

Reduction of *Salmonella* Enteritidis (SE) in Commercial Layers

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Salmonella Enteritidis Risk Reduction in Commercial Layers

The report that started the ball rolling

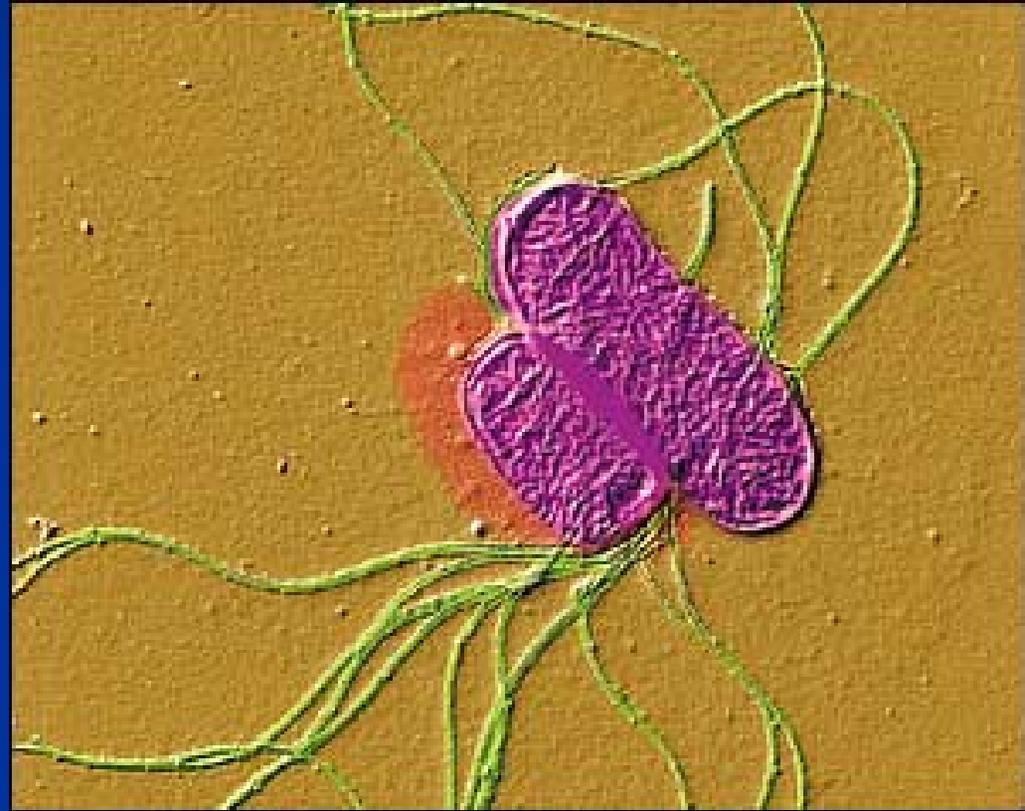
“The emergence of grade A eggs as a major source of *Salmonella enteritidis* infections. New implications for the control of salmonellosis.”

JAMA 1988; 259: 2103-2107.

M. E. St Louis; D. L. Morse; M. E. Potter; T. M. DeMelfi; J. J. Guzewich; R. V. Tauxe; P. A. Blake

Salmonella Enteritidis Risk Reduction in Commercial Layers

- SE found to be transmitted within the egg and not due to shell borne transmission
- Northeastern states first region to experience a significant increase in SE cases





National Poultry Improvement Plan

- Breeder sources first to be examined
- National Poultry Improvement Plan (NPIP) initiated US SE Clean Program for egg-type breeders in 1989



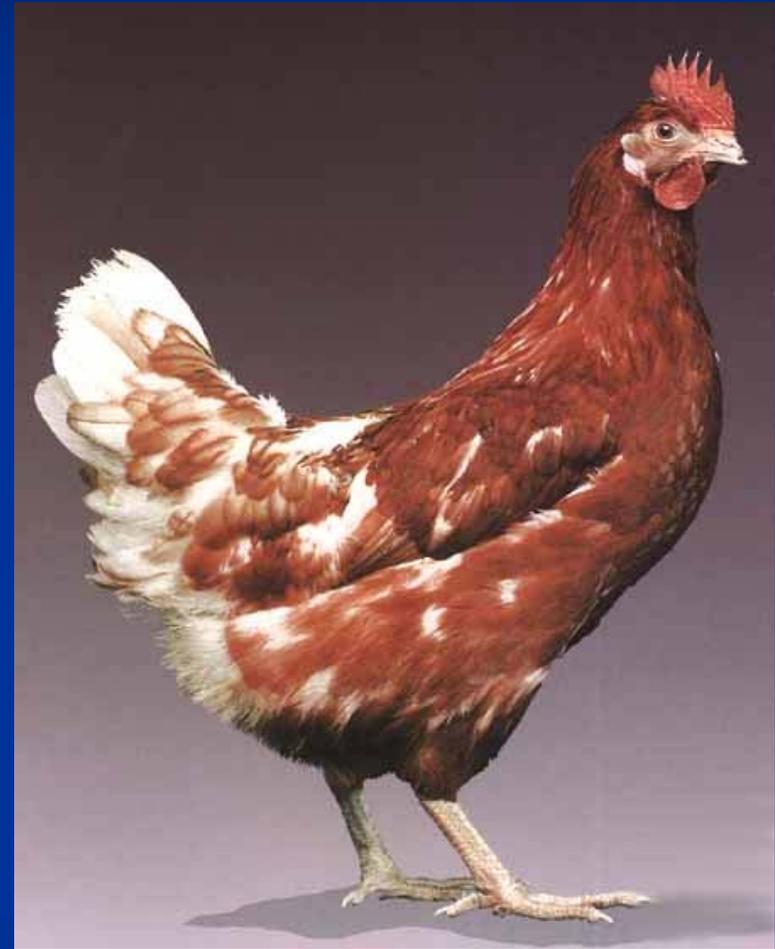
NPIP US SE Clean Program

- Parents hatch from SE negative stock
- Parent flock manure tested once a month for life beginning the first month of life
 - 4 manure drag swabs per house
 - 2 nest/egg belt samples once in the lay house
- 300 Pullorum-Typhoid blood tests @ 4 months of age

NPIP US SE Clean Program

- 19 parent flocks have tested positive for SE since 1989
- 1 positive in 2005
- 1 positive in 2006
- 4 positive in 2007

Source: A.R. Rhorer, USAHA 2007 Proceedings



Breeder – Best Management Practices

- Biosecurity
- Feed ingredients
- Vaccination
- Hatch egg sanitation



Breeder – Best Management Practices

- Breeder flock biosecurity practices used to prevent SE
 - Rodent control
 - Traffic control
 - Bird movement equipment sanitation
 - Clean worker and visitor footwear, clothing, and headgear plus hand sanitation



Breeder – Best Management Practices

- Breeder vaccination
 - Used by the major breeder in the US
 - Must keep 300 non-vaccinates for testing at 4 months
- Hatch egg sanitation
 - Used by some operations
 - Spray at time of collection



NPIP US SE Clean Program

- Animal byproducts use
 - Source must comply with practices according to the Animal Protein Products Industry (APPI) Salmonella Education/Reduction Program
 - Pelletized complete feed
 - Mash with pelletized animal byproduct
 - Mash that is treated with an FDA approved anti-Salmonella control product

Salmonella Enteritidis Risk Reduction in Commercial Layers

- Hatcheries
 - Hatch only eggs from breeder flocks on NPIP SE Clean Program
 - Use standard sanitation practices



SE Outbreaks by state, 1985-1999



CDC data

1-9: Puerto Rico
10-49: District of Columbia

Salmonella Enteritidis Risk Reduction in Commercial Layers

1992 - US Secretary of Agriculture declared SE
an emergency



1992-93 – SE Pilot Project Begun



1994 – The Pennsylvania Egg Quality Assurance
Program (PEQAP) initiated

Salmonella Enteritidis Risk Reduction in Commercial Layers

- Three critical control points correlated with SE positive layers found by the SE Pilot Project
 1. Positive pullets
 2. Rodent population
 3. C&D of house between flocks

Salmonella Enteritidis Risk Reduction in Commercial Layers

- Developed by Pennsylvania scientists
- Published in 1997
- Covers all aspects of SE control
- Available on PSU website -
<http://pubs.cas.psu.edu/FreePubs/pdfs/AGRS72.pdf>

Preharvest **HACCP** in the Table Egg Industry

Hazard Analysis
Critical Control Point System for
Enhancing Food Safety

Egg Quality Assurance Programs

- Egg Quality Assurance Programs (EQAPs)
 - Best Management Practices
 - Education/Training
 - Record keeping
 - Verification



Egg Quality Assurance Programs

- Pennsylvania
- Maryland
- California
- New York
- South Carolina
- Ohio
- New England
- United Egg Producers
- Company programs

Egg Quality Assurance Programs

- All EQAPs have Best Management Practices
 - Chicks from NPIP SE Clean breeders
 - Biosecurity
 - C&D of houses between flocks
 - Rodent control
 - Egg sanitation
 - Egg holding conditions

Egg Quality Assurance Programs

- Rodent control found to be highly correlated to SE infection in layers
- Rodent index formulated
- Twelve live traps (Tin-Cats) placed in layer house
- Mice counted after 7 days



Egg Quality Assurance Programs

Rodent Index

No. of mice caught	Rodent Index	Description
0 to 10	1	Low
11-25	2	Moderate
26 +	3	High

An index of 1 or less is acceptable

Egg Quality Assurance Programs

- Training/education
 - Meetings
 - Written materials
 - 3rd party audit visits (Pennsylvania Dept of Ag)
- Record keeping
 - Rodent control log
 - Vaccinations
 - C&D
 - Testing



**Sampling
Chick Box
Papers**



Verification Test	Required by Programs
Chick box paper testing	PA, MD, NY
Pullet manure testing	PA, MD, NY
Young layer manure testing (30 weeks)	PA, MD
Mid-lay manure testing (45 weeks)	PA, MD
Post-molt manure testing	PA, MD, NY
Pre-moveout testing (within 8 weeks of moveout)	NY, OH, SC, UEP

Manure Drag Swab Sampling



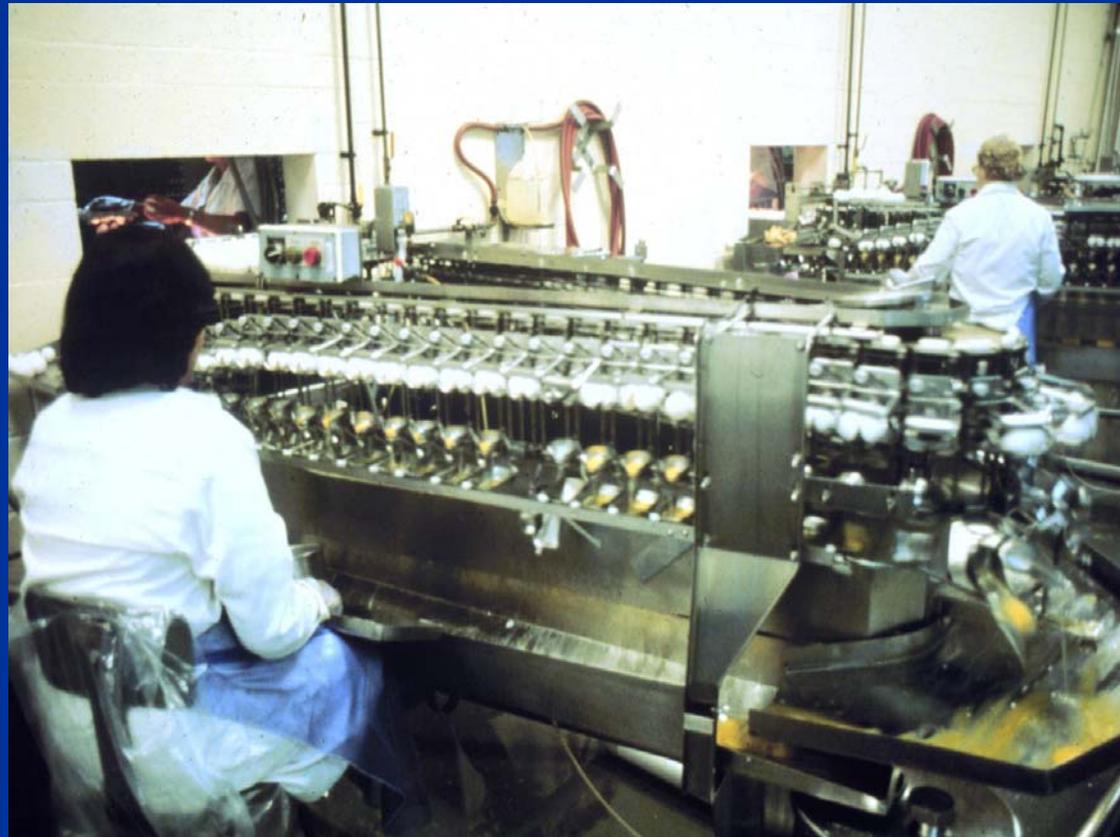
Egg testing of manure positive flocks

- Initial test
 - 1000 eggs
 - Pools of 20 eggs
 - 2 week interval
 - 4 tests
- Continued testing
 - 1000 egg sample, once a quarter



Egg Quality Assurance Programs

- Diversion of eggs to pasteurization or hard-cooking
 - Required if any egg pool is positive
 - PA, MD, NY



Vaccines

- Not required by any EQAP
- Used by producers to aid in remaining SE negative, egg test negative
- Only one egg positive flock in PEQAP where SE bacterin has been used



Vaccines

- Vaccination
 - SE bacterin
 - Usually 1x at 13 to 15 weeks
 - Live ST vaccines
 - 3 applications – 2, 6, and 12 weeks
 - Bacterin + live vaccine
 - Live vaccine - 2 and 6 weeks
 - Bacterin – 13 to 15 weeks

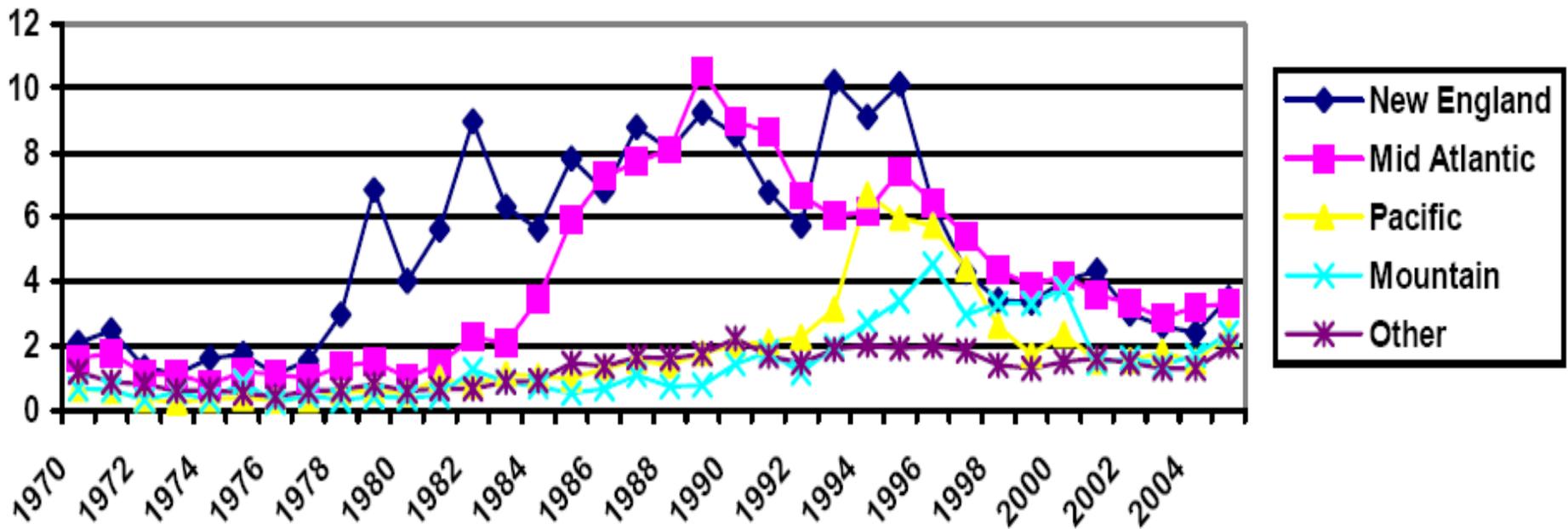


SE Reduction by EQAPs

PEQAP Success

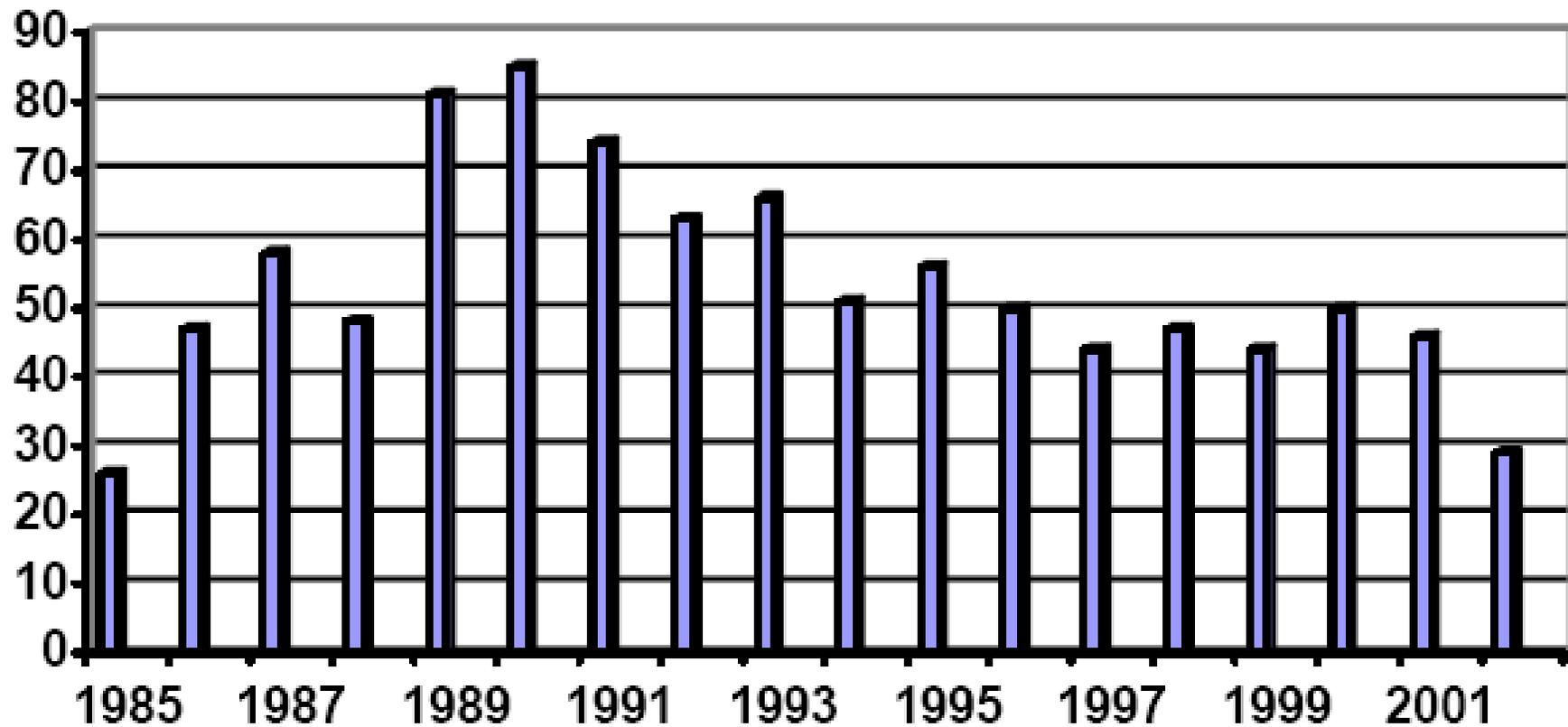
	1992	2003
% + Manure samples	23	1.5
% Positive Flocks	38	4.4

Salmonella Enteritidis by Region 1970-2005

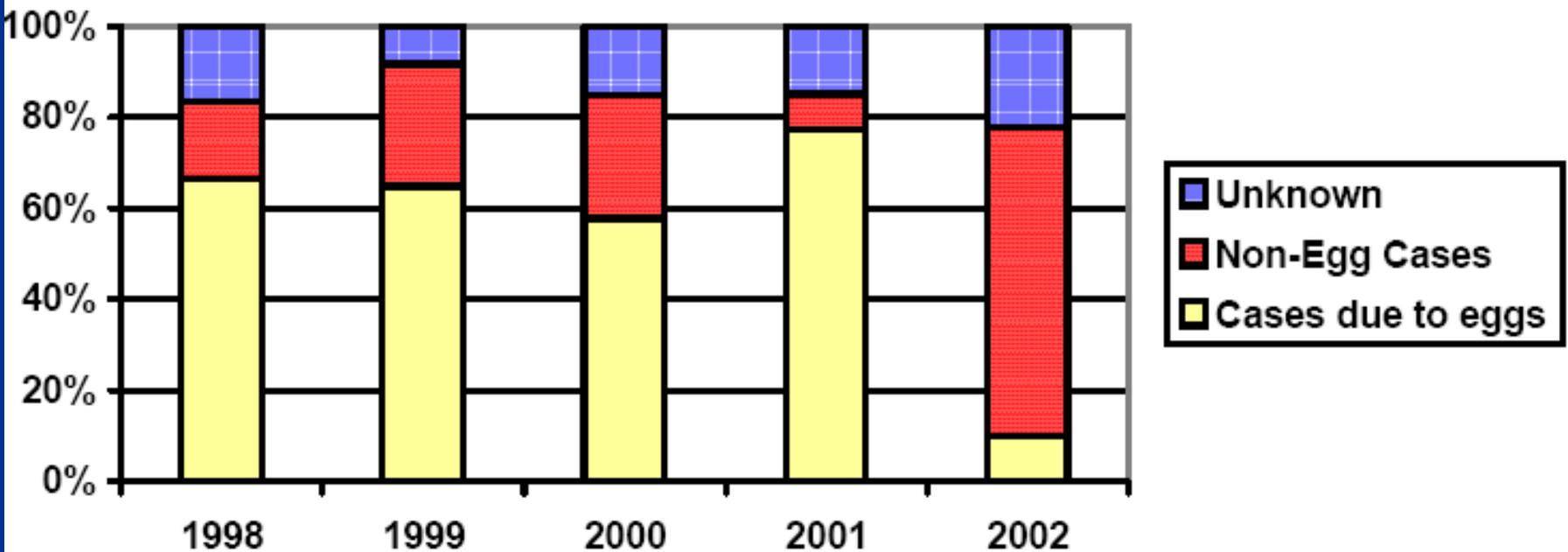


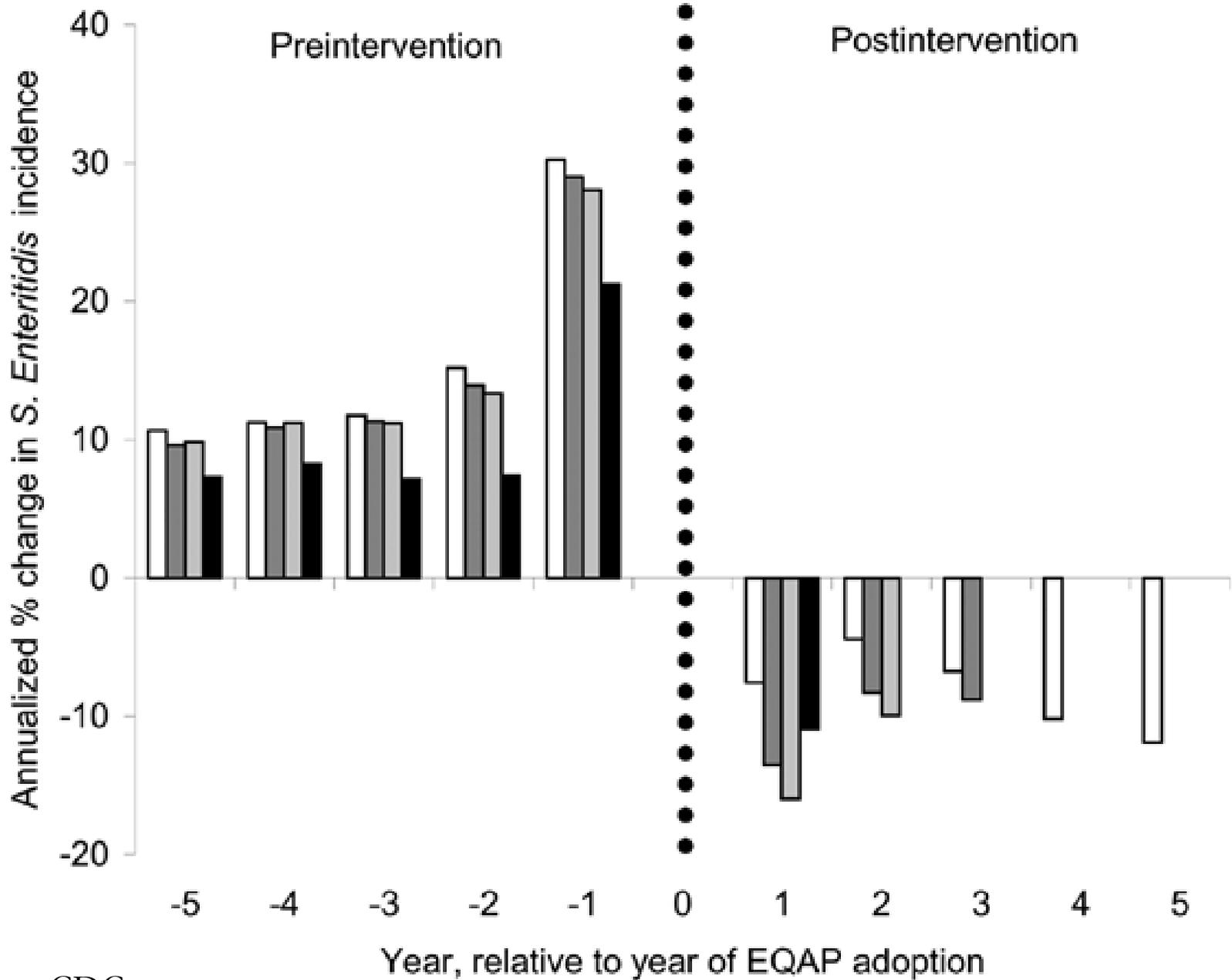
CDC SE Outbreak Surveillance System

SE Outbreaks: Number of Outbreaks per year 1985-2002



1998-2002 CDC Outbreak Data for *Salmonella* Enteritidis (as Percent of total cases)



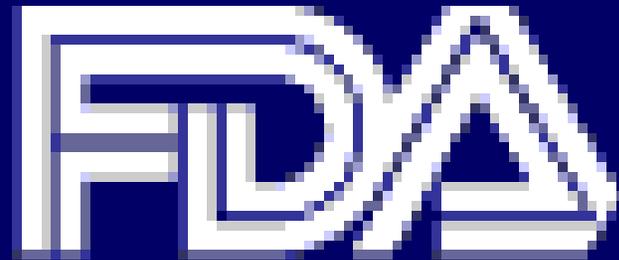


From CDC
report, 2004

□ 4 states ■ 6 states ▨ 7 states ■ 11 states

FDA Proposed SE Program

- Proposed September 2004
- Comment period until December 2004
- Asked for more input on pullets in May 2005
- Implementation expected 2007
- Postponed – still waiting



FDA Proposed SE Program

- Contains components of the successful EQAPs
- Challenges for a national program
 - Diversion of eggs very difficult in many parts of the US
 - Laboratory testing capabilities lacking in many states
 - Many states not willing to subsidize costs of program
 - Testing
 - Auditing



Questions??