

Salmonella Reduction: A Continuous Improvement Journey

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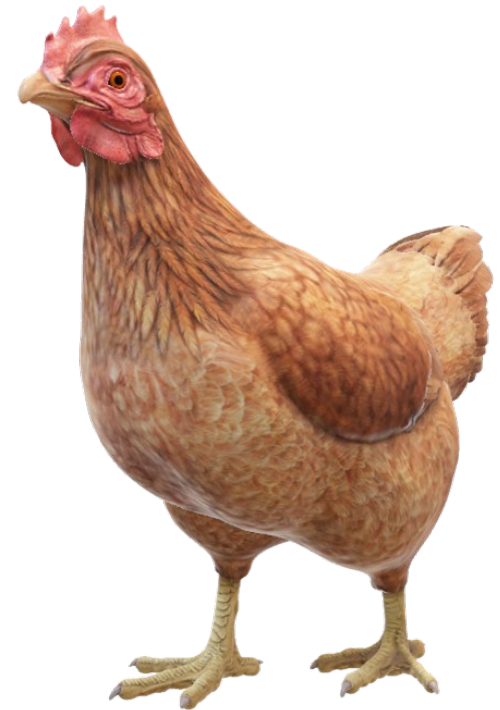


#ChickenMarketingSummit



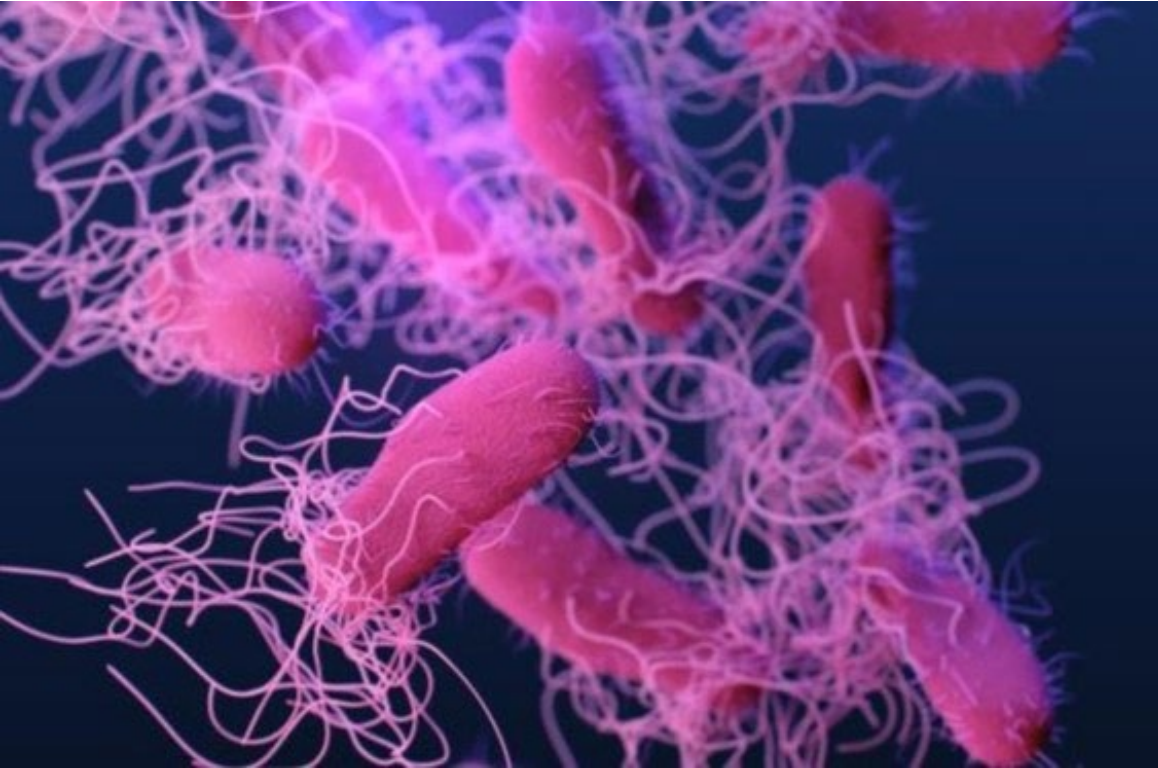
Salmonella Improvement Topics:

- The Journey
- Preharvest Tools
- Processing Improvements
- Increased Monitoring
- Future Perspectives

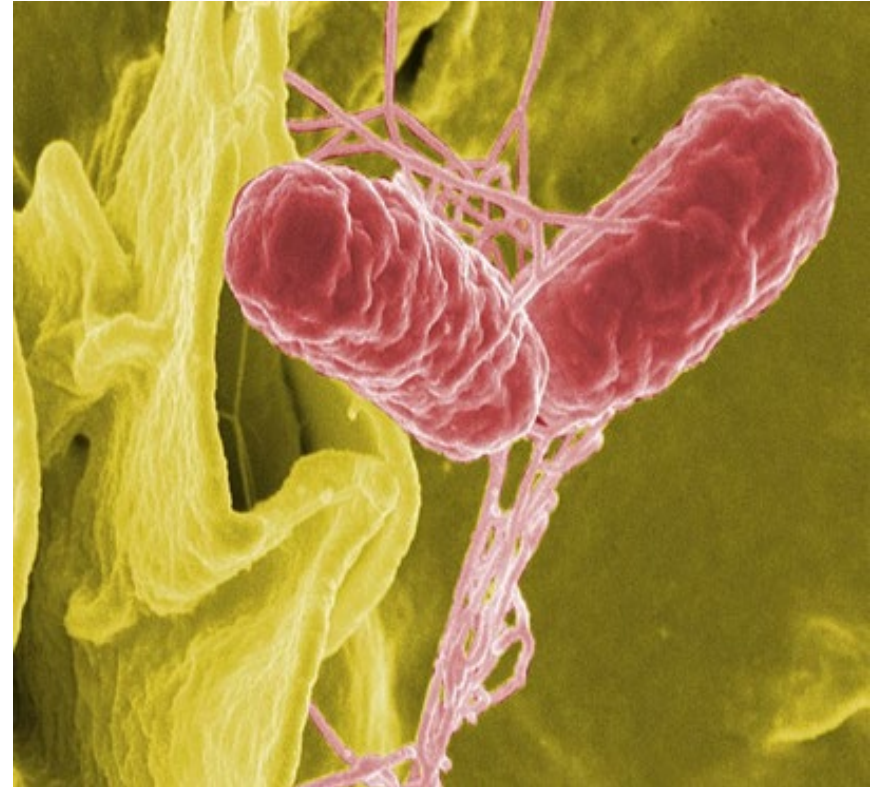


***Salmonella* Reduction: The Journey**

Salmonella

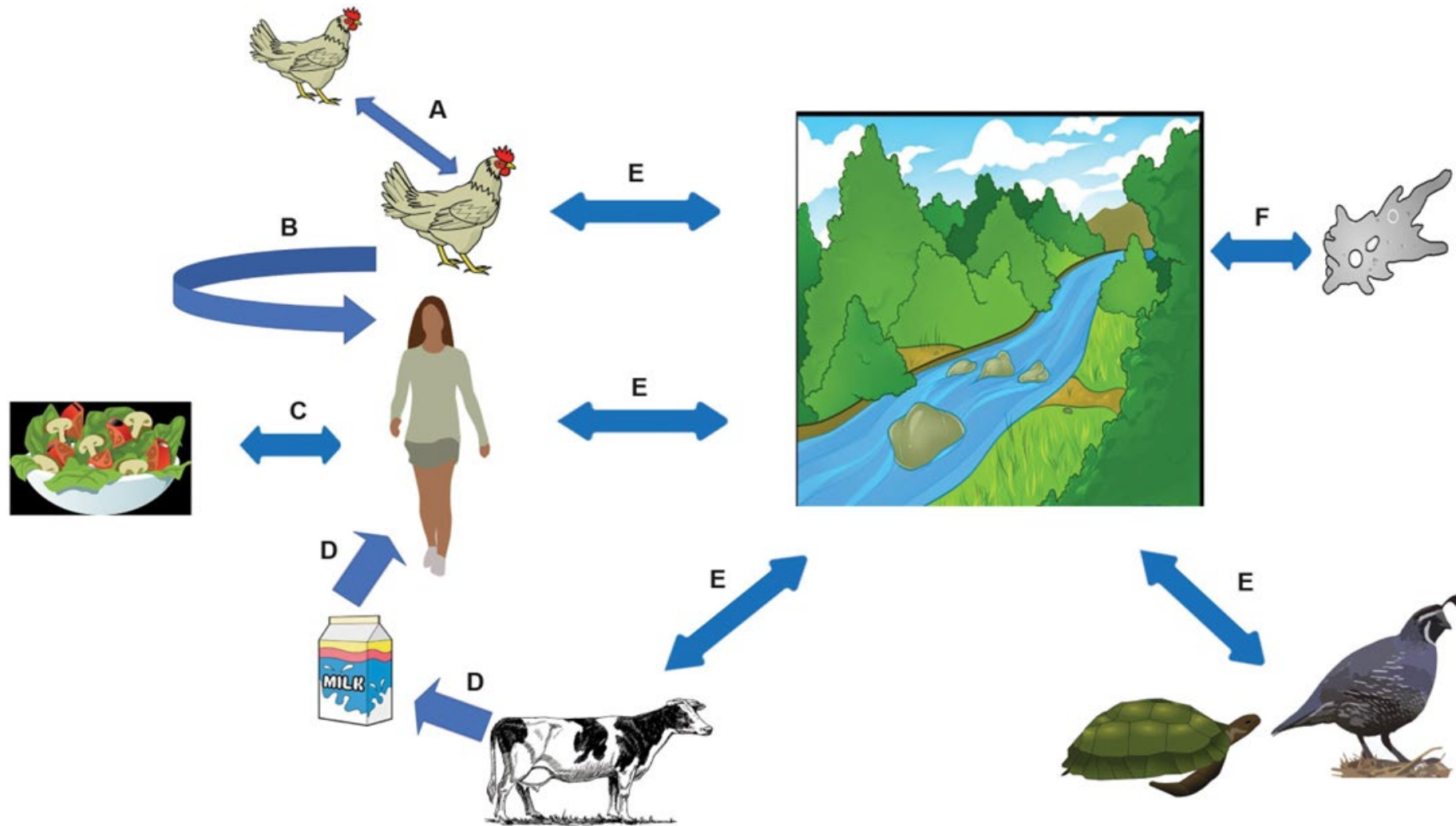


<https://www.cdc.gov/salmonella/about/index.html>

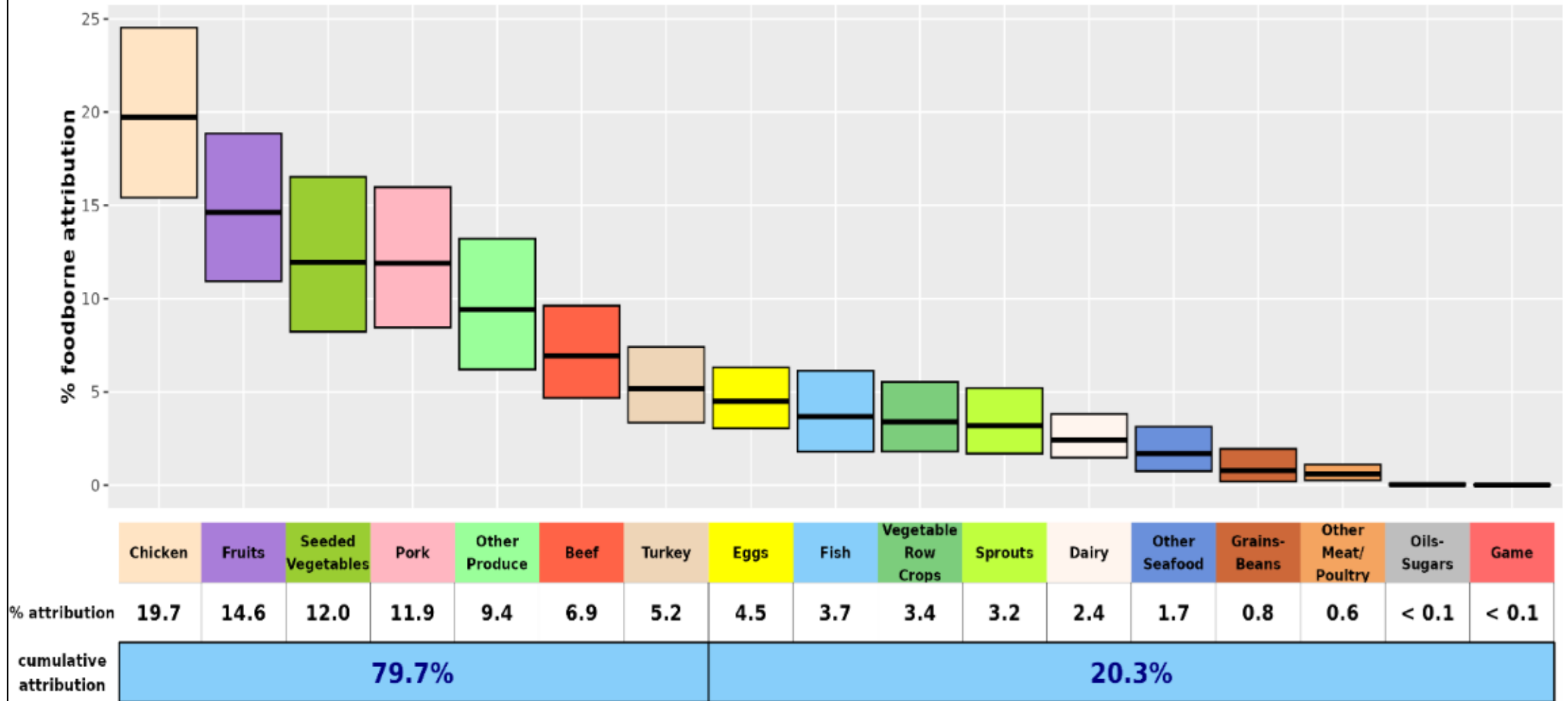


<https://en.wikipedia.org/wiki/Salmonella>

Pathogens can be Ubiquitous



IFSAC *Salmonella* Illness Attribution



Source: IFSAC (CDC, FDA, USDA), 2022. <https://www.cdc.gov/ifsac/php/data-research/annual-report-2022.html>

What has been making the “News”

- Recalls Across Various Food Types
- Food Safety Opinions & Debates
- Producer vs. Consumer Responsibilities
- USDA Poultry “Framework” Rescinded



“The Rest of the Story”

- Confidence in Chicken: Consumption per Capita ↑
- \$\$ Millions spent on *Salmonella* reduction & testing
- Poultry Food Safety Interventions are Working



Source: wclo.com



<https://www.youtube.com/watch?v=FESyZatJVUo>



uaex.uada.edu



ranchflip.com



nationalchickencouncil.org



US Poultry: <https://www.youtube.com/watch?v=ZnRYi2ukzOs>



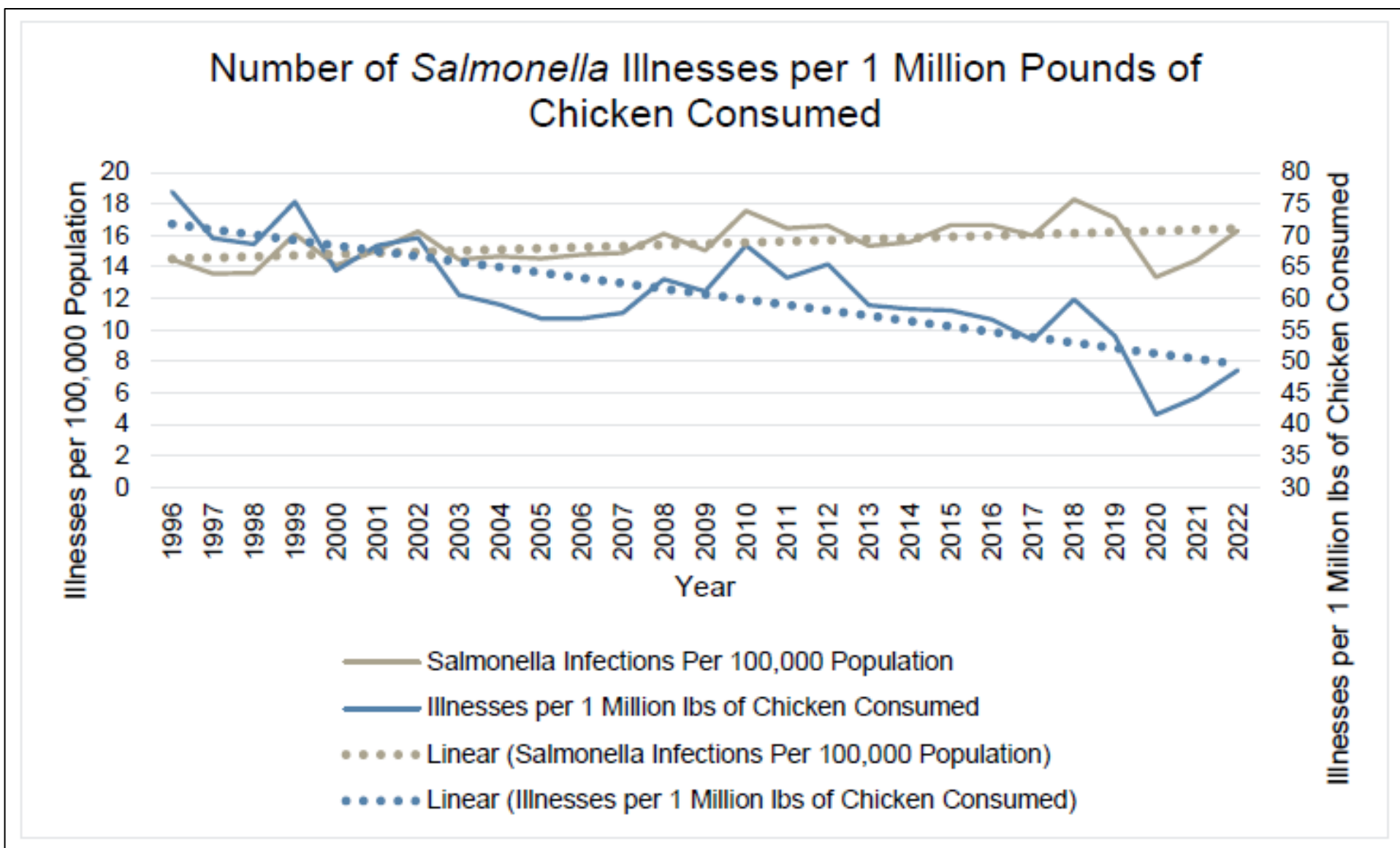
www.chickencheckin/faq



USDA *Salmonella* Initiatives

Year	Regulatory Actions in Poultry
1996	Initial <i>Salmonella</i> Standards Established
2006	Established Plant Categories 1-2-3
2007	New Baselines for Salm Prevalence & MPN Counts
2010	Tightened <i>Salmonella</i> Standards
2015	Implemented Moving Window for Each Plant
2016	New Standards Parts & Comminuted, and nBPW
2018	Final Plan for Internet Posting of Plant Categories
2024	<i>Salmonella</i> Framework with Adulterants Proposed
2025	Framework Rescinded; New Program Developing

Note: Dates provided are approximate; sources: www.fsis.usda.gov



***Salmonella* Reduction: Preharvest Tools**

Boot Sock Sampling



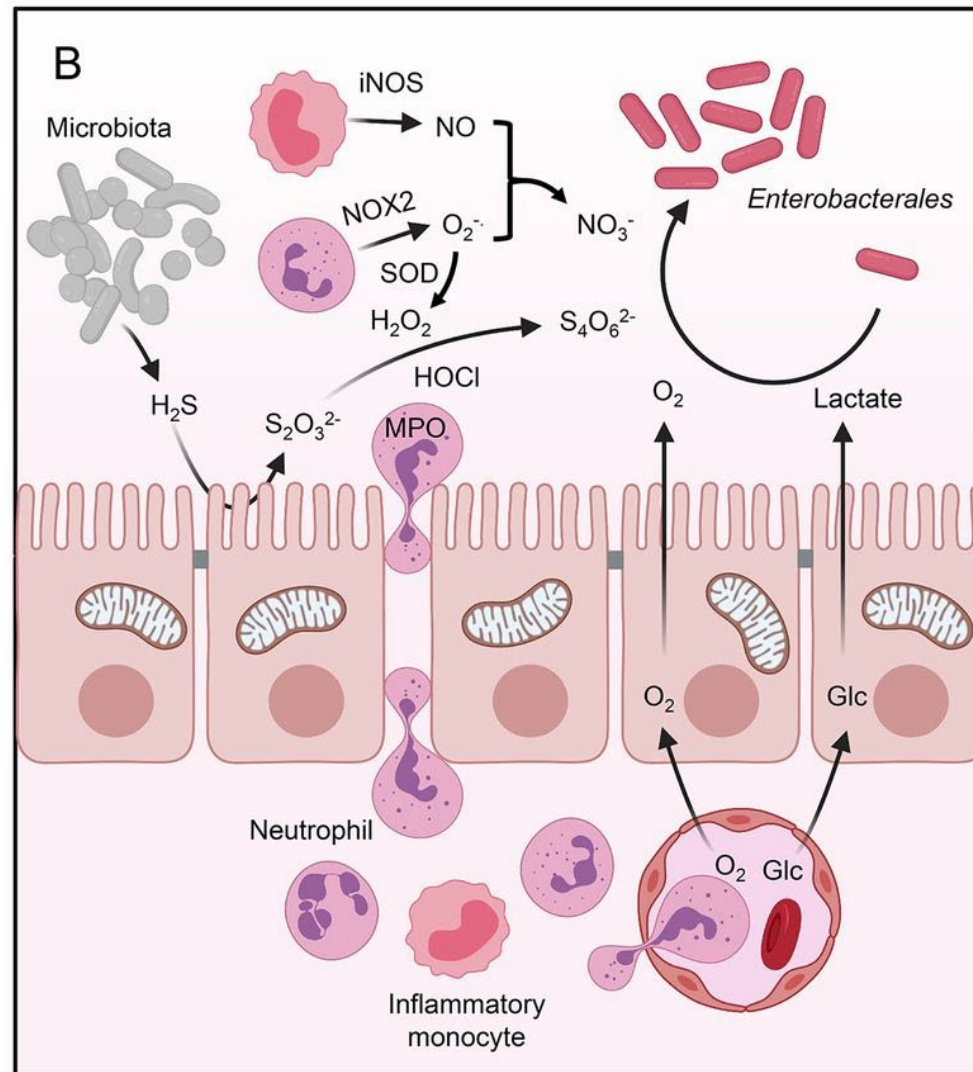
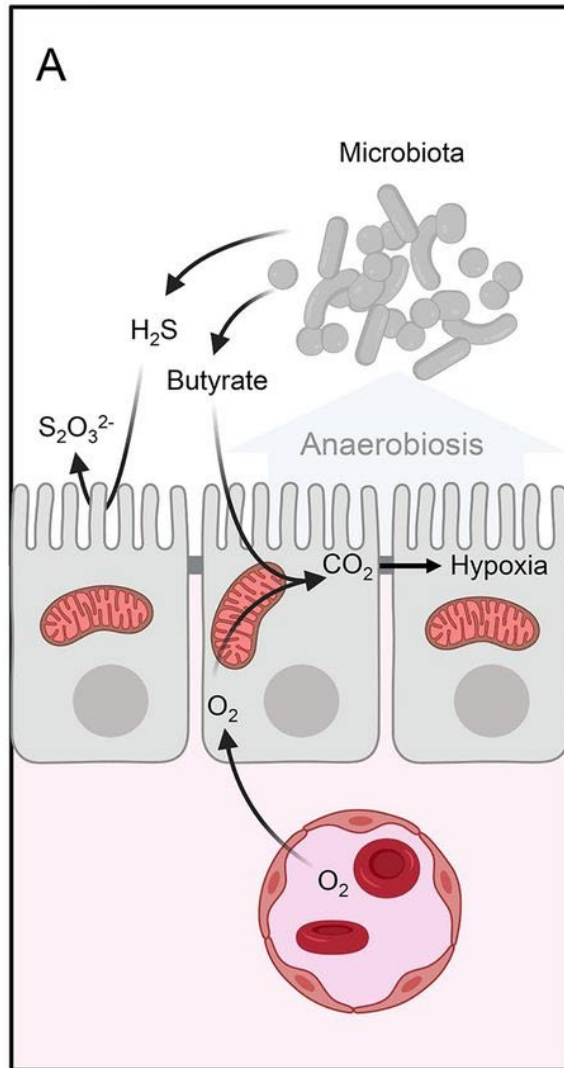
<https://www.youtube.com/watch?v=JfPanrovFio>; Hardy Diagnostics (2014)

Litter & Windrow Management



Photo courtesy Z. Williams (2025), UADA CES

Intestinal Health and *Salmonella* Mitigation



Enterobacteriales
in GIT increase
in response to
gut inflammation
& weakened
intestinal integrity

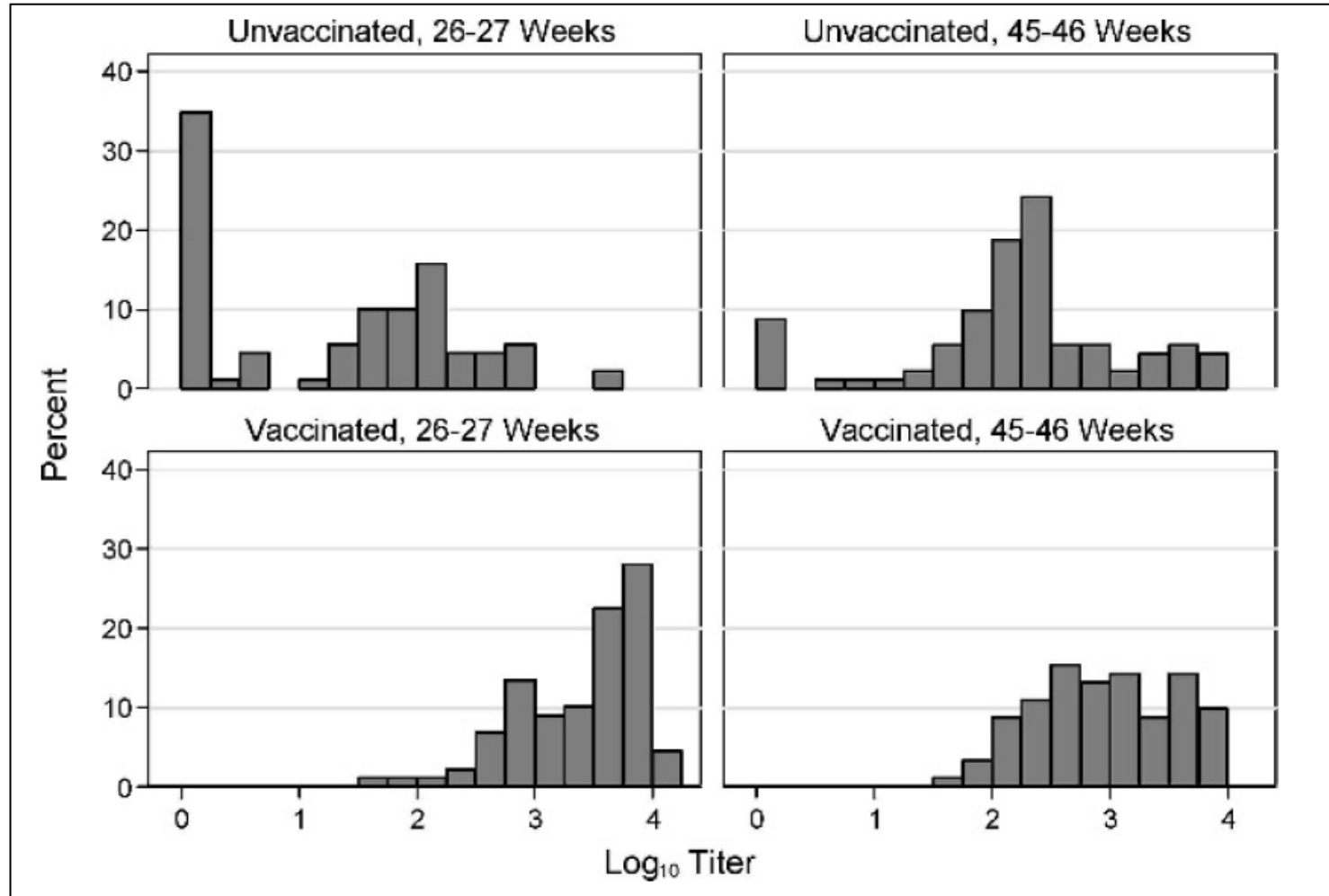
Water Line Sampling



Watkins Water Lab, 2013. <https://youtu.be/BWDdcg22Wug?t=494>

Salmonella Immunity from Breeder Vaccines

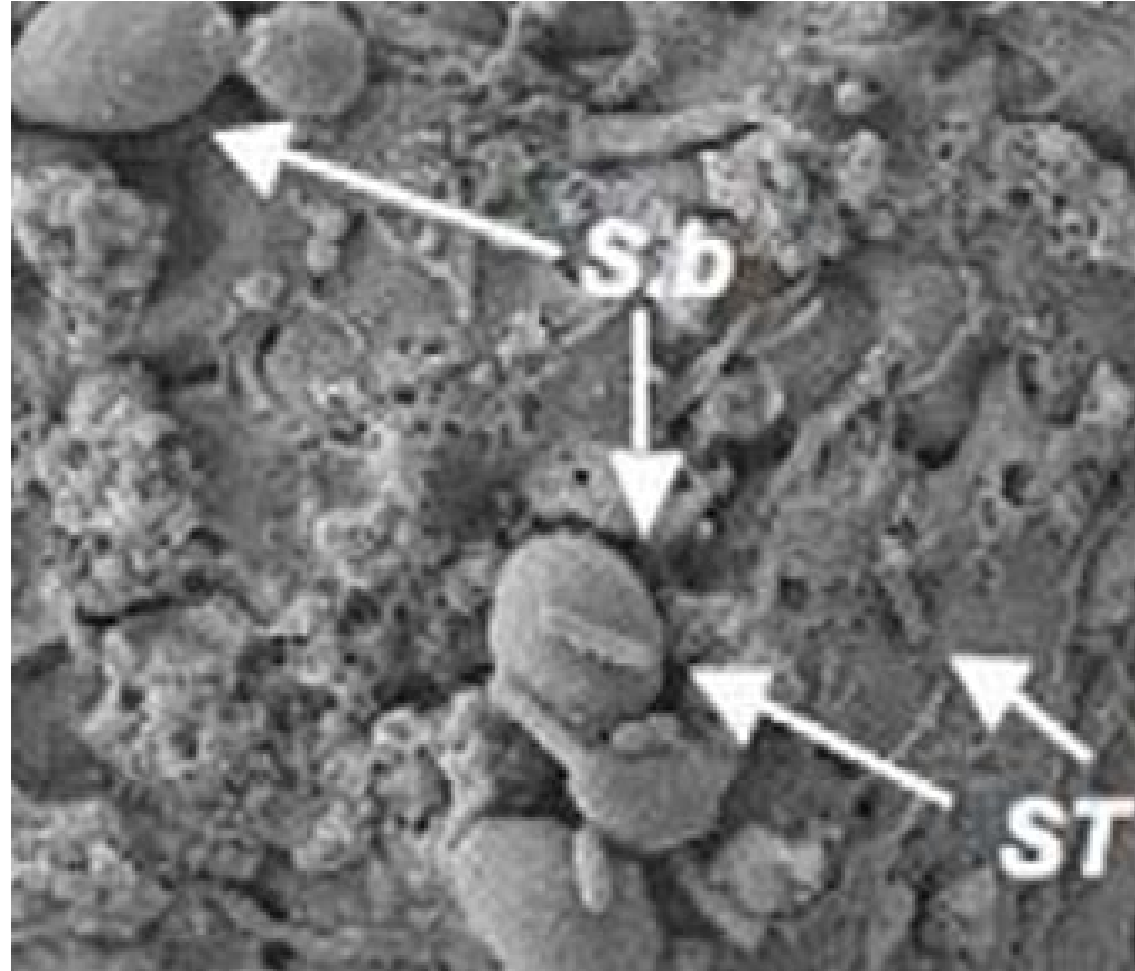
Breeder *Salmonella* antibody titers ELISA 14-16 birds/flock
6 vaccinated / 6 unvaccinated flocks, 26-27 weeks and 45-46 weeks



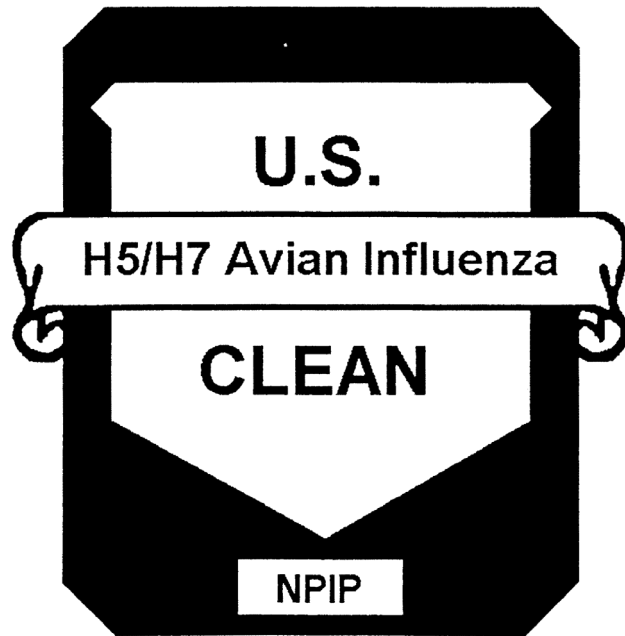
Berghaus et al., 2011. J. Food Protect. 74(5): 727-734

Feed Additives impact on *Salmonella*

Ex. *Saccharomyces boulardii* adherence to *S. Typhimurium*



NPIP Programs & Biosecurity Emphasis



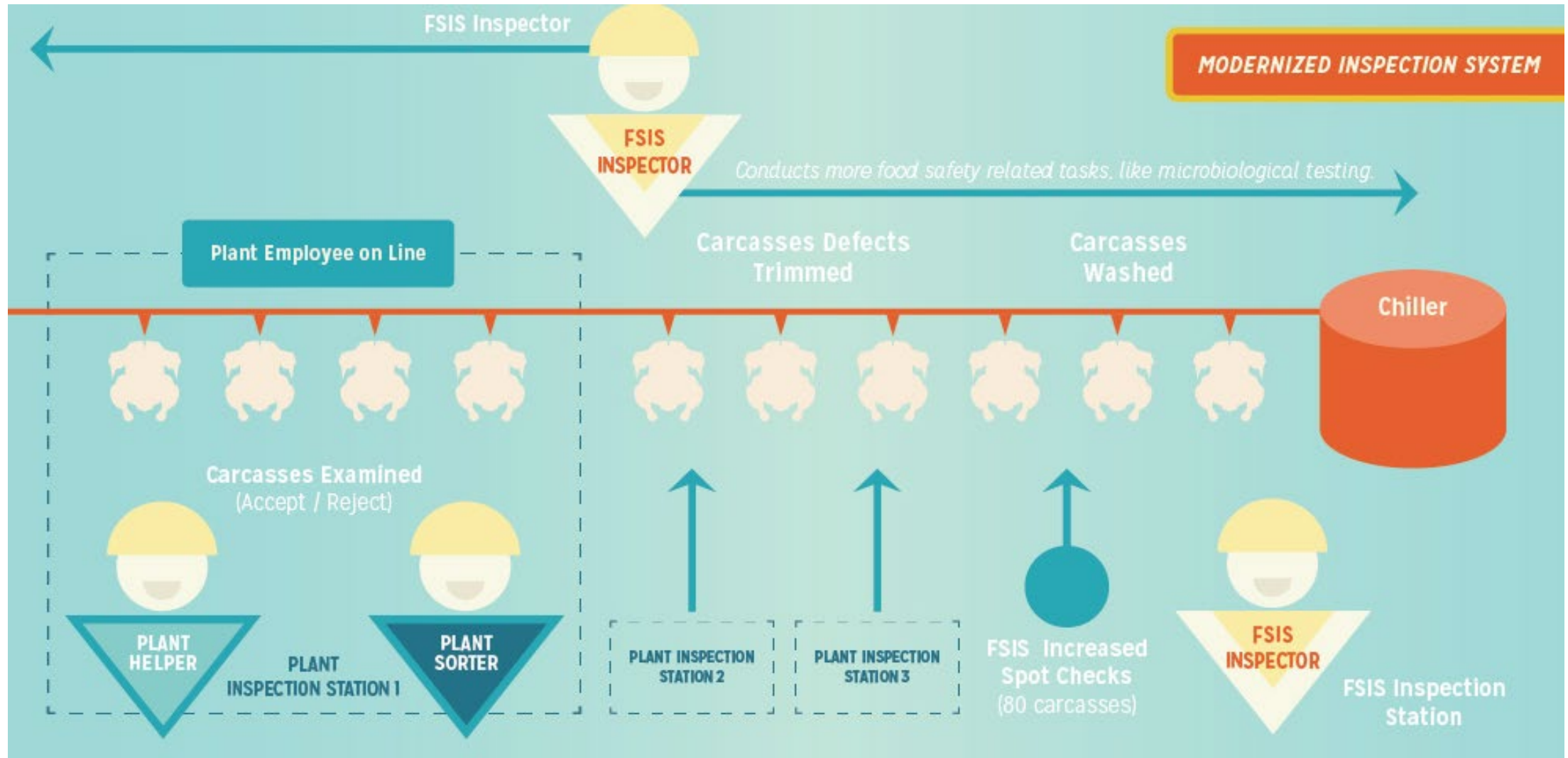
<https://www.ecfr.gov/current/title-9/chapter-I/subchapter-G/part-145>

Indirect Farm Food Safety Metrics



***Salmonella* Reduction: Processing Improvements**

Modernized NPIS Chicken Processing



Sanitary Dressing Controls



Processing Evolution: SIS ⇒ NELS ⇒ HIMP ⇒ NPIS

On-Line Reprocessing (OLR) and Inside-Outside Bird Washing (IOBW)



Antimicrobial Chemistries Evolution

Selected Examples

Cl_2

TSP

ASC

Organic
Acids

H_2O_2

CPC

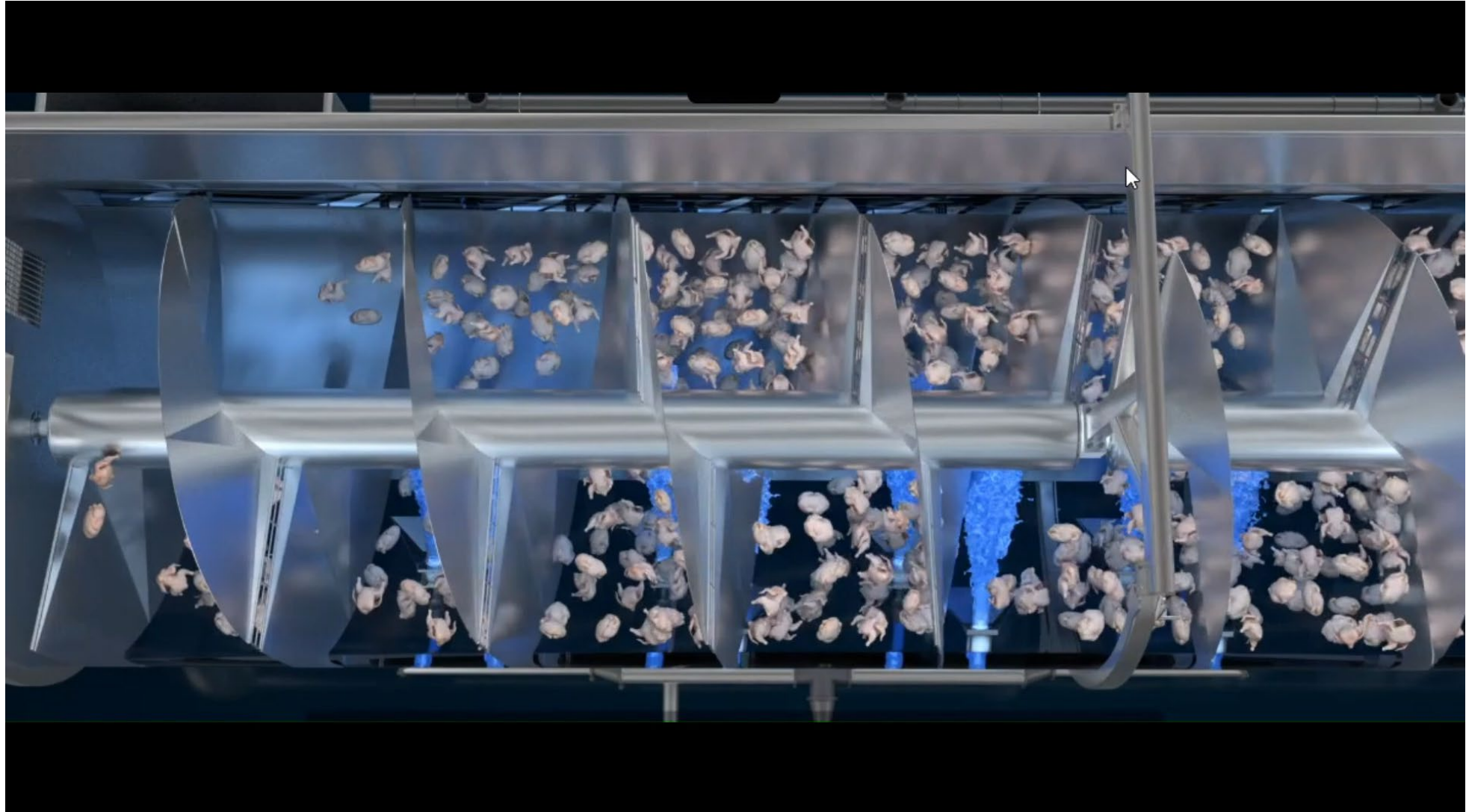
PAA

NaOH

SAS

O_3

Advanced Chiller Antimicrobial Applications



Parts Intervention Alternatives

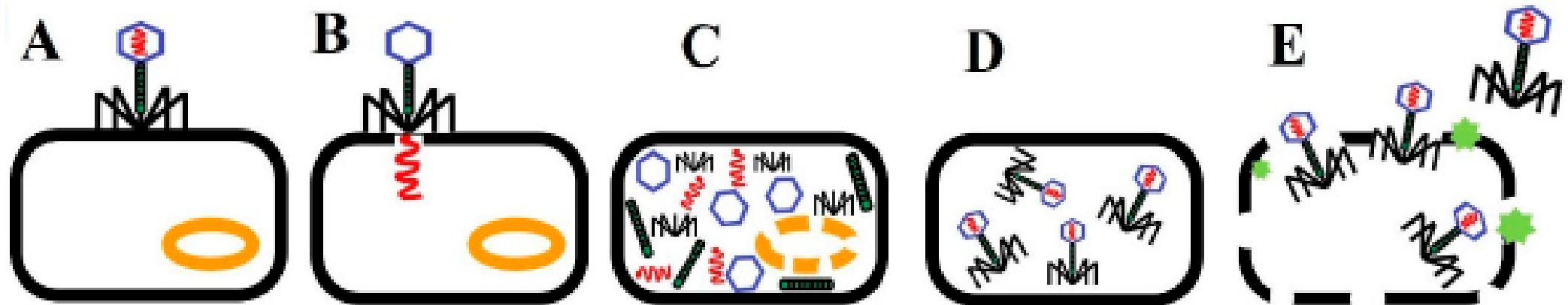


fortrexsolutions.com



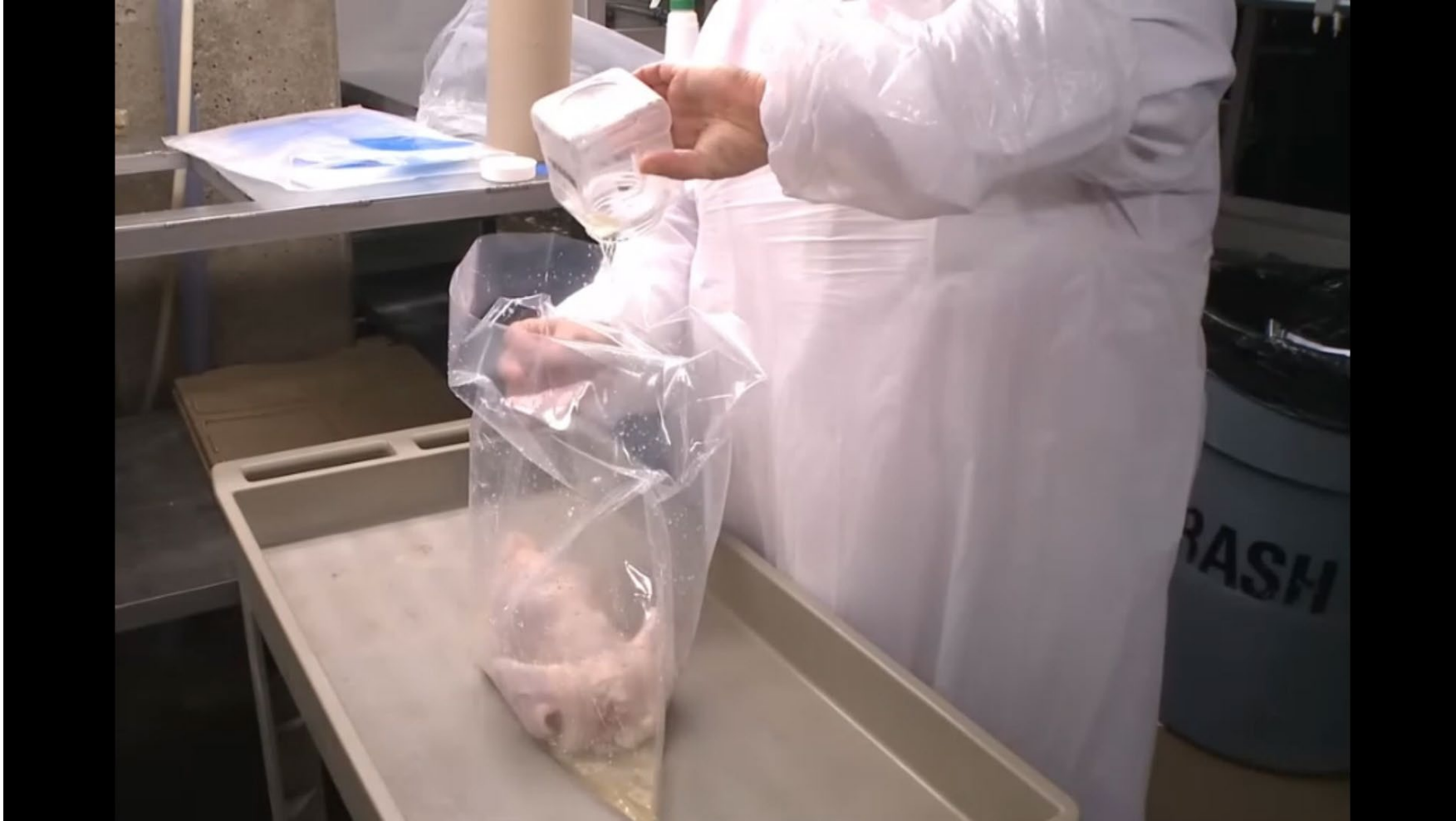
morrithermal.com

Bacteriophages



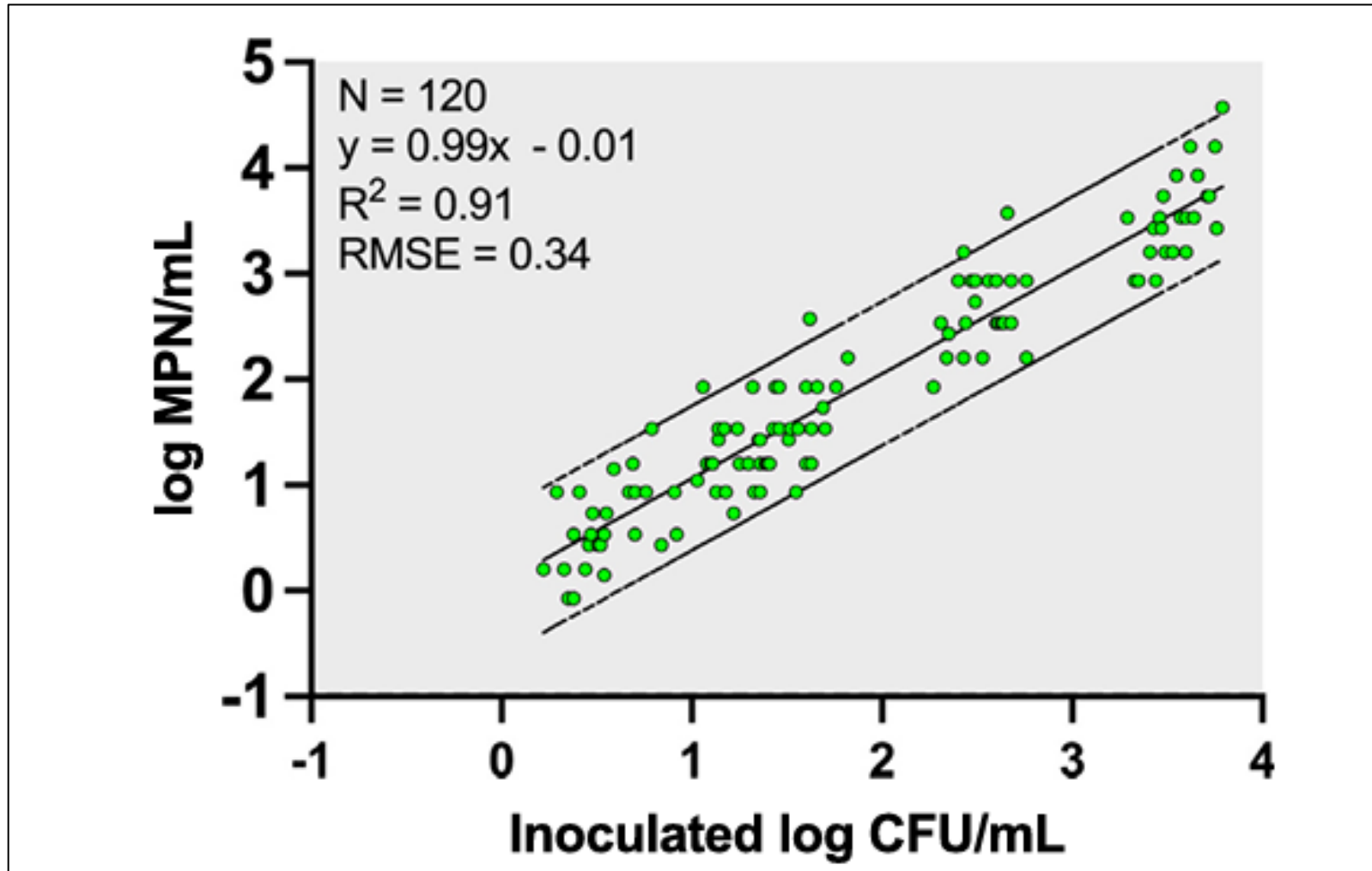
***Salmonella* Reduction: Increased Monitoring**

Salmonella Sampling in Plant



U.S. Poultry, 2015, <https://youtu.be/ZnRYi2ukzOs>

Quantitative *Salmonella* MPN



Quantitative *Salmonella* Rapid Methods



hygiena.com

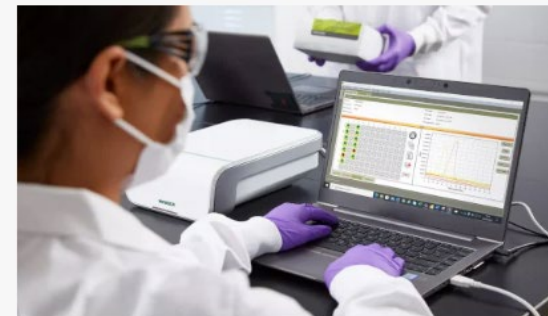
PCR



bioMérieux Univ. on-line, 2024

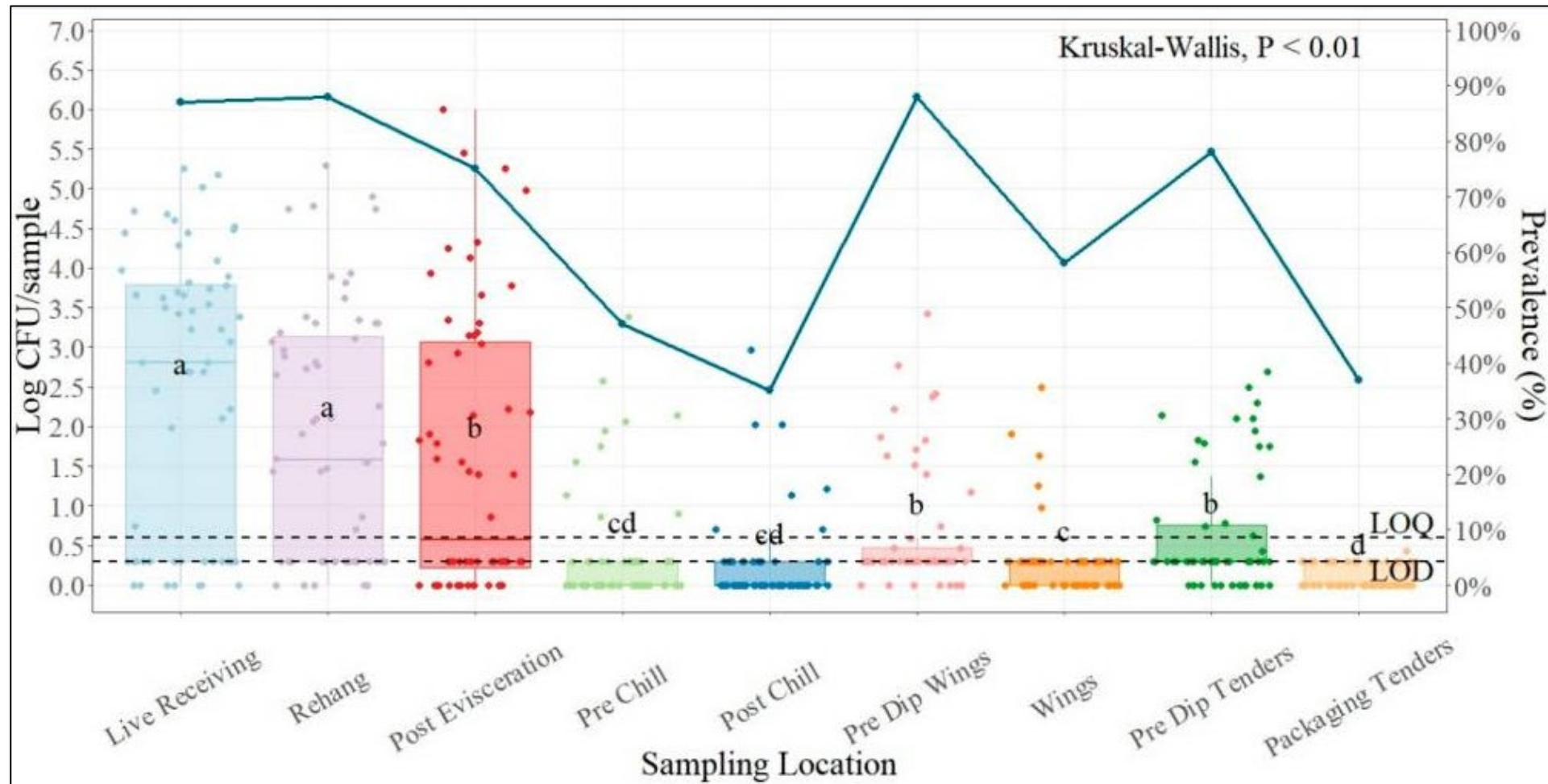
LAMP

Plant samples



neogen.com

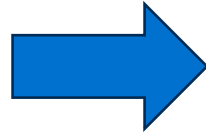
Quantitative Bio-Mapping and SPC



Salmonella Serotyping: Antigen Agglutination



<https://www.fishersci.se/se/en/home.html>



BioRad 2025 acc. <https://youtu.be/CHdoKSiaiwg>

Salmonella Serotyping: NGS & WGS



Illumina.com



nanoporetech.com



ClearLabs video, acc. 2025. <https://www.youtube.com/watch?v=AWjHlh-vLCQ>

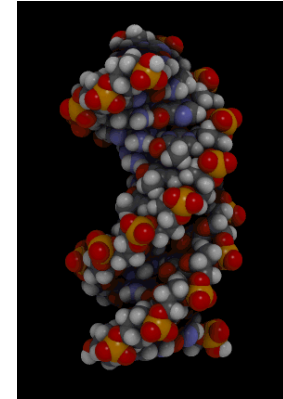
Salmonella Serotyping

Comparisons of Selected Lab Methods

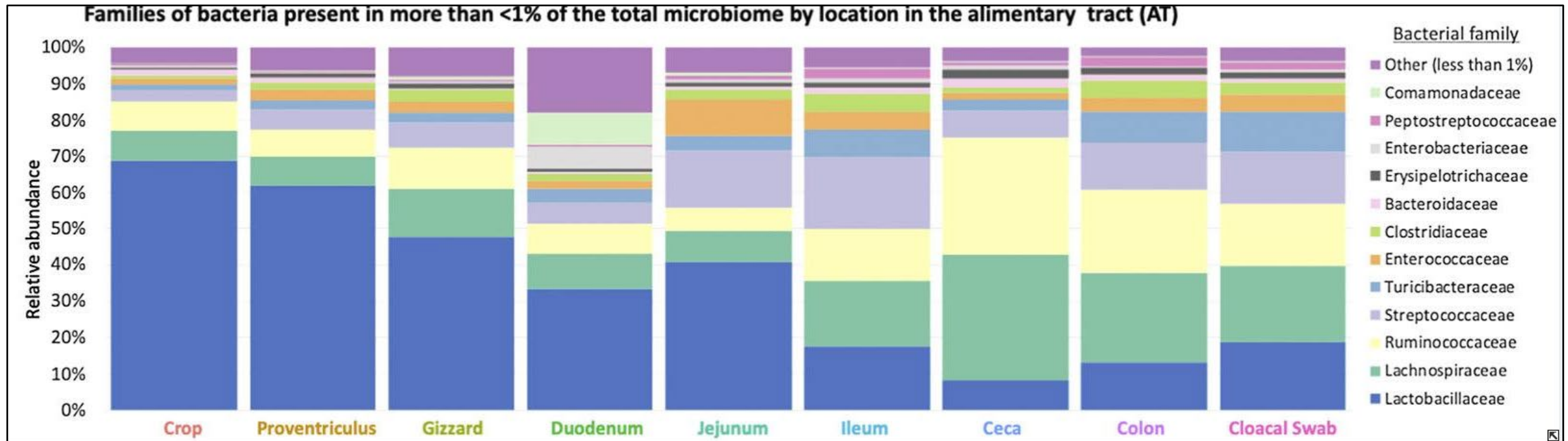
Method	Labor	Technology Requirements	Information Granularity	Information Provided
Antigen Agglutination	High	Basic	Basic	Serotypes of selected colonies
LAMP ST/SE	Low	Moderate	Intermediate	ST/SE
PCR Salm/ST/SE	Low	Moderate	Intermediate	Salm/ST/SE
NGS Partial Sequencing	Medium	High	Intermediate	Predominant 1° serotypes Designated 2° serotypes
CRISPR Deep Serotyping	High	High	Advanced	Multiple Serotypes Relative Rate Profiles
Whole Genome Sequencing	High	High	Advanced	Multiple Serotypes Bioinformatics Options

Microbiome & Bioinformatics

Models Expanding



https://commons.wikimedia.org/wiki/File:Protein_structure_3D_model
free access
(2022)



Growing Number of Accredited Labs

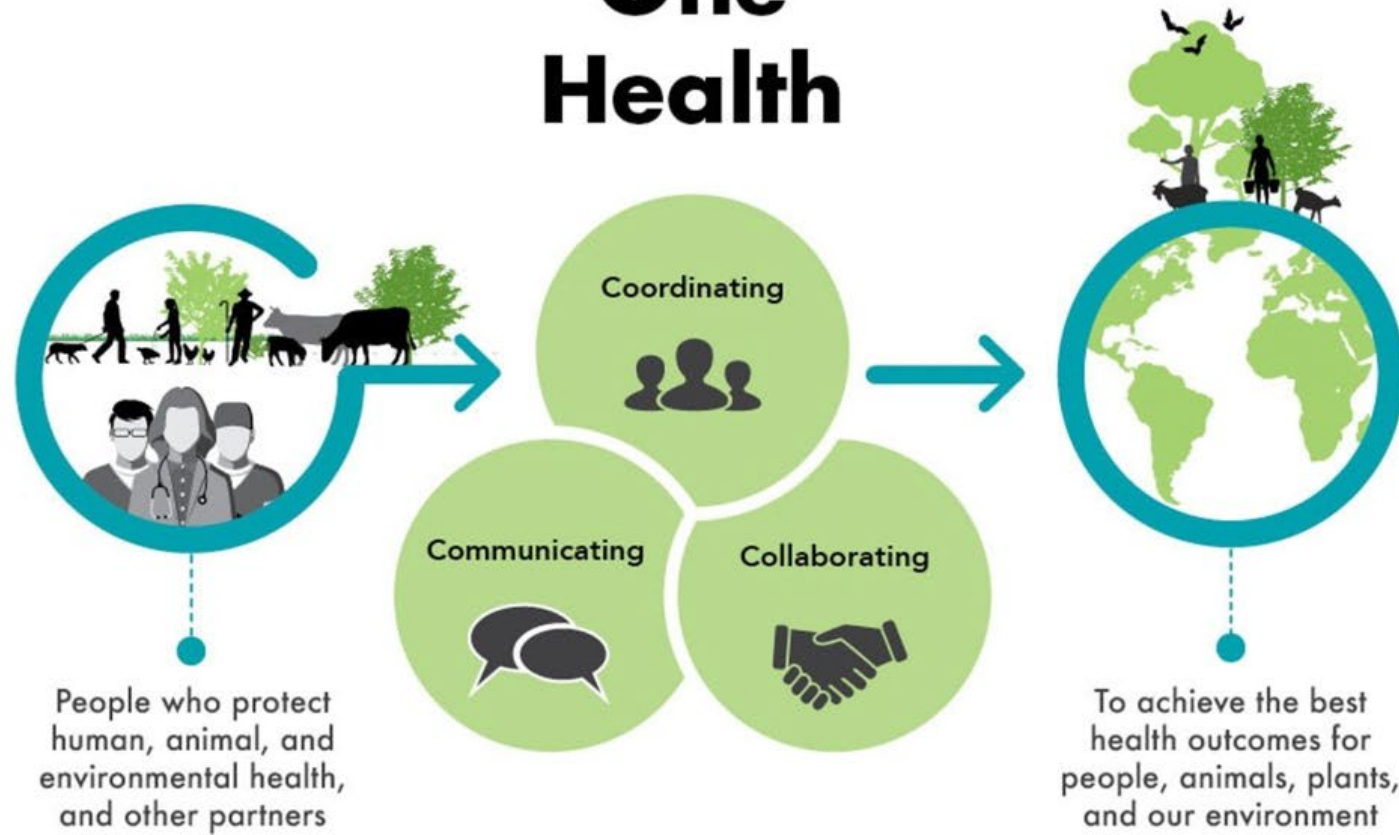
Private, Public, Internal, 3PL's



<https://www.iso.org/home.html>

***Salmonella* Reduction: Future Perspectives**

One Health



<https://www.cdc.gov/one-health/about/index.html>



One Health Certified™

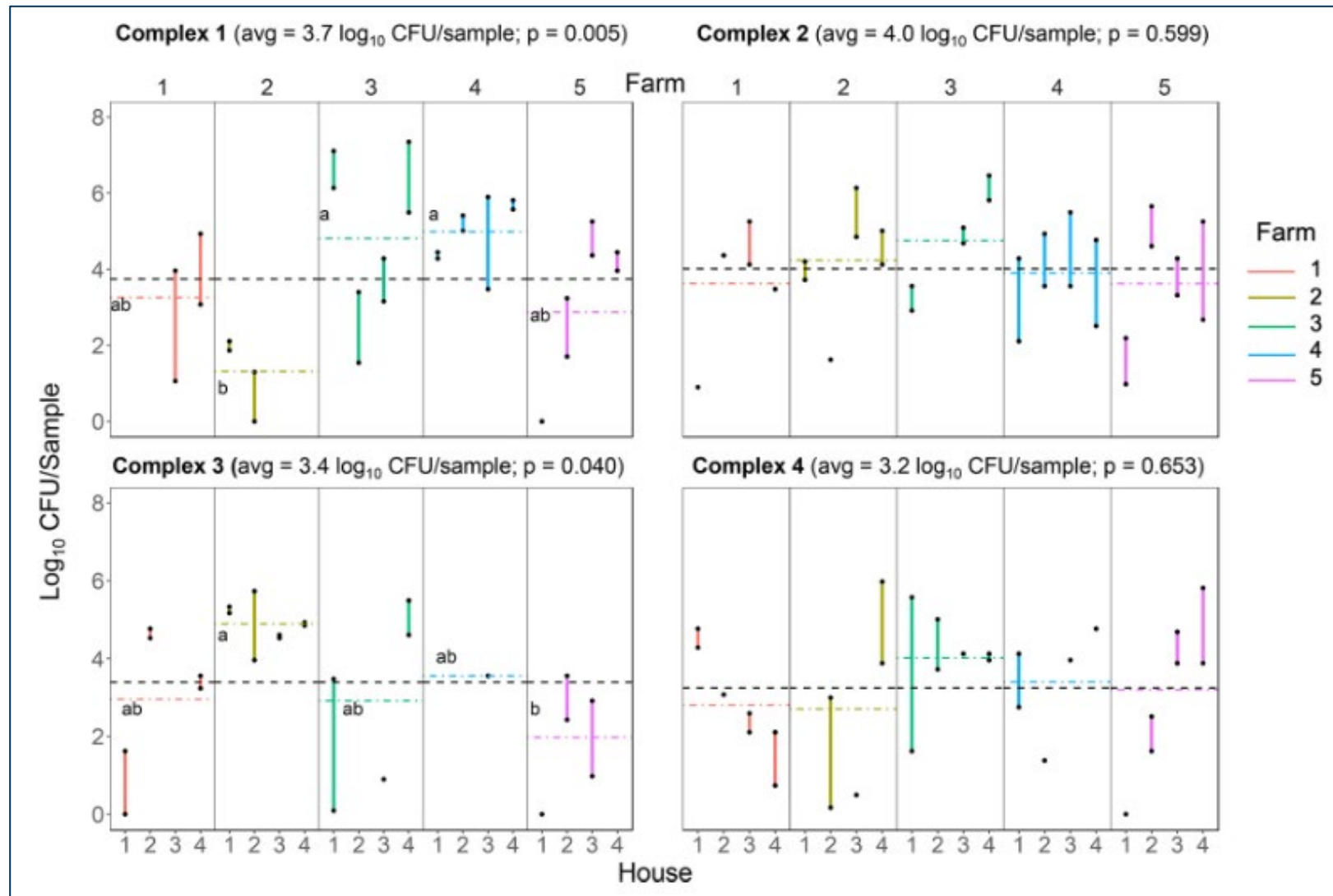
Chicken Standards



NIAMRRE OHC Program:

- Biosecurity
- AHP
- Antibiotic Stewardship
- 3rd Party AW Program
- Environmental Measures
- Documentation
- Logo Use
- Reporting

Farm Quantitative *Salmonella* Profiling (ex.)



World Food Safety Day June 7

CLEAN



SEPARATE



COOK



CHILL



Partnership for Food Safety Education | fightbac.org

Source: fightbac.org:



ServSafe®

Dining Commitment



2022

Source: restaurant.org, servsafedining.org

USDA



FSIS

FDA

Summary: The U.S. *Salmonella* Reduction Elevator Speech

U.S. Chicken *Salmonella* Improvement “Elevator Speech”

- Chicken consumption is ↑
- Preharvest Interventions are ↑
- Plant Interventions ↑
- *Salmonella* Monitoring ↑
- *Salmonellosis* ratio to chicken consumed ↓ ↓



Thank You

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<https://online.uark.edu/programs>



#ChickenMarketingSummit



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