Salmonella Control Programs in the USA

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A Word About *Salmonella*

- Genus *Salmonella* named after USDA’s veterinarian and bacteriologist Daniel E. Salmon.
- More than 2,500 species (serotypes/serovars).
- Poultry species belong to a common serovar, *Salmonella enterica*.
- The poultry-adapted species (*S. pullorum*, *S. gallinarum* and *S. arizonae*) do not cause disease in humans.
- The remaining salmonellae can infect chickens and turkeys and subsequently humans through the consumption of contaminated poultry products.
Public Health Importance of Salmonella Infections

• CDC estimates, about 9.4 million people get sick in the USA each year from contaminated food.

• USDA reports *Salmonella* as the leading cause of bacterial-related food illness.

• About one million Americans get sick from *Salmonella* each year; 19,000 are hospitalized; >370 people die.
Public Health Importance of Salmonella Infections

- The annual cost of medical treatment for *Salmonella*-related food illness is estimated to be $365 million.
- CDC estimates, eggs & poultry account for nearly half (47 percent) of all foods associated with *Salmonella* outbreaks.
Contribution of Various Food Sources to Outbreaks of Salmonellosis

USA – CDC, 2012
Salmonella Prevalence on broiler chickens in the U.S.
Salmonellosis in the U.S. from 1997 to 2006

Not much variance from year to year

Very little relationship between Salmonella on poultry and salmonellosis
Most is coming from peanuts, lettuce, cilantro, etc.
<table>
<thead>
<tr>
<th>Salmonella serotype</th>
<th>% of total cases</th>
<th>Salmonella serotype</th>
<th>% of total cases</th>
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<tbody>
<tr>
<td>Enteritidis</td>
<td>20.1</td>
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<td>29.4</td>
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<td>Newport</td>
<td>13.1</td>
<td>Kentucky</td>
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<td>12.2</td>
<td>Senftenberg</td>
<td>7.9</td>
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<td>Javiana</td>
<td>10.2</td>
<td>Heidelberg</td>
<td>5.5</td>
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<tr>
<td>S. I 4,(5),124</td>
<td>3.4</td>
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<tr>
<td>Montevideo</td>
<td>1.9</td>
<td>Montevideo</td>
<td>1.2</td>
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</tbody>
</table>
Salmonella Control Begins with the Primary Breeders

Begin Here

Elite PDs

PDs

GGPs

GPs

Parent Flocks
Salmonella Control Programs for Poultry
National Poultry Improvement Plan (NPIP) Established

• 1935- National Poultry Improvement Plan was established by an act of Congress. Provisions were based on recommendations from IBCA and industry and Government meetings.

• Degrees of freedom from *S. pullorum*.

• Statewide breeding programs with uniform terminology.

U.S. ROP, U.S. Approved, U.S. Certified, and U.S. Register of Merit
Today’s Commercial Poultry Industry

- 8.5 Billion Meat Chickens
- 300 Million Meat Turkeys
- 275 Million Table-Egg Layers
- 75 Million Meat-Type Breeding Chickens
- 3 Million Egg-Type Chicken Breeding Chickens
- 5 Million Breeding Turkeys
- 311 Egg & Meat-Type Chicken Hatcheries
- 40 Turkey Hatcheries
- $45 Billion Industry 2010

USDA – ERS - 2012
SALMONELLA CONTROL PROGRAMS

• NPIP PROGRAMS FOR SALMONELLA
  – Pullorum/Typhoid clean.
  – SE clean.
  – *Salmonella* monitored.
  – Sanitation monitored.
SALMONELLA CONTROL PROGRAMS

• SALMONELLA IS CONTROLLED AT 3 LEVELS:
  – At the farm (pre-harvest)
  – During loading & transport (harvest)
  – At the processing plant (post-harvest)
FARM CONTROL MEASURES

- Chicks from clean breeder flocks.
- Chicks placed in clean, rodent-proof broiler houses.
- Clean feed and water offered to chicks.
- Feed additives to prevent *salmonella* contamination.
- Active rodent and insect control programs.
- Strict bio-security.
- Monitoring of *salmonella* status.
- Strategic use of antimicrobials and acidifiers.
- Live, inactivated or autogenous vaccines/bacterins.
TRANSPORT CONTROL MEASURES

• Schedule for loading, hauling and processing of flocks based on *salmonella* status.
• Catching and loading crews must shower and change clothing between different farms.
• Transport coops tested and confirmed negative for *salmonella* prior to loading.
• Minimize stress during transportation by providing good temperature control.
• Optimal feed withdrawal time.
TRANSPORT CONTROL MEASURES

• Strategic use of drinking water acidifiers.
• Schedule processing of flocks based on their salmonella status.
• Manage yard times to optimize length of feed withdrawal.
• Minimize stress by providing good temp. control in the sheds at the processing plant sheds.
PROCESSING PLANT CONTROL MEASURES

• Use pre-scald brushes to remove organic matter.
• Use counter-flow watering in the scalder.
• Add high pressure body sprayers at strategic locations. Maintain nozzles in good condition.
• Increase water volume in chiller (dilution effect).
• Add additives to water in chiller.
PROCESSING PLANT CONTROL MEASURES

• Maintain proper temperature of finished product.
• Prevent cross-contamination of finished product.
• Irradiate?
A Word About Vaccination

Vaccinated birds have the following advantages:

• Better productivity.
• Lower mortality.
• Less colonization of internal organs.
• Less fecal shedding of *salmonella*.
• Less vertical & horizontal transmission.
SALMONELLA VACCINES*
U.S.A.

Live:
• *S. typhimurium*.

Inactivated:
• *S. enteritidis*.
• Autogenous bacterins
• Autogenous SRP vaccines.

*Primarily used in table-egg layers and broiler and turkey breeders.*
VACCINATION PROGRAMS – U.S.A.

Live vaccines:
• 1-3 days
• 4-6 weeks
• 12 weeks

Live & killed vaccines:
• 1-3 days (live)
• 4-6 weeks (live)
• 12 weeks (live)
• 10-12 weeks (killed)
• 10 weeks (killed) & 18 weeks (killed)
NEW INITIATIVES

THE EGG SAFETY RULE

“Prevention of Salmonella Enteritidis in Shell Eggs During Production, Storage and Transportation”
The Association of Eggs with Human Salmonella Infections in the USA

• The incidence of human *Salmonella* infections in the USA did not decline between 1996-98 and 2010, and the incidence of *S. enteritidis* infections increased.

• Over 80% of human *S. enteritidis* outbreaks with identifiable sources have been attributed to eggs.

• A USDA-FSIS risk assessment report estimated that >100,000 human illnesses may be caused annually in the USA by the consumption of shell eggs contaminated by *S. enteritidis*.

• In 2010, an *S. enteritidis* outbreak involving ~ 1,939 illnesses was traced to two Iowa egg producers and led to the recall of ~ 550 million eggs.
FDA Egg Safety Rule Overview

• In effect since July 9, 2010.
• Chicks are procured from SE-monitored breeder flocks that meet NPIP “US SE Clean” certification.
• House environment is tested for SE when birds are 14-16 weeks-old, 40-45 weeks-old and 4-6 weeks post-molt.
• If pullet environmental test is positive, begin egg testing within 2 weeks of start of egg laying.
• If hen environmental test is positive, begin egg testing.
• Egg testing, four sets of 1000 eggs at 2-week intervals.
• Positive egg test requires egg diversion to breakers.
FDA Egg Safety Rule Overview

• Requires:
  – Written SE Prevention Plan.
  – Biosecurity.
  – Rodent, flies and other pests control.
  – Cleaning and disinfection.
  – Egg refrigeration (hold/transport at or below 45°F ambient temperature beginning 36 hours after time of lay).
  – Record keeping.

• Inspections/audits.
NEW PERFORMANCE STANDARDS
FOOD SAFETY & INSPECTION SERVICE
NEW PERFORMANCE STANDARDS

• Started in July 2011.
• New maximum number of *salmonella* positive chilled carcasses:
  Broiler chickens 5 out of 51 (9.80%)
  Turkeys 4 out of 56 (7.14%)
SUMMARY

• *S. pullorum*, *S. gallinarum* (chickens) and *S. arizonae* (turkeys) can cause severe losses.

• *S. enteritidis* and all the other paratyphoids can cause human illness and are of great importance in public health.

• There is not a single strategy to control salmonella.

• Success will depend on the implementation of multiple control measures.
THE END
Thank you for your attention
Questions?

GO DAWGS

GO DAWGS