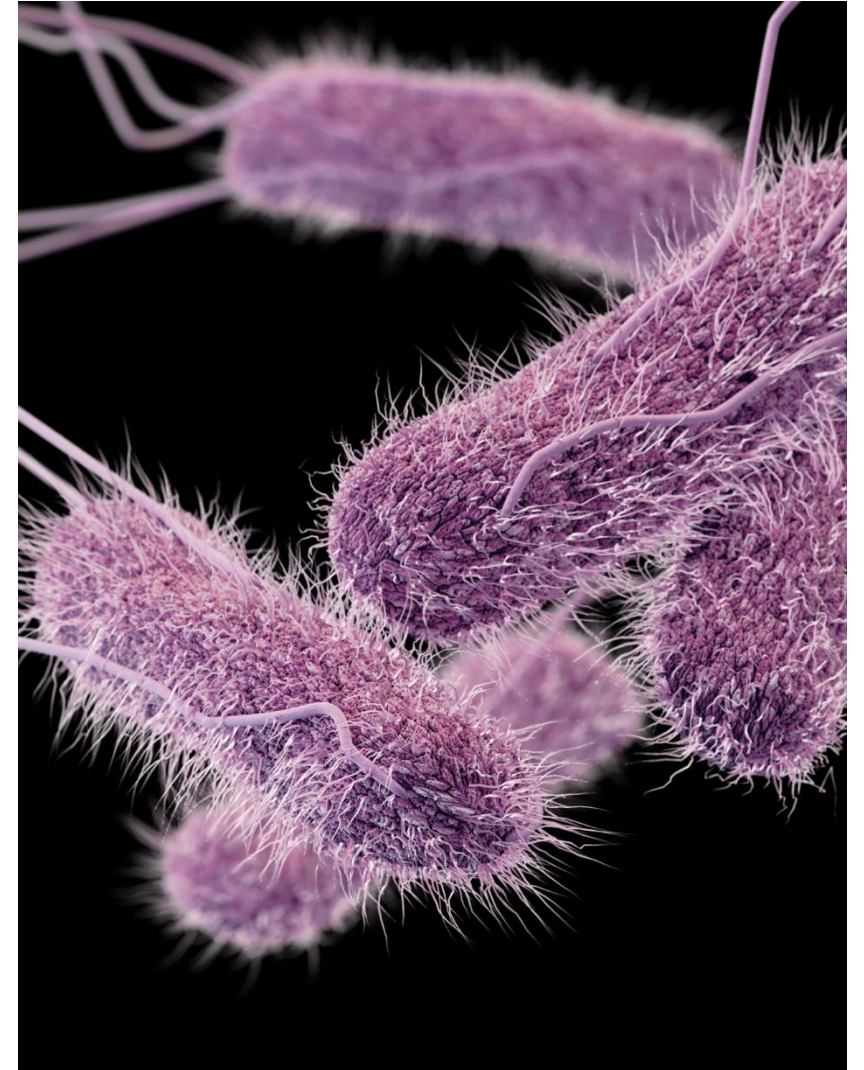
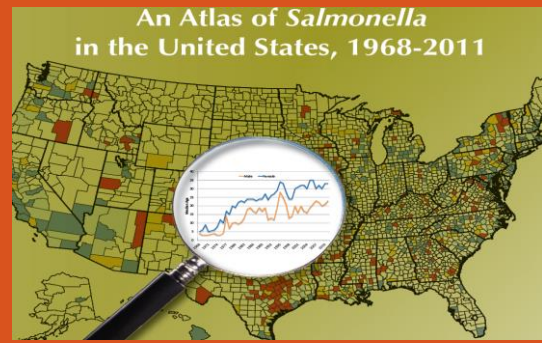


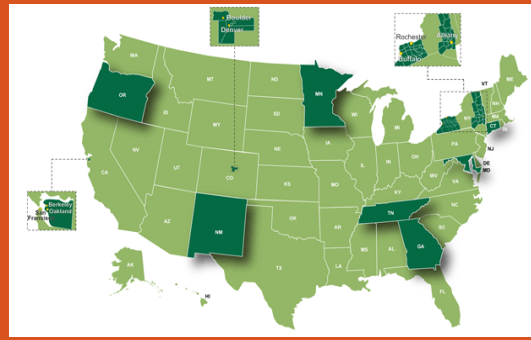
# *Salmonella* serotype Enteritidis Infections in the United States

Patricia M Griffin, MD  
Chief, Enteric Diseases Epidemiology Branch  
Division of Foodborne, Waterborne, and Environmental Diseases





**National Enteric Disease Surveillance**  
 Reports of all human isolates  
 (~42,000/year)



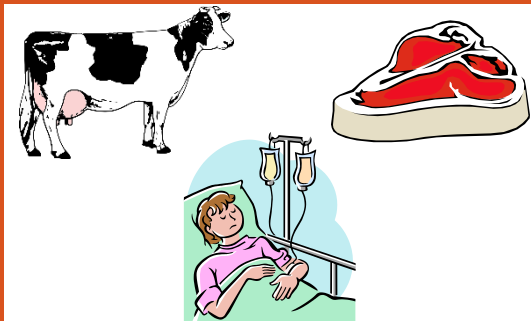
**FoodNet**  
 Reports of human isolates from 10 sites  
 with travel and outcome information  
 (48 million persons, 15% of population)



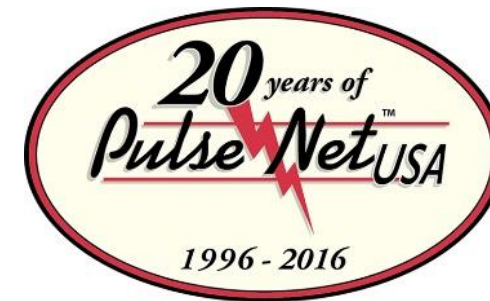
**National Outbreak Reporting System**  
 Reports of food, water, animal contact,  
 person-to-person outbreaks,  
 ~140 *Salmonella*/year

## *Salmonella* Data Sources

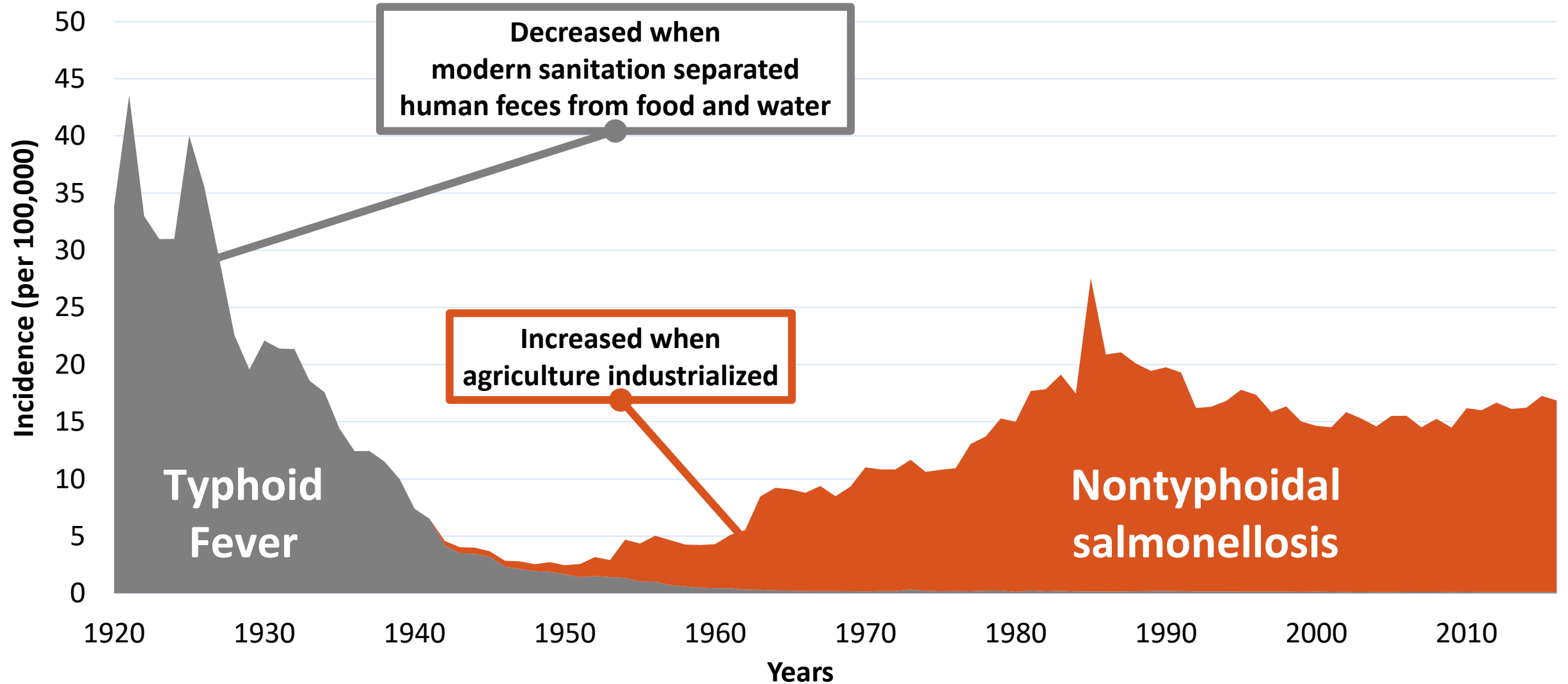
**National Antimicrobial Resistance Monitoring System (NARMS)**  
 Tests every 20<sup>th</sup> human and selected meat and animal isolates for resistance



**PulseNet**  
 Subtypes human, food, animal, and environmental isolates



# By the mid-20<sup>th</sup> century typhoid fever cases had decreased... but nontyphoidal salmonellosis became a major problem



# Most common *Salmonella* serotypes

	Serotype
1	Enteritidis
2	Newport
3	Typhimurium
4	Javiana
5	14,[5],12:i:-

# Incidence of *Salmonella* infections

	Serotype	Incidence lab-confirmed (per 100,000) per year
1	Enteritidis	3.0
2	Newport	1.7
3	Typhimurium	1.6
4	Javiana	1.3
5	I 4,[5],12:i:-	1.0
	<b>Top 5</b>	
	<b>All</b>	<b>15.4</b>

# Incidence of *Salmonella* infections

	Serotype	Incidence lab-confirmed (per 100,000) per year	% of total
1	Enteritidis	3.0	20
2	Newport	1.7	11
3	Typhimurium	1.6	10
4	Javiana	1.3	8
5	I 4,[5],12:i:-	1.0	7
	<b>Top 5</b>		<b>56</b>
	<b>All</b>	<b>15.4</b>	<b>100</b>

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5	14,[5],12:i:-	1.0	7
	<b>Top 5</b>	<b>—</b>	<b>56</b>
	<b>All</b>	<b>15.4</b>	<b>100</b>

**We estimate 29 cases for every lab-confirmed case**

# Incidence of *Salmonella* infections

	Serotype	Incidence lab-confirmed (per 100,000) per year	% of total	% with international travel
1	Enteritidis	3.0	20	26
2	Newport	1.7	11	4
3	Typhimurium	1.6	10	6
4	Javiana	1.3	8	3
5	I 4,[5],12:i:-	1.0	7	7
	<b>Top 5</b>	<b>8.6</b>	<b>56</b>	<b>—</b>
	<b>All</b>	<b>15.4</b>	<b>100</b>	<b>12</b>




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	Top 5	8.6	56	—
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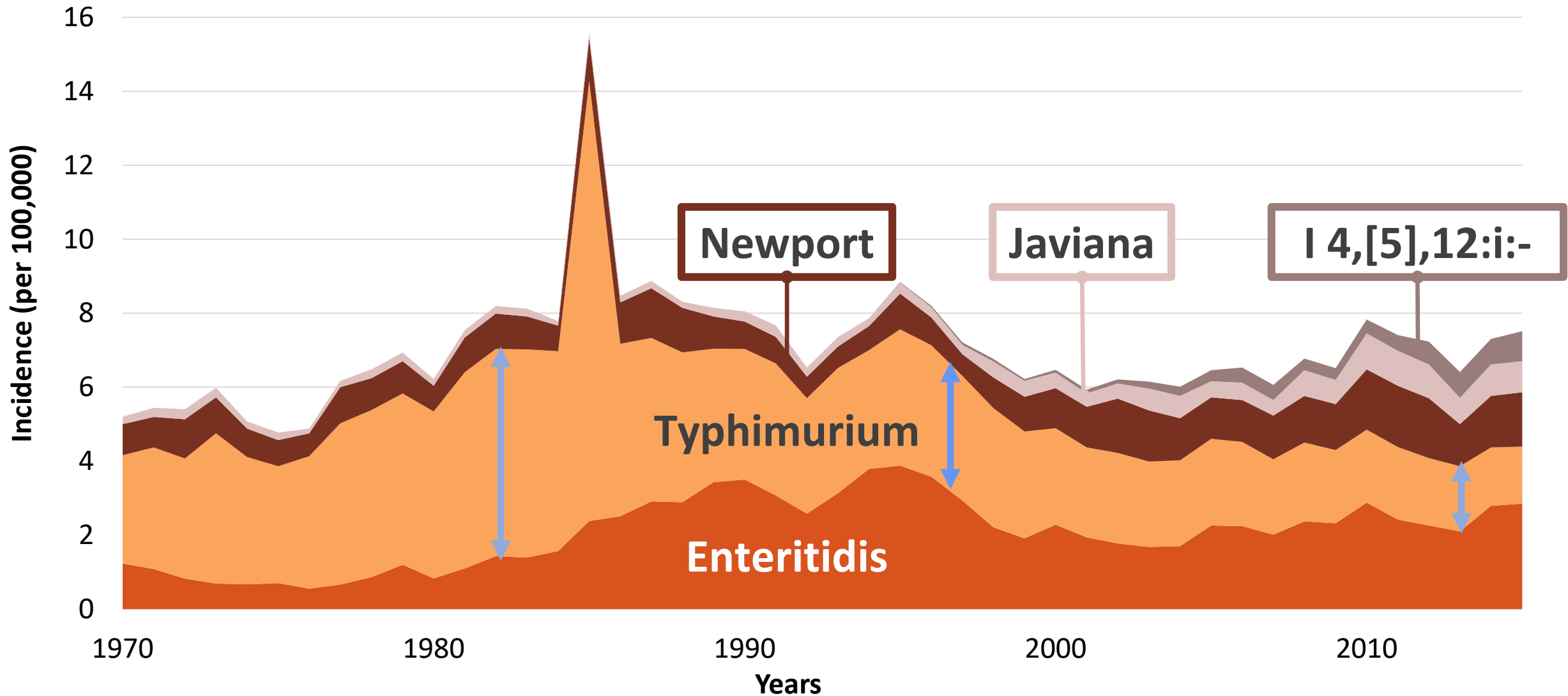
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	Top 5	—	56	—
	All	15.4	100	12

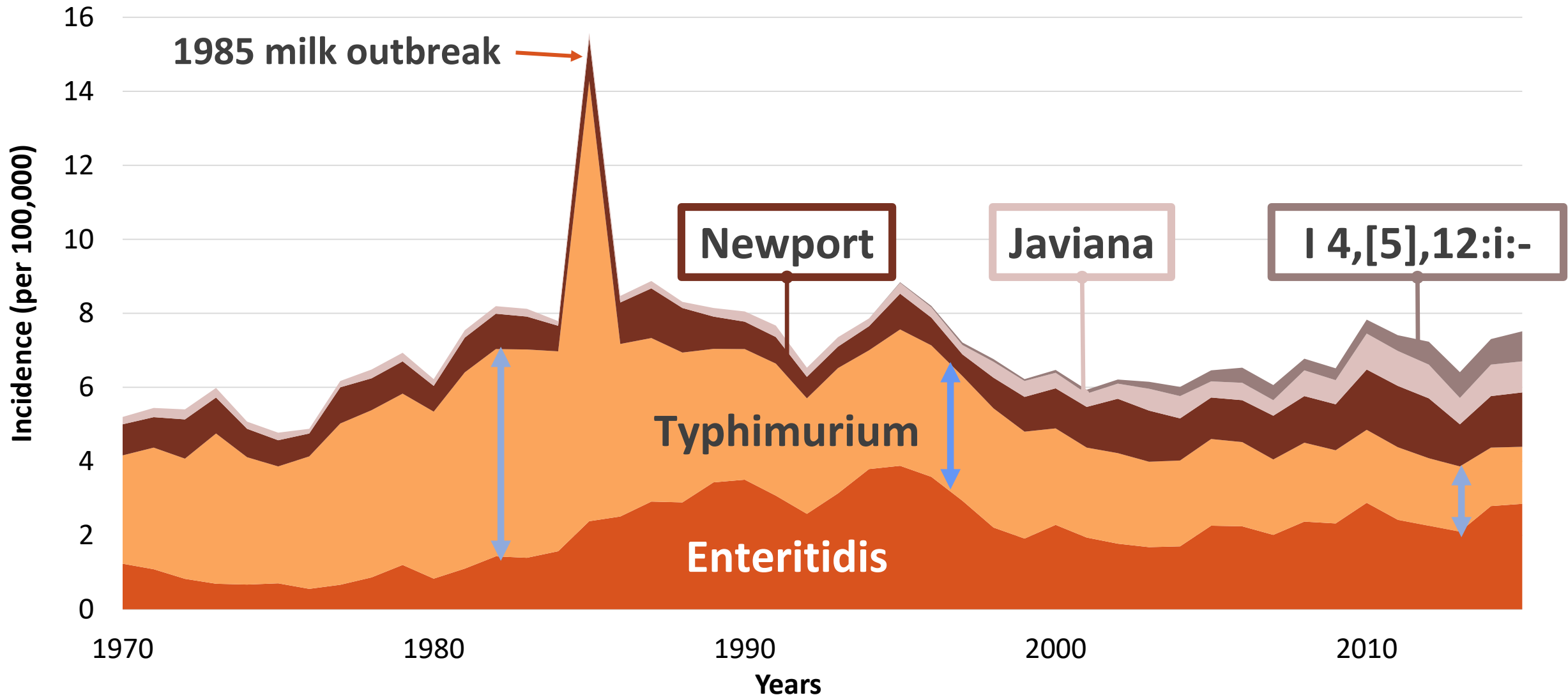
**75% to Mexico and the Caribbean**



Among the top 5 serotypes, Typhimurium was most common for decades. It's the only one that has been decreasing.

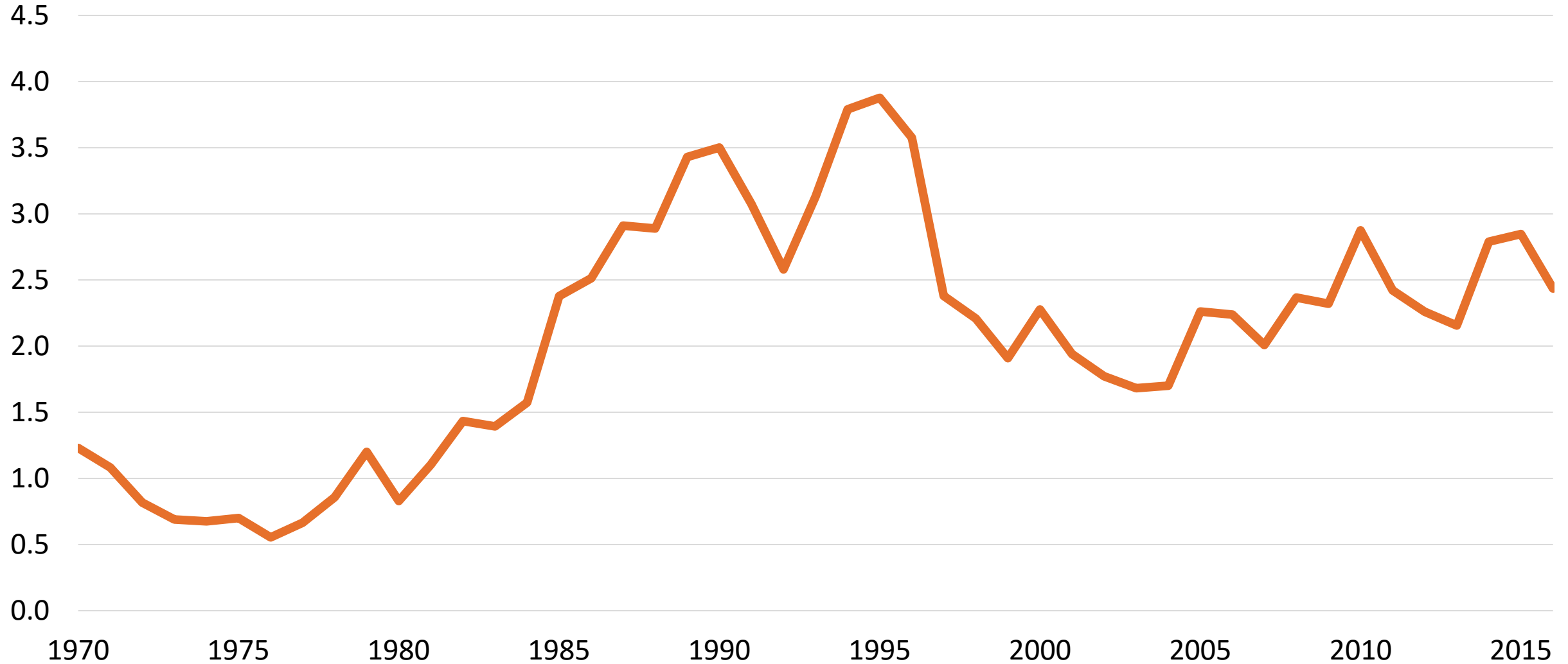


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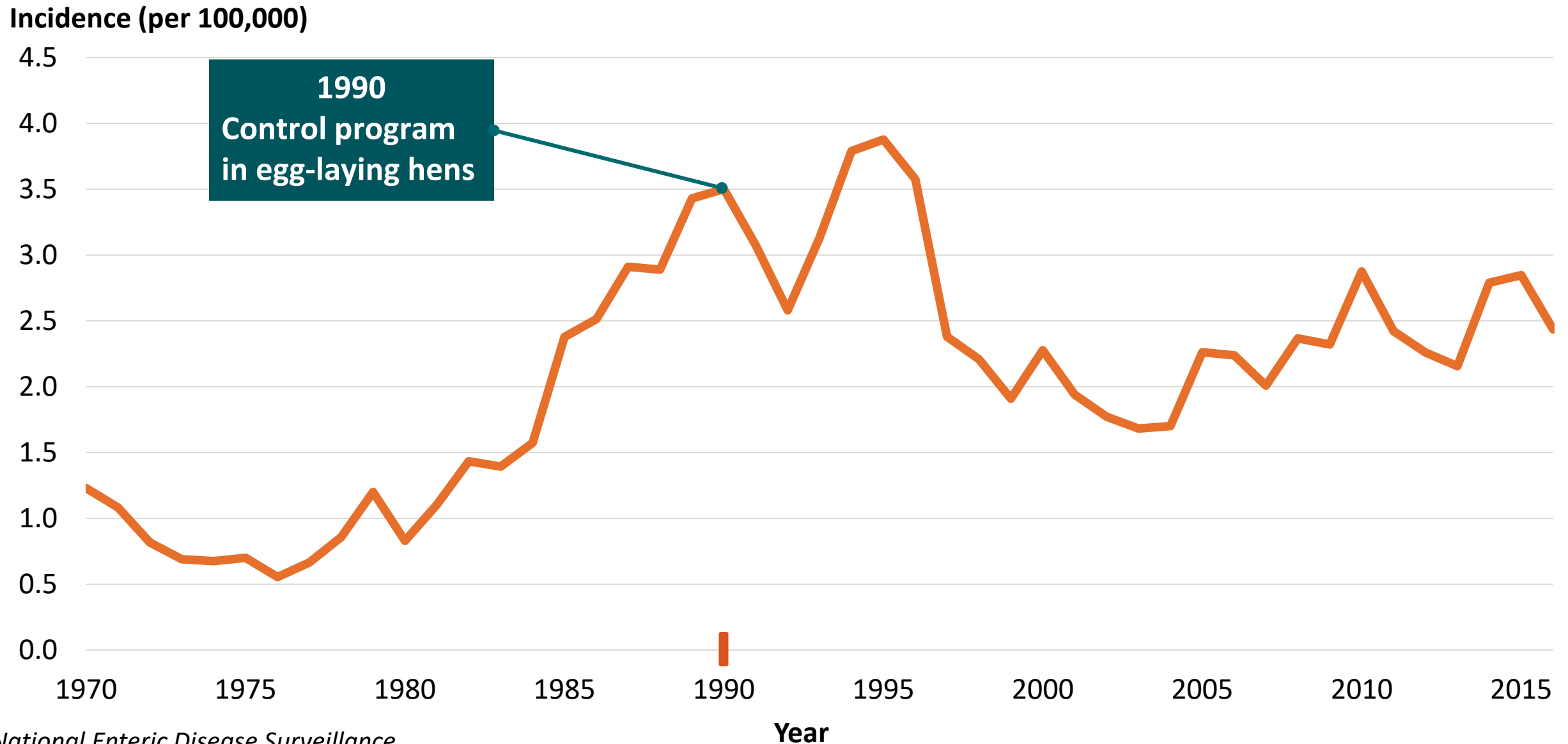


# Incidence of Enteritidis infections has varied markedly since 1970

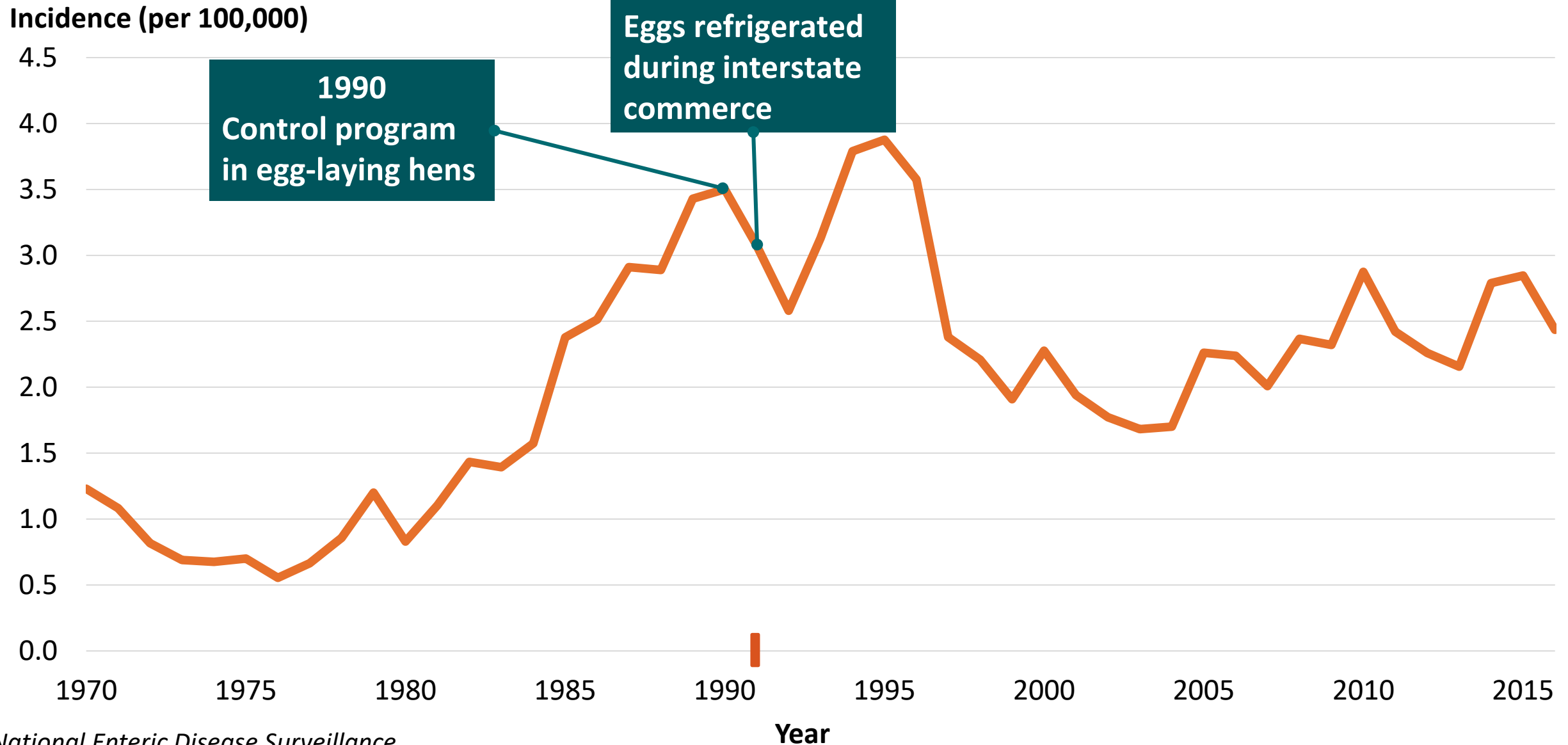
Incidence (per 100,000)



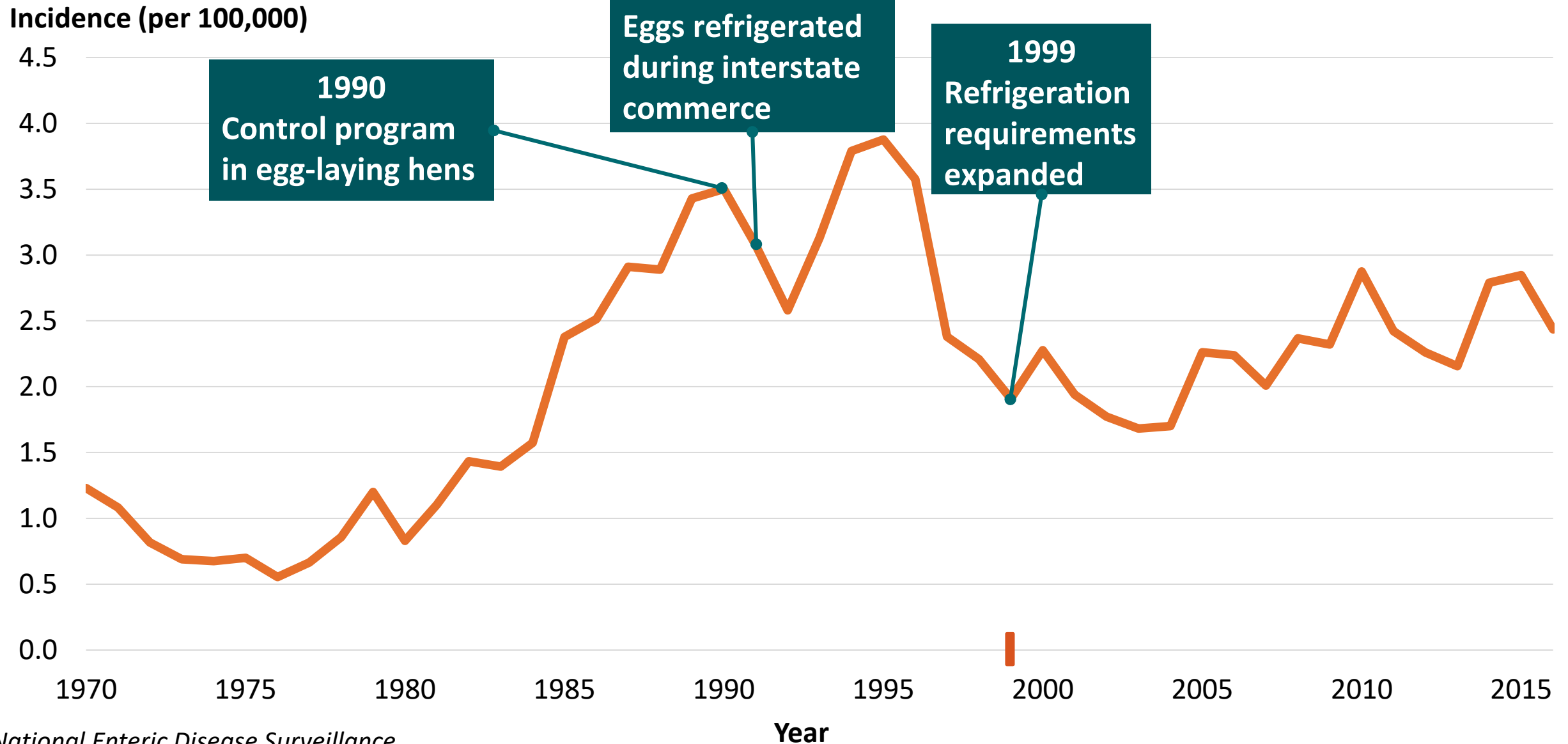
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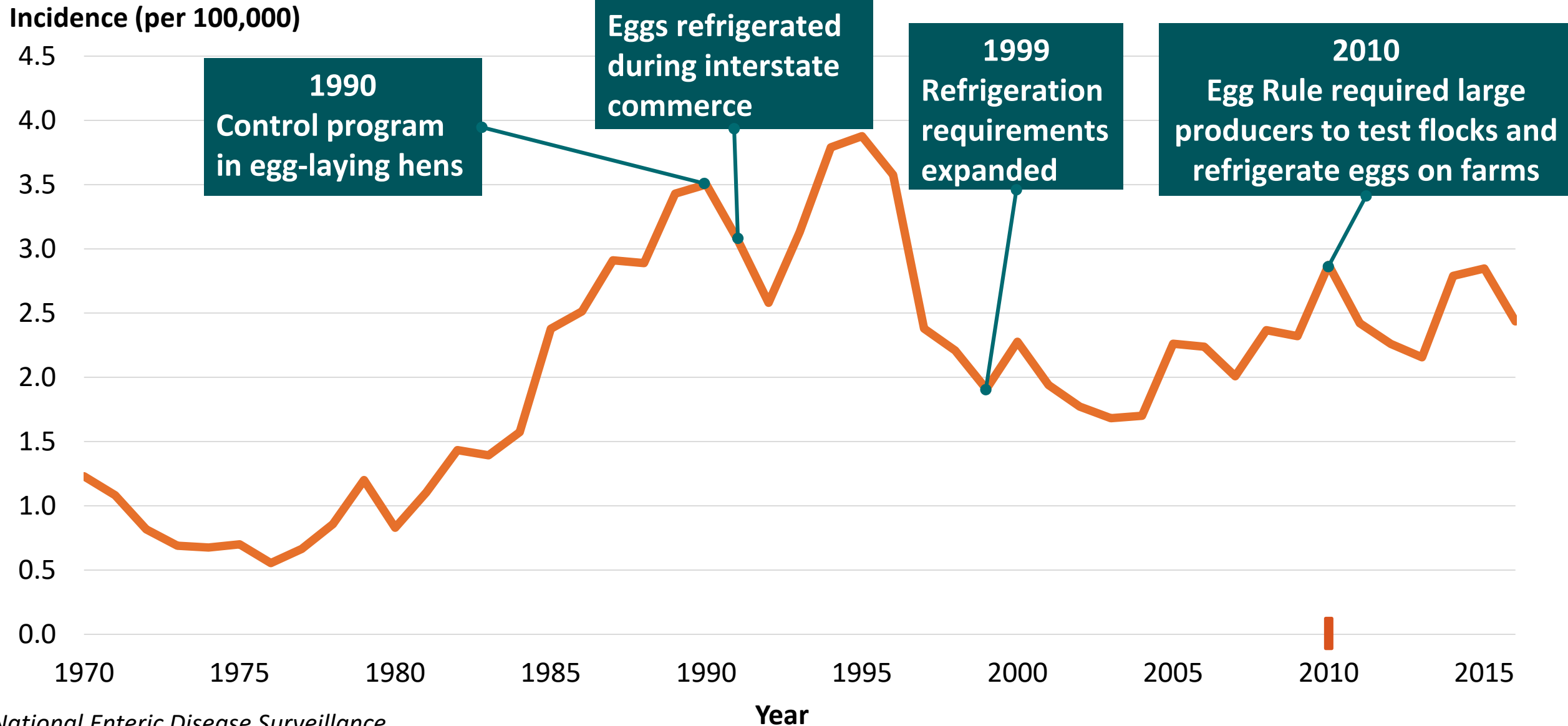


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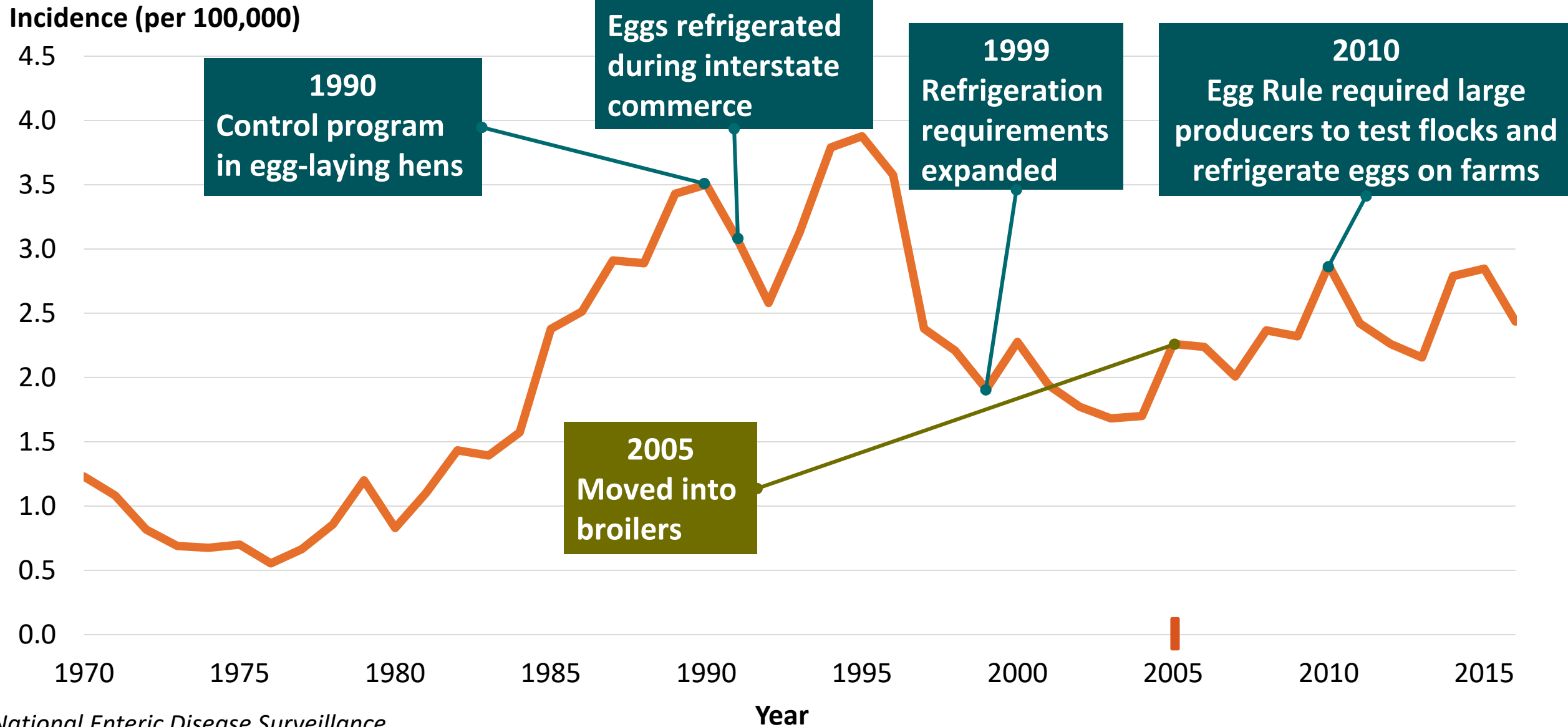




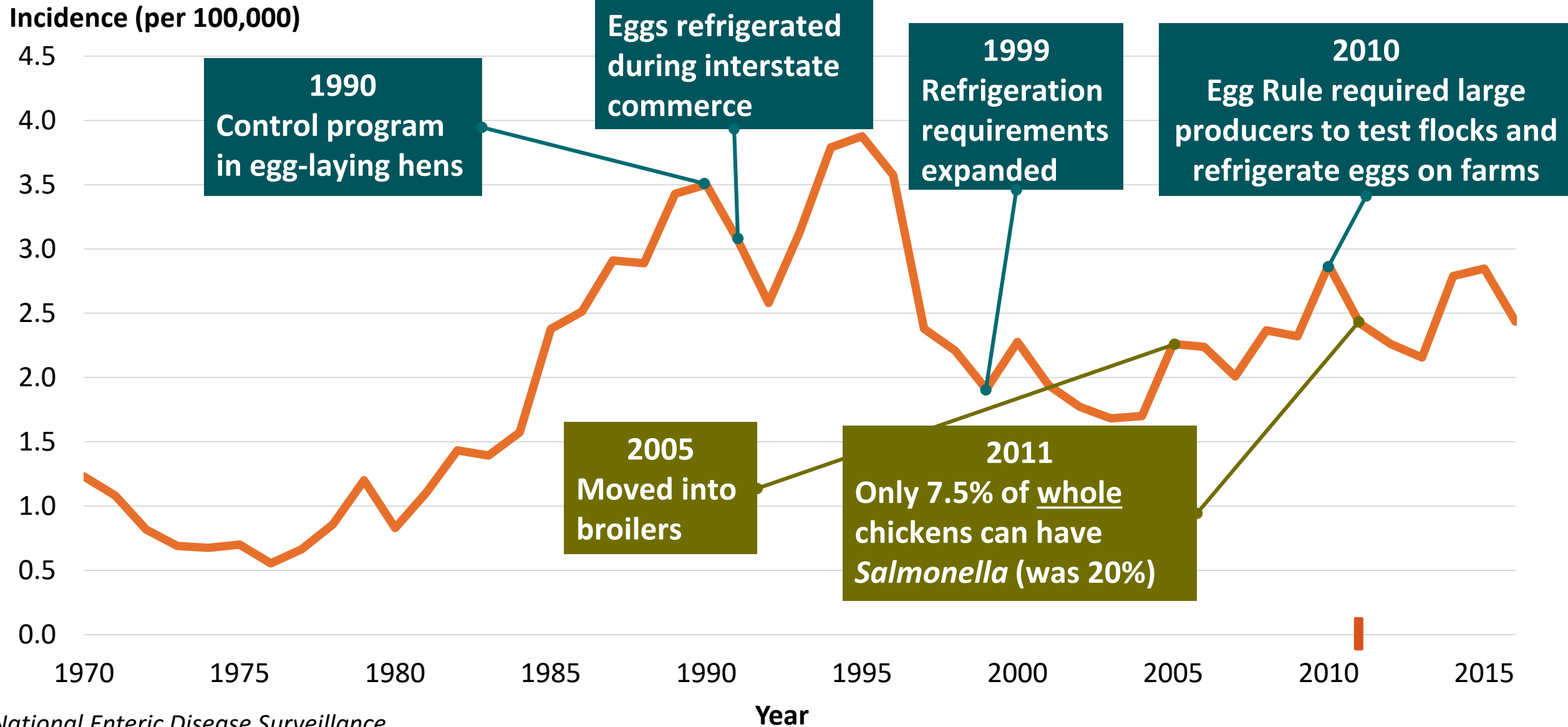
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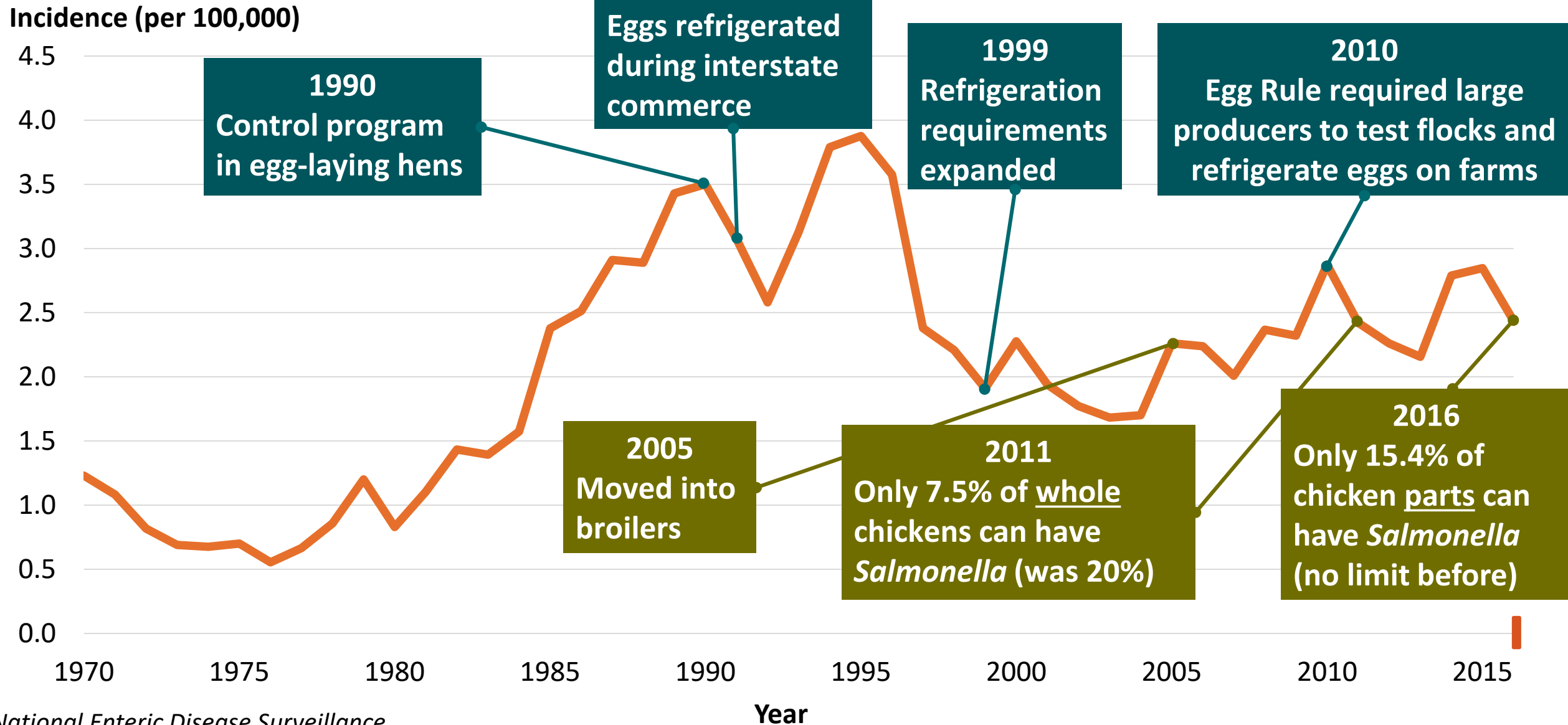
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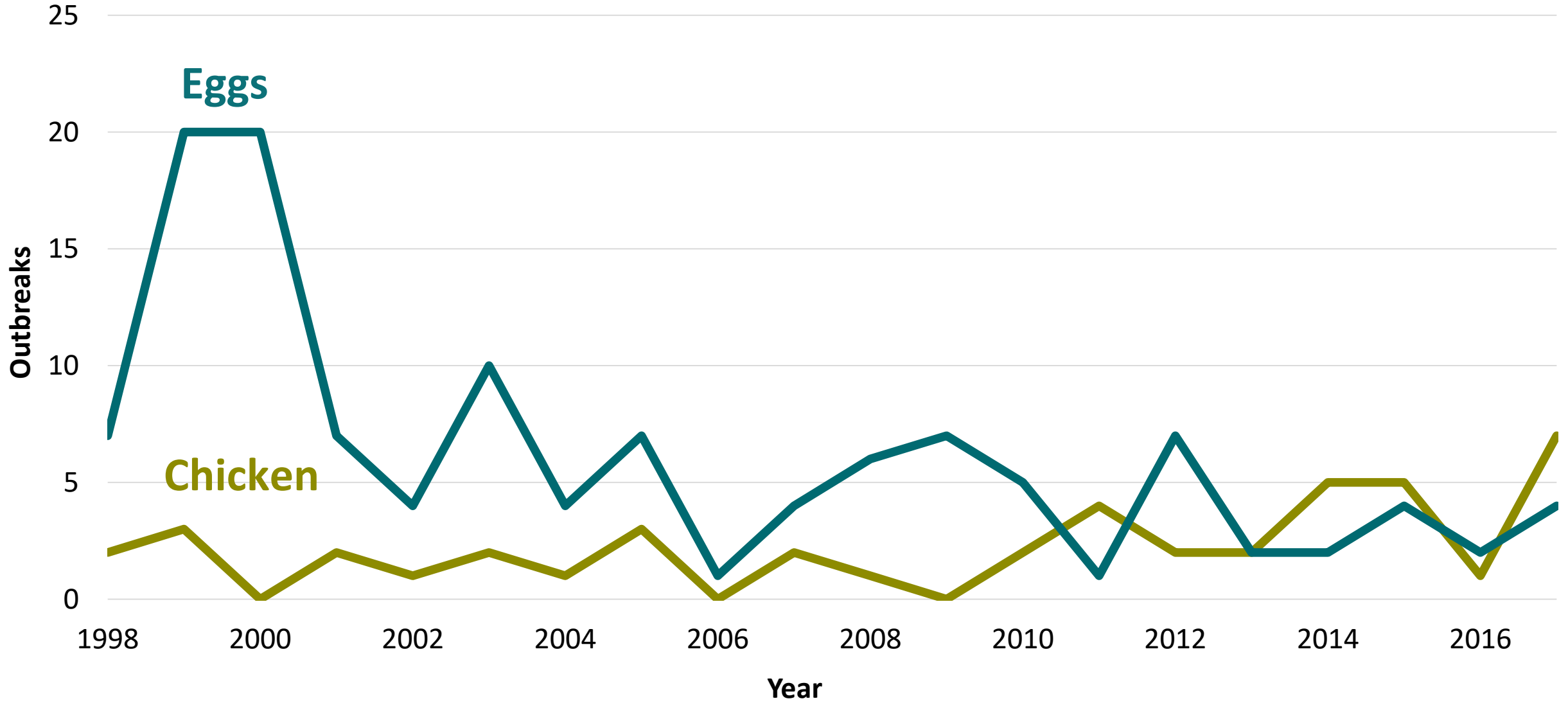
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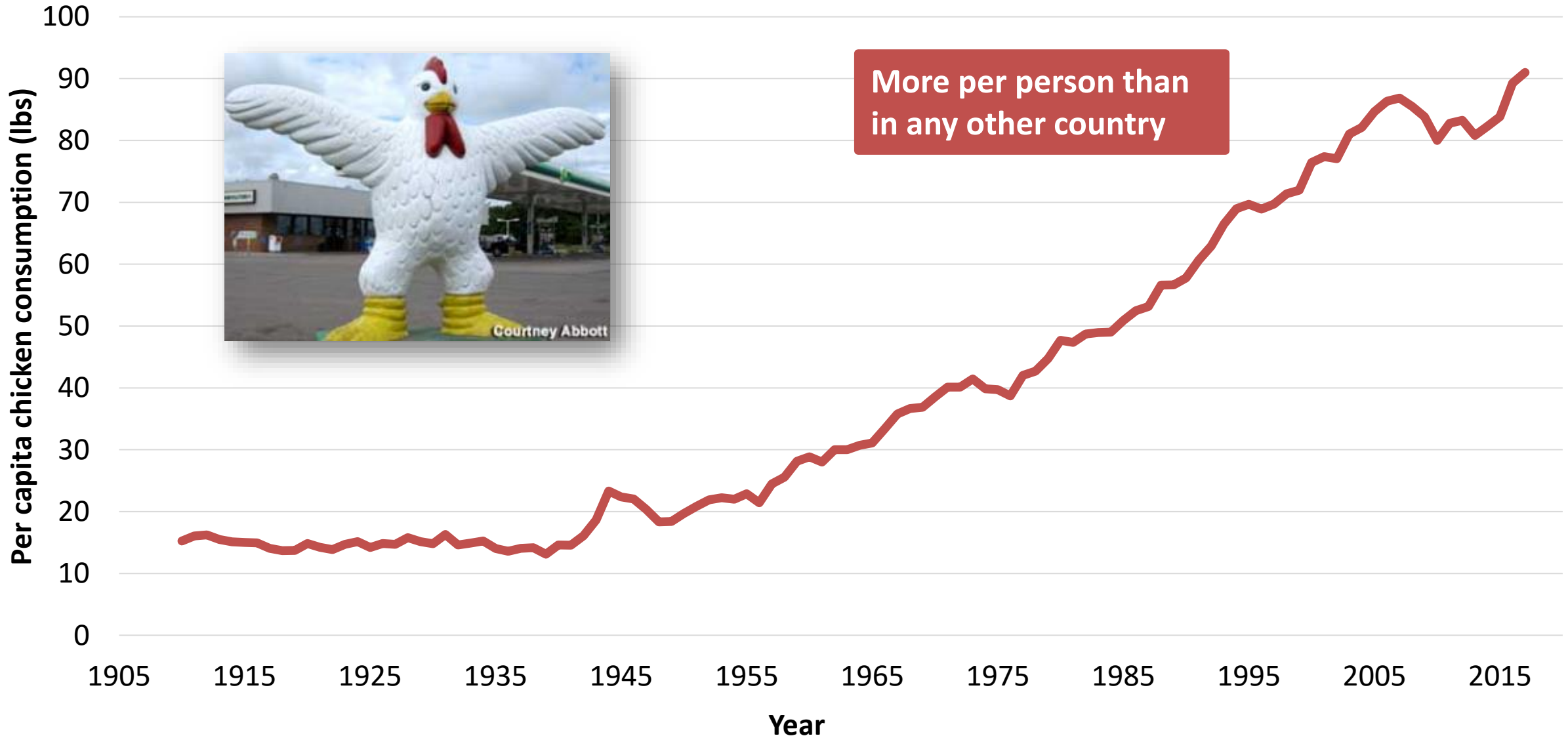
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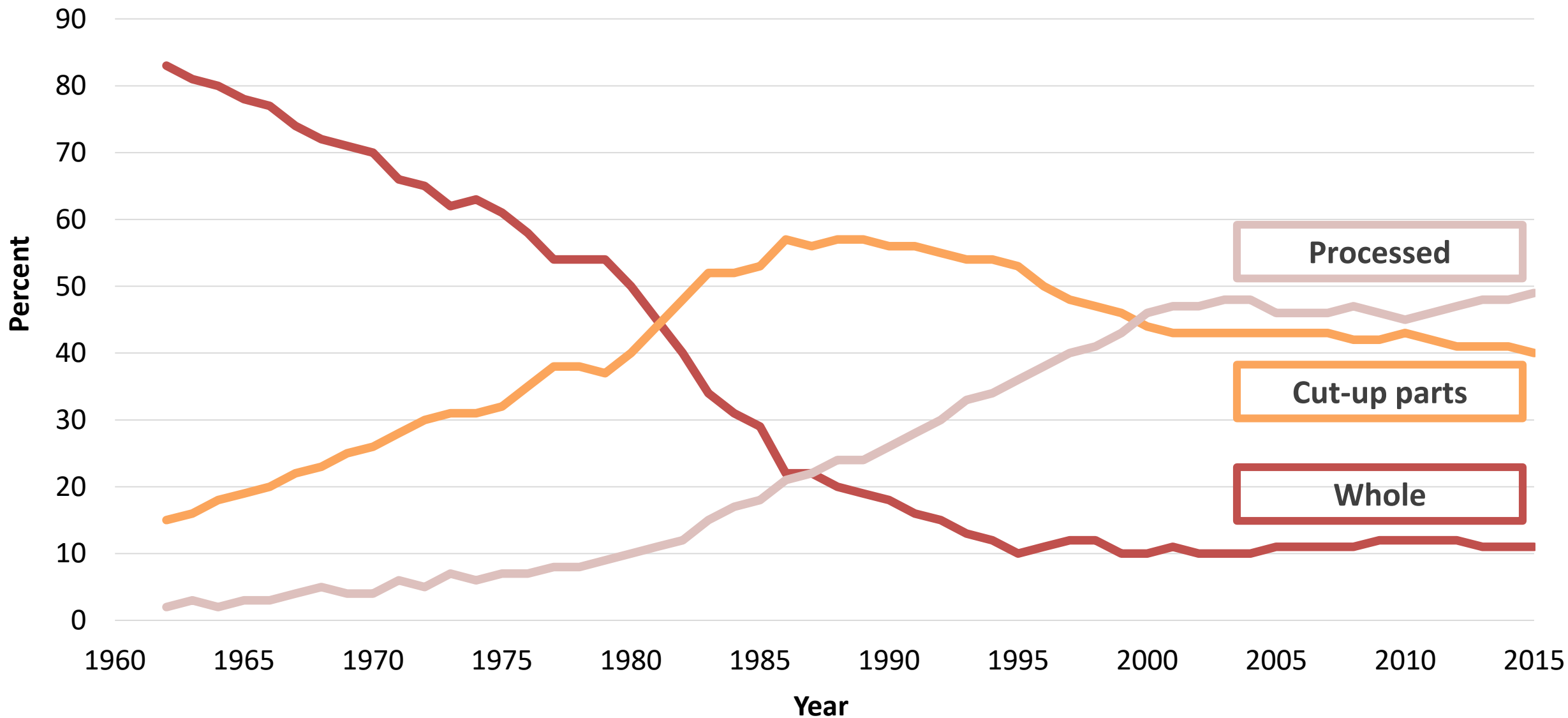
# Enteritidis outbreaks due to eggs have decreased, but those due to chicken have increased



# Chicken consumption has increased markedly since 1909— now the #1 protein eaten in USA



# We now buy most broiler chickens processed and as cut-up parts, not whole



Source: National Chicken Council, 1962–2015

# Final word on Enteritidis: Major challenges

## Eggs

- **Compliance with 2010 Egg Rule varies (requires hygiene, testing, refrigeration)**
  - Inspection and enforcement limited
  - Farms with <3,000 laying hens exempt
- **Vaccine coverage uncertain**
  - On large farms, most young layers get Enteritidis bacterin injection



## Chicken

- **High level of contamination allowed**
  - 15.4% of chicken parts can yield *Salmonella* (no limit before 2016)
- **Vaccine coverage uncertain**





# Current and former members of these groups contributed to this work

- **CDC's enteric diseases epidemiology, outbreak, and laboratory branches**
- **State and local public health departments**
- **US Food and Drug Administration**
- **Food Safety and Inspection Service, US Department of Agriculture**



*Enteric Diseases Epidemiology Branch*

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For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



*Enteric Diseases Epidemiology Branch*