchen, Typhimurium	1120	2017
Live Poultry	Enteritidis, Muenster, Hadar, Indiana, Mbandaka, Infantis, Braenderup	895	2016

# CDC – Salmonella “Contact” Outbreaks 2013 - 2019

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Live Poultry	Enteritidis, Hadar, Indiana, Muenchen	181	2015
Live Poultry	Infantis, Newport, Hadar	363	2014
Live Poultry	Typhimurium	356	2013
Live Poultry	Infantis, Newport, Lille, Mbandaka	158	2013

# CDC – Salmonella “Contact” Outbreaks 2013 - 2019

<b>Outbreak</b>	<b>Serotype(s)</b>	<b># Cases</b>	<b>Year</b>
Pet hedgehogs	Typhimurium	17	2019
Pet Guinea Pigs	Enteritidis	9	2018
Pet Turtles	Agbeni	76	2017
Dairy bull calves	Heidelberg	36	2016
Pet Crested Geckos	Muenchen	22	2015
Small Turtles	Sandiego, Poona	133	2015
Frozen feeder rodents	Typhimurium	41	2014
Pet bearded dragons	Cotham, Disarawe	150	2014

# Salmonella Outbreak

(CDC)

When 2 or more people get the same illness from the same contaminated food or drink, the event is called a foodborne disease outbreak. Similarly, when 2 or more people get the same illness from contact with the same animal or animal environment, the event is called a zoonotic outbreak.

# Raw turkey outbreak

Reading

358 cases

42 states

Recall

133 hospitalizations

1 death

“Epidemiologic and laboratory evidence indicated that many types of turkey products from a variety of sources are contaminated with *Salmonella* Reading and are making people sick.

- The outbreak strain was identified in samples taken from raw turkey products, raw turkey pet food, and live turkeys.
- Several turkey products have been recalled because they might have been contaminated with *Salmonella*.
- Available information indicates these recalled products do not account for the whole outbreak.”

# Raw Turkey Outbreak

## Reading

“A single, common supplier of raw turkey products or of live turkeys was not identified.”

“Available information indicates the outbreak strain of *Salmonella* Reading is present in live turkeys and in many types of raw turkey products. CDC and USDA-FSIS shared this information with representatives from the turkey industry, including the National Turkey Federation, and requested that they take steps to reduce *Salmonella* contamination.”

“ This outbreak strain could remain present in live turkeys and raw turkey products until actions from industry further reduce *Salmonella* Reading contamination.”



# Raw Turkey Outbreak

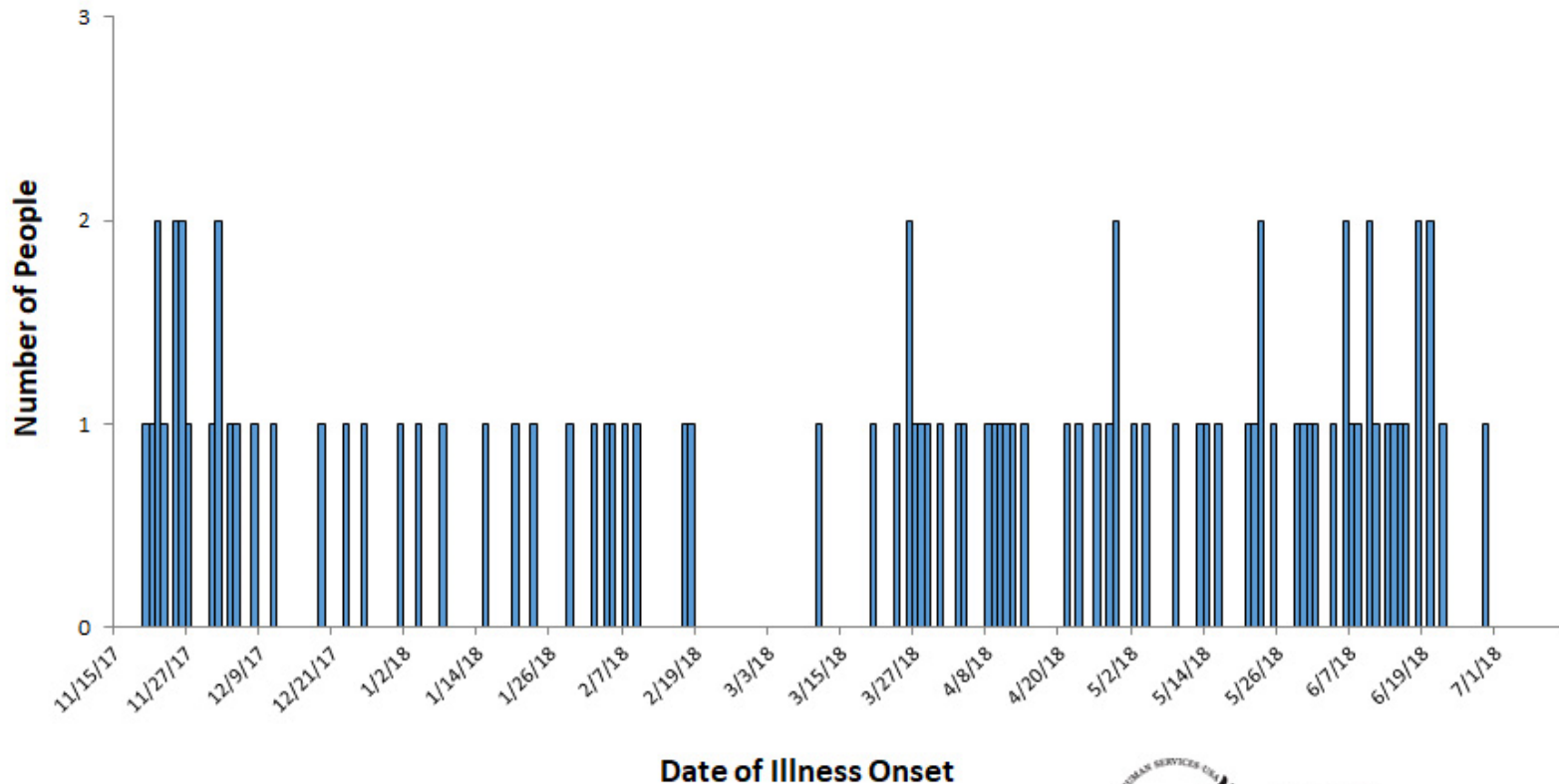
## Reading

“Illnesses started on dates from November 20, 2017 to March 31, 2019” (~16 months!)

“The outbreak strain was also identified in samples from raw turkey products from 24 slaughter and 14 processing establishments. The samples collected by FSIS at these slaughter and processing establishments were part of FSIS’s routine testing under the *Salmonella* performance standards. Furthermore, WGS showed that the *Salmonella* strain isolated from these samples is closely related genetically to the *Salmonella* strain from ill people.”

# Raw Turkey Products

## Reading



Data courtesy of Dr. Matthew Wise - CDC

# Raw Chicken Products

Infantis

129 cases

32 states

25 hospitalizations

1 death

“Epidemiologic and laboratory evidence indicated that many types of raw chicken products from a variety of sources are contaminated with *Salmonella* Infantis and are making people sick. In interviews, ill people reported eating different types and brands of chicken products purchased from many different locations.”

“The outbreak strain was identified in samples taken from raw chicken products, raw chicken pet food, and live chickens.”

# Raw Chicken Products

## Infantis

“A single, common supplier of raw chicken products or of live chickens was not identified.”

The outbreak strain of *Salmonella* Infantis is present in live chickens and in many types of raw chicken products, indicating it might be widespread in the chicken industry. CDC and USDA-FSIS shared this information with representatives from the chicken industry and requested that they take steps to reduce *Salmonella* contamination.

# Raw Chicken Products

## Infantis

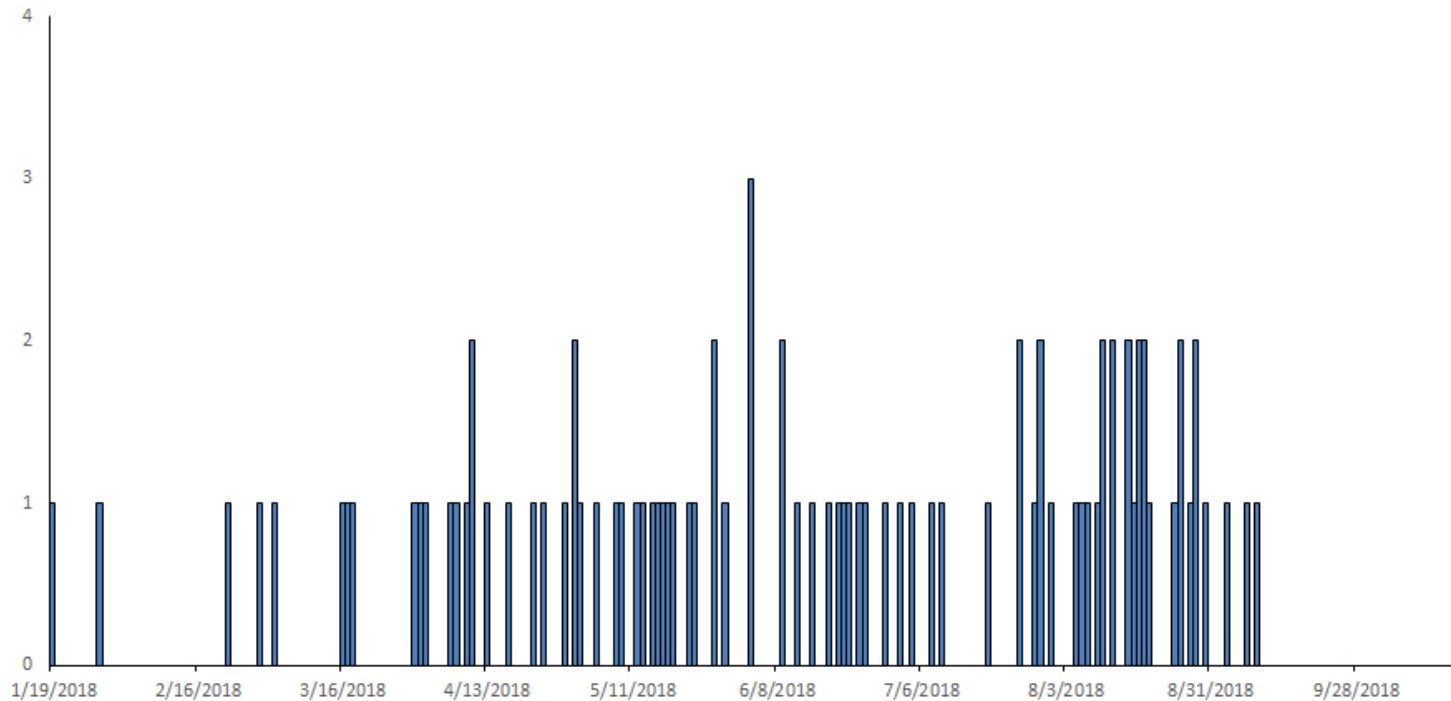
Illnesses started from January 8, 2018 to January 27, 2019

The outbreak strain of *Salmonella* Infantis has been identified in samples from raw chicken products from **76 slaughter and/or processing establishments**, from raw chicken pet food, and from live chickens. Samples collected at slaughter and processing establishments were collected as part of FSIS's routine testing under the *Salmonella* performance standards. WGS showed that the *Salmonella* strain from these samples was closely related genetically to the *Salmonella* from ill people. This result provided more evidence that people in this outbreak got sick from handling or eating raw or undercooked chicken.

# Raw Chicken Products

## Infantis

Number of People



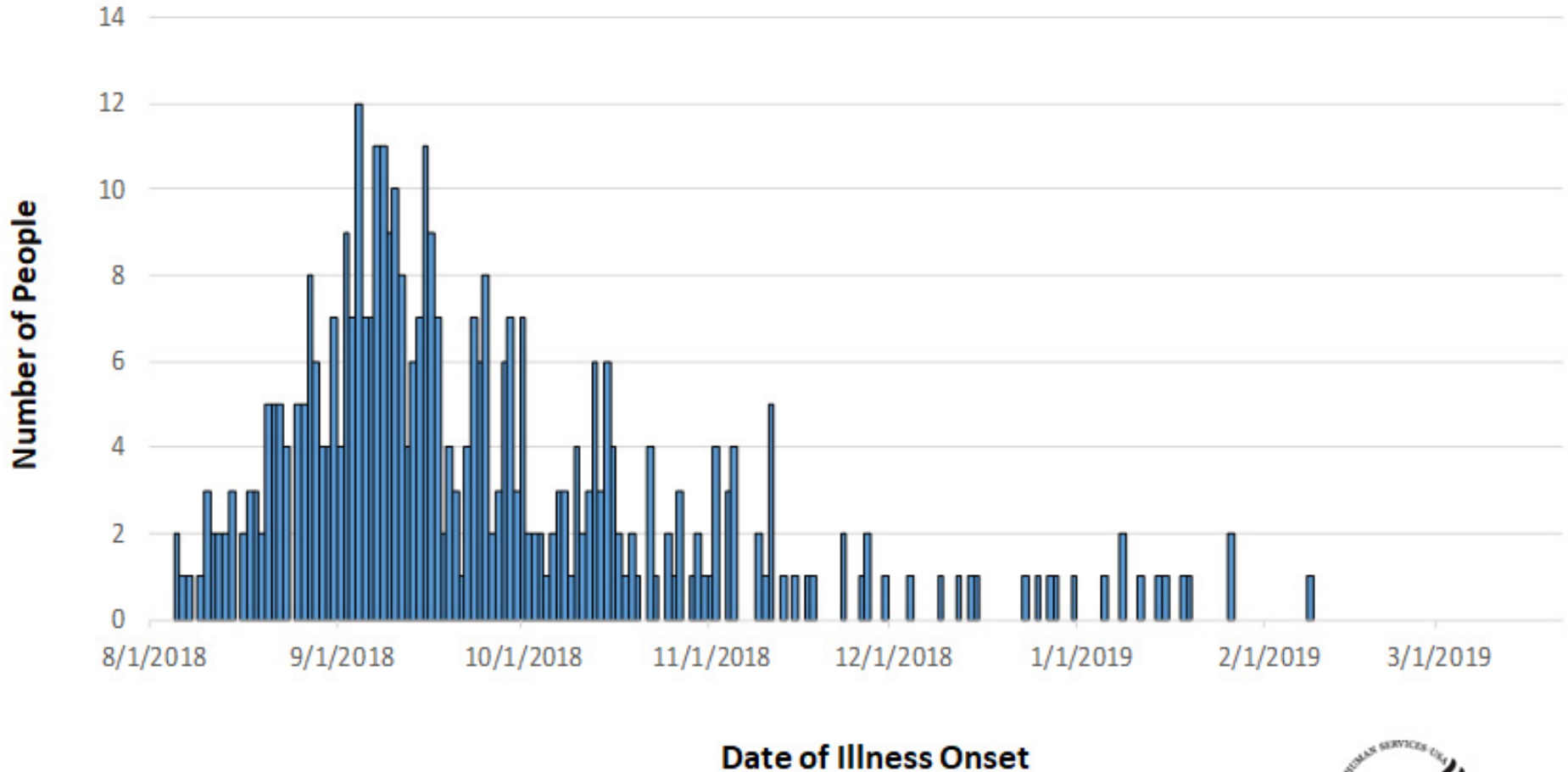
Date of Illness Onset



Data courtesy of Dr. Matthew Wise - CDC

# Ground beef

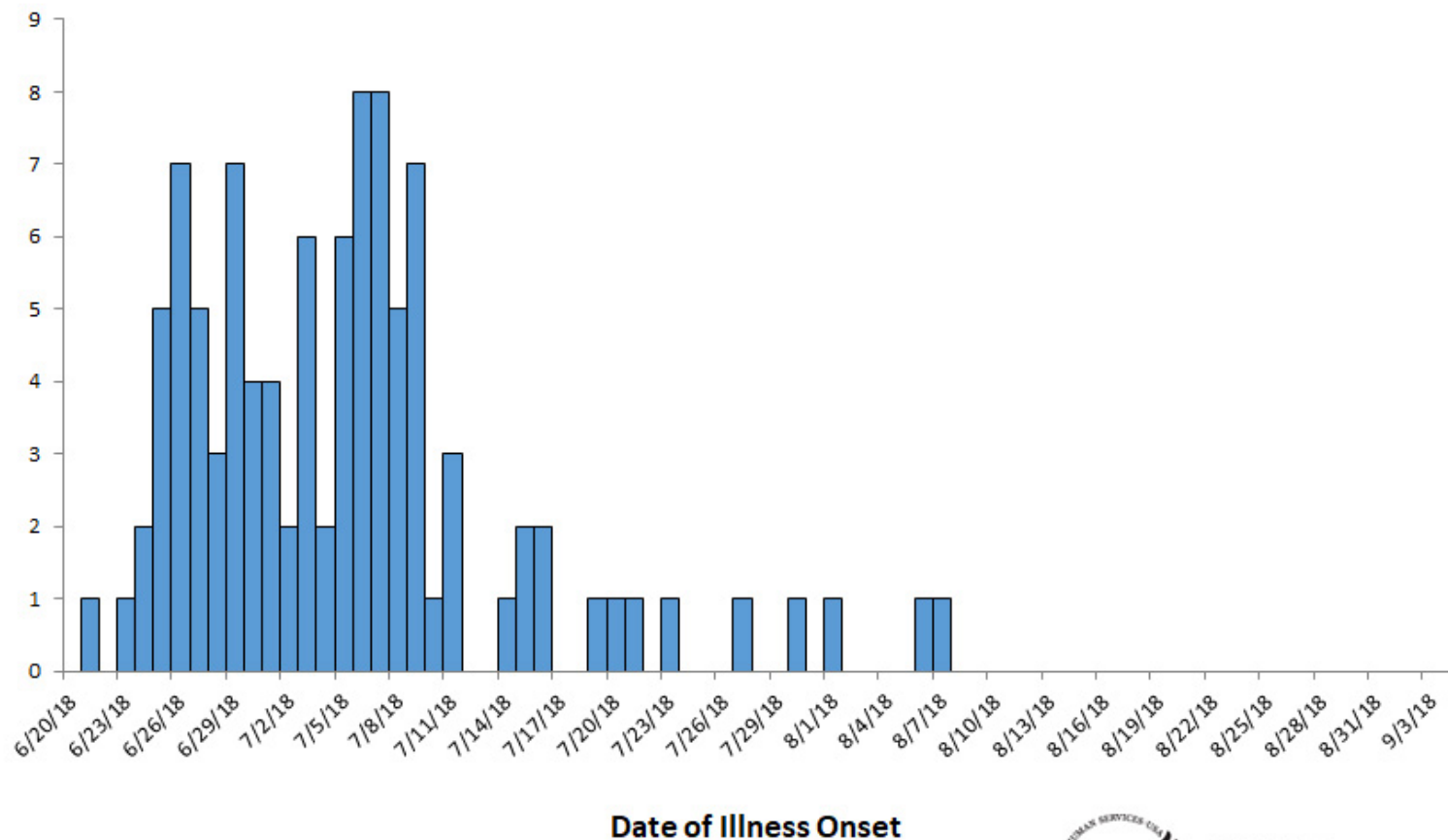
## Newport



# Hy-Vee Spring Pasta Salad

## Sandiego and Subspecies IIIb

Number of People



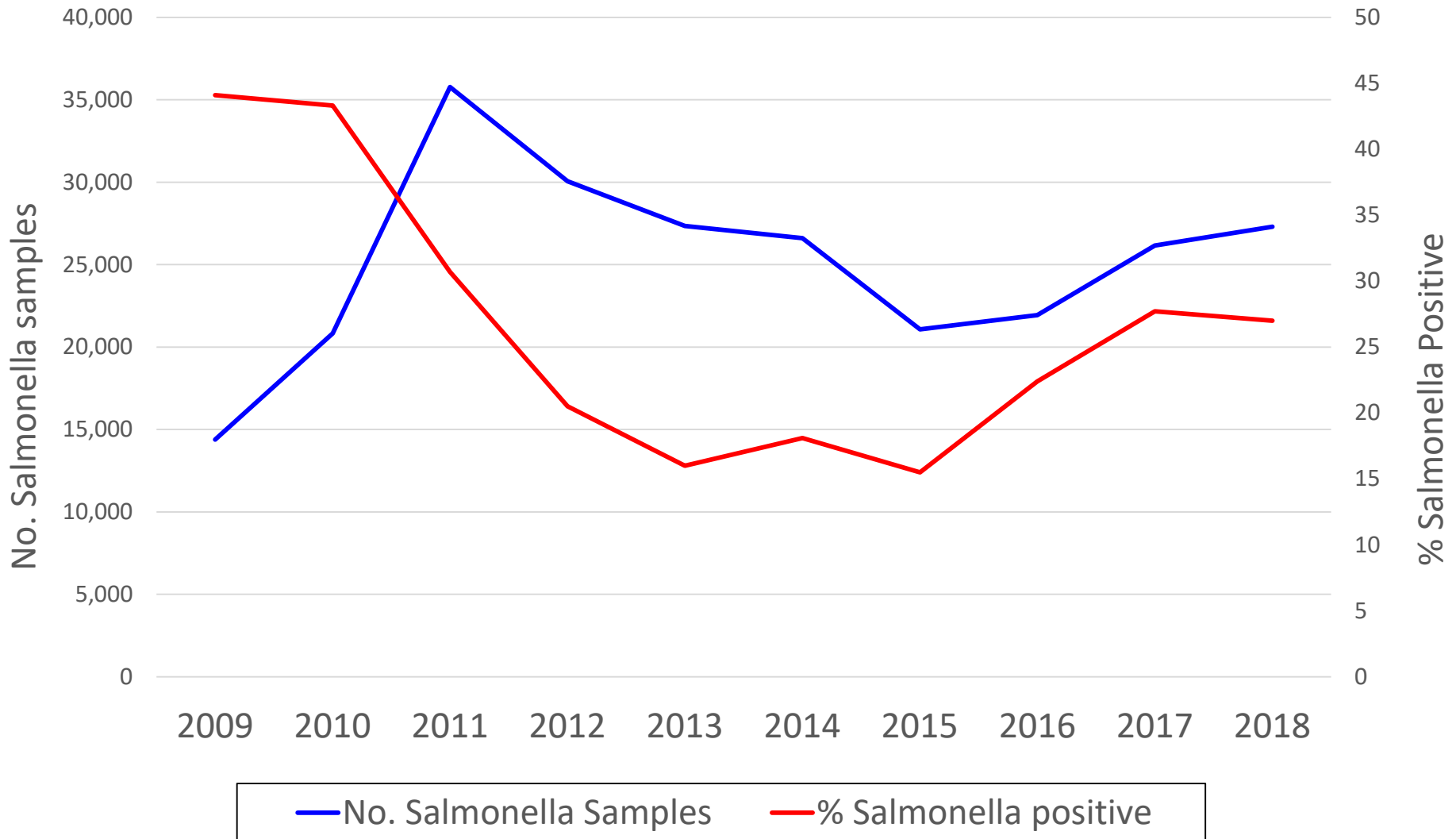


# Looking Ahead ... Full Implementation of WGS in PulseNet

- **PulseNet switch from PFGE to WGS will occur in early 2019**
  - Nearly all *Salmonella* will be sequenced
  - PFGE will be rapidly phased out
- **This will require shifts in:**
  - How outbreaks are detected, defined, and investigated
  - The current processes for interagency and interdisciplinary collaboration
- **Will likely lead to finding more outbreaks**
  - Many outbreaks may be easier to solve with WGS
  - WGS will also uncover complex connections throughout the food system that may be difficult to explain or understand without more collaboration

# Isolation of *Salmonella* at GPLN

## 2009 - 2018



# Top 20 serotypes reported by CDC and GPLN for 2014 - 2016

Rank	CDC	GPLN	Rank	CDC	GPLN
1	Enteritidis	Kentucky	11	Braenderup	Montevideo
2	Typhimurium	Enteritidis	12	Oranienburg	Anatum
3	Newport	Mbandaka	13	Thompson	Cerro
4	Javiana	Heidelberg	14	Mississippi	Ohio
5	I 4,[5],12:i:-	Typhimurium	15	Poona	I 4,[5],12:i:-
6	Infantis	Senftenberg	16	Typhi	Johannesburg
7	Heidelberg	Schwarzengrund	17	Bareilly	Agona
8	Muenchen	Infantis	18	Berta	Muenster
9	Montevideo	Liverpool	19	Paratyphi B	Muenchen
10	Saintpaul	Braenderup	20	Agona	Newport

# NPIP Approved Rapid Systems

<http://www.poultryimprovement.org/Salmonella.cfm>



# Approved at 2018 Biennial Conference

- Removed the requirement for PT testing as part of the U.S. S. Enteritidis Clean classification (B, G, H)
- Added additional sampling and *Salmonella* testing to U.S. Salmonella Monitored classification (E)
- Clarified language in Standard B of the Program Standard for isolation and identification of *Salmonella*

## Approved at 2018 Biennial Conference

- Removed procedure for culturing eggshells for colon bacilli
- Removed procedures to determine status and effectiveness of sanitation monitored program
- Moved the procedure for culturing chicks and poults into *Salmonella* section
- Approved the IDEXX RealPCR Salmonella DNA test

*Thank you*

