WISCONSIN CHEESE MAKERS ASSOCIATION

EST. 1891

Focus on Food Safety

August 14, 2025

Agenda

- The Alliance Approach: Strengthening Safety Through Industry Connection
  - Presenter: Kirsten Strohmenger, WCMA
- Education + Support = Success: Tools and Resources for Dairy Manufacturers & Processors
  - Presenter: Alex O'Brien, CDR
- Whole Genome Sequencing and its Use in Outbreaks and Applications
  - Presenter: Craig Hedberg, University of Minnesota
- Q&A

The Alliance Approach: Strengthening Safety Through Industry

Dairy Food Safety Alliance

FSMA-Compliant Templates

WCMA Website Resources: wischeesemakers.org/food-safety

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About Events Education

Food Safety

Dairy Food Safety Alliance

Together with the Center for Dairy Research and Dairy Farmers of Wisconsin, the Wisconsin Cheese Makers Association leads the Dairy Food Safety Alliance, a group designed to deliver the latest in food safety news to dairy product manufacturers, processors, and their suppliers.

The Dairy Food Safety Alliance meets annually, and features speakers from the U.S. Department of Agriculture, the U.S. Food and Drug Administration, the Wisconsin Department of Agriculture, Trade, and Consumer Protection, and respected leaders in the field of food safety and quality assurance.

Learn more and get involved now. Contact Events Manager Kirsten Strohmenger.

FSMA Compliance Support

Disclaimer: The information provided in the documents below is for informational purposes only, and may not be used as a substitute for legal advice regarding food safety laws in any jurisdiction. Materials are based on compliance with federal laws. The Wisconsin Cheese Makers Association makes no representation or warranty with respect to the completeness, accuracy, reliability, or suitability of any information provided in training sessions or materials. We recommend that participants consult an attorney concerning the laws applicable to any particular situation. By utilizing the materials provided, you agree to release WCMA and their

Standard Operating Procedures

- Allergen Control – Milk Only
- Allergen Control – Multiple Allergens
- Brine Management Plan Template
- Calibration
- Chemical Control Program
- Correction and Corrective Action
- Customer Complaint Management
- Drug Residual (Antibiotics)
- Equipment Commissioning and Decommissioning
- Finished Product Specification Template
- Finished Product Specifications 1
- Food Safety Culture Policy
- Food Defense Flow Chart
- Food Defense
- Food Fraud
- Foreign Material Control
- Good Manufacturing Practices
- Hold and Release
- Hygienic Zoning Environmental Monitoring
- Internal Audit
- Lab Practices
- Maintenance Program
- Pasteurization Thermization
- Pest Control
- Raw Milk Receiving
- Recall and Traceability Program
- Record Control
- Retention Sample Program
- Sanitation
- Shipping and Receiving
- Supplier Control
- Temperature Control
- Training Program
- Verification
- Water Quality

Records

- Brine Monitoring
- Calibration Form Template
- Cheese Cold Smoking
- Cheese Wax Application
- Chemical Inventory Register
- Corrective Action Form
- Customer Complaint Investigation Form
- Customer Complaint Register
- Environmental Monitoring Investigation Form
- Environmental Monitoring Listeria Surveillance Monitoring
- Environmental Monitoring Site Register
- Emergency Contact List
- Food Allergen Ingredient Analysis
- Food Allergen Label Compliance
- Foreign Material Register
- Glass-Ceramic & Brittle Plastic Monitoring
- Internal Audit Plant Inspection Form
- Maintenance Work Order
- Master Sanitation
- Metal Detection Check Sheet
- Mock Recall
- Name and Initial Log
- Preventive Maintenance Program
- Security Incident Report
- Shipping & Receiving (Inbound – Outbound)
- Supplier Approval Form
- Supplier Register
- Temperature Monitoring Log
- Traffic Flow Map
- Training Register Example

Support Documents

- Allergen Derivatives
- Allergen Infographic
- Allergen Risk Assessment Template
- Audit Food Safety Worksheet for CDR
- Broken Seal Report Procedure
- Choke Hazard
- Critical Customer Complaint Guidance
- Dairy Equipment Design Checklist
- Dairy Facility Design Checklist
- Environmental Monitoring Addendum I (Hygienic Zoning)
- Environmental Monitoring Addendum II (Compositing)
- Effect of Raw Milk Temperatures
- Environmental Monitoring Handbook
- Food Defense USDA
- Food Defense Example - Monterey Jack w Peppers (Supporting Document)
- Food Defense Process Flow Chart (Supporting Document)
- Food Defense Risk Assessment Template
- Food Defense Risk-Vulnerability Assessment – Example (Supporting Document)
- Food Defense Training Example
- Food Fraud Vulnerability Assessment Example
- Food Safety Hazard Table
- Food Safety Plan Template
- Food Safety Plan – Model for Pepper Jack Cheese
- Food Safety Plan – PC – HACCP Systems Validation Checklist
- Food Safety Systems Guide to Raw Milk Cheese Production
- Good Documentation Practices
- Good Manufacturing Practices (Sample of Employee Instructions)
- Good Manufacturing Practices Subpart B
- Ingredient Risk Assessment Template
- Internal Audit Training
- Microbial Pathogens Detected in Spices
- Pre-Trial and Pre-Production Checklist
- Sanitation SOP Template
- Seven Steps of Wet Sanitation
- Smoke Flavoring Cheese Products (Liquid Smoke) Red Arrow
- Smoking of Cheese Products by W.L Wendorff
- Supplier Controls Food Safety Resource Packet
- The Effects of Application of Cold Natural Smoke on the Ripening of Cheddar Cheese
- Thermization Determination and Validation Study
- Thermization Risk Assessment App
- Thermization Table for Raw Milk Heat Treatment
- WDATCP Wis. PC Checklist

Education + Support = Success: Tools and Resources for Dairy Manufacturers & Processors

Dairy Food Safety: Available Resources

Alex O'Brien: Food Safety / Quality Coordinator

Center for Dairy Research

- 53 full time staff
- Analytical
  - WGS Capabilities
- Dairy Product and Processing Technology
  - Spray drying, Evaporation, (Coming Soon) Aseptic processing
- Cheese Group
- Troubleshooting
  - 4 Mentors
  - 1 Food Safety / Quality Coordinator

Resources

Safe Cheesemaking Hub

https://guides.cheesesociety.org/safecheesemakinghub

- Regional Resources
  - Cheese Guild Contacts
- FAQ
- Government Resources
  - Food Safety plan builder template
- Search Resources
  - ACS Library
  - Combase Access
  - Open Access Journals
  - Search Food Science Commons
- Online Education
  - Food Safety Online Courses
  - American Cheese Society Webinars

New formatting and updating coming soon!

The Safe Cheesemaking Hub

Food Safety Resources for Cheesemakers

Powered by AMERICAN CHEESE SOCIETY

Search | Getting Started | Search Resources | Online Education | Regional Support | Government Resources | Templates | FAQ | Spanish/Español

What's In This Guide

- **Getting Started**
  - Food Safety Publications
  - Most Frequently Used Resources
  - Learn more about FSMA
- **Search Resources**
  - Search ACS Virtual Library
- **Online Education**
  - Online Courses
  - Instructional Videos
- **Map of Dairy Food Safety Resources in the USA**

Welcome to the

Safe Cheesemaking Hub

Welcome to the Safe Cheesemaking Hub! This is a compendium of food safety resources selected and organized to help cheesemakers easily find the information they need.

Learn More About: Food Safety Plans for

ACS Best Practices Guide for Cheesemakers

American Cheese Society Best Practices Guide for Cheesemakers

An easy reference for busy cheesemakers-especially small- to mid-size producers. This guide highlights the key requirements, suggestions, and practices. Condensed into an easily digestible format, and written in accessible language.

The Safe Cheesemaking Hub
Food Safety Resources for Cheesemakers

Powered by AMERICAN CHEESE SOCIETY

Search | Getting Started | Search Resources | Online Education | Regional Support | Government Resources | Templates | FAQ | Spanish/Español | Retailers Toolkit | Glossary

Online Education

Use this page to access online education opportunities, courses, workshops and webinars.

New Online Course: Food Safety Basics for Artisan Cheesemakers

- Food Safety Basics for Artisan Cheesemakers
  This online course was developed by a collaborative group of food safety and cheese experts from the University of Wisconsin-Madison, University of Connecticut, Cornell University, and NC State University. The course consists of five sections:
  (1) Importance of Food Safety
  (2) Regulations and Standards
  (3) Food Safety Hazards
  (4) Good Manufacturing Practices and Process Controls
  (5) Environmental Pathogen Monitoring and Testing

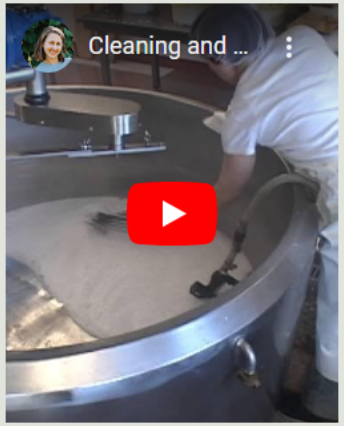
As a new benefit for ACS members, this $140 course is available FREE of charge.

ACS Member? You can find the discount code on the Member Benefits: Quick Access page. **Not a member? Consider Joining Today!**

Online Education

- Food Safety Preventive Controls Alliance
  The Food Safety Preventive Controls Alliance (FSPCA) is a broad-based public/ private alliance consisting of key industry, academic and government stakeholders whose mission is to support safe food production by developing a nationwide core curriculum, training, and outreach programs to assist companies producing human and animal food in complying with the preventive controls regulations that will be part of the Food Safety Modernization Act (FSMA).
- ACS Webinars
  ACS Webinar Archive of webinars available exclusively to ACS members.

Deep Dive: Instructional Videos



This video from the Cornell University Food Science Department, Cornell Small Farms Program, and the New York State Department of Agriculture and Markets demonstrates cleaning and sanitizing procedures.

More Instructional Videos:

- Food Safety and Preventive Controls Alliance Technical Assistance Network
  A series of videos that provide technical support, and aid in FSMA compliance.

Dairy Management Inc

https://www.usdairy.com/about-us/innovation-center/food-safety

- Training
- Guidance Documents
- Webinars
- Collaboration of Academia and Industry

Dairy Management Inc

https://www.usdairy.com/about-us/innovation-center/food-safety/dairy-plant

Guidance Documents

CONTROLLING PATHOGENS IN DAIRY PROCESSING ENVIRONMENTS

GUIDANCE FOR THE U.S. DAIRY INDUSTRY

INNOVATION CENTER FOR U.S. DAIRY
HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET

Free Tools!

Dairy Plant Food Safety Resources (materials used or referenced in the class)

Control of Pathogens: Guidance for the U.S. Dairy Industry
Comprehensive guidance document on pathogen controls which follows the 'Pathogen Equation'

Dairy Equipment Design Checklist
This is the list you will need for evaluating equipment designs for dairy equipment designs.

Dairy Facility Design Check list
This is the list you will need for evaluating facility designs for a dairy facility.

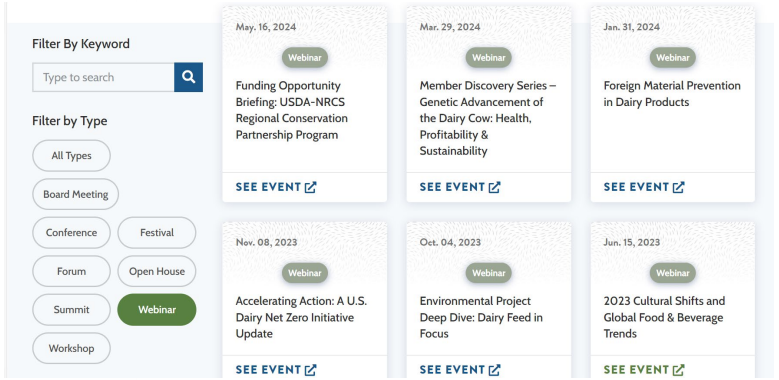
Dairy Pathogen Control Program Assessment
This is the list you will need for evaluating a pathogen control program for the dairy industry.

Seven steps of effective wet sanitation | (En Español)
This list will walk you through the Good, Bad and Ugly.

Seven steps of effective dry sanitation
This list will walk you through the Good, Bad and Ugly.

Powder Sanitizer Validation for LM RTE Plants
This document helps meat and poultry processors to identify and share best practices for control.

Webinars!



Workshops!

Food Safety Resources Map

https://www.idfa.org/safeicecream/food-safety-map

Supplier Controls Food Safety Packet

https://www.usdairy.com/getmedia/6ea5dc6e-fe30-47d6-a099-dc97ebfb7f96/Supplier-Controls-Guidance-Templates-Labeling-Packet-Version-C.pdf

Supplier Controls Food Safety Resource Packet

INNOVATION CENTER FOR U.S. DAIRY
HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET

Innovation Center for US Dairy

Food Safety Training Packet

https://www.usdairy.com/getmedia/329e1e26-864d-4432-9107-1b6cbba4f0c6/Training-Schedule-Resources-v1-Final-061824.pdf

Food Safety Training Schedule & Resources

Day One

This section contains links to videos and resources geared towards new employees and to those employees and/or visitors with a limited knowledge of food safety. Control of your facility, control of the people that enter your facility, control of the items that they bring into your facility and/or use in your facility are important for minimizing risks. Good Manufacturing Practices, proper sanitation and personal safety are all important components to ensure the overall safety of your operation and your products. Whether this training takes one day or 7 days, it is vital to the success of your business.

Just Starting Out	Topic Area(s)	Resources & Tools
Day 1 Fundamentals	• Food Borne Illness Awareness & Basic GMP • Company Background • Job Description/Responsibilities • Training Sign-Off Procedures • Food Safety Culture	New Employee Video English New Employee Video Spanish Food Safety Basics For Artisan Cheesemakers Why Food Safety Culture Matters Dr Lone Jespersen WCMA Onboarding Series

Food Safety Training Packet

https://www.usdairy.com/getmedia/329e1e26-864d-4432-9107-1b6cbba4f0c6/Training-Schedule-Resources-v1-Final-061824.pdf

Food Safety Training Schedule & Resources

Facility Risks & Hazards	• Mitigation of Risks Through Cleaning & Sanitation-Why, How and How to Verify	General Mills Sanitation Videos Food Manufacturing GMPs NCSU Sanitation Documentation 7 Steps To Effective Wet Sanitation Preventing Aerosolization
	• Importance of SSOPs	Writing Sanitation Standard Operating Procedures PSU Sample SSOP
	• Clean & Sanitize Surfaces Before Cutting or Packaging Cheese	Retail Cheese Cut & Wrap Video Satori 9 Ways to Cut the Cheese The People's Cheese
	• Prevention of Cross Contamination	Components Of An Effective Allergen Control Program Supervisor Remind Employee To Clean Raw Milk Tools Last
	• Your Role in Documentation	Food Safety Toolbox Talks: Documentation Basics in Food Manufacturing FSMA Human Food Audit Checklist ISU Generic Technical Data Sheet Document Request Form
	• Food Defense	Employees are the FIRST Line of Food Defense
	• When to Notify/Ask Questions	See Something Say Something Poster Food Safety Culture Overview IC

Dairy Food Safety Alliance Webpage

https://www.wischeesemakersassn.org/food-safety

New updates coming soon!

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About Events Resources Industry Careers Advocacy News

Food Safety

Dairy Food Safety Alliance

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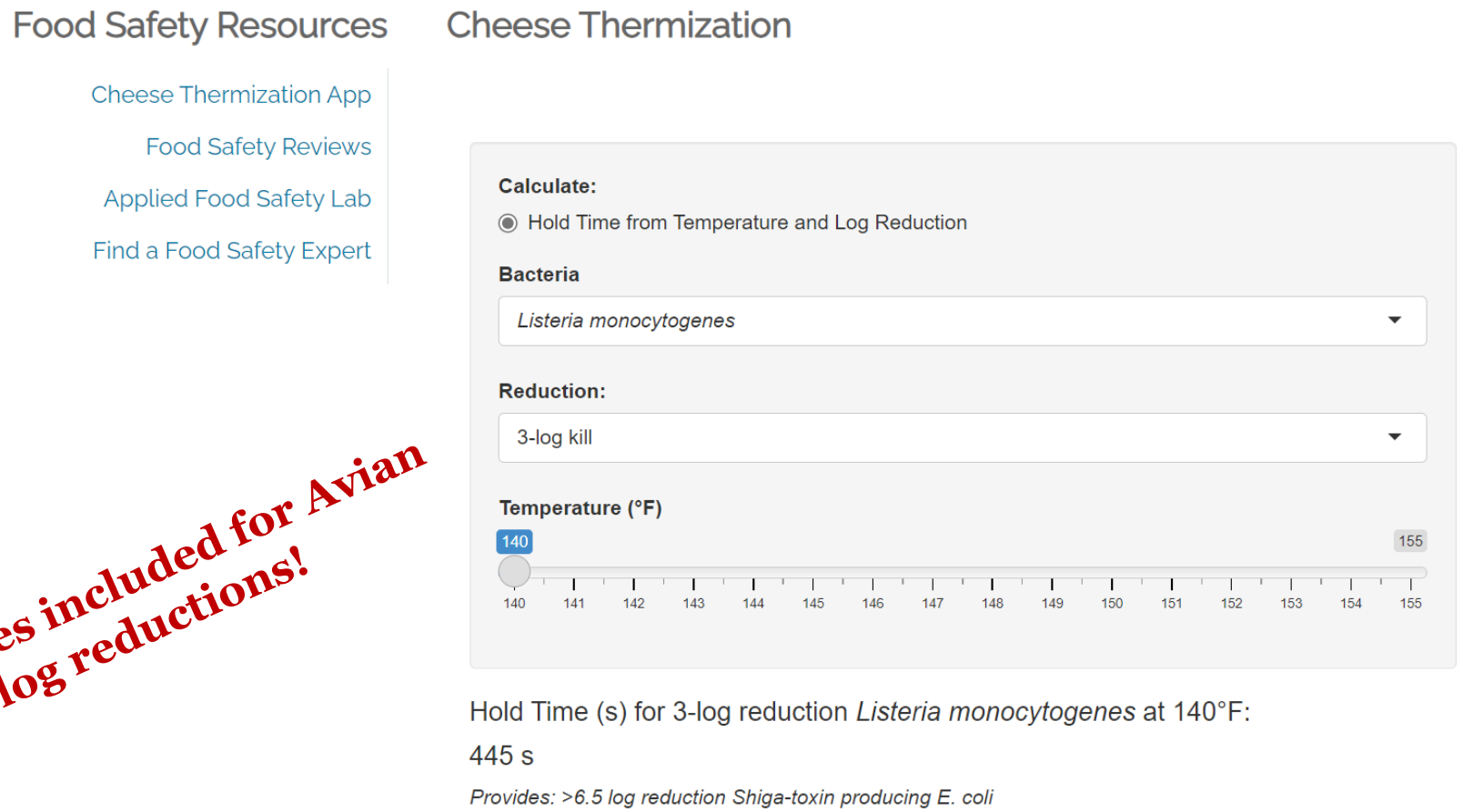
Learn more and get involved today! Contact WCMA's Kirsten Strohmenger.

Thermization Calculator

https://fri.wisc.edu/resources_thermization.php

- FRI – Food Research Institute



New updates included for Avian Influenza log reductions!

Center for Dairy Research – Pipeline

https://www.cdr.wisc.edu/pipeline

Center for Dairy Research – Pipeline

https://www.cdr.wisc.edu/pipeline

Resources, Articles, Videos and Helpful Tools

Foreign Material Prevention

CDR Safety & Quality Coordinator Alex O'Brien covers important topics like detecting and separating equipment. **Read Article (PDF)**

Also, check out the webinar given by the Innovation Center for U.S. Dairy. **Foreign Material Control Webinar**

Controlling the Risk of Allergens in Dairy Processing

CDR Safety & Quality Coordinator Alex O'Brien writes about tips and strategies to control allergens in the dairy plant. **Read Article (PDF)**

Wisconsin Pasteurizer Broken Seal Process

This article includes links to key documents and contacts to assist with the process of properly reporting a pasteurizer broken seal. **Read Article (PDF)**

Dairy Food Safety Recalls in the United States and Canada: 2022 in Review

This article reviews the top reasons for recalls in the dairy industry in the U.S. and Canada in 2022, and discusses the suggested areas of improvement to reduce the instance of these recalls. Read Article (PDF) **Dairy Food Safety Recalls in the US and Canada 2022 in Review**

Dairy Food Fraud Primer

Food Fraud has been around for centuries. Not only is

Cheese Thermization App

Developed by the Food Research Institute, the Cheese

Center for Dairy Research

Dairy Recall Tracker

https://www.cdr.wisc.edu/dairy-recall-tracker

2024

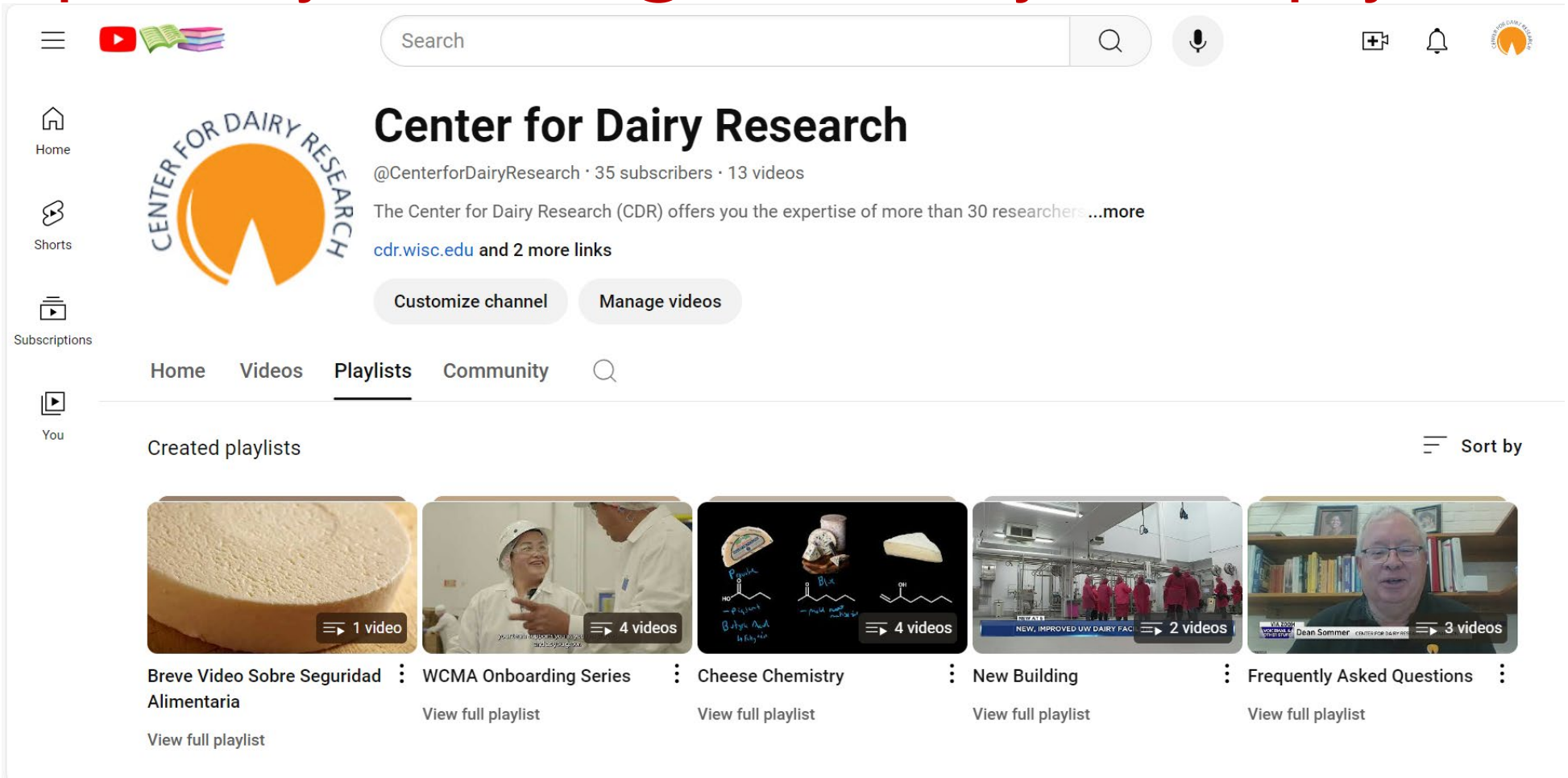
- January 2024 +
- February 2024 +
- March 2024 +
- April 2024 +
- May 2024 +
- June 2024 +
- July 2024 +
- August 2024 ×

August 6, 2024 **Consumer Alert: Campylobacter Jejuni Contamination in Raw Milk in Montgomery County | Agriculture and Markets (ny.gov)**

Center for Dairy Research

Youtube Page

https://www.youtube.com/@CenterforDairyResearch/playlists



Center for Dairy Research

Youtube Page

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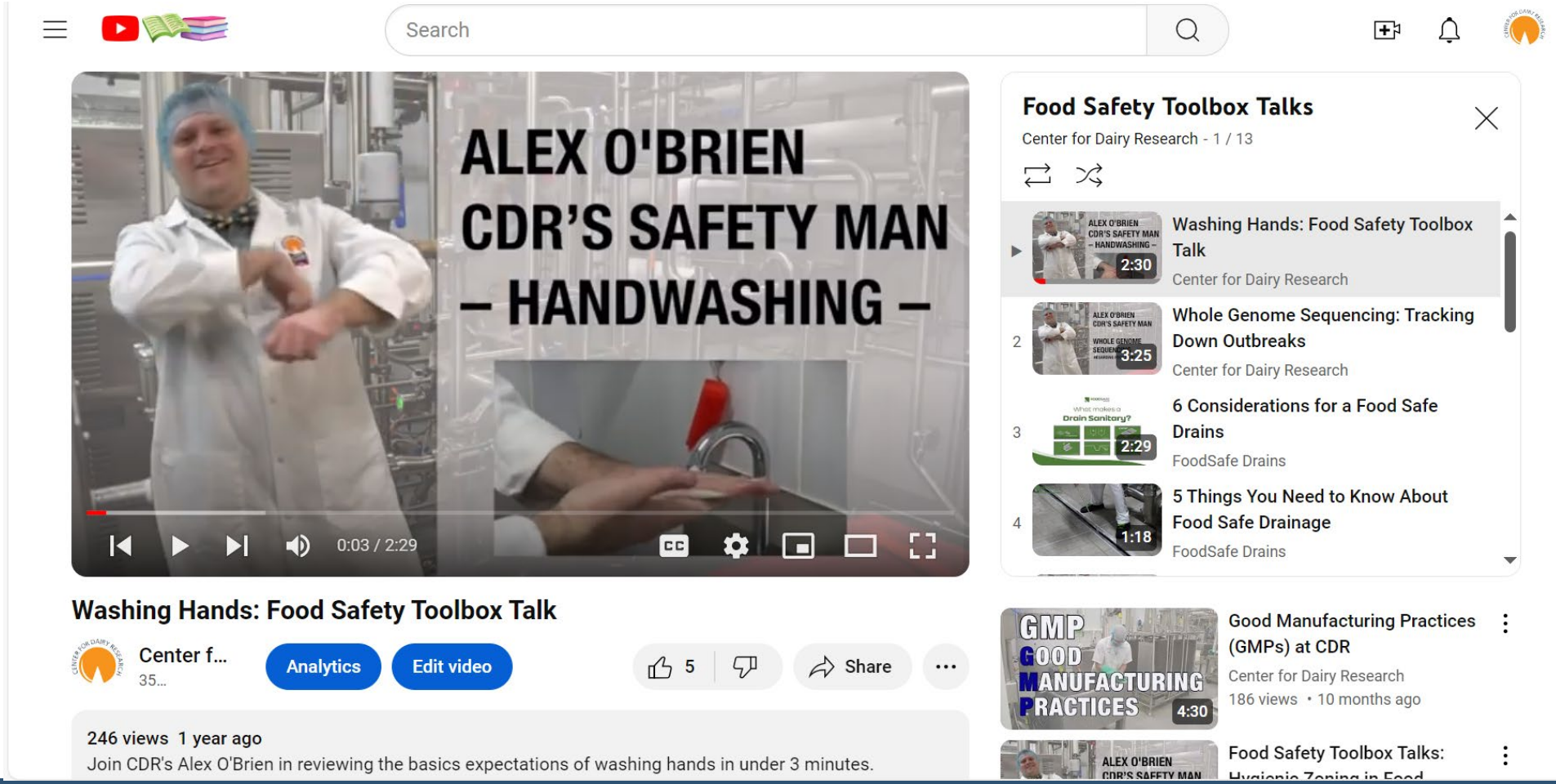


Center for Dairy Research

Youtube Page

- https://www.youtube.com/watch?v=vBPh8OBQ-s4&list=PLB7gkTZx_4TvVrUDgq-AOn9XFFTK51blh&index=2

Center for Dairy Research

Food Safety Page

- Links to articles
- Links to other resources discussed
- Free posters
- One Point Lessons
- Links to videos
- https://www.cdr.wisc.edu/safety-quality

Center for Dairy Research

Available short courses

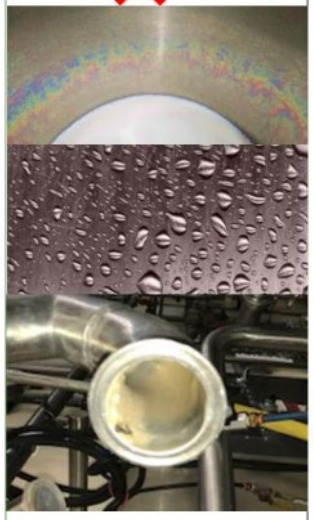
- HACCP
- PCQI
- Advanced Sanitation
- Comprehensive Environmental Monitoring

One Point Lesson Example

Food Safety Page

Visual Inspections
One Point Lesson
XX
Version 1
XX/XX/XXXX

One Point Lesson			
Location	Production Areas		
Objective	Visually Inspect for Proper Sanitation	**Date:** XX/XX/XXXX	**Switch Out:** XX/XX/XXXX
Type	Improvement Cases	**Author** NAME	**Approved By** NAME



All **equipment must always** be visually inspected before use. Personnel must look for:

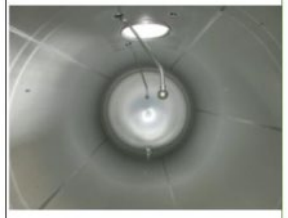
→ **rainbow hues (Protein Residue)**

→ **"hanging" water droplets. (Fat Residue)**

→ **White Chalky residue (Milk Stone)**

If foul odor or Visual inspection fails, equipment must be (re)washed before use. Use a flashlight or UV flashlight to assist in inspection!

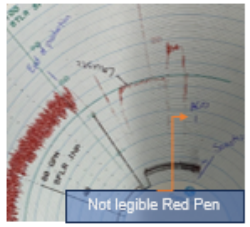
Please document findings!

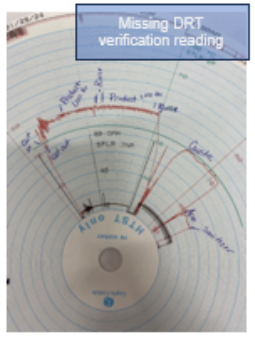


Page **1** of **2**

HTST Charts
One Point Lesson
XXXX
Version 1
XX/XX/XXXX

One Point Lesson			
Location	CDR Pilot Plant Areas		
Objective	Verify HTST Charts	**Date:** XX/XX/XXXX	**Switch Out:** XX/XX/XXXX
Type	Improvement Cases	**Author**	**Approved By**



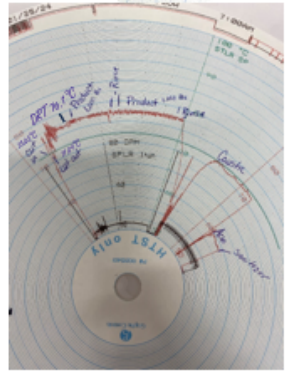


Top things to document when completing HTST paperwork:

1. Proper Stamp or documentation for the intended piece of equipment
   a. Plant Address
   b. Plant #
   c. Regulatory Seal Check
   d. Initials/Signature
2. Check and document that all regulatory seals are present
3. Document Cut In/ Cut Out Temperature
4. Date
5. Document Product being run on chart
6. Document DRT Verification
7. Document any reasons for Diverts
8. All sanitation cycles:
   a. Rinse
   b. Caustic
   c. Rinse
   d. Acid
   e. Rinse
   f. Sanitizer

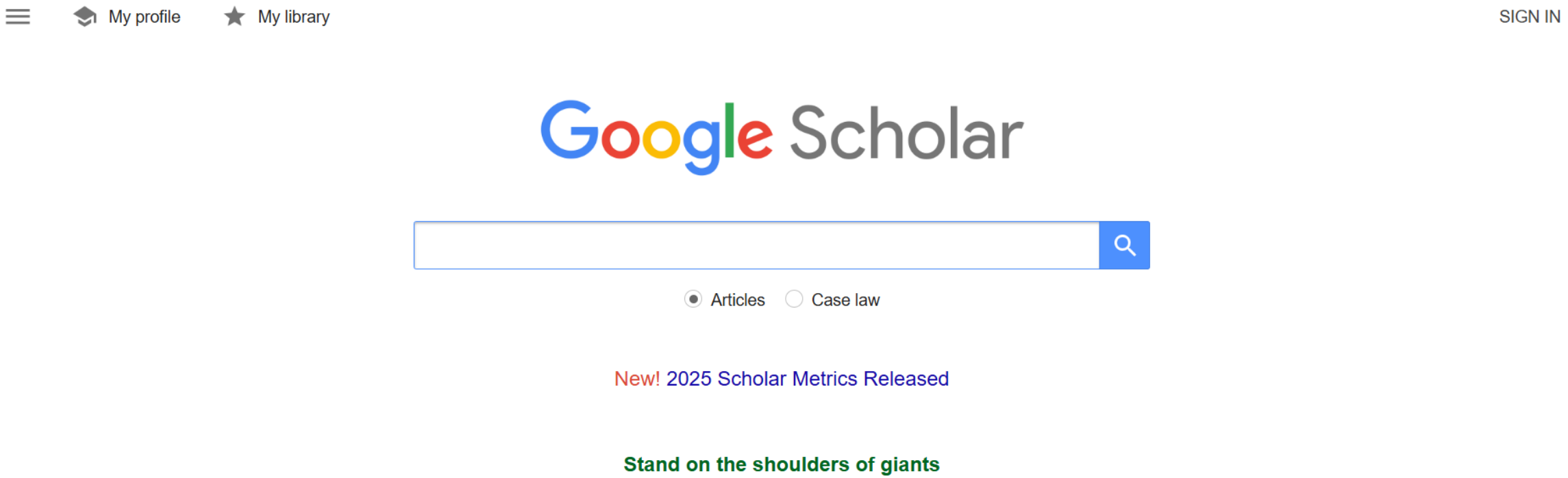
BIG PICTURE:

1. **This chart ensures that microbial pathogens are controlled!**
2. **Ensure red, green, black (all) pen ink is recording properly.**
3. **Have the correct CIP chart style (Batch vs. Pasteurizer)**
4. **Document anything unusual (Explain diverts, any power outages, etc.)**



Page 1 of 2

Google Scholar



Guides to take a look at

- Draft Guidance for Industry: Hazard Analysis and Risk-Based Preventive Controls for Human Food
- **CPG Sec. 555.425 Foods-Adulteration-Involving Hard or Sharp Objects**
- Draft Guidance for Industry: Control of Listeria monocytogenes in Ready-To-Eat Foods
- **FDA Risk Profile: Pathogens and Filth in Spices**
- Draft Guidance for Industry: Control of Listeria monocytogenes in Ready-To-Eat Foods
- **2nd Edition Neogen® Environmental Monitoring Handbook for the Food and Beverage Industries**

Questions?

- Phone: 608-598-9977
- Email: aobrien@cdr.wisc.edu

Thank You to Our Supporters

Wisconsin and US Dairy Farm Families | Dairy Farmers of Wisconsin

National Dairy Council | CDR Industry Team | WCMA

Whole genome sequencing and its use in outbreaks and applications

Craig Hedberg, PhD
University of Minnesota

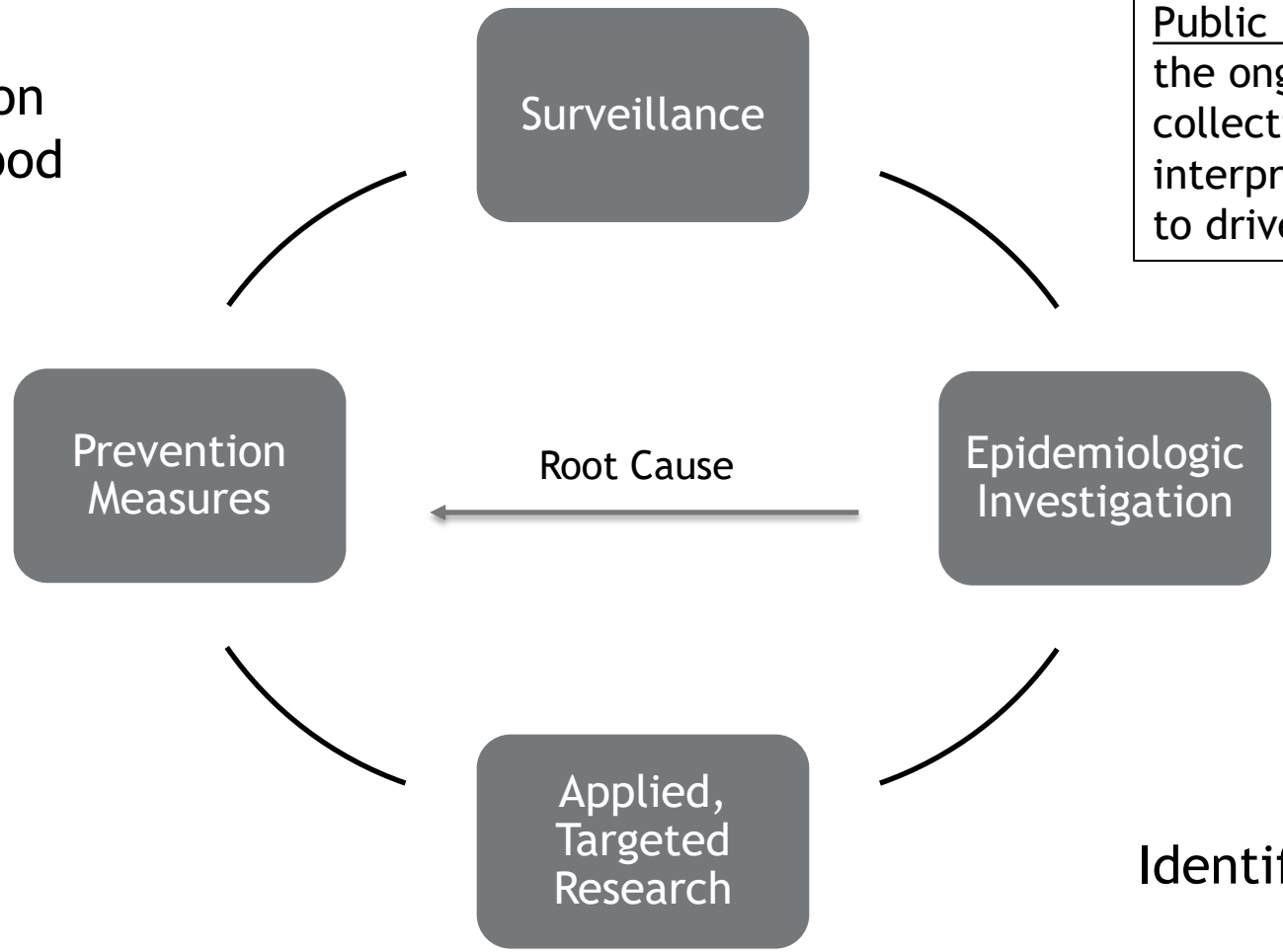
SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MINNESOTA

Objectives

- Understand that whole genome sequencing is a powerful tool for linking human illnesses together, and with food or environmental isolates.
- Understand that routine sampling of food or environments by regulatory agencies may provide a key link to otherwise unexplained illnesses.
- Understand the importance of eliminating persistence of potential foodborne pathogens from production environments.

The Cycle of Public Health Prevention

Provide feedback on effectiveness of food safety systems



Public Health Surveillance: the ongoing, systematic collection, analysis and interpretation of health data to drive action

Identify new hazards

Tauxe RV (2002) *Food Control*

2023 Food Safety Report

Measuring progress toward foodborne illness prevention

Pathogen	Change from baseline (2023 compared with 2016–2018)	Rate in 2023 per 100,000 people	Target rate based on Healthy People 2030 goals
Campylobacter	↑ 22%	19.3	10.9
Cyclospora	↑ 406%	1.3	None
Listeria	↔ No change	0.29	0.22
Salmonella	↔ No change	13.9	11.5
Shigella	↔ No change	4.2	None
STEC Shiga toxin-producing *E. coli*	↑ 25%	5.2	3.7
Vibrio	↑ 64%	1.0	None
Yersinia	↑ 247%	2.5	None

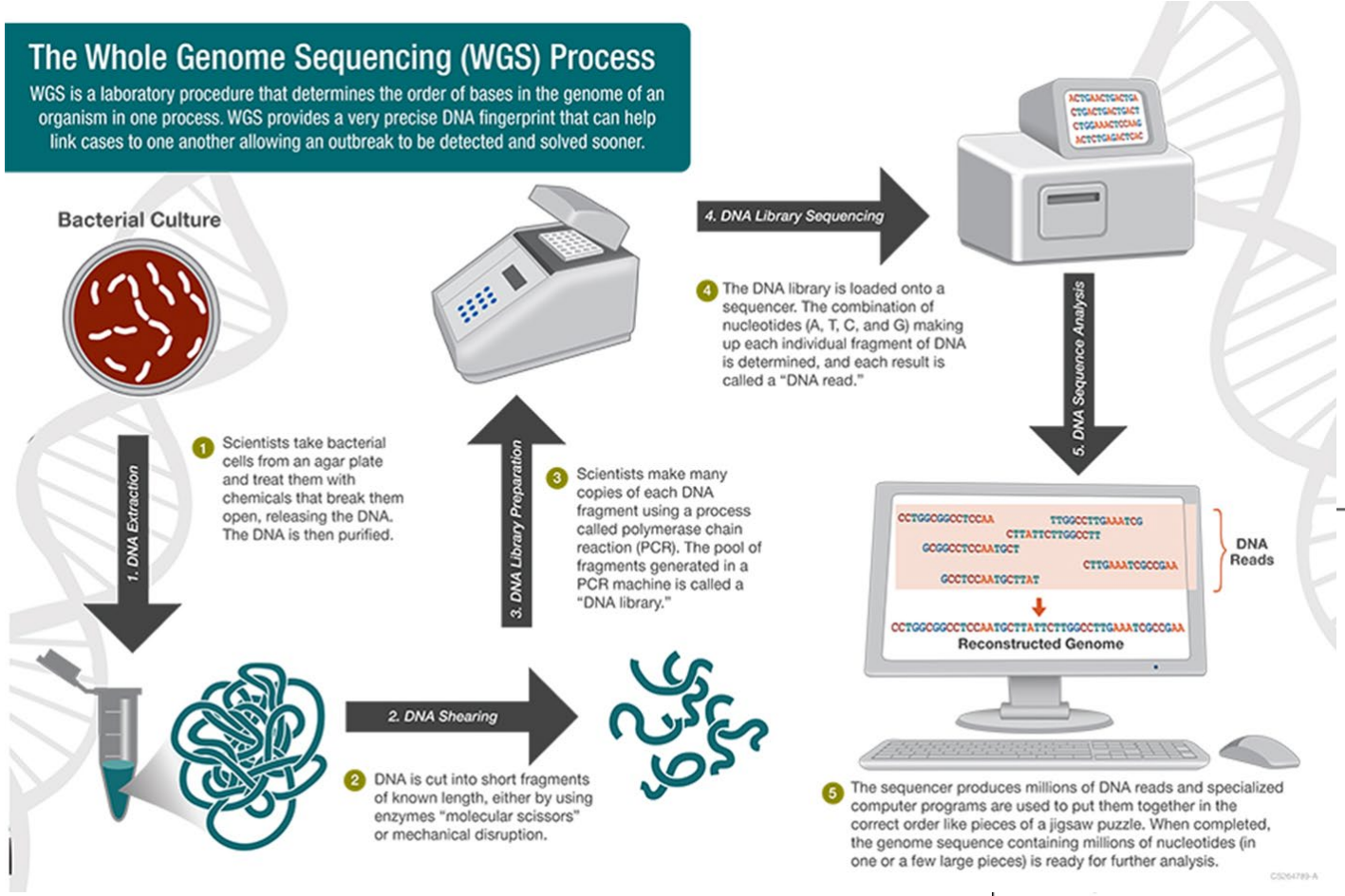
Rates & targets are numbers of infections per 100,000 people per year. They include only domestically acquired infections. Targets based on Healthy People 2030 goals, which were set using average annual incidences during 2016–2018. No change indicates that the 95% credible interval of the percentage change included zero. For more information, visit cdc.gov/FoodNet.

https://www.cdc.gov/foodnet/reports/preliminary-data.html

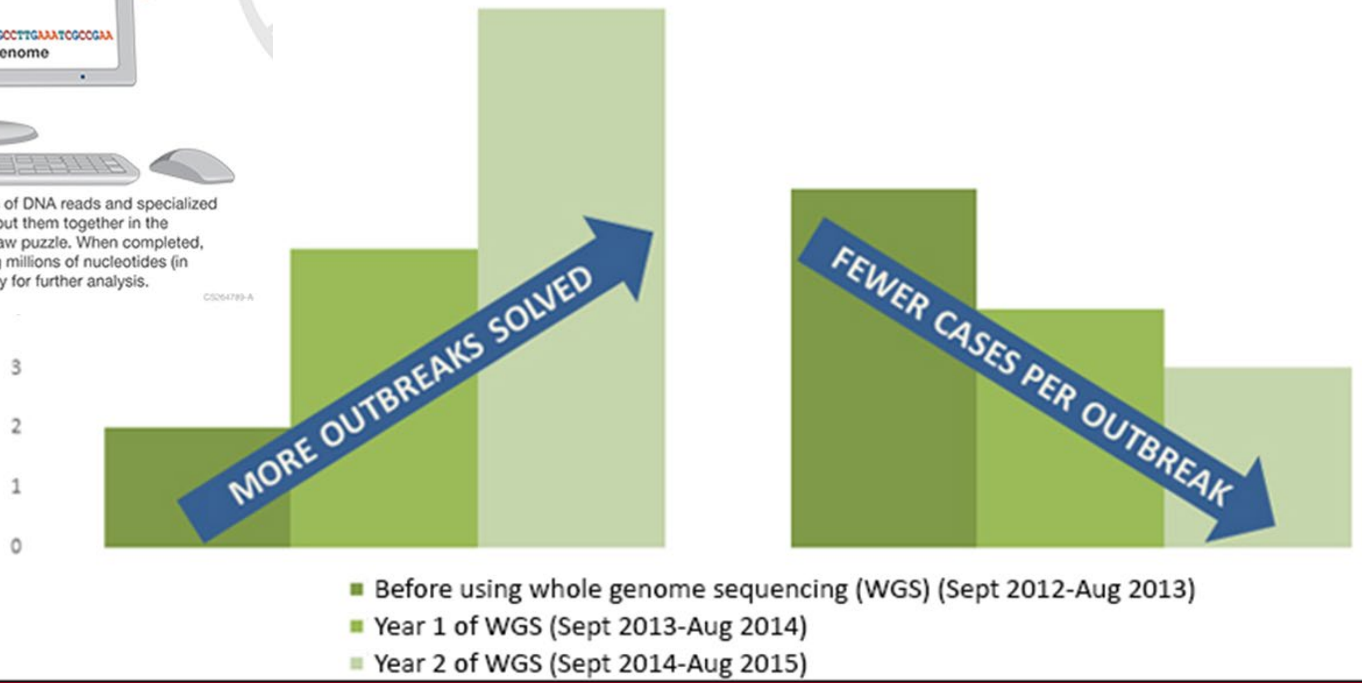
SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MINNESOTA

Improved Investigational Approaches and Tools

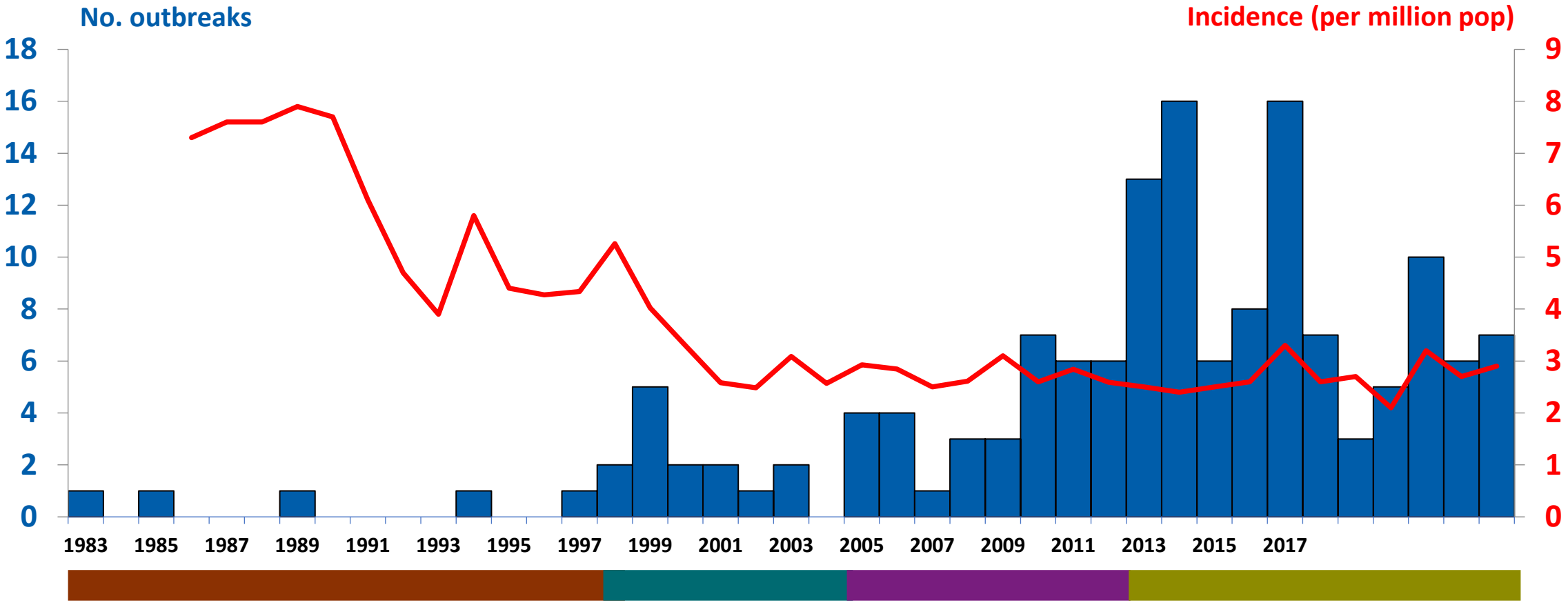
- Laboratory
  - CIDT diagnosis
  - WGS
- Epidemiology
  - Standardized, routine hypothesis generating interviews
  - Population exposure comparisons
  - Informational tracebacks
- Environmental assessments



Whole genome sequencing improves the detection and investigation of foodborne outbreaks



Listeriosis Outbreaks* and Incidence, 1983-2023

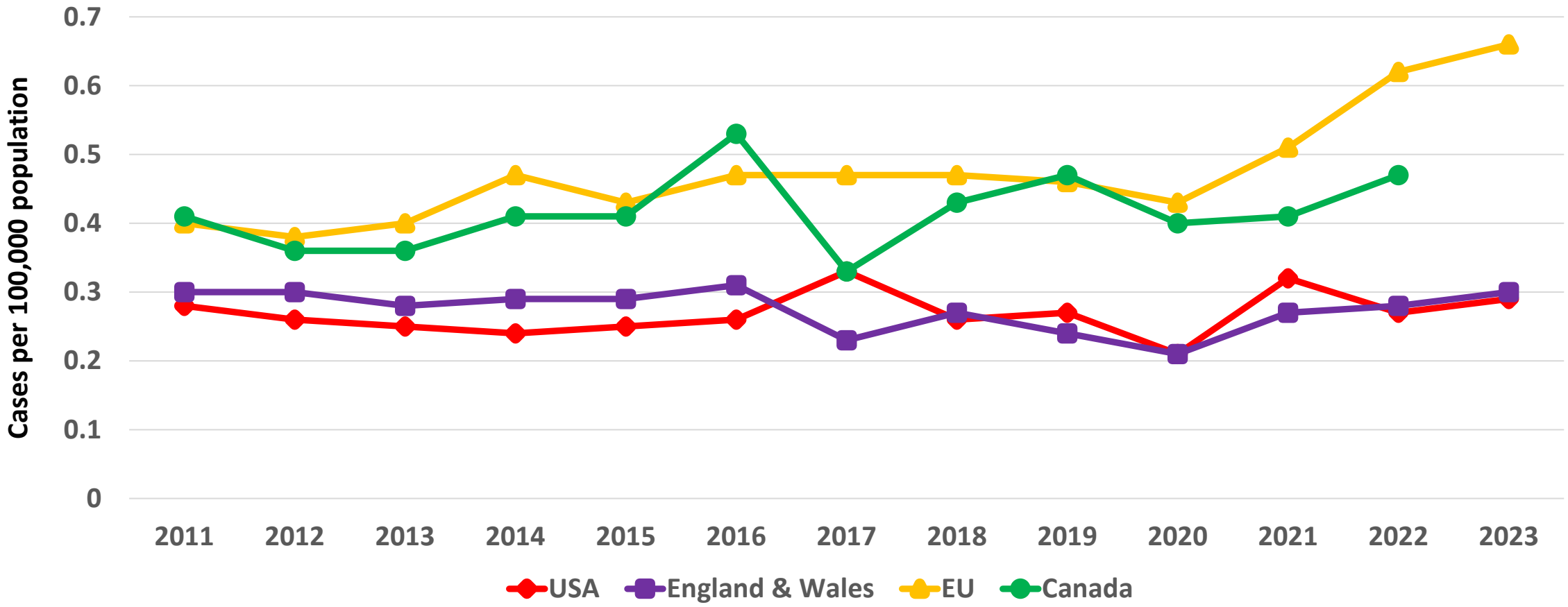


Era	Pre-PulseNet	Early PulseNet	*Listeria* Initiative	WGS
Outbreaks per year	0.3	2.0	4.3	9.0
Median cases per outbreak	69	11.5	6	6

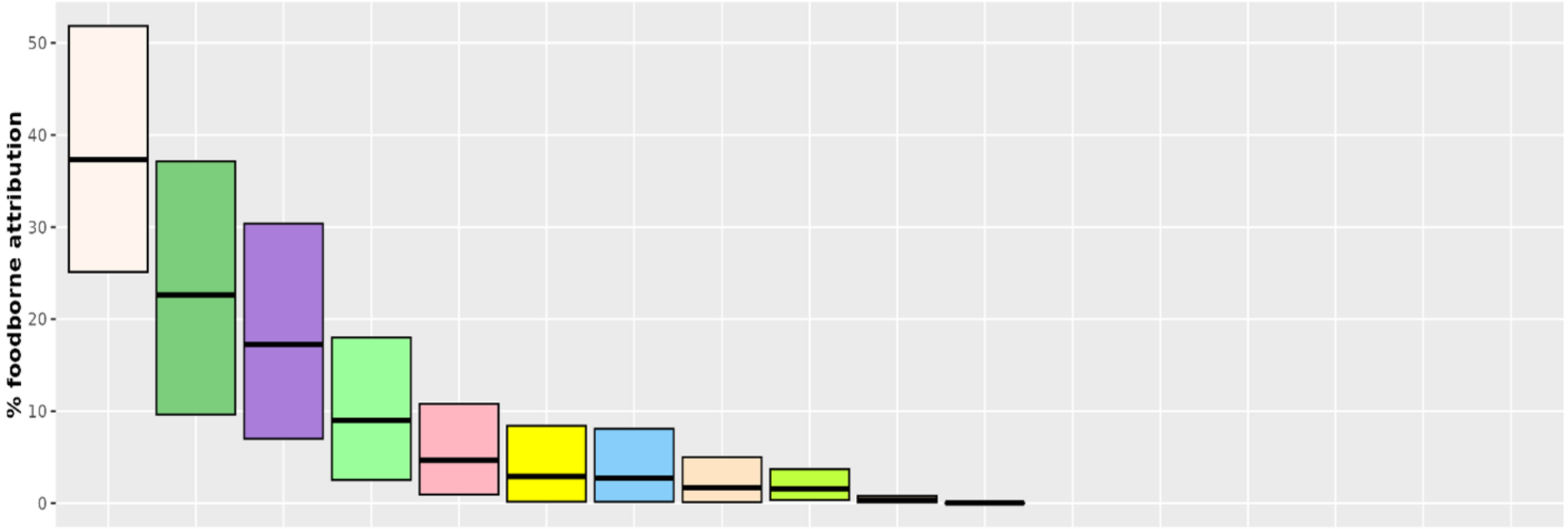
*By Year of Detection

Source: CDC-NORS, FOODNET

Rates of listeriosis in US, England & Wales, EU, France and Canada, 2011-2023

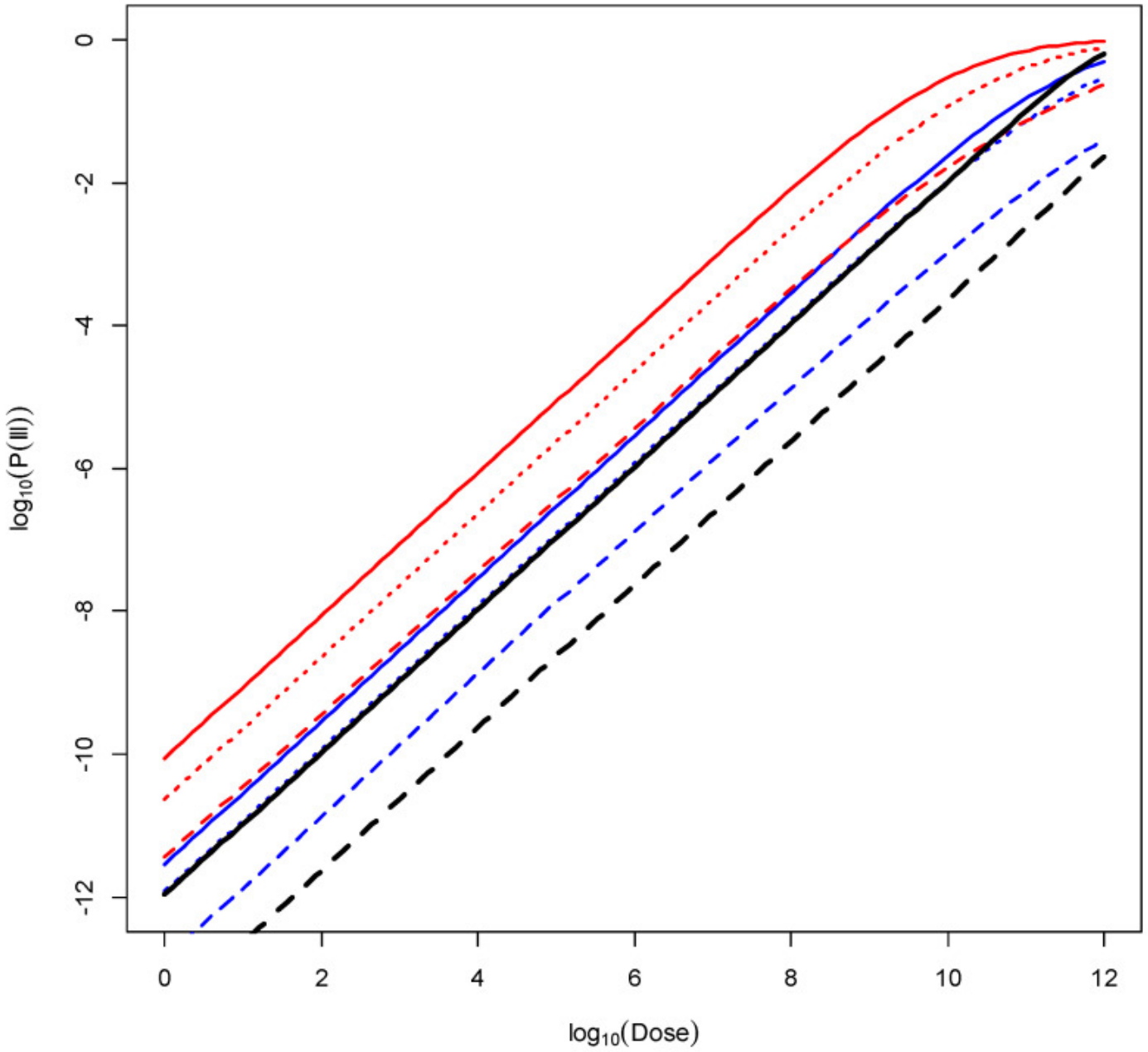


Listeria Attribution to Food Categories, 2022



	Dairy	Vegetable Row Crops	Fruits	Other Produce	Pork	Eggs	Fish	Chicken	Sprouts	Turkey	Beef	Other Meat/ Poultry	Game	Other Seafood	Grains-Beans	Oils-Sugars	Seeded Vegetables
% attribution	37.3	22.6	17.3	9.0	4.7	2.9	2.7	1.7	1.5	0.3	< 0.1	--	--	--	--	--	--
cumulative attribution	77.2%			22.8%													

https://www.cdc.gov/foodsafety/ifsac/pdf/P19-2021-report-TriAgency-508.pdf



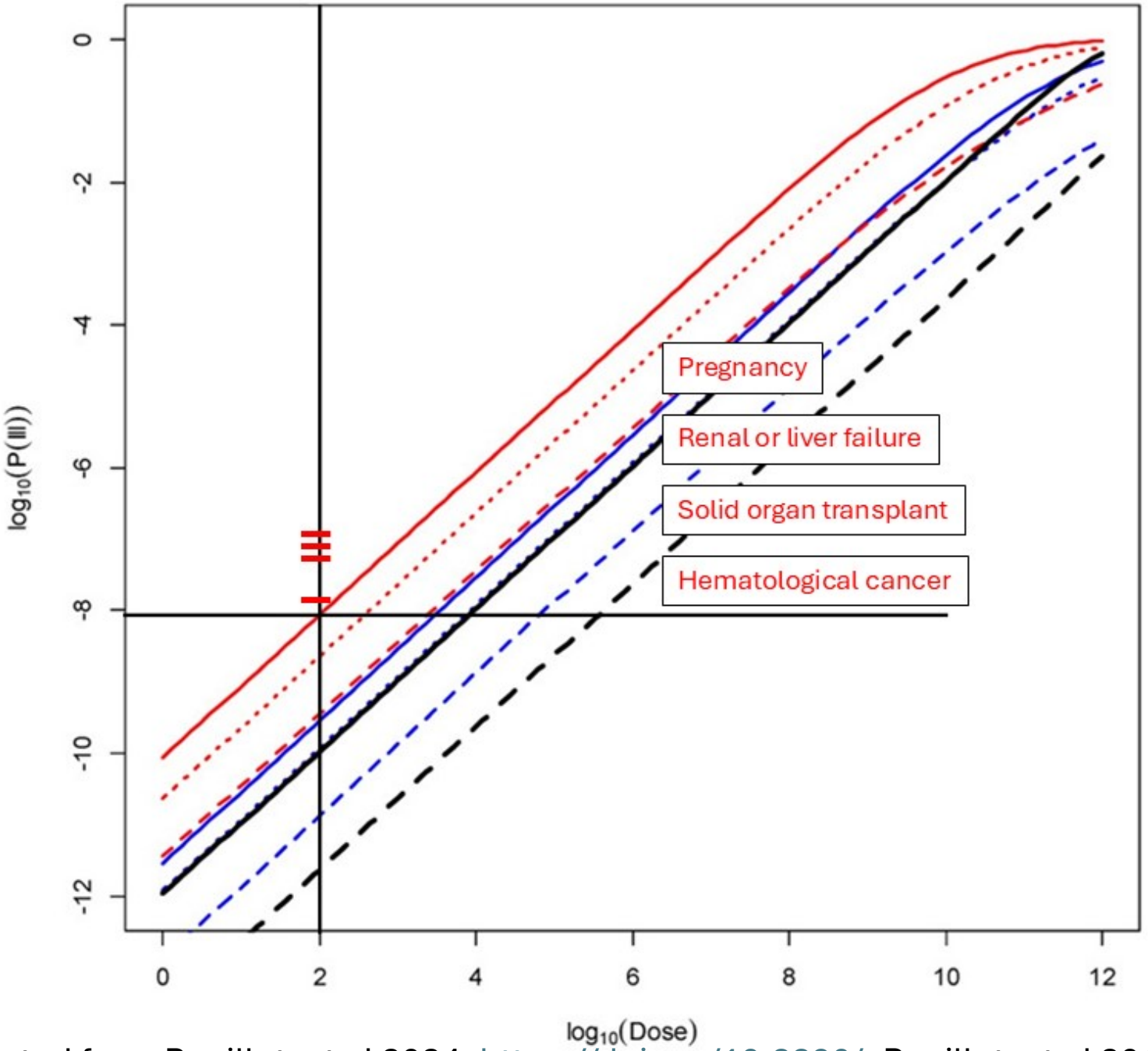
- This figure presents dose response curves for *Listeria monocytogenes* (LM), based on population susceptibility and strain virulence.
- The solid red line represents women >75 exposed to more virulent strains.

- Note, both scales are logarithmic:

  For dose,
  - $Log_{10}(0)$ = 1 LM/gram
  - $Log_{10}(2)$= 100 LM/gram

  For probability of illness,
  - $Log_{10}(0)$ = 100%
  - $Log_{10}(-2)$ = 1%

Pouillot, et al. 2024, https://doi.org/10.3390/



- At a limit of 100 LM/gram the risk of illness is generally on the order of 1/100 million servings. Certain high risk groups highlighted here, pregnancy, renal or liver failure, solid organ transplant, and hemotologic cancer may be at higher risk, in the range of 1/10 million servings.
- As depicted on this curve for every order of magnitude increase in dose, the risk of illness also increases one order of magnitude.
- For example, going from100 to 1000 LM/gram increases the risk of illness from 1 in 100 million servings to 1 in 10 million servings.

Adapted from Pouillot, et al 2024, https://doi.org/10.3390/, Pouillot, et al 2015, doi:10.1111/risa12235

LISTERIA AND BLUE BELL ICE CREAM

Contaminated production facilities and illnesses linked to Blue Bell Creameries

CDC recommends that people not eat, serve, or sell any recalled Blue Bell brand products. This complicated investigation of a listeriosis outbreak involved serious illnesses from 2010 through 2015 linked to two Blue Bell production facilities.

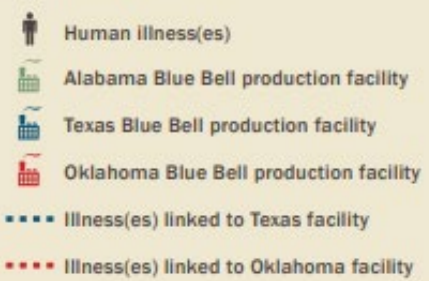
Kansas
- 5 cases in one hospital linked to ice cream made in Texas facility, resulting in 3 deaths

Oklahoma
- 1 case linked to ice cream made in Oklahoma facility
- *Listeria* found in ice cream products and in Oklahoma facility where they were made

Arizona
- 1 case linked to ice cream made in Oklahoma facility

Alabama
- *Listeria* found in Alabama facility
- No cases linked to Alabama facility

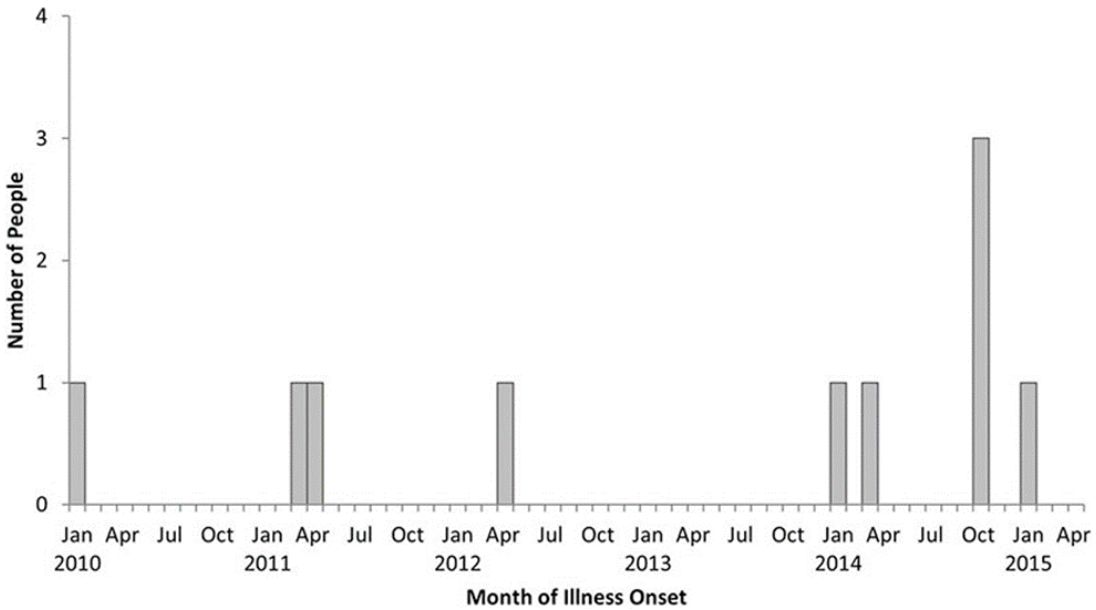
Texas
- 3 cases in separate hospitals linked to ice cream made in Oklahoma facility
- *Listeria* found in ice cream products made in Texas facility



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Learn more: www.cdc.gov/listeria/bluebell

CS257655B



Quantification of Listeria in Blue Bell Ice Cream

- High prevalence, low levels of L. monocytogenes found in 2,320 tested ice cream samples produced November 2014 to March 2015 on production line A.
- High number of individual consumers exposed to low levels of L. monocytogenes.
- Ice cream from production line A resulted in four reported ice cream–associated cases of listeriosis, including two deaths, among members of a highly susceptible population of elderly persons hospitalized for other medical conditions.

TABLE 3. *Percentage of ice cream samples yielding various levels of* L. monocytogenes

L. monocytogenes level[a]	No. of samples	% of samples	Cumulative % of samples
<0.03	13	0.56	0.56
(0.03, 0.1]	73	3.15	3.71
(0.1, 1]	242	10.43	14.14
(1, 5]	986	42.50	56.64
(5, 10]	479	20.64	77.28
(10, 20]	349	15.04	92.32
(20, 50]	140	6.03	98.35
(50, 100]	34	1.47	99.82
(100, 200]	1	0.04	99.86
(200, 400]	3	0.13	100

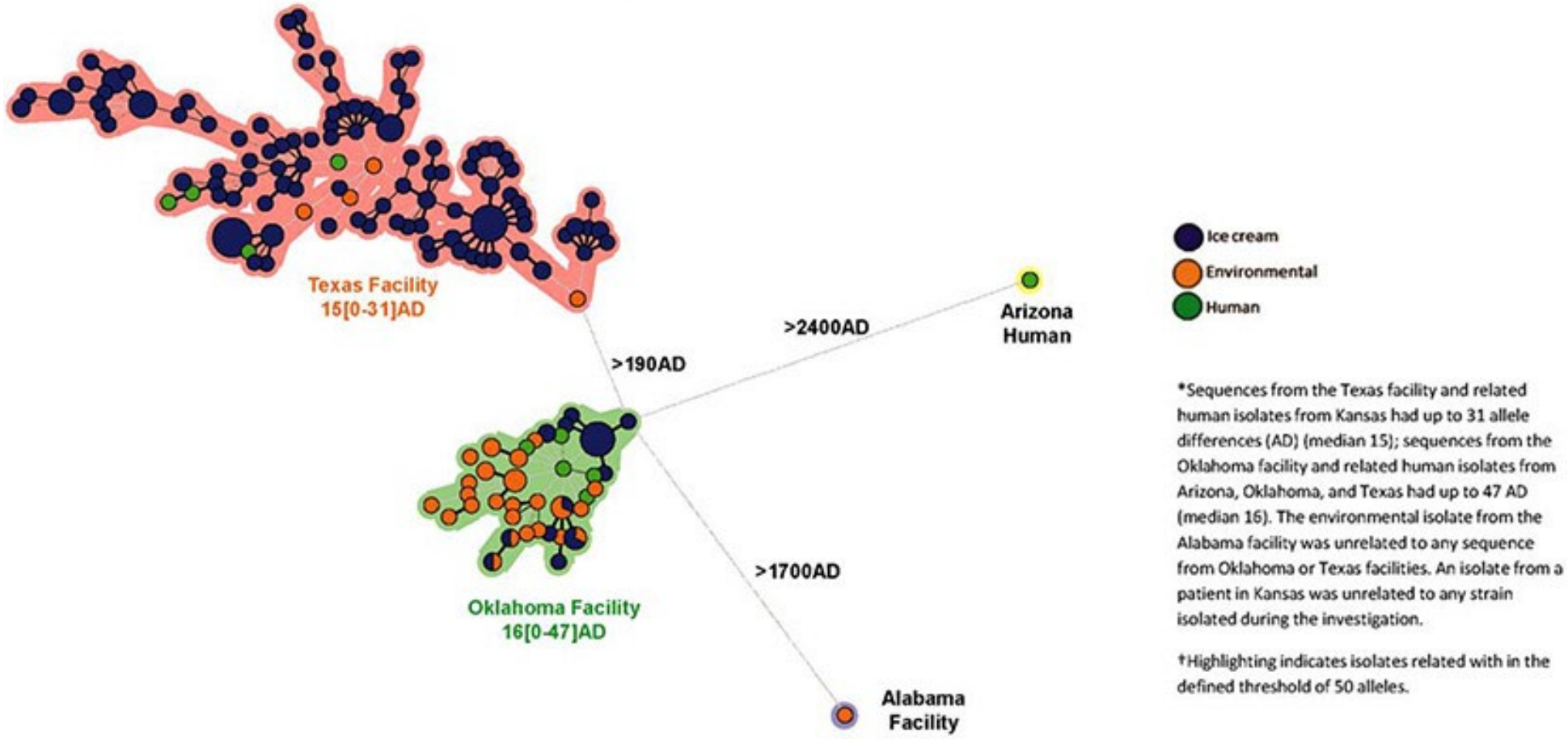
[a] Levels are given in MPN per gram except for six samples for which direct plating results (CFU per gram) were used.

https://doi.org/10.4315/0362-028X.JFP-16-208

Whole Genome Sequencing of Listeria in Blue Bell Ice Cream

No. of isolates per state

	Texas	Alabama	Oklahoma	Kansas	Arizona
Food	147	0	21	0	0
Environmental	4	1	30	0	0
Human	3	0	1	5	1



*Sequences from the Texas facility and related human isolates from Kansas had up to 31 allele differences (AD) (median 15); sequences from the Oklahoma facility and related human isolates from Arizona, Oklahoma, and Texas had up to 47 AD (median 16). The environmental isolate from the Alabama facility was unrelated to any sequence from Oklahoma or Texas facilities. An isolate from a patient in Kansas was unrelated to any strain isolated during the investigation.

†Highlighting indicates isolates related with in the defined threshold of 50 alleles.

[Clin Infect Dis. 2023 Jan 6;76(1):89-95. doi: 10.1093/cid/ciac550

Multistate Foodborne Outbreak Notices

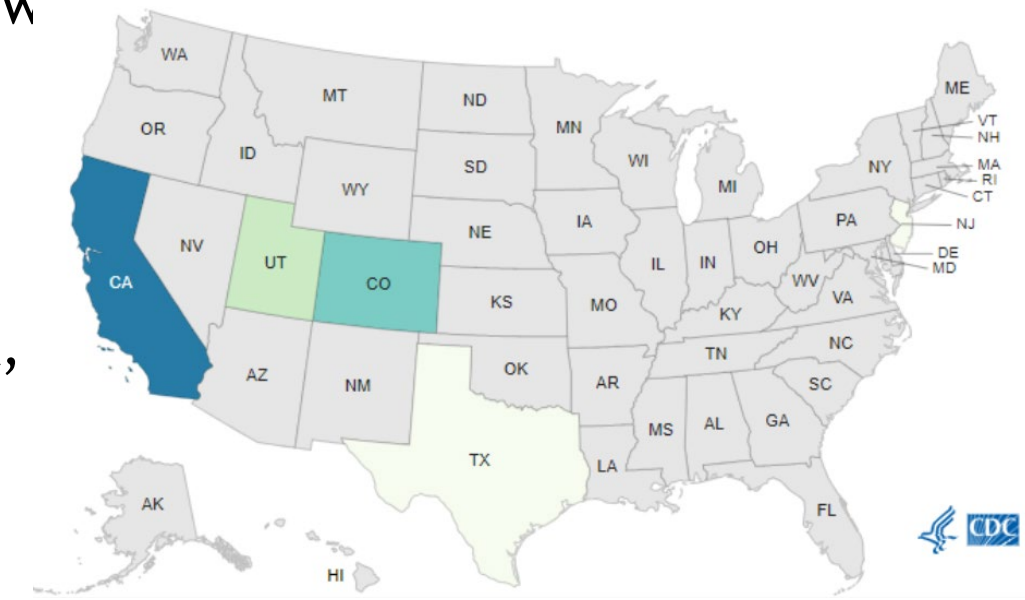
Contaminated Food	Germ	Year
Frozen Sprouted Beans	*Salmonella* Anatum	2025
Chicken Fettuccine Alfredo Meals	*Listeria monocytogenes*	2025
Pistachio Cream	*Salmonella* Oranienburg	2025
Supplement Shakes	*Listeria monocytogenes*	2025
Ready-to-Eat Meat and Poultry Products	*Listeria monocytogenes*	2024
Cucumbers	*Salmonella* Typhimurium	2024
Raw Cheddar Cheese	*E. coli* O157	2024
Queso Fresco and Cotija Cheese	*Listeria monocytogenes*	2024

https://www.cdc.gov/foodborne-outbreaks/active-investigations/all-foodborne-outbreak notices.html?CDC_AAref_Val=https://www.cdc.gov/foodsafety/outbreaks/lists/outbreaks-list.html

E. coli Outbreak Linked to Raw Cheddar Cheese

March 26, 2024:

- Cases: 11; 10/18/23, to 1/29/24.
- Hospitalizations: 5
- Deaths: 0
- States: 5
- Of the 10 people interviewed, 7 (70%) specifically reported eating Raw Farm brand raw cheddar cheese.
- CDC warned against all raw cheese products from this firm. The outbreak investigation is now over, but this product has a long shelf life.
- As part of this investigation, officials in CO, CA, and UT collected various RAW FARM-brand products for testing, and all samples were negative for E. coli.



https://www.fda.gov/food/outbreaks-foodborne-illness/outbreak-investigation-e-coli-o157h7-raw-cheddar-cheese-february-2024

U.S. Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 74 / No. 27
July 24, 2025

Outbreak of *Salmonella* Typhimurium Infections Linked to Commercially Distributed Raw Milk — California and Four Other States, September 2023–March 2024

Eva Weinstein, MPH[1]; Katherine Lamba, MPH[1]; Christian Bond[1]; Vi Peralta, MPH[1]; Michael Needham, MPH[1]; Stephen Beam, PhD[2]; Francine Arroyo, MSc[1]; David Kiang, PhD[1]; Yishi Chen, PhD[1]; Seema Shah, MD[3]; Mark E. Beatty, MD[3]; Stephen Klish, MPH[4]; Akiko Kimura, MD[1]

Abstract

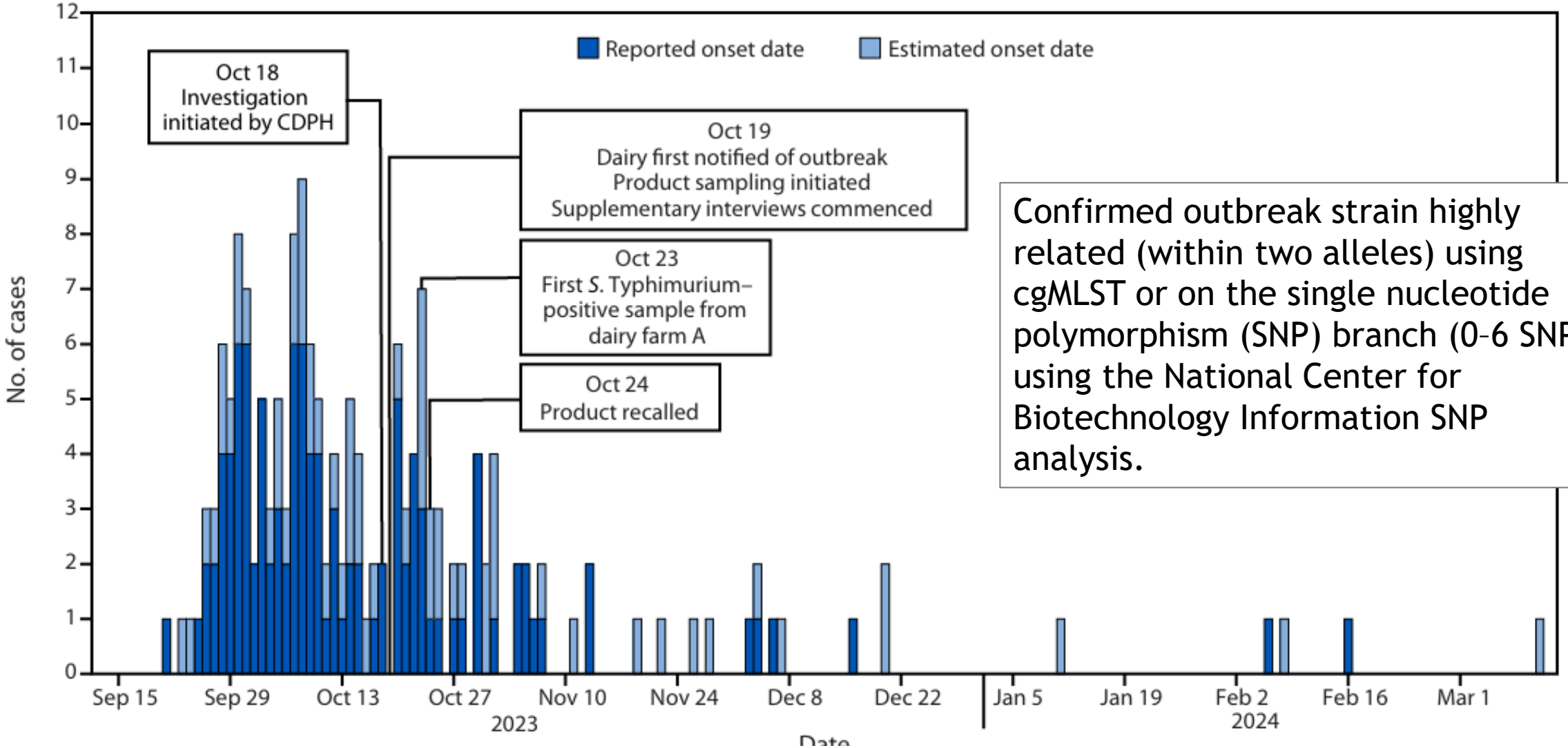
Unpasteurized (raw) milk has been linked to foodborne illness outbreaks caused by *Escherichia coli* bacteria and certain species of *Brucella*, *Campylobacter*, *Cryptosporidium*, and *Salmonella*. In October 2023, the County of San Diego Health and Human Services Agency notified the California Department of Public Health (CDPH) of eight cases of salmonellosis in persons who reported consuming brand A raw milk, produced exclusively by dairy farm A. A total of 171 outbreak-associated *Salmonella* Typhimurium cases were

Introduction

In California, unpasteurized (raw) milk is regulated by the California Department of Food and Agriculture (CDFA). CDFA requires raw milk dairy farms to hold a permit and pass dairy farm and bottling sanitation inspections. Livestock must be tested for brucellosis and tuberculosis annually. Raw milk must meet strict bacterial and cell count limits and be kept at 45°F (7.2°C) or below (*1*). Raw milk may be legally sold at retail stores but requires warning labels alerting customers of potential contamination by disease-causing microorganisms

MMWR Morb Mortal Wkly Rep. 2025 Jul 24;74(27):433-438. doi: 10.15585/mmwr.mm7427a1.

FIGURE. Outbreak of *Salmonella* Typhimurium linked to consumption of raw milk products, by reported* or estimated† illness onset date (N = 171) — California§ and four other states,¶ September 2023–March 2024



Confirmed outbreak strain highly related (within two alleles) using cgMLST or on the single nucleotide polymorphism (SNP) branch (0–6 SNPs) using the National Center for Biotechnology Information SNP analysis.

MMWR Morb Mortal Wkly Rep. 2025 Jul 24;74(27):433-438. doi: 10.15585/mmwr.mm7427a1.

Outbreak of *Salmonella* Typhimurium Infections Linked to Commercially Distributed Raw Milk — California and Four Other States, September 2023 March 2024

Public Health Response

- October 24, 2023, in response to the epidemiologic evidence and *Salmonella*-positive raw milk sample, dairy farm A halted production and voluntarily recalled its raw milk.
- Recall included fluid milk and heavy cream with best-by dates October 11–November 6, 2023;
  - recalled lots were destroyed or held at the facility for aged cheese production, with cheese to be held under impound by CFDA.
  - Raw cheese made from the contaminated milk lots tested positive after 60 days of aging and was not distributed for retail sale.

MMWR Morb Mortal Wkly Rep. 2025 Jul 24;74(27):433-438. doi: 10.15585/mmwr.mm7427a1.

PulseNet Cluster Code Assignment at the National Level

Organism	*Salmonella*	*Escherichia*	*Shigella*	*Listeria*	*Campylobacter*
# days for search, based on Upload Date	60 days	60 days	60 days	120 days	60 days
case threshold	7+ Clinical cases	5+ Clinical cases	5+ Clinical cases	3+ Clinical cases	5+ Clinical cases
methods used	cgMLST	cgMLST	cgMLST	cgMLST/wgMLST	cgMLST
Cluster Coding Criteria*	Within 10 alleles with at least 3 cases within 5 alleles; 3+ from single state	Within 10 alleles with at least 3 cases within 5 alleles	Within 10 alleles with at least 3 cases within 5 alleles	within 7 alleles by cgMLST; further refined by wgMLST	Within 10 alleles
Notes about other dates	30% typically have isolation dates within the past 50 days	30% typically have isolation dates within the past 50 days	30% typically have isolation dates within the past 50 days	Include historical isolates related within 25 alleles by wgMLST	50% typically have isolation dates within the past 30 days
Single and multi-state clusters	Single-state clusters are not coded	Only O157 single-state clusters may be coded	Single-state clusters are not coded	Single-state clusters are not coded	Single-state clusters are not coded
Additional Notes per Organism	Enteritidis, Newport, and Javiana: 10 clinical cases within 5 alleles; Common sequence types are monitored, not coded	-	May include cases within a wider allele range due to person-to-person transmission	-	-

*Rare serotypes, seasonality and matches to nonhuman entries are considered. May go down to 5+ for *Salmonella* and 3+ for *E. coli* for rarer serotypes or slower months.

PulseNet Cluster Code Assignment at the National Level

Organism	*Salmonella*	*Escherichia*	*Shigella*	*Listeria*	*Campylobacter*
# days for search, based on Upload Date	60 days	60 days	60 days	120 days	60 days
case threshold	7+ Clinical cases	5+ Clinical cases	5+ Clinical cases	3+ Clinical cases	5+ Clinical cases
methods used	cgMLST	cgMLST	cgMLST	cgMLST/wgMLST	cgMLST
Cluster Coding Criteria*	Within 10 alleles with at least 3 cases within 5 alleles; 3+ from single state	Within 10 alleles with at least 3 cases within 5 alleles	Within 10 alleles with at least 3 cases within 5 alleles	within 7 alleles by cgMLST; further refined by wgMLST	Within 10 alleles
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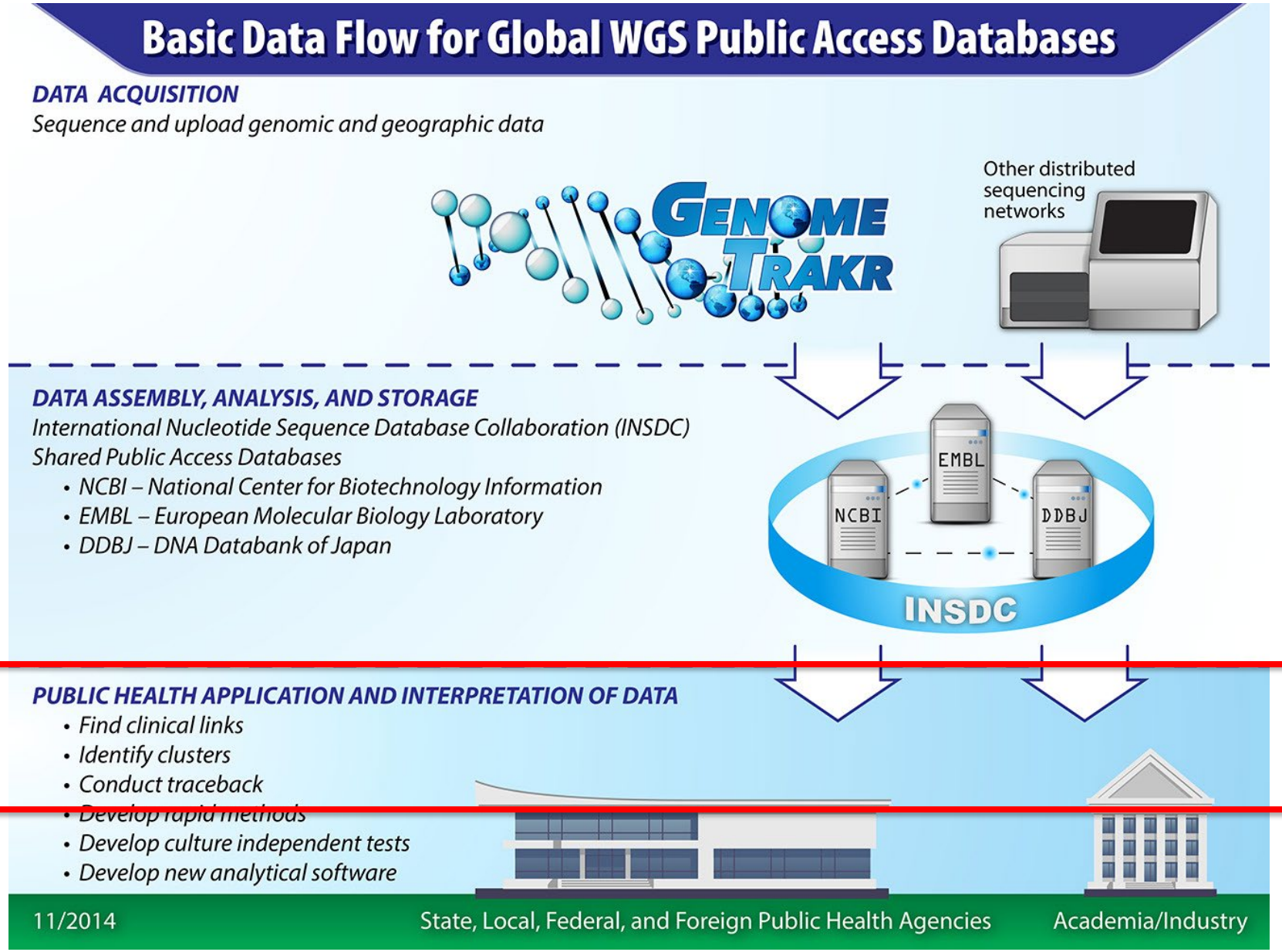
Additional Notes per Organism	Enteritidis, Newport, and Javiana: 10 clinical cases within 5 alleles; Common sequence types are monitored, not coded	-	May include cases within a wider allele range due to person-to-person transmission	-	-

*Rare serotypes, seasonality and matches to nonhuman entries are considered. May go down to 5+ for *Salmonella* and 3+ for *E. coli* for rarer serotypes or slower months.



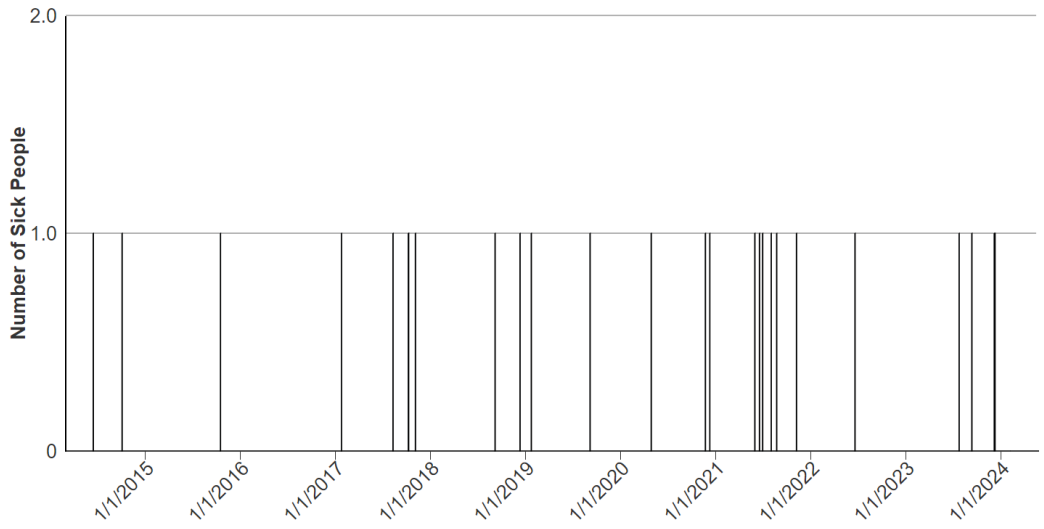
https://doi.org/10.1016/j.meegid.2019.04.026

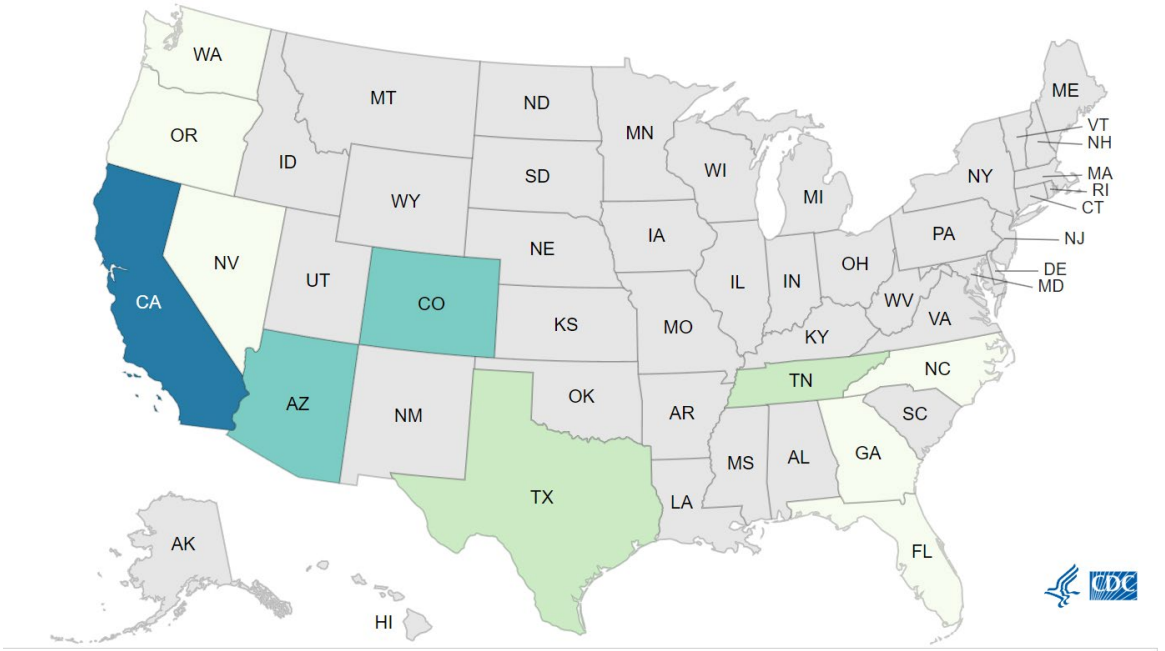
Whole genome sequencing uses for foodborne contamination and compliance: Discovery of an emerging contamination event in an ice cream facility using whole genome sequencing

https://doi.org/10.1016/j.meegid.2019.04.026

Listeria Outbreak Linked to Queso Fresco and Cotija Cheese - February 2024

Fast Facts
Cases: 26
Hospitalizations: 23
Deaths: 2
States: 11

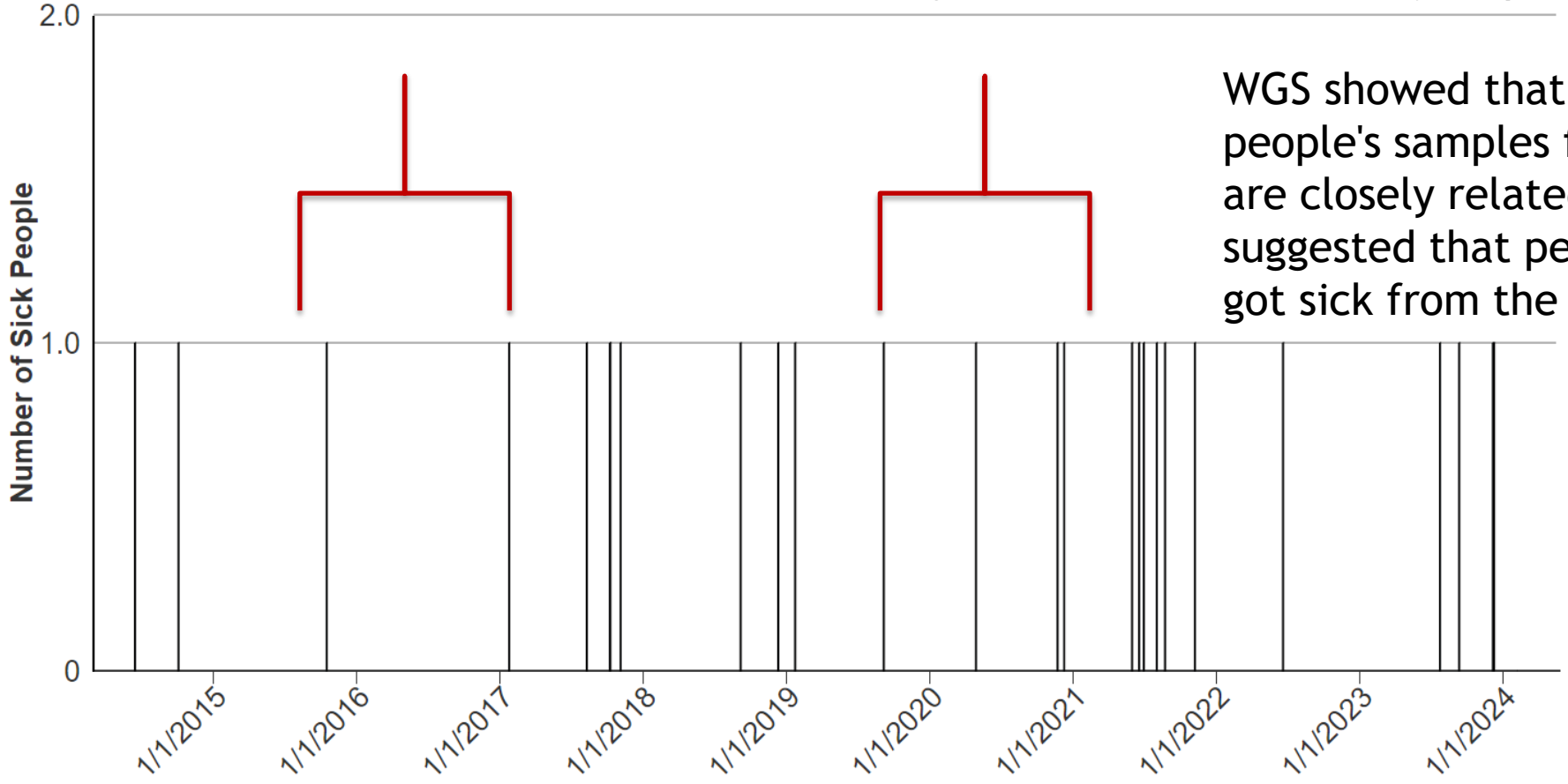




https://www.cdc.gov/listeria/outbreaks/cheese-02-24.html

Listeria Outbreak Linked to Queso Fresco and Cotija Cheese - February 2024

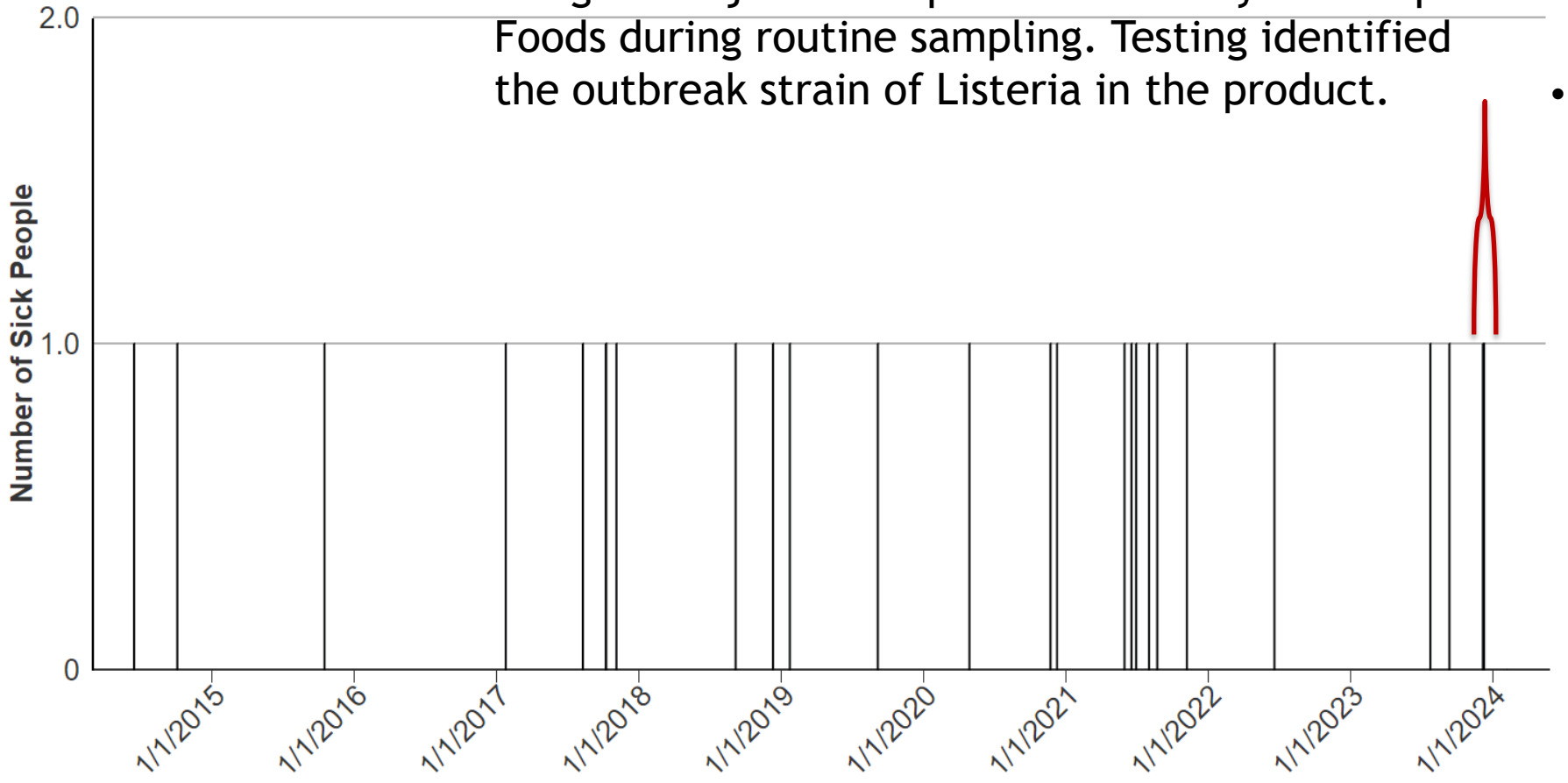
CDC investigated this outbreak in 2017 and 2021. Epidemiologic evidence in previous investigations identified queso fresco and other similar cheeses as a potential source of the outbreak, but there was not enough information to identify a specific brand.



WGS showed that bacteria from sick people's samples from 2014 to present are closely related genetically. This suggested that people in this outbreak got sick from the same food.

Listeria Outbreak Linked to Queso Fresco and Cotija Cheese - February 2024

- In January 2024, the Hawaii State Department of Health's Food and Drug Branch collected a sample of aged cotija cheese product made by Rizo-López Foods during routine sampling. Testing identified the outbreak strain of Listeria in the product.



- FDA conducted inspections at the Rizo-López Foods facility and collected food and environmental samples for testing. FDA found the outbreak strain from two environmental samples that were collected at the facility.

Listeria Outbreak Linked to Queso Fresco and Cotija Cheese - February 2024

Summary

Company Announcement Date:
January 11, 2024
FDA Publish Date:
January 11, 2024
Product Type:
Food & Beverages Dairy
Reason for Announcement:
Potential Listeria monocytogenes contamination.
Company Name:
Rizo Lopez Foods, Inc.
Brand Name:
Rizo Bros California Creamery
Product Description:
Aged Cojita Mexican Grating Cheese

- To date, no confirmed illnesses related to this product have been reported.
- The recall was a result of a routine sampling program by the Hawaii State Department of Health's Food and Drug Branch on Wednesday, January 3rd which revealed that the finished product contained the bacteria.

Listeria Outbreak Linked to Queso Fresco and Cotija Cheese - February 2024

Summary
Company Announcement Date:
February 05, 2024
FDA Publish Date:
February 06, 2024
Product Type:
Food & Beverages Dairy
Reason for Announcement:
Foodborne Illness. Expanded recall for potential Listeria monocytogenes contamination.
Company Name:
Rizo Lopez Foods, Inc.
Brand Name:
Rizo Brothers California Creamery
Product Description:
Cheese, Yogurt, Sour cream

- State and local public health officials interviewed people about the foods they ate in the month before they got sick.
- Of the 22 people interviewed, 16 (73%) reported eating queso fresco, cotija, or other similar cheeses.
- Among people who remembered specific brands, four people reported eating brands made by Rio Lopez.

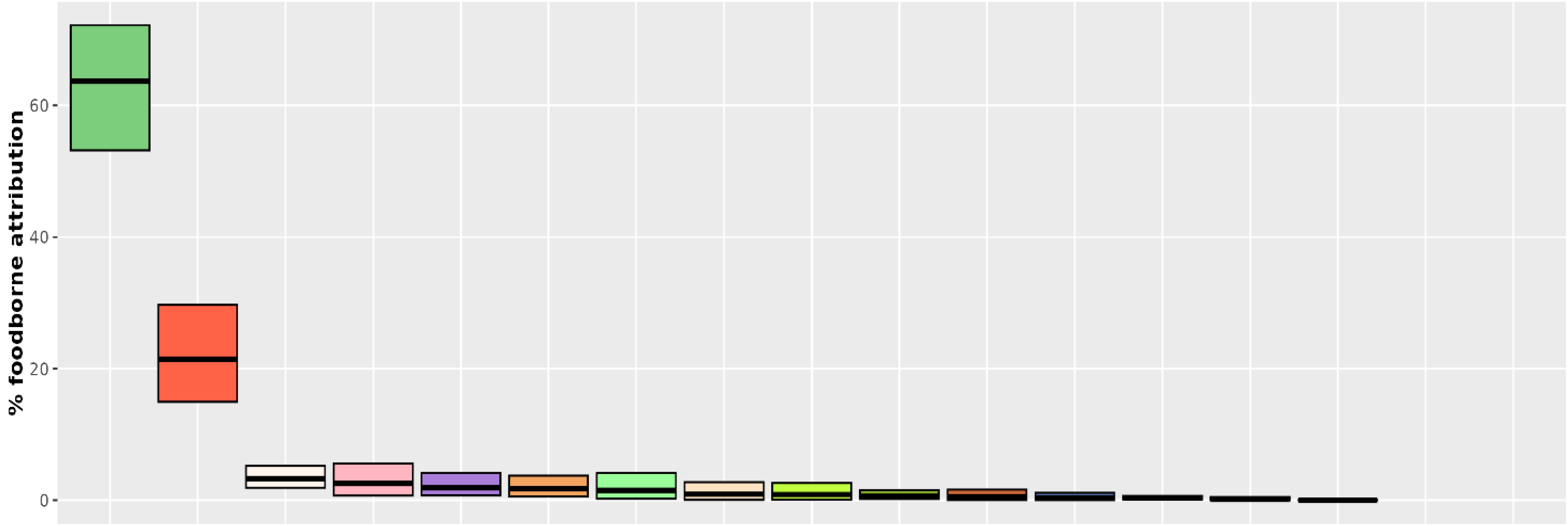
Objectives

- Understand that whole genome sequencing is a powerful tool for linking human illnesses together, and with food or environmental isolates.
- Understand that routine sampling of food or environments by regulatory agencies may provide a key link to otherwise unexplained illnesses.
- Understand the importance of eliminating persistence of potential foodborne pathogens from production environments.

Thank you
Questions?

Craig Hedberg: hedbe005@umn.edu

E. coli O157:H7 Attribution to Food Categories, 2022



	Vegetable Row Crops	Beef	Dairy	Pork	Fruits	Other Meat/ Poultry	Other Produce	Chicken	Sprouts	Seeded Vegetables	Grains-Beans	Other Seafood	Game	Fish	Turkey	Eggs	Oils-Sugars
% attribution	63.7	21.4	3.3	2.5	1.9	1.8	1.5	0.9	0.9	0.7	0.5	0.4	0.3	0.1	< 0.1	--	--
cumulative attribution	85.1%		14.8%														

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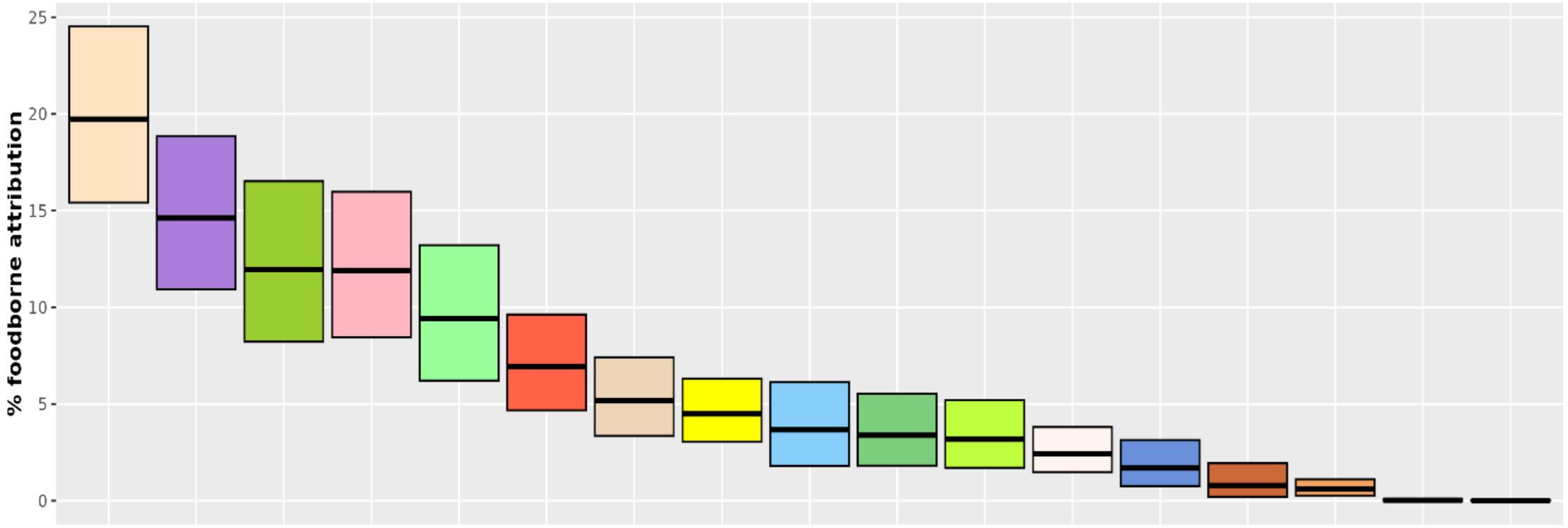
https://www.cdc.gov/foodsafety/ifsac/pdf/P19-2021-report-TriAgency-508.pdf

Salmonella Attribution to Food Categories, 2022



	Chicken	Fruits	Seeded Vegetables	Pork	Other Produce	Beef	Turkey	Eggs	Fish	Vegetable Row Crops	Sprouts	Dairy	Other Seafood	Grains-Beans	Other Meat/ Poultry	Oils-Sugars	Game
% attribution	19.7	14.6	12.0	11.9	9.4	6.9	5.2	4.5	3.7	3.4	3.2	2.4	1.7	0.8	0.6	< 0.1	< 0.1
cumulative attribution	79.7%							20.3%									

SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MINNESOTA

https://www.cdc.gov/foodsafety/ifsac/pdf/P19-2021-report-TriAgency-508.pdf

Questions and Answers

Q&A

When we hear the phrase "genetic fingerprint," what does that really mean? How close to an exact match genetically between isolates and the plant are there? How big of a difference is there in base pairs between clinical isolates and environmental/product samples?

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