Effect of bacterial load on chickens entering the processing plant on final carcass contamination

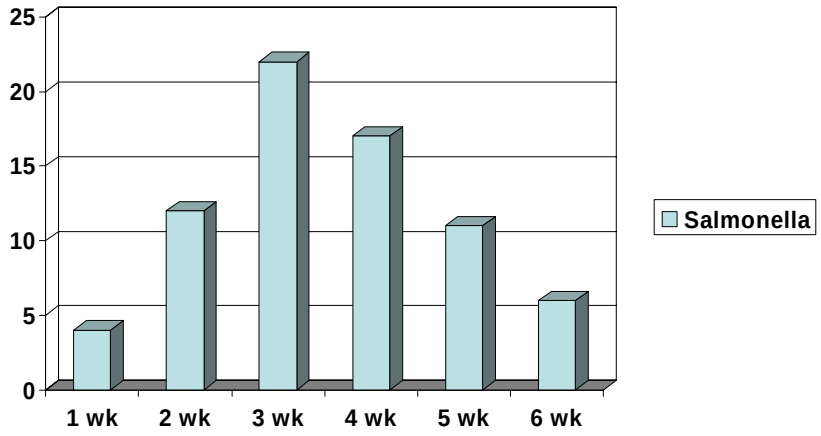
J. Stan Bailey

USDA, Agricultural Research Service
Bacteriological Epidemiology and Antimicrobial Resistance Research Unit
Athens, GA 30604
jsbailey@saa.ars.usda.gov

Factors affecting *Salmonella* colonization of poultry

- Age of chick(en)
- Breeder stock / hatchery
- Bird health / stress level
- Environmental exposure
- Feed exposure

Theoretical average *Salmonella* colonization of broiler chickens



External carriage vs internal colonization of *Salmonella* in broiler chickens

Bailey *et al.*

- Chickens challenged with *Salmonella* at day-of-hatch. At six weeks, 5% were intestinally colonized while 53% of birds carried the *Salmonella* on the feathers
- A second set of studies found 15.5% of birds intestinally colonized compared to 50% with *Salmonella* on the feathers

Transport

- Catching and transport coops have been shown to significantly increase both internal and external carriage of *Salmonella* into the processing plant.

A Multi-state Epidemiological Investigation of Sources and Movement of *Salmonella* Through Integrated Poultry Operations

S. Bailey, N. Stern, P. Fedorka-Cray,
S. Craven and N. Cox

USDA, ARS, Athens, Georgia

Objective

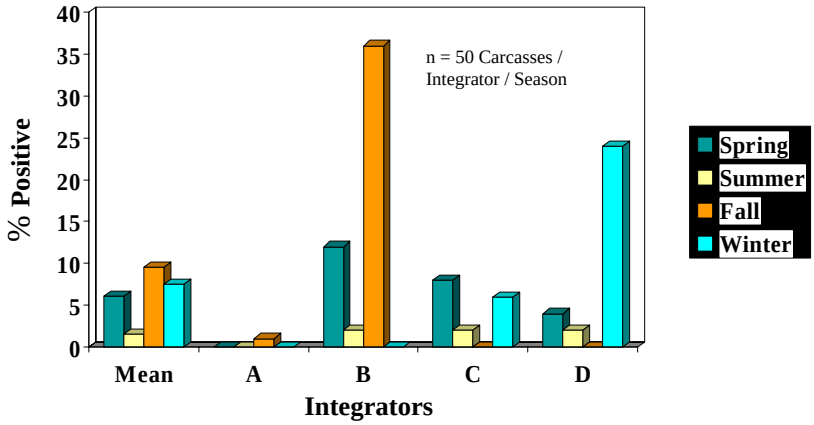
Characterize on a multi-state basis the prevalence of *Salmonella* from numerous sources in chicken production and processing

Materials and Methods

Locations:	Georgia, Alabama, Arkansas, California
Seasons:	Spring, Summer, Fall, Winter
Farms:	High and Low Production

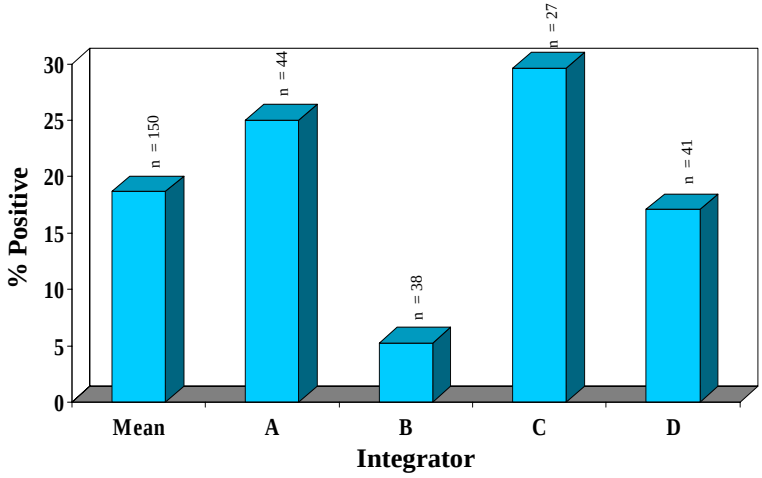
Carcass Rinses by Seasons

Salmonella



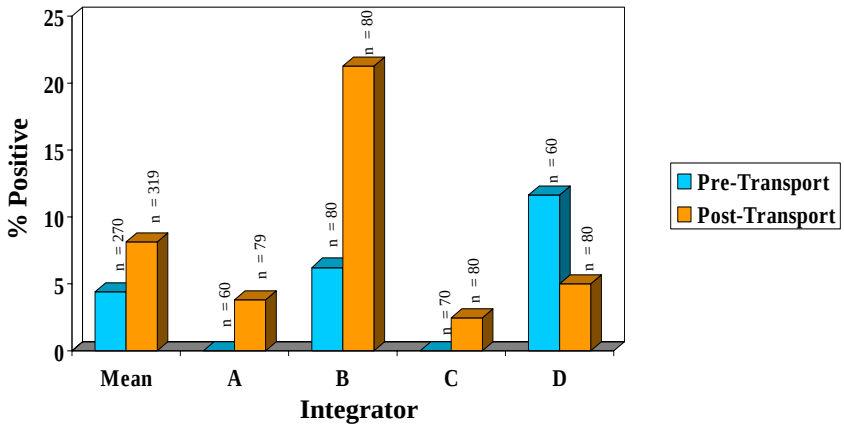
Fly Strips by Integrator

Salmonella



Pre-Transport vs Post-Transport Coop Swabs

Salmonella



Serotypes

- 36 different serotypes identified
- Most frequent:
  - *S. senftenberg*
  - *S. thompson*
  - *S. montevideo*
- First time poultry isolate:
  - *S. ouakam*

ARS FSIS Cooperative Study - Can *E. coli* be used as a measure of process control -

Questions

- Can a reliable measure of process control be determined from one or more post-chill samples or do samples have to be paired from within a given flock post-pick compared to post-chill?
- How many samples needed?
- Is there a relationship between the reduction in *E. coli* counts during processing and the reduction in *Salmonella* and *Campylobacter* during processing?

Materials and Methods

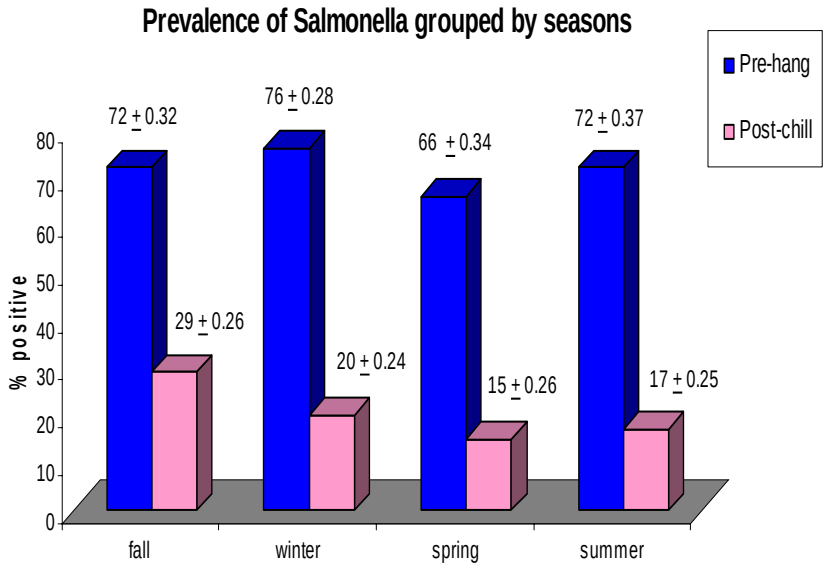
- 20 randomly selected plants
- 4 seasons
- FSIS collects samples (and survey information) and sends refrigerated to ARS in Athens, GA
- 10 carcass rinses post-pick and post-chill

Materials and Methods

- Quantitative: *E. coli,* coliform, *Campylobacter*
- Qualitative: *Salmonella*
- Petrifilm for *E. coli* and coliforms and direct plating on Campy Cefex for *Campylobacter*
- BAX PCR with cultural back-up for *Salmonella*

Materials and Methods

- When completed, a total of 6400 microbiological analyses will be run in this study. 1600 each for *Salmonella, Campylobacter, E. coli,* and Coliform



Salmonella Control in Scandinavian Production Systems Compared to Production Systems in the U.S.

J. Stan Bailey[1] and T. Roberts[2]

[1] USDA, ARS, BEAR
Athens, Georgia
[2]USDA, ERS
Washington, DC

Scientific principals of Swedish program

- If broilers are never exposed to *Salmonella* then they cannot become colonized and subsequently they will not be contaminated after processing.
- Primary method of control is eradication of *Salmonella* positive breeders or broilers
- Control *Salmonella* on farm. No chemical treatments in the processing plant.

Potential US Intervention strategies

- with no eradication program -

- Control *Salmonella* in breeder flocks
  - feed, biosecurity, vaccination, competitive exclusion, moisture control
- Control *Salmonella* in broiler production
  - feed, biosecurity, competitive exclusion, moisture control

Conclusion

- Most chicken flocks in the U.S. carry some load of *Salmonella*
- Transportation appears to increase both internal and external carriage of *Salmonella*
- Chemical treatments in plant can reduce *Salmonella* on processed chickens
- Important to keep the level of *Salmonella* in and on chickens as low as possible