Salmonella in poultry and the importance of food safety measures to protect public health in food establishments

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What is *Salmonella*?

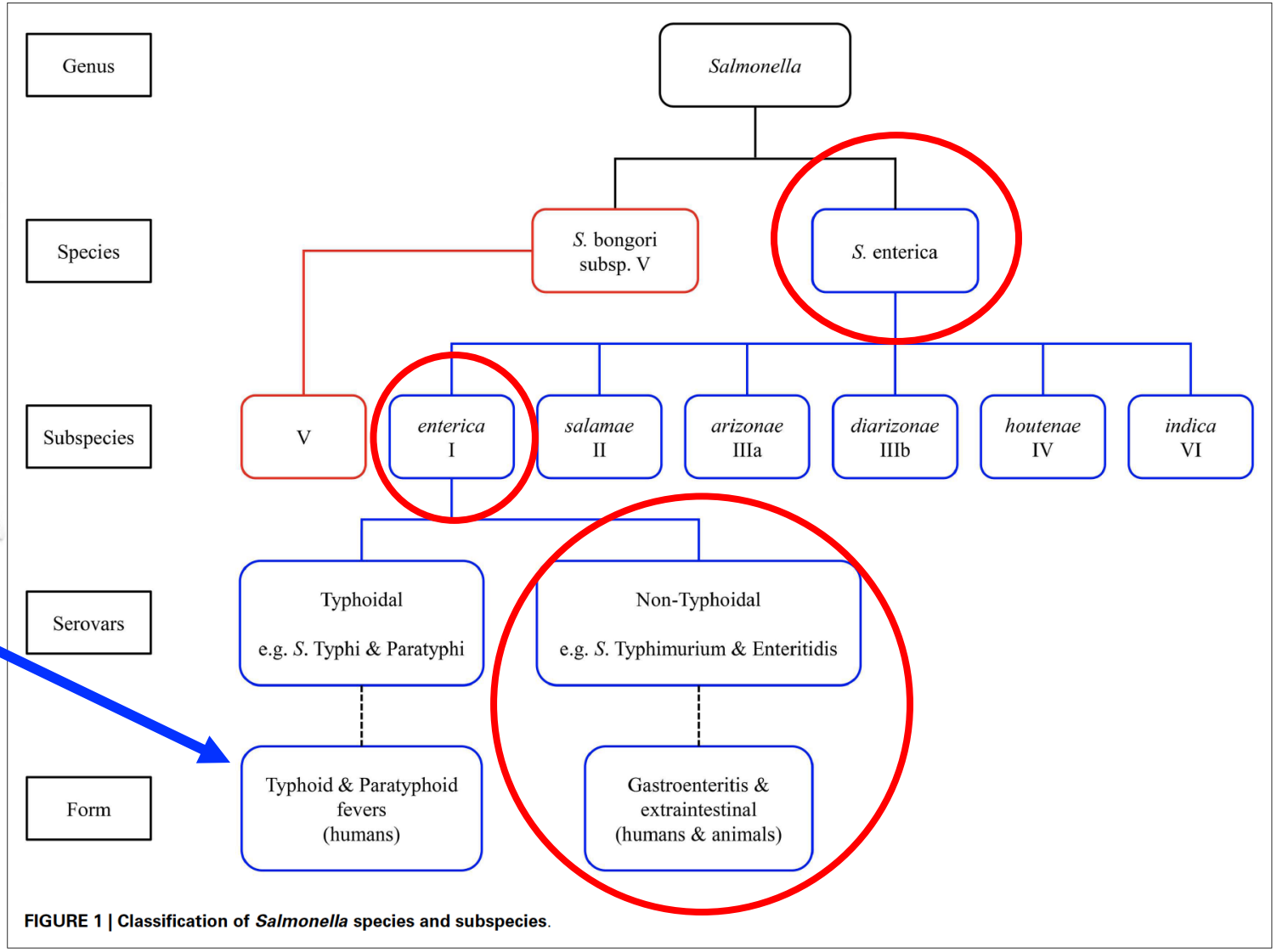


FIGURE 1 | Classification of *Salmonella* species and subspecies.

What is *Salmonella*?

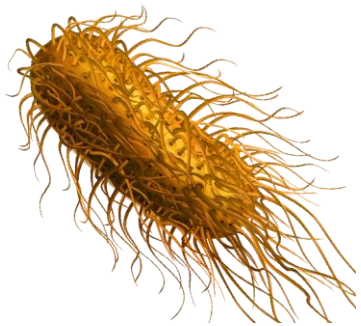
Non-Typhoidal

e.g. *S.* Typhimurium & Enteritidis

Gastroenteritis & extraintestinal (humans & animals)

Pullorum, Galinarum

Sick Chickens



Enteritidis, Typhimurium, Infantis, Heidelberg and 2,600 others

Chickens not affected at all

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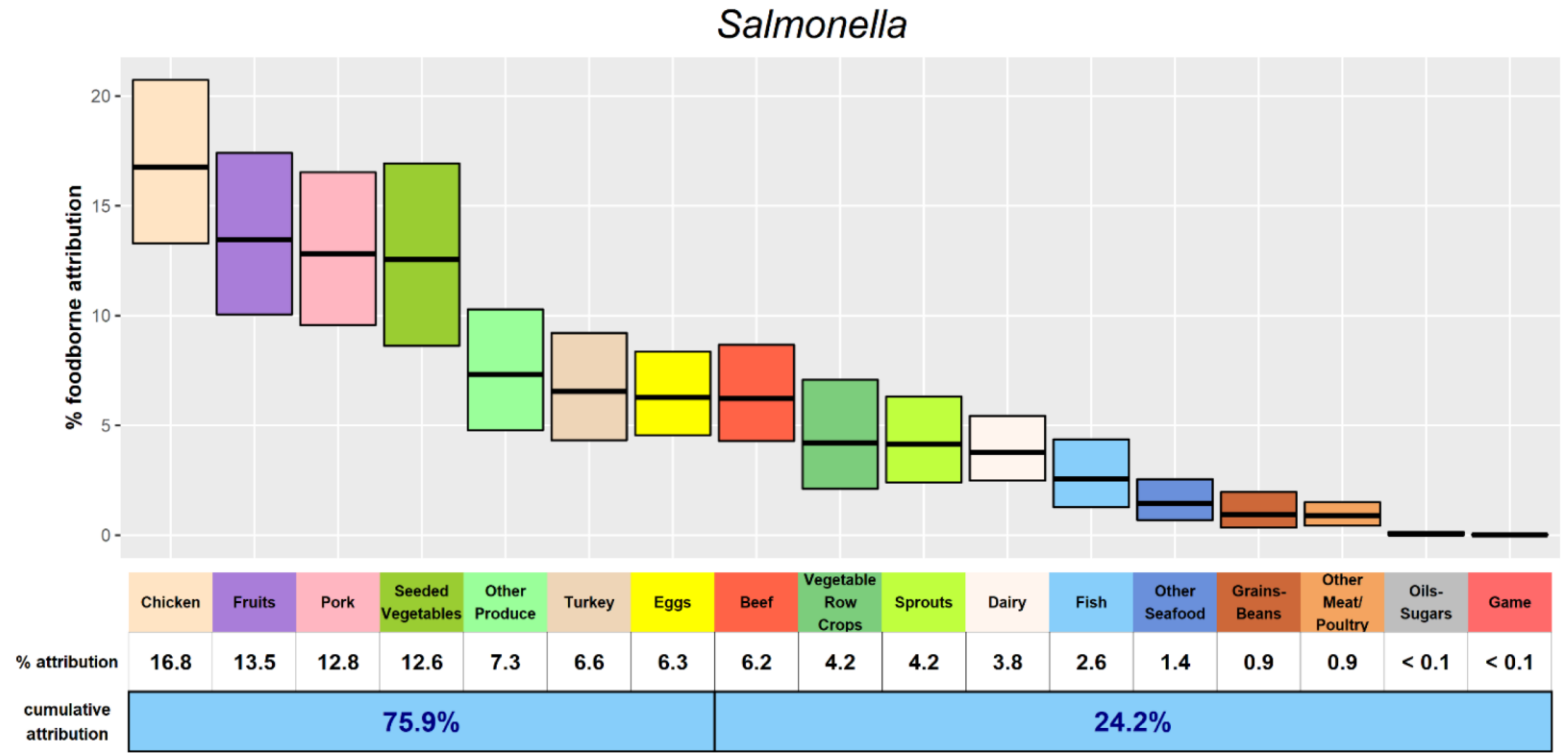
Salmonellosis outbreaks from food

Figure 2: Estimated percentage of foodborne *Salmonella* illnesses (with 90% credibility intervals) for 2019, in descending order, attributed to each of 17 food categories, based on multi-year outbreak data,* United States. Click here to download relevant data.



*Based on a model using outbreak data that gives equal weight to each of the most recent five years of data (2015-2019) and exponentially less weight to each earlier year (1998-2014).

https://www.cdc.gov/foodsafety/ifsac/pdf/P19-2019-report-TriAgency-508.pdf

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Salmonellosis Outbreaks from Food

- https://www.cdc.gov/salmonella/outbreaks.html
- 2024 – Charcuterie meats
- 2023 – Cantaloupes, diced onions, ground beef, cookie dough, flour
- 2022 – Alfalfa sprouts, fish, peanut butter
- 2021 – Salami, seafood, onions, Italian meats, salad, shrimp, stuffed chicken, brie, ground turkey
- 2020 – Mushrooms, peaches, onions

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How does USDA prevent *Salmonella* in meat?

- Prevention is not possible
- Reduce probability of contamination
- Process controls in place and followed

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Current Expectations - FSIS

- *Salmonella* Poultry Performance Standards
  - Broiler carcasses – 9.8% (5/51)
    - >9.8% = Category 3
    - 4.9 to 9.8% = Category 2
    - <4.9% = Category 1
  - Comminuted chicken – 25% (13/52)
  - Chicken parts – 15.4% (8/52)

- 52-week moving window

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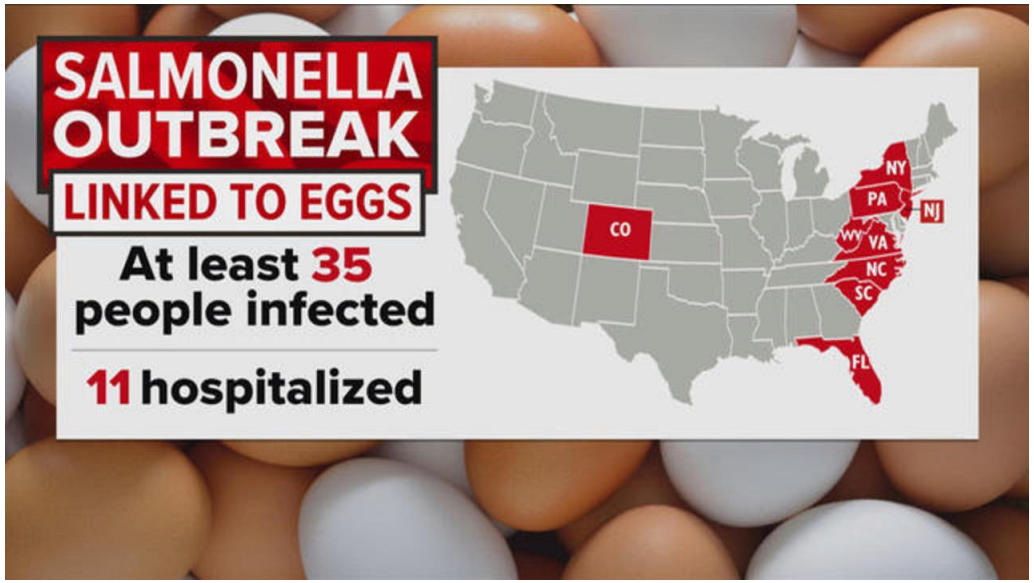
What about *Salmonella* in eggs?

- FDA handles shell eggs
- Flocks are monitored for *Salmonella* Enteritidis
  - Why just this one?
  - Salmonellas behave differently



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Sounds bad. Should I just buy organic?

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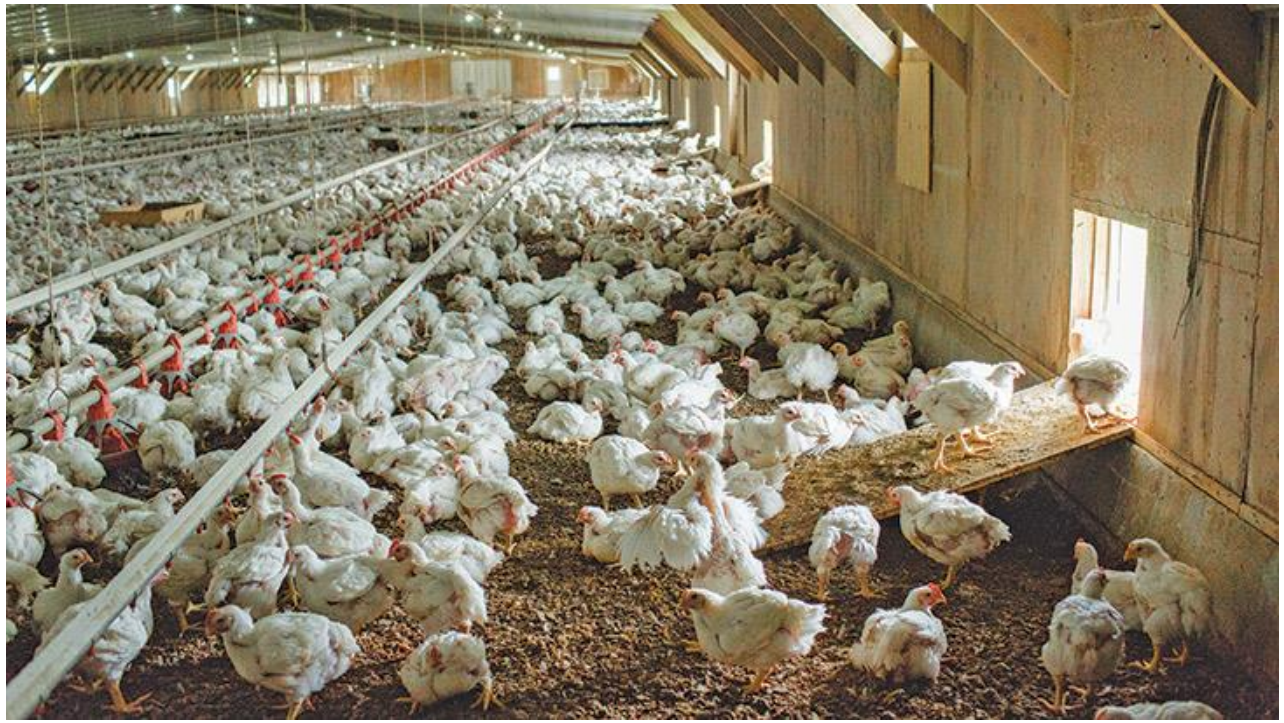
What is organic?

- Organic – regulated by USDA
- Starting on 2nd day of life
- Organic feed
- Access to outdoors
- No antibiotics



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APPLIED AND ENVIRONMENTAL MICROBIOLOGY, July 2005, p. 4108–4111 Vol. 71, No. 7
0099-2240/05/$08.00+0 doi:10.1128/AEM.71.7.4108–4111.2005

Prevalence and Antimicrobial Resistance of *Campylobacter* spp. and *Salmonella* Serovars in Organic Chickens from Maryland Retail Stores

TABLE 1. Contamination with *Salmonella* and *Campylobacter* bacteria in organically and conventionally produced chicken samples

Bacteria	No. (%) of contaminated samples[a]	
	Organic (n = 198)	Conventional (n = 61)
Campylobacters	150 (76)	45 (74)
C. jejuni	68 (45)	28 (62)
C. coli	71 (47)	18 (40)
Other campylobacters	31 (20)	7 (16)
Salmonellae	121 (61)	27 (44)
Serovar Kentucky	72 (59)	10 (37)
Serovar Heidelberg	40 (33)	1 (4)
Serovar Typhimurium	20 (17)	12 (44)
Other salmonellae	11 (9)	6 (2)

[a] Twenty-seven samples contained two or more *Campylobacter* species, and 21 samples had two or more *Salmonella* serotypes.

61% of organic had Salmonella
44% conventional had Salmonella

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Article

Prevalence and Antibiotic Resistance of *Salmonella* and *Campylobacter* Isolates from Raw Chicken Breasts in Retail Markets in the United States and Comparison to Data from the Plant Level

Sana Mujahid *, Michael Hansen, Robyn Miranda, Keith Newsom-Stewart and James E. Rogers

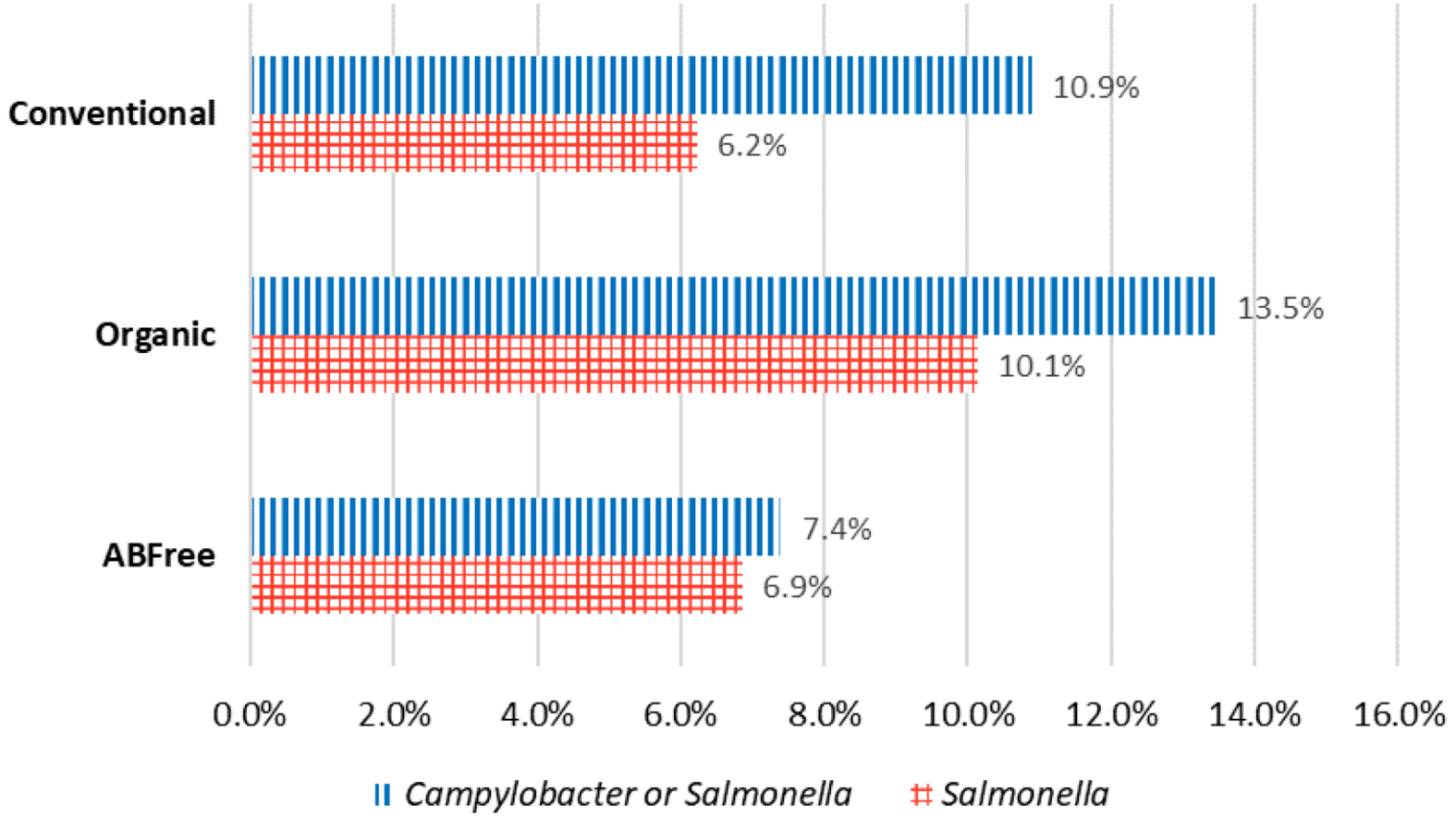

Figure 1. Levels of contamination *. * All values in Figure 1 are adjusted.

Mujahid, et al, 2023

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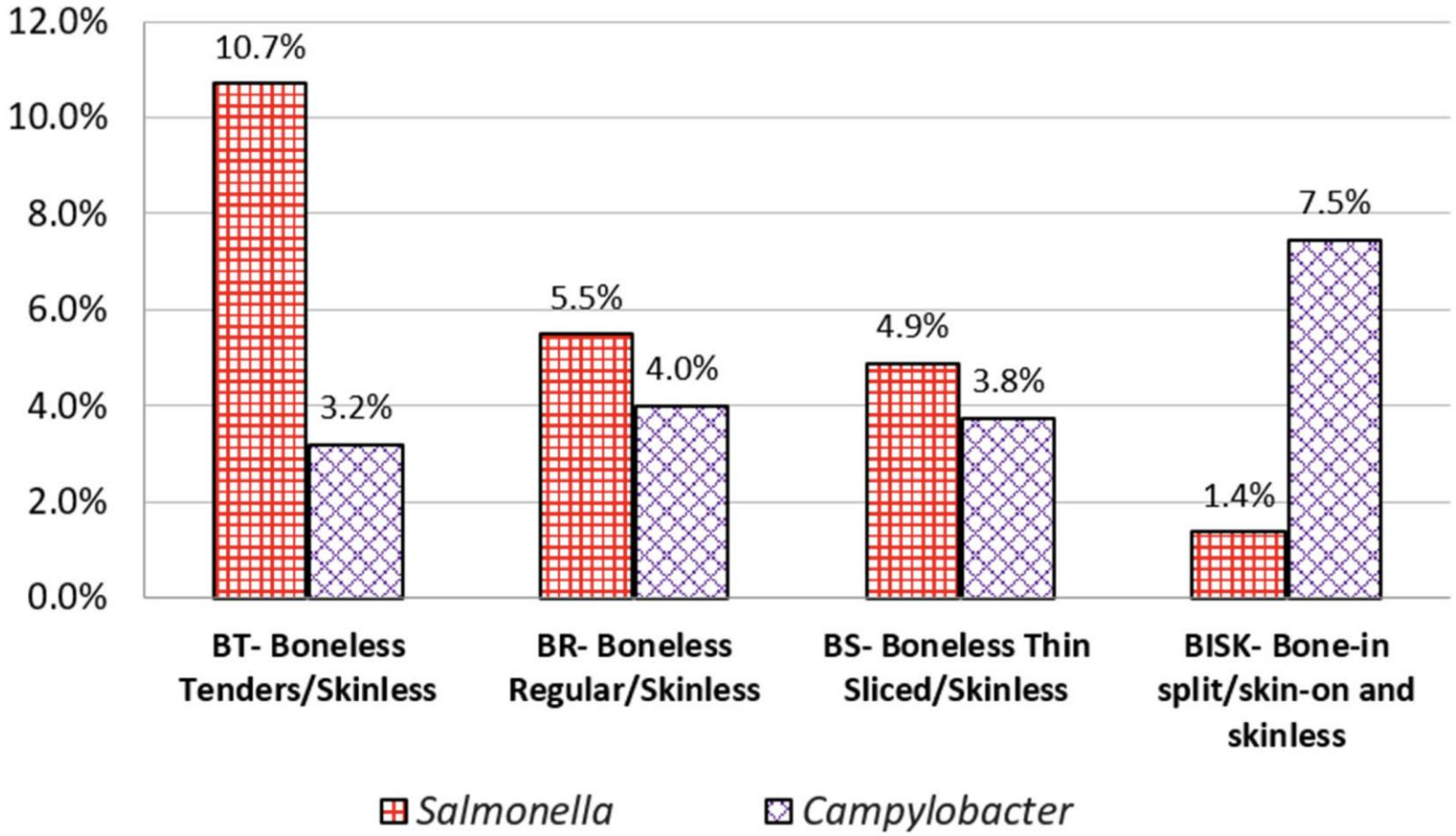

Mujahid, et al, 2023 **Figure 2.** Levels of contamination by product type.

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What about all those other options?

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What about buying local?

- Local small farmers
- Farmers markets

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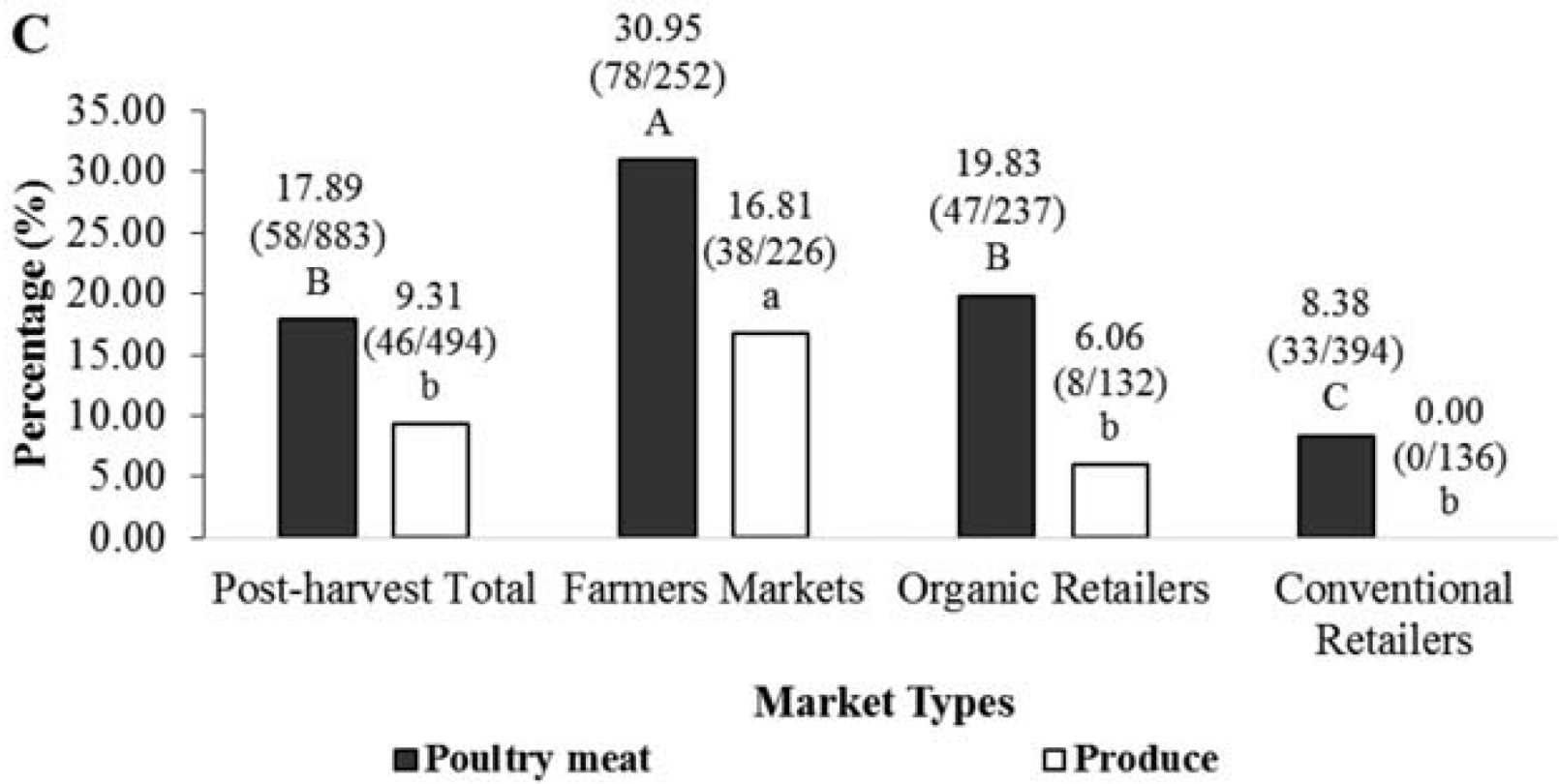
environmental microbiology

Environmental Microbiology (2016) **18**(5), 1654–1665 doi:10.1111/1462-2920.13265

Prevalence and antibiotic resistance pattern of *Salmonella* serovars in integrated crop-livestock farms and their products sold in local markets



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Regardless of what type of chicken/eggs you purchase, there is a reasonable expectation that raw meat/eggs will contain *Salmonella*.

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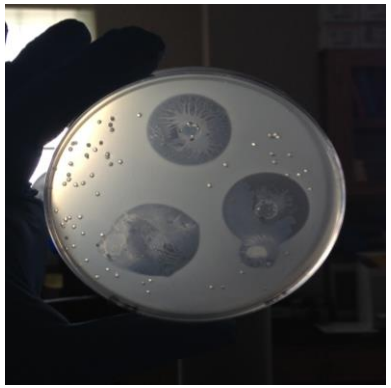
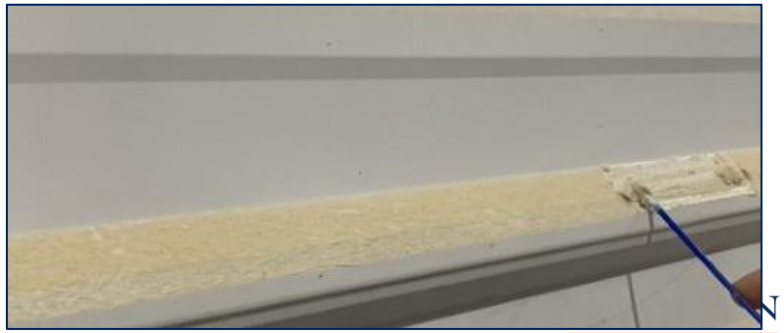
What are farmers/integrators doing about it?

- Prevention
  - Biosecurity
  - Clean chicks
  - Hatchery fumigation
  - Vaccination
  - Water hygiene
  - Feed mill management
  - Feed/water additives
- Routine Monitoring
  - Serotyping
- Mitigation
  - Litter management
  - Antimicrobial processing aids





What can you do about it?

- Assume raw chicken/eggs have *Salmonella*
- Follow safe food handling practices
- Providing safe food for your customers/family/friends is in your hands.

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Four Steps To Food Safety

CLEAN 	Wash hands for 20 seconds with soap and water before, during and after preparing food and before eating.	Wash utensils, cutting boards and countertops after each use with hot, soapy water.	Rinse fresh fruits and vegetables under running water — but not meat, poultry or eggs.
SEPARATE 	Use separate cutting boards and plates for produce and for meat, poultry, seafood and eggs.	When grocery shopping, keep raw meat, poultry, seafood and their juices away from other foods.	Keep raw meat, poultry, seafood and eggs separate from all other foods in the fridge.
COOK 	Use a food thermometer.	Keep food hot after cooking (at 140˚F or above).	Microwave food thoroughly (to 165˚F).
CHILL 	Refrigerate perishable foods within two hours.	Never thaw or marinate foods on the counter.	Know when to throw food out.

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Tips for Safer Chicken

For more on our investigation into salmonella, go to revealnews.org/chickentips

CHILL IT OUT

Fresh chicken should feel cold to the touch at the store. At home, promptly refrigerate your bird at 40° F or below.

KEEP IT SEPARATED

Isolate raw poultry from all other foods to avoid cross-contamination.

DON'T WASH IT

Rinsing or soaking raw poultry doesn't destroy salmonella – only cooking does. Bacteria and poultry juices can spread to other foods, utensils and surfaces.

WASH EVERYTHING ELSE

Clean hands, cookware and surfaces often – basically everything *and* the kitchen sink.

TAKE ITS TEMP

Cook to an internal temperature of 165° F – don't assume it's cooked by its color!

SOURCE: USDA Food Safety and Inspection Service

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Summary

- Conventional, organic, free-range, local, etc.
  - They are all good products for different markets
  - Always assume raw product might have *Salmonella*
- Don't forget about *Campylobacter*
  - Same rules apply

- Take responsibility for handling and preparing chicken or eggs to provide a safe food product for those you are serving.

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