Environmental Monitoring

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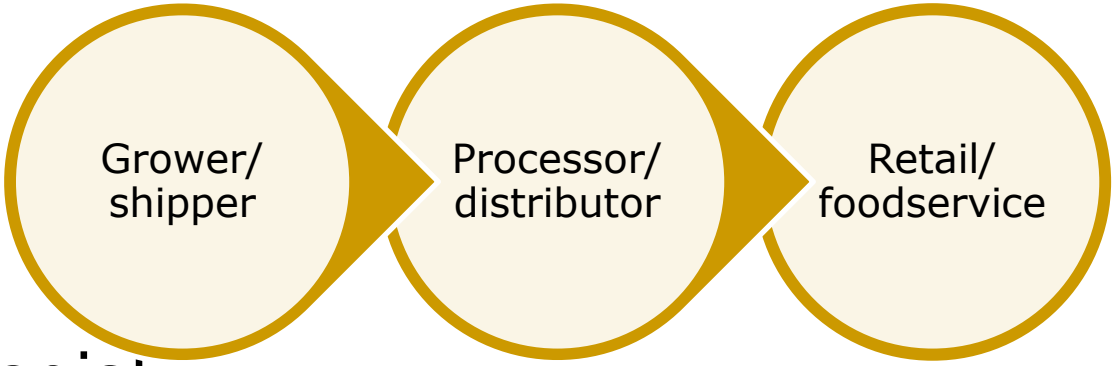
About United Fresh & Me

- Produce industry trade assn www.unitedfresh.org
- Based in Washington DC



Me: Food microbiologist

Worked across multiple commodities

Intersect with govt, academia, consumer groups etc.

What's an EMP?

- Environmental monitoring program
  - For the purpose of this presentation, focus is on *Listeria*
- Verifies sanitation, identifies facility/ equipment issues, gives feedback on GMPs & other programs
- Goal is to prevent cross contamination from lurking *Listeria* onto product

Does your company/ facility have an EMP?

1. Yes
2. No
3. I’m not sure
4. Not applicable (not a food company)

Why *Listeria*?

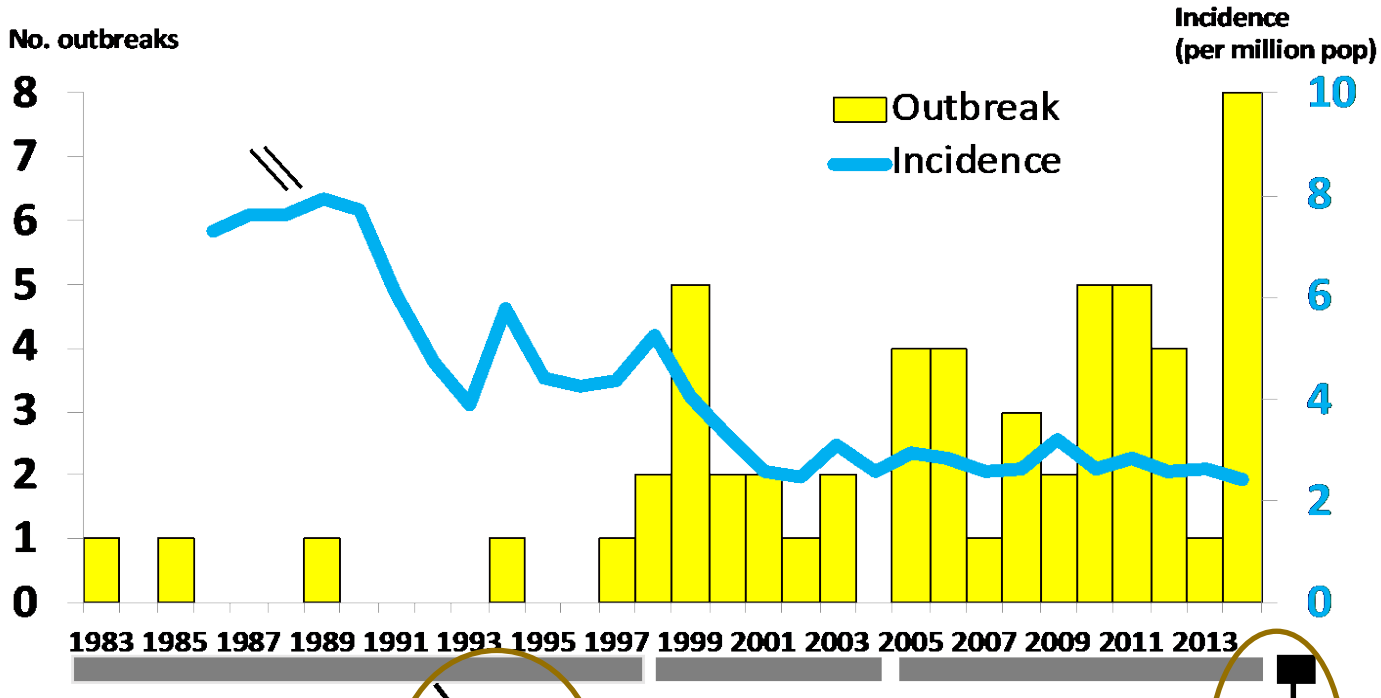
- Deadly pathogen
- Grows under refrigerated conditions

- Other environmental organisms
  - *Salmonella*
    - More associated with dry / low moisture foods

Why now?

- Scientific tools are better!
- How familiar are you with Whole Genome Sequencing?
  1. Never heard of it
  2. Heard of it but know very little
  3. Know a little
  4. Know a lot
  5. Expert on it

Listeria Outbreaks and Incidence, 1983-2014



Era	Pre-PulseNet	Early PulseNet	*Listeria* Initiative	WGS
Outbreaks per year	0.3	2.3	2.9	8
Median cases per outbreak	69	11	5.5	4.5

Data are preliminary and subject to change

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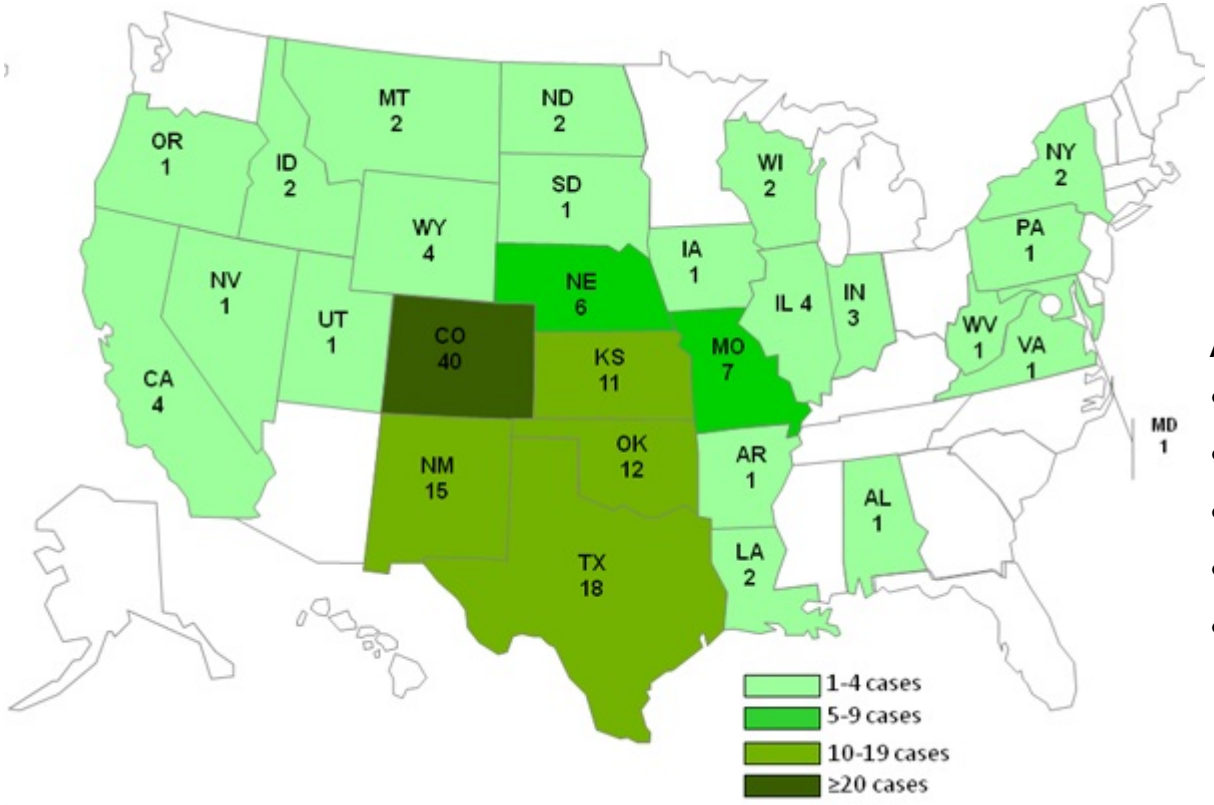
Who Remembers This?



At a Glance:

- **Case Count: 147**
- **States: 28**
- **Deaths: 33**
- **Hospitalizations: 143**
- **Recall: Yes**

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Concept of Post-Process Contamination

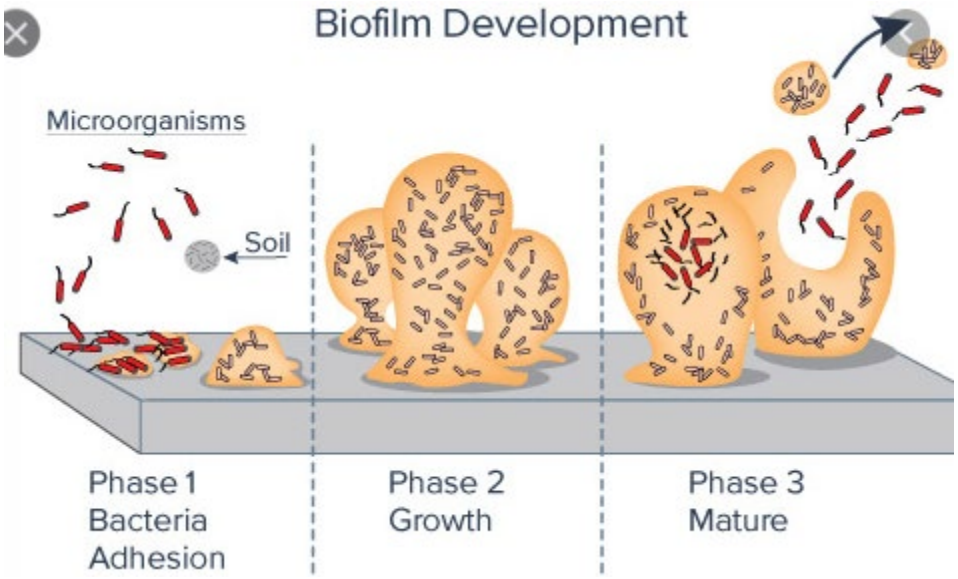
- Many foods have a "kill step"
- Some don't

- "Post-process" contamination is a risk either way

"raw" → "processing" → "finished"

Shouldn't have MORE *Listeria*!

Why/ How Would This Happen??



https://www.cdr.wisc.edu/insider/gassy/micro_2

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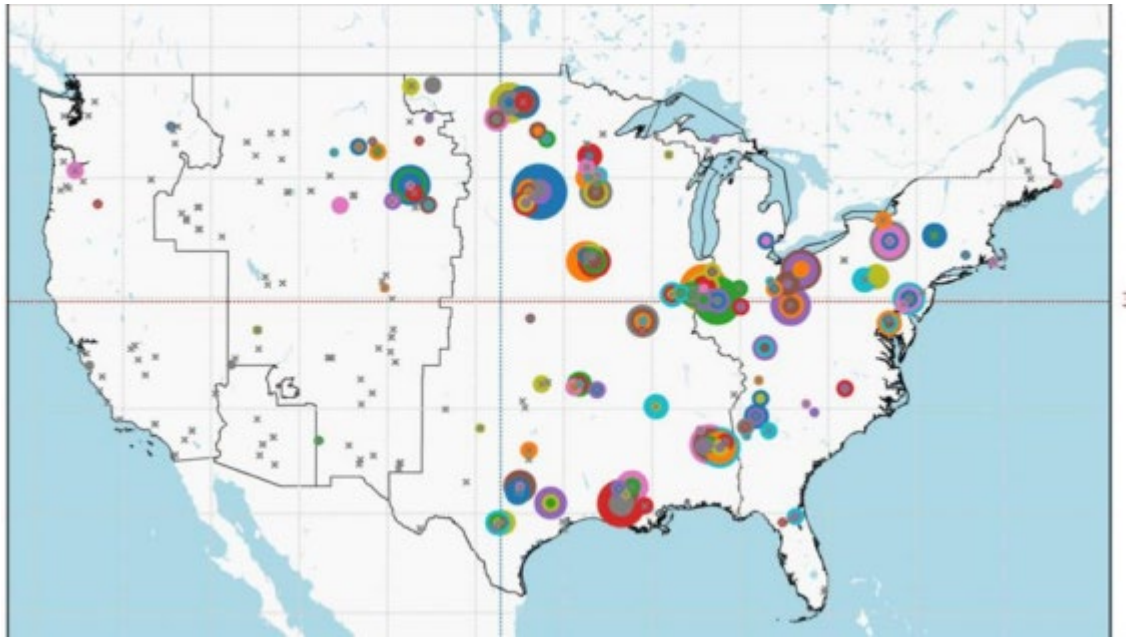
But Listeria is Everywhere!

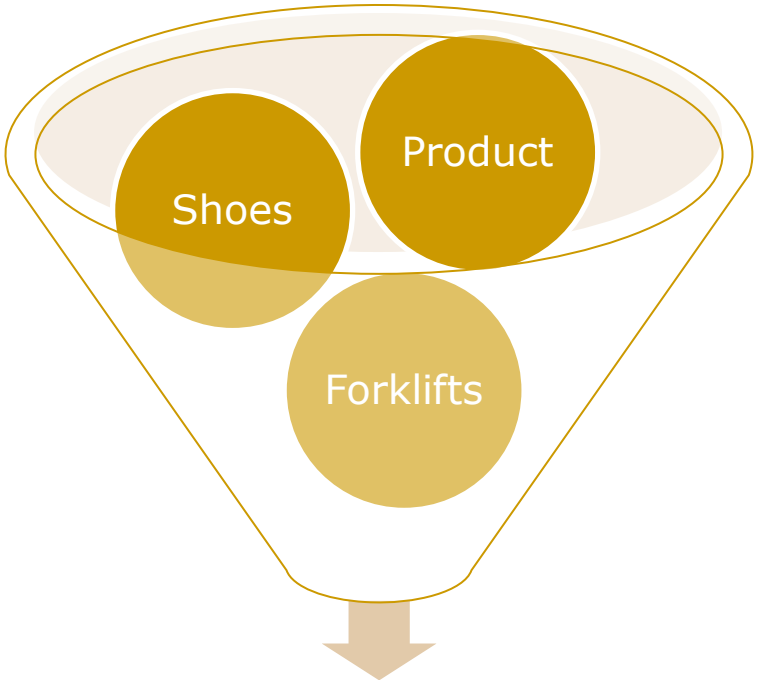


Expect constant pressure from new *Listeria* entering the operation

Listeria should not be ubiquitous *in your facility or packing shed*

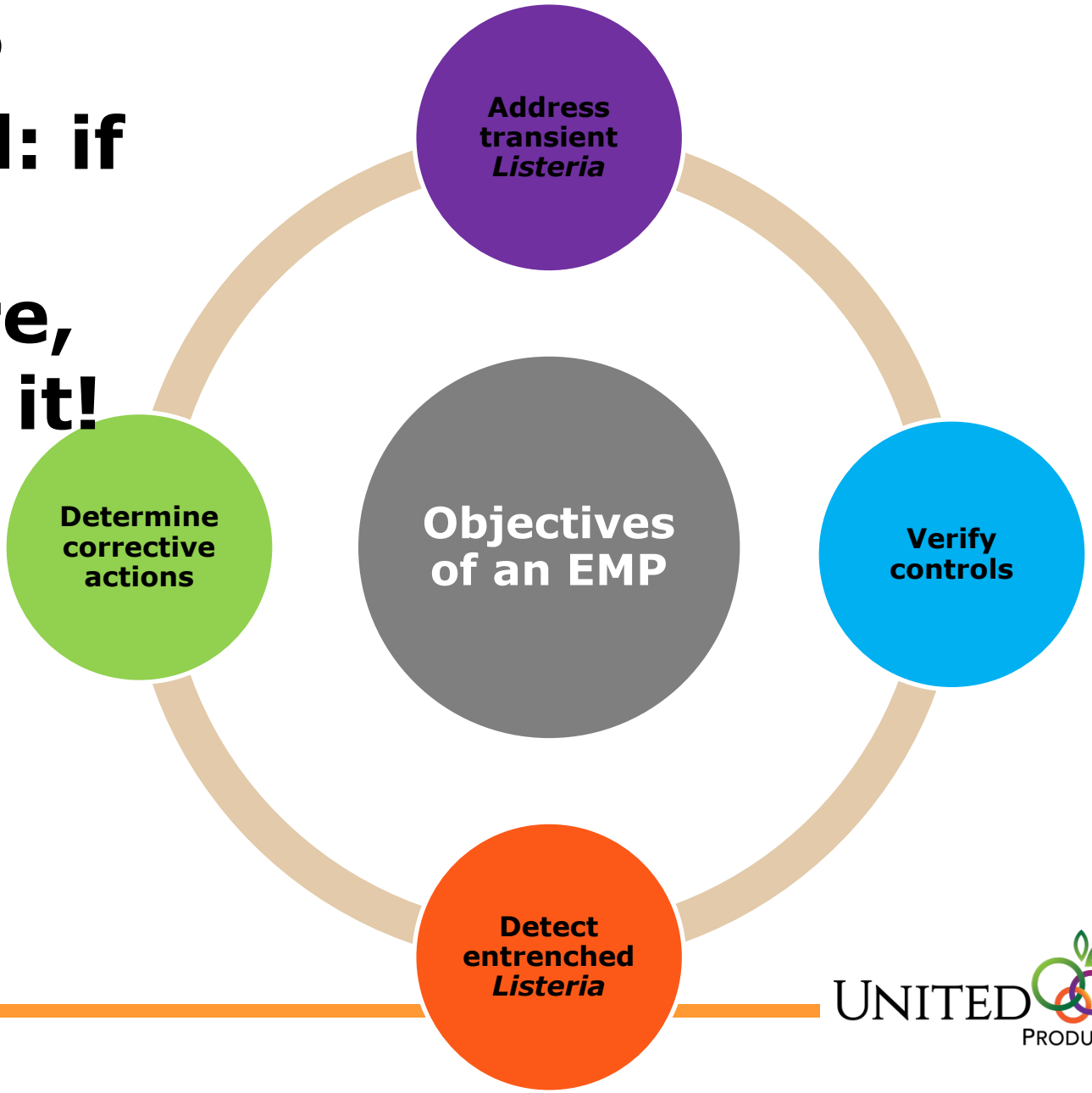
https://www.centerforproducesafety.org/amass/documents/researchproject/426/CPS%20Final%20Report%20-%20Wiedmann%20%28WGS%29_January%202020.pdf

How it gets in



Listeria will enter!

EMP Goal: if it's there, find it!



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The EMP: written, documented

- Type of samples being taken
- Sampling locations and Zones
- Number of swabs being collected
- Sampling frequency and timing
- Testing method
- Personnel training
- 'Special event' contingency plan
- Corrective Action and Root Cause Analysis strategy

Not just sampling!
Hazard analysis of your facility, traffic flow, equipment design, condition of drains/floors

Team Effort! (not finger-pointing)

- Food safety/ quality
- Sanitation
- Maintenance
- Operations

- Risk management, legal, finance, etc.

DO

- Assess the risk of the product, risk associated with the facility and equipment, and adherence to GMPs within the operation
- Clean and sanitize before beginning an EMP
- Dedicate a trained cleaning crew
- Test for genus *Listeria (*not *monocytogenes)*
- Test and monitor regularly to actively find positives. Swab areas most likely to harbor *Listeria*.
- Embrace positives and ensure trained personnel implement immediate corrective actions and on-going preventative actions.

DO

- Determine corrective actions *before* starting an environmental monitoring program
- Take corrective actions that address the root cause of the positive
- Trend data
- Evaluate traffic patterns
- Hold product if you are testing product or product contact surfaces for *L. monocytogenes*

Note: it is not always necessary to hold if you are testing Zone 1 for *Listeria* species;

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DON'T

- Embark on a *Listeria* environmental monitoring program (EMP) if sanitation is not adequately performed.
- Use house hold cleaners and brushes; follow label instructions.
- Assume that all positives are transients
- Conduct finished product testing in order to demonstrate that *Listeria* is controlled in your facility instead of investing in a robust environmental monitoring program.

You WILL Find Listeria

- Corrective actions are key
  - GOAL: find it again, find the source, eradicate it
  - Adding sanitizer, and then reswabbing to find a negative is *not* enough
- Corrective actions
  - Short term
    - Vector swabbing (it didn't start in the drain)
  - Long term
    - Trending data
      - Specific areas, specific times of year, specific people?

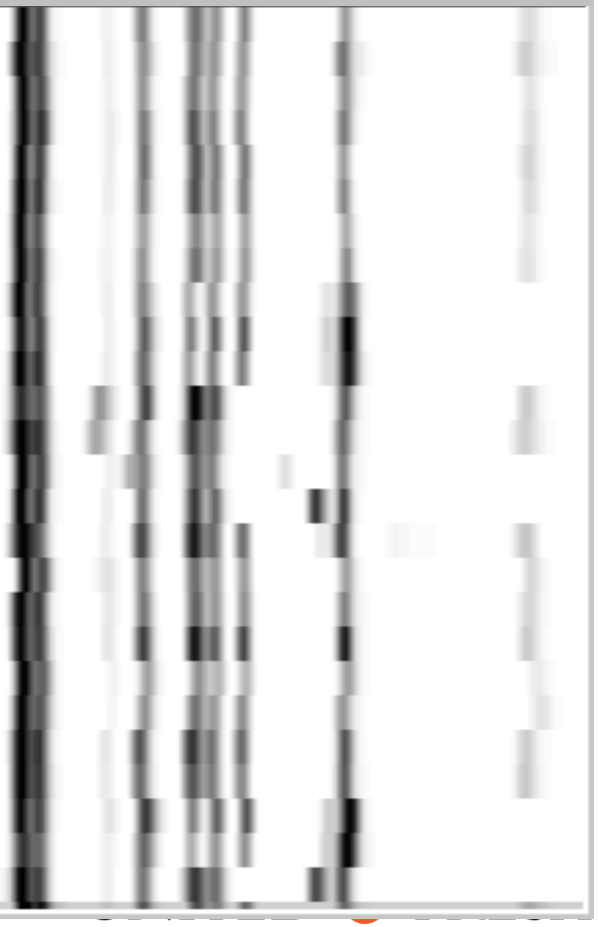
Frequently Asked Questions

- Can ATP be correlated with *Listeria* presence?
  - No, although both are forms of sanitation verification
- Should I test for *Listeria* spp or *monocytogenes*?
  - Species
- If I get a positive, do I have to report to FDA?
  - For species, no. For *monocytogenes*, yes if on product or a zone 1 surface
- How many swabs should I take?
  - Take the ones likely to be positive
- What % positive is ok?
  - The percent that accurately reflects your facility

DNA fingerprinting can identify persistence in plants: Avoid This!

	Sample		Ribotype	Sample Source
VISIT 1	D15-3	*	1039C	(E) Floor drain, raw materials area
	2D-35-6	*	1039C	(E) Floor drain, hallway to finished area
	2D-22-1	*	1039C	(IP) Troll Red King Salmon, in brine, head area
	2D-23-1	*	1039C	(IP) Troll Red King Salmon, in brine, belly area
	2D-27-1	*	1039C	(IP) Brine, Troll Red King Salmon
	2D-28-1	*	1039C	(IP) Faroe Island Salmon, in brine, head area
	2D-34-1	*	1039C	(F) Smoked Sable
VISIT 2	2D-42-1	*	1039C	(F) Cold-Smoked Norwegian Salmon
	2D-30-1		1044A	(E) Floor drain, brining cold room 1
	2D-10-1		1044A	(R) Raw Troll Red King Salmon, head area
	2D-31-2		1044A	(IP) Brine, Faroe Island Salmon
	2D-11-1		1045	(R) Raw Troll Red King Salmon, belly area
	2D-29-3		1045	(IP) Faroe Island Salmon, in brine, head area
	2D-24-1		1053	(IP) Norwegian Salmon, in brine
	2D-16-1		1062	(E) Floor drain #1, raw materials preparation
	3D-10-3	*	1039C	(E) Floor drain #1, raw materials preparation
	3D-11-13	*	1039C	(E) Floor drain, brining cold room 1
	3D-13-4	*	1039C	(E) Floor drain #2, raw materials preparation
	3D-14-1	*	1039C	(E) Floor drain #2, raw materials receiving
	3D-6-21	*	1039C	(E) Floor drain, finished product area
VISIT 3	3D-8-26	*	1039C	(E) Floor drain, hallway to finished area
	3D-36-2	*	1039C	(IP) Brine, Troll Red King Salmon
	3D-50-1	*	1039C	(F) Smoked Sable
	3D-38-1		1044A	(IP) Sable, in brine
	3D-42-3		1044A	(IP) Brine, Faroe Island Salmon
	3D-37-1		1062	(IP) Brine, Norwegian Salmon

RiboPrint® Pattern



Courtesy of Dr. Martin Wiedmann, Cornell University

Good Unintended Consequences

- Better hygienic design =
  - Easier to clean
  - Less chemicals, less water, less time
- Improved shelf life?

Resources

- https://www.unitedfresh.org/listeria-monocytogenes/
  - Includes links to FDA guidance
  - Detailed Zone 1 information

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Questions?