

Smarter food safety, food safety culture, Industry 4.0: how to look past the buzzwords and prepare your facility for the future

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Cornell University

Agenda

- **Noteworthy 2021/2022 outbreaks and issues**
- “Trends and buzzwords”
 - Smarter Food Safety
 - Food Safety Culture
 - Industry 4.0 and all things digital
 - Whole genome sequencing
- Thoughts on industry actions and needs
 - Digital transformation
 - Root cause analysis
 - Food safety culture
 - Training
 - Sanitary equipment design
 - Integration of food safety into Enterprise Risk management
- Cornell is here to help:
 - And it’s not just workshops

Cronobacter Illnesses Linked to Powdered Infant Formula

[Español \(Spanish\)](#)

Updated February 28, 2022

Abbott Nutrition has recalled [☑](#) powdered infant formula produced at its manufacturing facility in Sturgis, Michigan, because of possible *Cronobacter* contamination. Parents and caregivers of newborns should not feed their baby recalled Similac, Alimentum, or EleCare powdered infant formulas.

[The U.S. Food and Drug Administration \(FDA\) ☑](#) also reports one complaint of *Salmonella* infection in an infant who was fed recalled formula. CDC has not detected any *Salmonella* illnesses linked to this case. CDC is currently working with state and local partners to determine whether any other *Salmonella* illnesses are linked to recalled infant formula.

Fast Facts

- Illnesses: 4
- Deaths: 2
- States: 3 (Minnesota, Ohio, Texas)
- Recall: Yes
- Investigation status: Active



[View Larger](#)

Cronobacter Illnesses Linked to Powdered Infant Formula

[Español \(Spanish\)](#)

Updated February 28, 2022

Abbott Nutrition has recalled [☑](#) powdered infant formula produced at its manufacturing facility in Sturgis, Michigan, because of possible contamination with *Cronobacter* bacteria. The recall affects formula that was fed to their baby recalled Similac.

The U.S. Food and Drug Administration (FDA) announced the recall on February 28, 2022. The agency said the formula was fed recalled formula. The agency is working with state and local health departments to identify infant formula.

Fast Facts

- Illnesses: 4
- Deaths: 2
- States: 3 (Minnesota, Ohio, Wisconsin)
- Recall: Yes
- Investigation status: Active

International Product Distribution

The recall impacts Alimentum, EleCare, and Human Milk Fortifier for markets outside the U.S. No other Abbott Nutrition products distributed outside of the U.S. are affected by this recall. According to the firm, recalled products were distributed to the following countries/locations: Australia, Bahrain, Barbados, Bermuda, Canada, Chile, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, Guam, Guatemala, Hong Kong, India, Indonesia, Israel, Jordan, Kuwait, Lebanon, Malaysia, Mexico, New Zealand, Oman, Peru, Puerto Rico, Qatar, Saudi Arabia, Singapore, South Africa, Sudan, Taiwan, Thailand, United Arab Emirates, United Kingdom, and Vietnam ANI South.



[View Larger](#)

There were no inspections carried out for two full years. Then, in September 2021 (unclear if in response to reported illness), the FDA returned. This time, the inspection uncovered several issues:

- Personnel working directly with infant formula, its raw materials, packaging, c equipment or utensil contact surfaces did not wash hands thoroughly in a handwashing facility at a suitable temperature after the hands may have become soiled or contaminated.
- You did not maintain a building used in the manufacture, processing, packing c holding of infant formula in a clean and sanitary condition
- An instrument you used to measure, regulate, or control a processing parameter was not properly maintained.
- You did not monitor the temperature in a thermal processing equipment at a frequency as is necessary to maintain temperature control.
- You did not install a filter capable of retaining particles 0.5 micrometer or smaller when compressed gas is used at a product filling machine.bmarler

In its recall notice, [Abbott](#) acknowledged having found “evidence of *Cronobacter sakazakii* in the plant in non-product contact areas,” but denied having found the bacterium in finished product.

Food Safety News March 6, 2022

Dry facilities

- Make sure you have a robust environmental monitoring and finished product testing program in place
- *Salmonella* as one target
 - Linked to multiple outbreaks involving dry products
- Cronobacter
 - Mainly an issue in infant formula
 - Causes severe blood infections (sepsis) or meningitis (an inflammation of the membranes that protect the brain and spine)
 - Babies with meningitis may develop serious, long-lasting problems in their brains. Up to 4 out of 10 babies with meningitis from *Cronobacter* can die

This outbreak is over. Even when there are no ongoing outbreaks, do not eat soft cheeses like queso fresco, unless they are labeled “made with pasteurized milk.” This is especially important for people who are at [higher risk for *Listeria* illness](#).

Fast Facts

- Illnesses: 13
- Hospitalizations: 12
- Deaths: 1
- [States](#): 4
- Recall: Yes
- Investigation status: Closed



What You Should Do

- **Don't eat any soft cheeses like queso fresco, unless they are labeled “made with pasteurized milk.”** This is especially important if you are pregnant, aged 65 or older, or have a weakened immune system due to certain medical conditions or treatments. This is because you are at [higher risk for severe *Listeria* illness](#).
- **Be aware that Hispanic-style fresh and soft cheeses made with pasteurized milk have caused *Listeria* outbreaks, including this outbreak.** Although pasteurization of milk kills *Listeria*, soft cheeses made from pasteurized milk can still become contaminated if they are produced in facilities with unsanitary conditions.

February 19, 2021

The FDA, along with the CDC and state and local partners, are investigating a multistate outbreak of *Listeria monocytogenes* infections linked to queso fresco cheeses made by El Abuelito Cheese, Inc.

As part of this outbreak investigation, the Connecticut Department of Public Health collected product samples of El Abuelito-brand Hispanic-style fresh and soft cheeses from a store where a sick person bought cheeses. Sample analysis showed the presence of *Listeria monocytogenes* in samples of El Abuelito Queso Fresco sold in 10 oz packages, marked as Lot A027 with an expiration date of 02/26/2021. On 2/19/2021, Whole Genome Sequencing (WGS) analysis conducted by the Connecticut State Laboratory determined that the *Listeria monocytogenes* found in the samples is a match to the outbreak strain.

On 2/19/2021, El Abuelito Cheese, Inc. of Paterson, NJ [recalled](#) all Queso Fresco products with “sell by” dates through 03/28/21. Products include El Abuelito, Rio Grande, and Rio Lindo brand queso frescos, distributed to CT, MD, NC, NJ, NY, PA, and VA. A full list of recalled products is included below. At this time, El Abuelito Cheese, Inc. has ceased production and distribution of all products.

Listeria

- Make sure you have a robust environmental monitoring program in place
- FDA is convinced that a substantial proportion of processors have *Listeria monocytogenes* persist in their facilities
 - It increasingly interprets “persistence” of Listeria as evidence of unhygienic conditions

Be prepared for 2022 (and beyond)

- You may have reduced some food safety parties due to COVID
 - It's time to get back on track
- Review, re-assess, and re-align your food safety program
 - That sanitation person you cut or re-assigned to COVID issue, bring them back
 - Just because “nothing bad happened” does not mean that was a good idea
- Also, re-assess your supply chain and suppliers
 - They may have cut or weakened food safety programs too

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NEW ERA OF SMARTER FOOD SAFETY

FDA's Blueprint for the Future

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GFSI Definition for “Food Safety Culture”

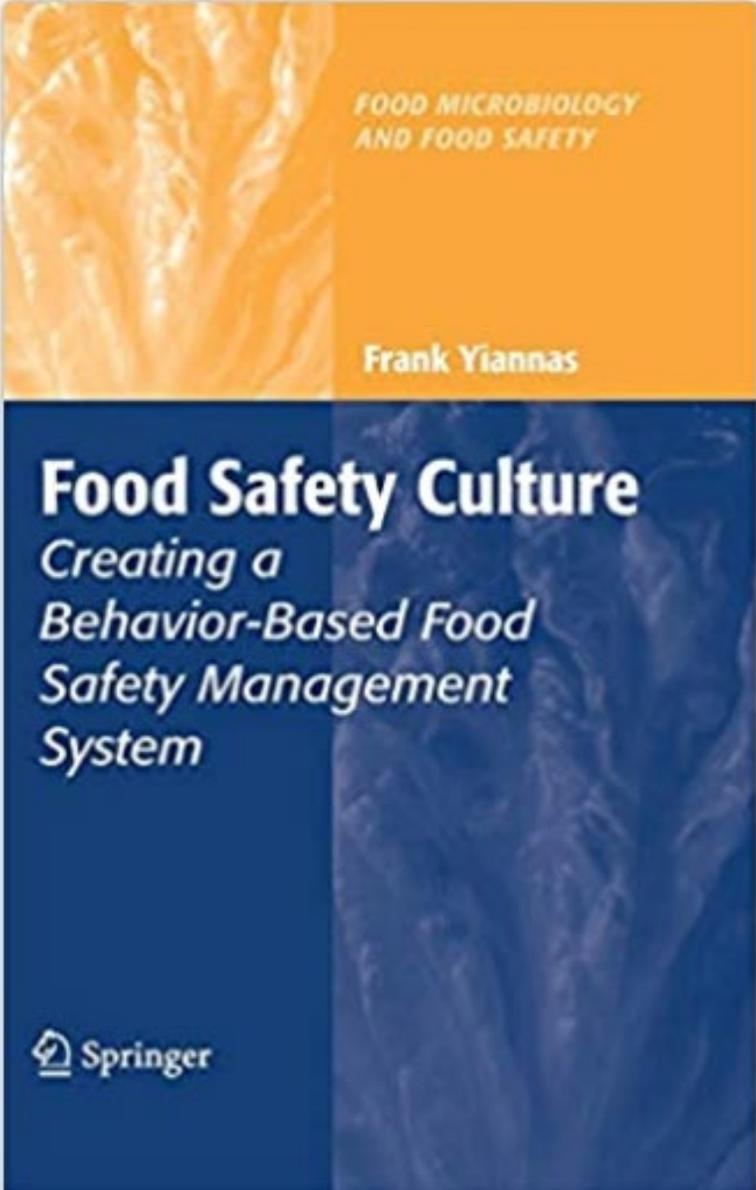
- Shared values, beliefs and norms that affect mind-set and behavior toward food safety in, across and throughout an organization.
- Working Paper released in summer of 2018
- KEY is Food Safety Culture is *Behavior Based*

A CULTURE OF FOOD SAFETY

*A POSITION PAPER
FROM THE GLOBAL
FOOD SAFETY
INITIATIVE (GFSI)*

V1.0 - 4/11/18

<https://www.mygfsi.com/news-resources/news/news-blog/1419-a-culture-of-food-safety.html>



FOOD MICROBIOLOGY
AND FOOD SAFETY

Frank Yiannas

Food Safety Culture

*Creating a
Behavior-Based Food
Safety Management
System*

 Springer

The GFSI TWG defines food safety cultures as, “**shared values, beliefs and norms that affect mind-set and behaviour toward food safety in, across and throughout an organisation.**” The definition is derived from existing liter-

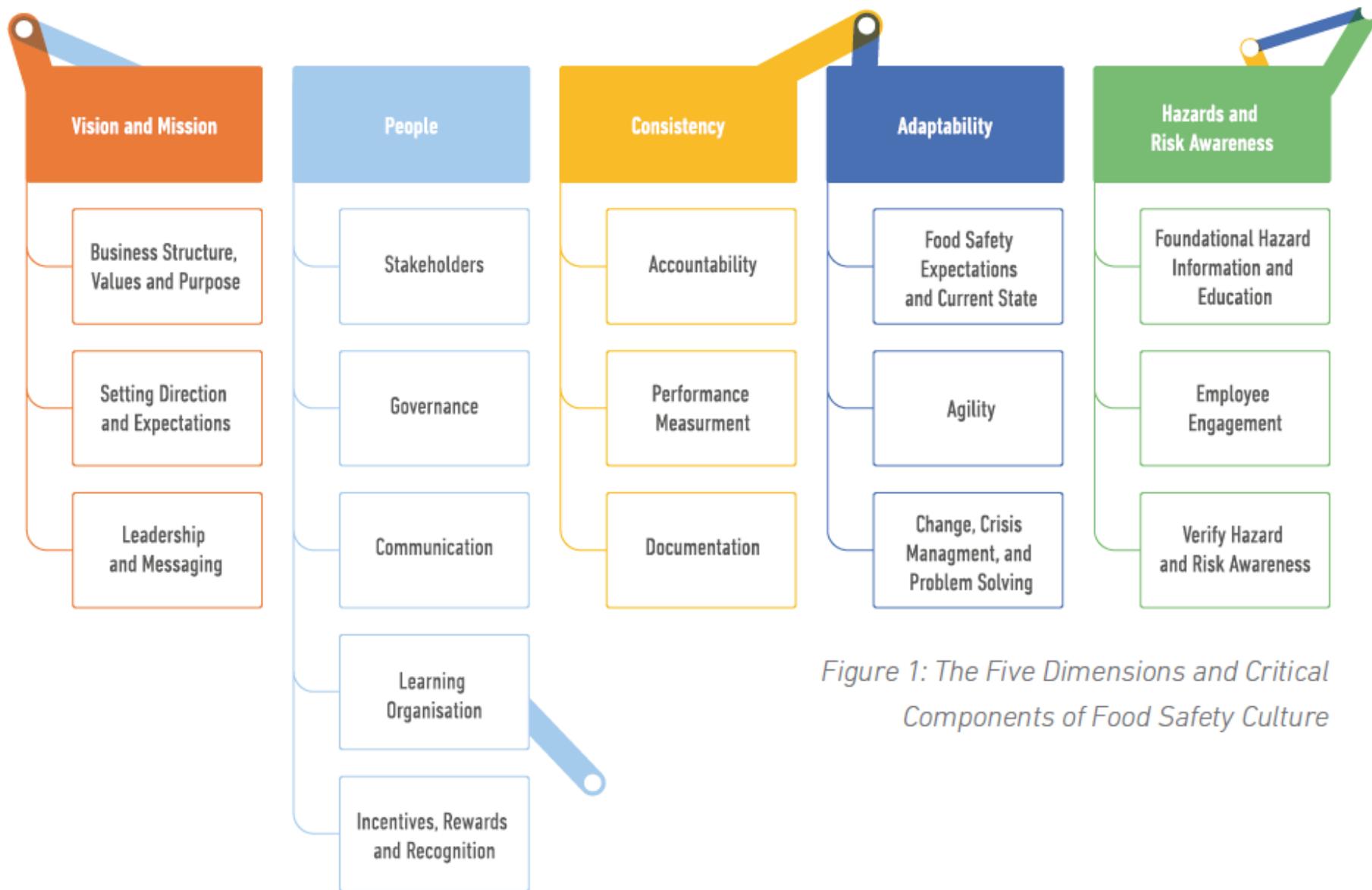
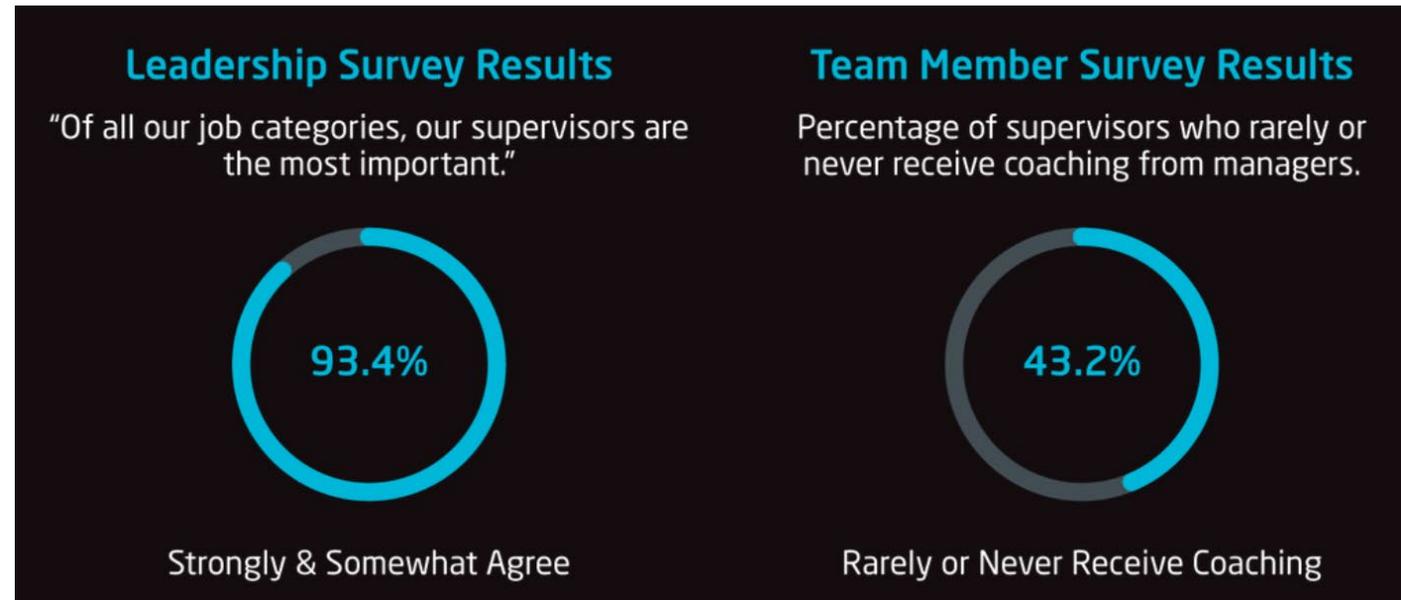


Figure 1: The Five Dimensions and Critical Components of Food Safety Culture

Common Themes of Different Food Safety Culture Models

Management Commitment
Accountability
Behaviors
Consequences
Metrics/Measurements
Training



<https://academy.alchemysystems.com/blog/addressing-the-5-dimensions-of-food-safety-culture/>

Best in Class Have Defined What "Good" Looks Like

Mature Cultures Include:

Integrated

Adaptable

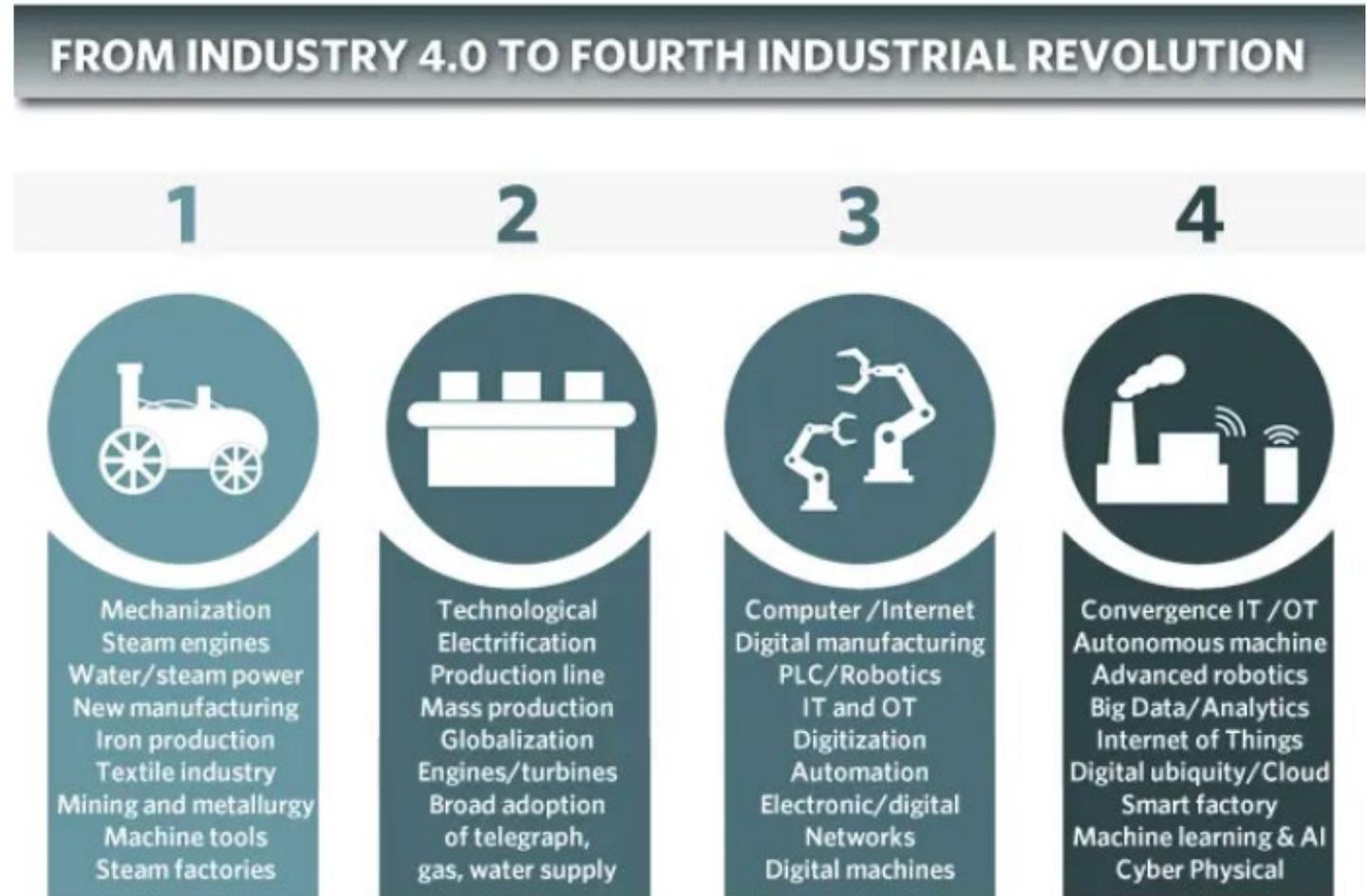
People/Behavior
Based

Successes & Weak
Links Celebrated
(e.g. report near
misses, celebrate
incented behaviors)

Linked to
Hazards/Risks

Industry 4.0

- Industry 4.0 is the digital transformation of manufacturing/production and related industries and value creation processes.



<https://www.i-scoop.eu/industry-4-0/>

Whole Genome Sequencing

Google search results for "ncbi pathogens". The search bar shows "ncbi pathogens" with a search icon and a microphone icon. Below the search bar are navigation options: All, News, Images, Videos, Shopping, More, Settings, and Tools. The search results show "About 36,900,000 results (0.45 seconds)". The first result is from "www.ncbi.nlm.nih.gov > pathogens" and is titled "Home - Pathogen Detection - NCBI". The description states: "NCBI Pathogen Detection integrates bacterial pathogen genomic sequences originating in food, environmental sources, and patients. It quickly clusters and ... You've visited this page many times. Last visit: 11/19/20". There are six sub-links: "Isolates Browser" (Health · Pathogen Detection; Isolates Browser. Help. Search ...), "About" (The NCBI Pathogen Detection project is a centralized system ...), "Help" (The Pathogen Detection Reference Gene Catalog help ...), "Organism Groups" (Species, Version, Publication Date*, Latest Isolate Creation Date ...), "Antimicrobial Resistance" (National Database of Antibiotic Resistant Organisms (NDARO ...)), and "Contributors" (Health · Pathogen Detection; Contributors. Major ...). A link "More results from nih.gov »" is also present. The second result is from "www.ncbi.nlm.nih.gov > pmc > journals" and is titled "Archive of 'Pathogens'. - NCBI - NIH". The description states: "Articles from Pathogens are provided here courtesy of Multidisciplinary Digital Publishing Institute (MDPI). Support Center Support Center ...".

ncbi pathogens

Google

Q All News Images Videos Shopping More Settings Tools

About 36,900,000 results (0.45 seconds)

www.ncbi.nlm.nih.gov > pathogens

Home - Pathogen Detection - NCBI

NCBI Pathogen Detection integrates bacterial pathogen genomic sequences originating in food, environmental sources, and patients. It quickly clusters and ...
You've visited this page many times. Last visit: 11/19/20

Isolates Browser
Health · Pathogen Detection;
Isolates Browser. Help. Search ...

About
The NCBI Pathogen Detection project is a centralized system ...

Help
(The Pathogen Detection Reference Gene Catalog help ...)

Organism Groups
Species, Version, Publication Date*,
Latest Isolate Creation Date ...

Antimicrobial Resistance
National Database of Antibiotic Resistant Organisms (NDARO ...)

Contributors
Health · Pathogen Detection;
Contributors. Major ...

[More results from nih.gov »](#)

www.ncbi.nlm.nih.gov > pmc > journals

Archive of "Pathogens". - NCBI - NIH

Articles from Pathogens are provided here courtesy of Multidisciplinary Digital Publishing Institute (MDPI). Support Center Support Center ...



COVID-19 is an emerging, rapidly evolving situation.
Get the latest public health information from CDC: <https://www.coronavirus.gov>.
Get the latest research from NIH: <https://www.nih.gov/coronavirus>.
Find NCBI SARS-CoV-2 literature, sequence, and clinical content: <https://www.ncbi.nlm.nih.gov/sars-cov-2/>.

[Health](#) > Pathogen Detection

Pathogen Detection **BETA**



To assist the National Database of Antibiotic Resistant Organisms (NDARO), NCBI Pathogen Detection identifies the antimicrobial resistance, stress response, and virulence genes found in bacterial genomic sequences. This enables scientists to track the spread of resistance genes and to understand the relationships between antimicrobial resistance and virulence.

NCBI Pathogen Detection integrates bacterial pathogen genomic sequences originating in food, environmental sources, and patients. It quickly clusters and identifies related sequences to uncover potential food contamination sources, helping public health scientists investigate foodborne disease outbreaks.

NEW Pathogen Detection received the 2020 Federal Laboratory Consortium for Technology Transfer (FLC) [Interagency Partnership Award](#). For more info on how this

Learn More

[About](#)

[FAQ](#)

[Browser Factsheet](#)

[Antimicrobial Resistance Factsheet](#)

[Antimicrobial Resistance](#)

[Contributors](#)

[Help](#)

Data Resources

[Isolates Browser](#)

Feedback



NCBI Pathogen Detection now contains over one million isolate genomes from 48 organism groups: 47 bacterial and one fungal!

Search isolates:

Examples:

1. Search for isolates encoding a mobile colistin resistance gene and a KPC beta-lactamase

search: [AMR_genotypes:mcr* AND AMR_genotypes:blaKPC*](#)

2. Search for Salmonella isolates from the USA

search: [geo_loc_name:USA AND taxgroup_name:"Salmonella enterica"](#)

Explore the Data

Species	New Isolates	Total Isolates
Salmonella enterica	83	425,845
E.coli and Shigella	33	215,196
Campylobacter jejuni	208	73,147
Listeria monocytogenes	3	50,267

[See more organisms...](#)

[Help](#)

[How To](#)

Data Resources

[Isolates Browser](#)

[Microbial Browser for Identification of Genetic and Genomic Elements \(MicroBIGG-E\)](#)

[Reference Gene Catalog](#)

NEW [Reference Gene Hierarchy](#)

[Reference HMM Catalog](#)

[Isolates with antibiotic resistant phenotypes](#)

[Download analysis results \(FTP\)](#)

Submit

[How to submit data](#)

[How to submit antibiotic resistance phenotypes](#)

[How to submit beta-lactamases](#)

[NCBI Submission Portal](#)

18 Isolates Selected Clear

Distance between selected isolates :
minimum = 0 SNPs, maximum = 28 SNPs, average = 12 SNPs

Target creation date range :
2015-09-16 to 2021-02-19

Group by: Creation date

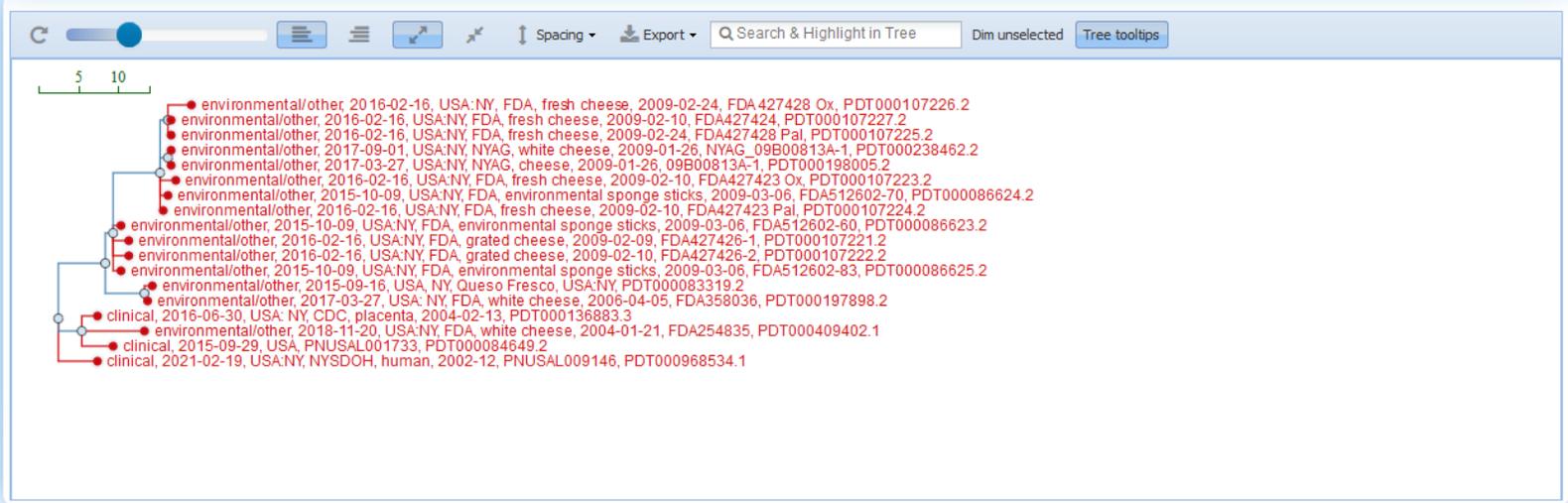
Isolation type	Location	Create d...	Min-same	Min-diff	Actions
Year: 2021					
clinical	USA:NY	2021-02-...	10	13	  
Year: 2018					
environmental/other	USA:NY	2018-11-...	19	10	  
Year: 2017					
environmental/other	USA:NY	2017-09-...	0	19	  
environmental/other	USA:NY	2017-03-...	0	19	  
environmental/other	USA: NY	2017-03-...	1	16	  
Year: 2016					
environmental/other	USA:NY	2016-02-...	3	22	  
environmental/other	USA:NY	2016-02-...	0	19	  
environmental/other	USA:NY	2016-02-...	0	19	  
environmental/other	USA:NY	2016-02-...	2	20	  
environmental/other	USA:NY	2016-02-...	1	18	  
environmental/other	USA:NY	2016-02-...	3	14	  

Filters

Page 1 of 4 Records per Page 5 Choose columns Download Hide plus AMR genotypes Expand all Displaying 1 - 5 of 18

#	Organism Group	Strain	Isolate identifiers	Serovar	Collection...	Collected by	Isolate	Create da...	Locati...	Isolation Source	Isolation t...	Min-same	Min-diff	BioSample	As
1	Listeria monocyt...	PNUSAL009...	PNUSAL009146 SRS8285704		2002-12	NYSDOH	PDT000968534.1	2021-02-19	USA:NY	human	clinical	10	13	SAMN17990275	GC
2	Listeria monocyt...	USA:NY	PNUSAL001710 SRS1071391 USA:NY			NY	PDT000083319.2	2015-09-16	USA	Queso Fresco	environ...	1	17	SAMN04090031	GC
3	Listeria monocyt...	PNUSAL001...	PNUSAL001733 SRS1093163				PDT000084649.2	2015-09-29	USA		clinical	6	12	SAMN04116061	GC
4	Listeria monocyt...	FDA254835	CFSAN021195 FDA00006657 FDA254835 SRS4060980		2004-01-21	FDA	PDT000409402.1	2018-11-20	USA:NY	white cheese	environm...	19	10	SAMN02922911	GC
5	Listeria monocyt...	FDA512602...	CFSAN021202 FDA00006664 FDA512602-60 SRS1108505		2009-03-06	FDA	PDT000086623.2	2015-10-09	USA:NY	environmental s...	environm...	2	13	SAMN02922918	GC

Share Hide Table Labels Load Labels Neighbors Common subtree Watch Watched isolates



Listeria Outbreak Linked to Packaged Salads Produced by Dole



Food Safety Alert

Posted February 1, 2022

CDC is currently investigating two separate *Listeria* outbreaks linked to packaged salads. This outbreak is linked to packaged salads produced by Dole. The [other outbreak](#) is linked to packaged salads produced by Fresh Express.

Fast Facts

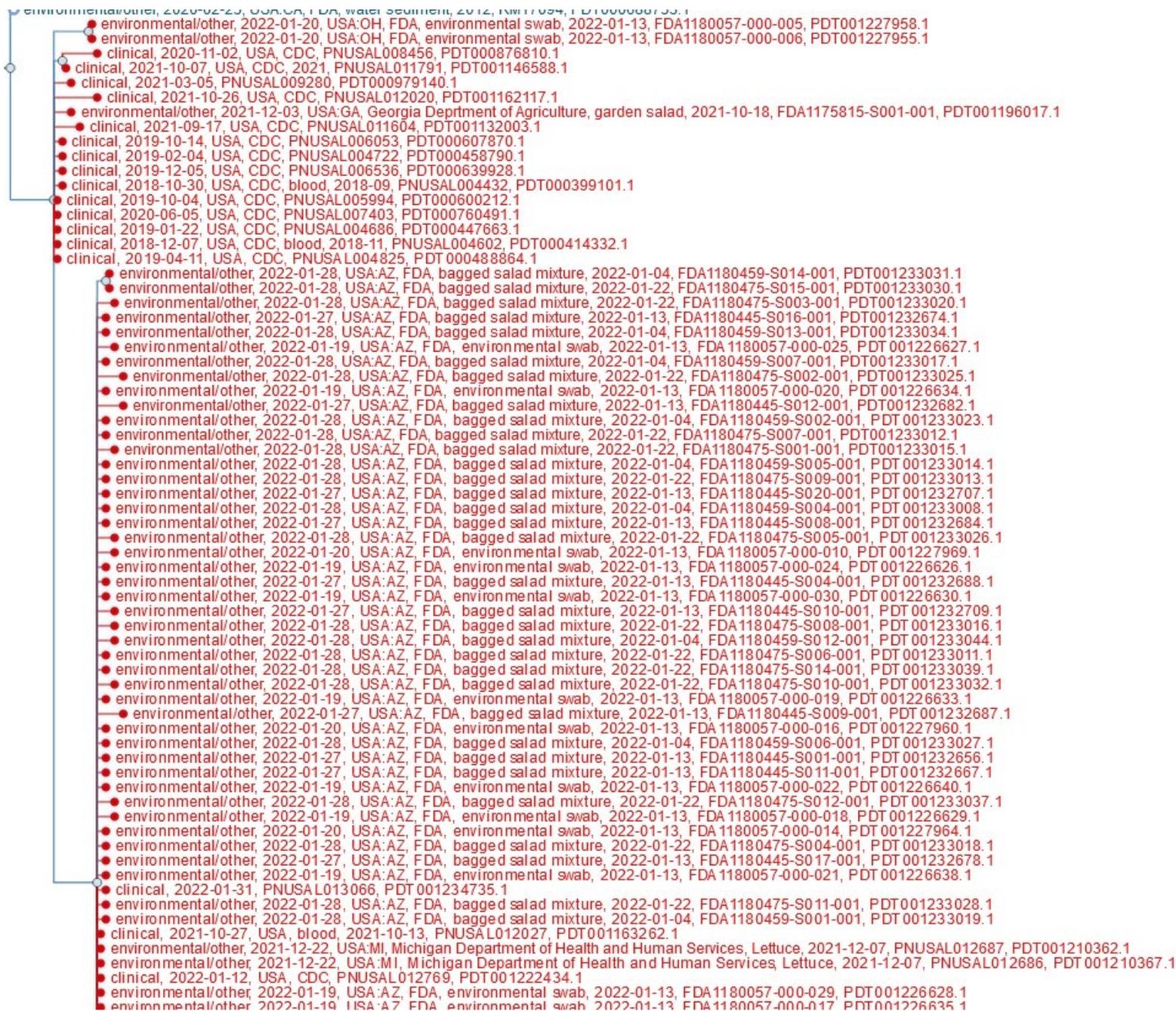
- Illnesses: 17
- Hospitalizations: 13
- Deaths: 2
- [States](#): 13
- Recall: Yes
- Investigation status: Active



Laboratory Data

Dole collected samples from their facilities and equipment for testing and found *Listeria* on equipment used to harvest iceberg lettuce. FDA conducted whole genome sequencing and found that the *Listeria* on the equipment was the outbreak strain.

Cluster 1



Full ▾

Pathogen: environmental/food/other sample from *Listeria monocytogenes*

Identifiers BioSample: SAMN14151538; SRA: SRS6184435; CFSAN: CFSAN068211

Organism [Listeria monocytogenes](#)
cellular organisms; Bacteria; Terrabacteria group; Firmicutes; Bacilli; Bacillales; Listeriaceae; Listeria

Package [Pathogen: environmental/food/other; version 1.0](#)

Attributes

strain	RM17094
isolate name alias	CFSAN068211
latitude and longitude	36.677689 N 121.640019 W
collection date	2012
geographic location	USA:CA
collected by	FDA
isolation source	water sediment
PublicAccession	CFSAN068211
attribute_package	environmental/food/other
Genus	Listeria
Species	monocytogenes
ProjectAccession	PRJNA215355
ontological term	water:CHEBI_15377, sediment:ENVO_00002007
IFSAC+ Category	environmental-water
source type	Environmental

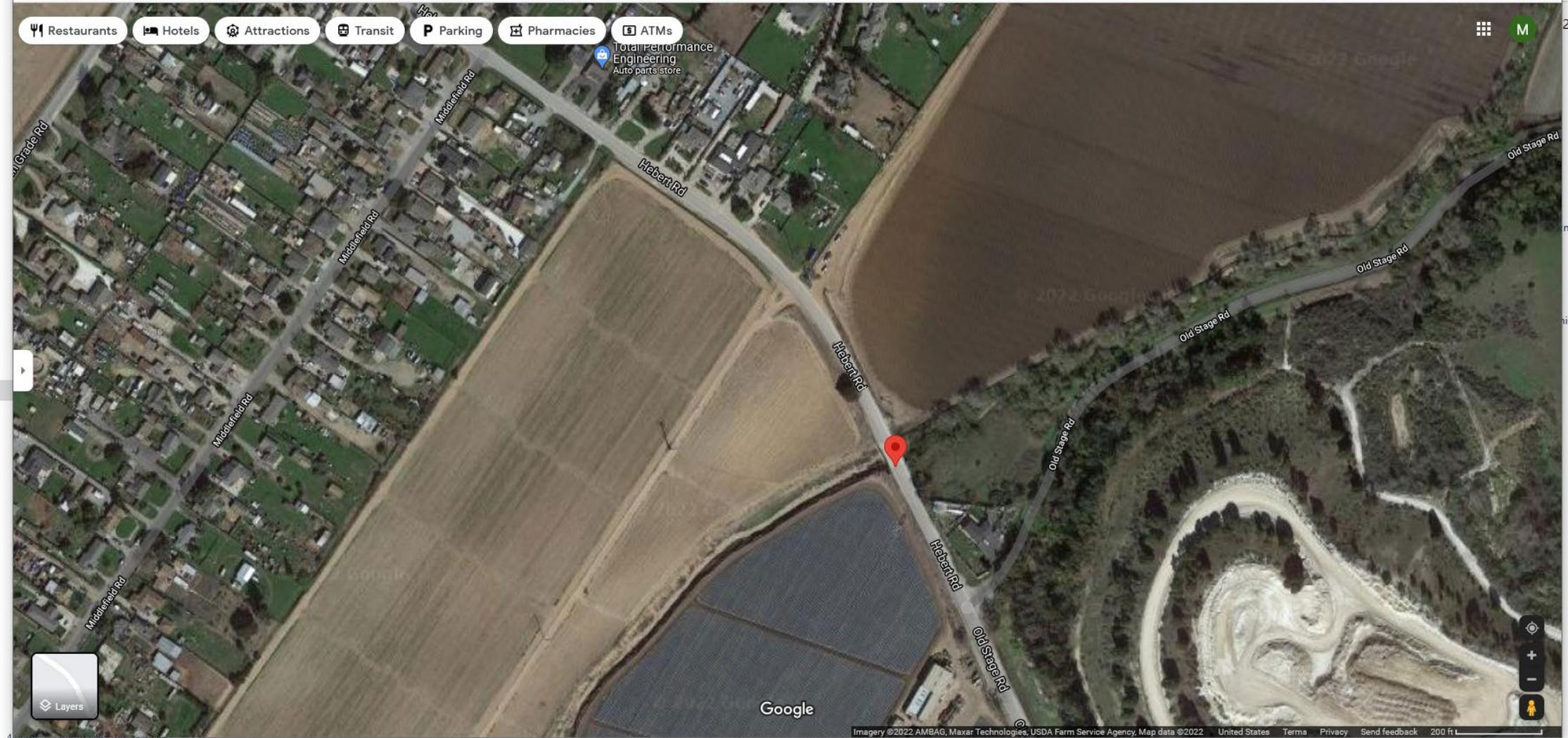
BioProject [PRJNA215355](#) *Listeria monocytogenes*
Retrieve [all samples](#) from this project

Restaurants Hotels Attractions Transit Parking Pharmacies ATMs

The map displays a section of Salinas, California, centered around the intersection of Highway 101 and E Market St. Key landmarks and businesses include Rancho Salinas Mobile Park, Holiday Inn Express & Suites Salinas, In-N-Out Burger, Smart & Final, El Pollo Loco, CVS, Tacos El Jaliscoense Alisal, Sherwood Elementary, Bank of America, Dairy Queen Grill & Chill, Little Caesars Pizza, and VCA All Pets Animal Hospital Salinas. The map also shows the Salinas River, Alisal Creek, and Cesar Chavez Community Park. A search bar at the top left contains the text 'Salinas'. The bottom right corner features a scale bar for 500 feet and a copyright notice for 2022 Google.

- Restaurants
- Hotels
- Attractions
- Transit
- Parking
- Pharmacies
- ATMs

Total Performance Engineering
Auto parts store



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 - **Root cause analysis**
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Digital transformation

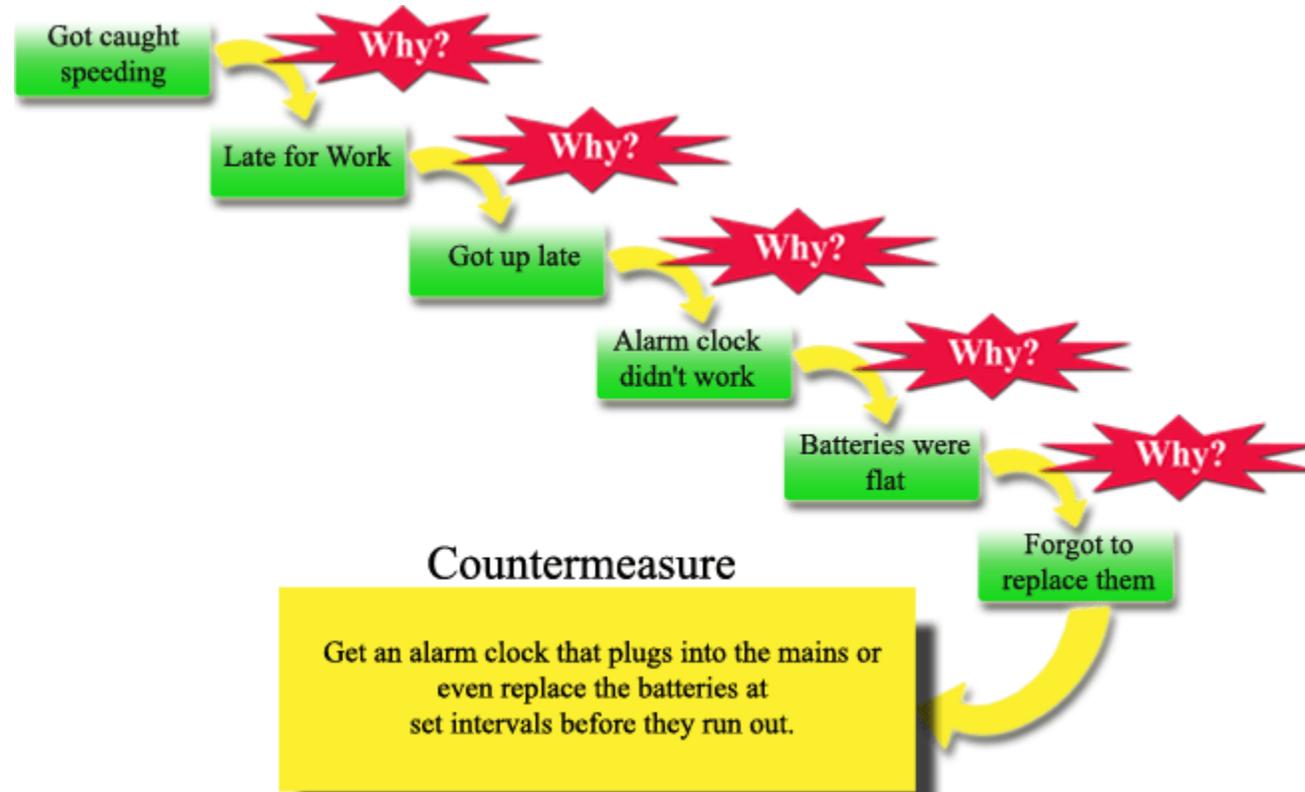
- Digitize food safety and food safety data
- Develop a digital “master plan” for the next 5 years

Root cause analysis

- Have a Root Cause Analysis SOP
- Make sure you have formal records of RCAs
 - Essential for every food safety incidence

Your responses do not indicate whether you have conducted any intensified environmental swabbing as part of your root cause investigation or your corrective actions. Further, it does not appear that you have fully investigated the cause of the contamination, especially related to the repeat *L. monocytogenes* findings in and near your cooling tank. The goal of environmental sampling is to verify the effectiveness of your control programs for *L. monocytogenes*. It is important to find *L. monocytogenes* and its harborage sites, if present, in your facility and to ensure corrective actions have eliminated the pathogen and harborage sites when identified. An investigation with actions such as intensified cleaning and sanitizing, intensified environmental sampling and testing, reassessment of your environmental testing program, review of sanitation procedures and monitoring records, and review of traffic patterns and equipment layout would demonstrate if all sources and potential routes of contamination have been identified and corrected.

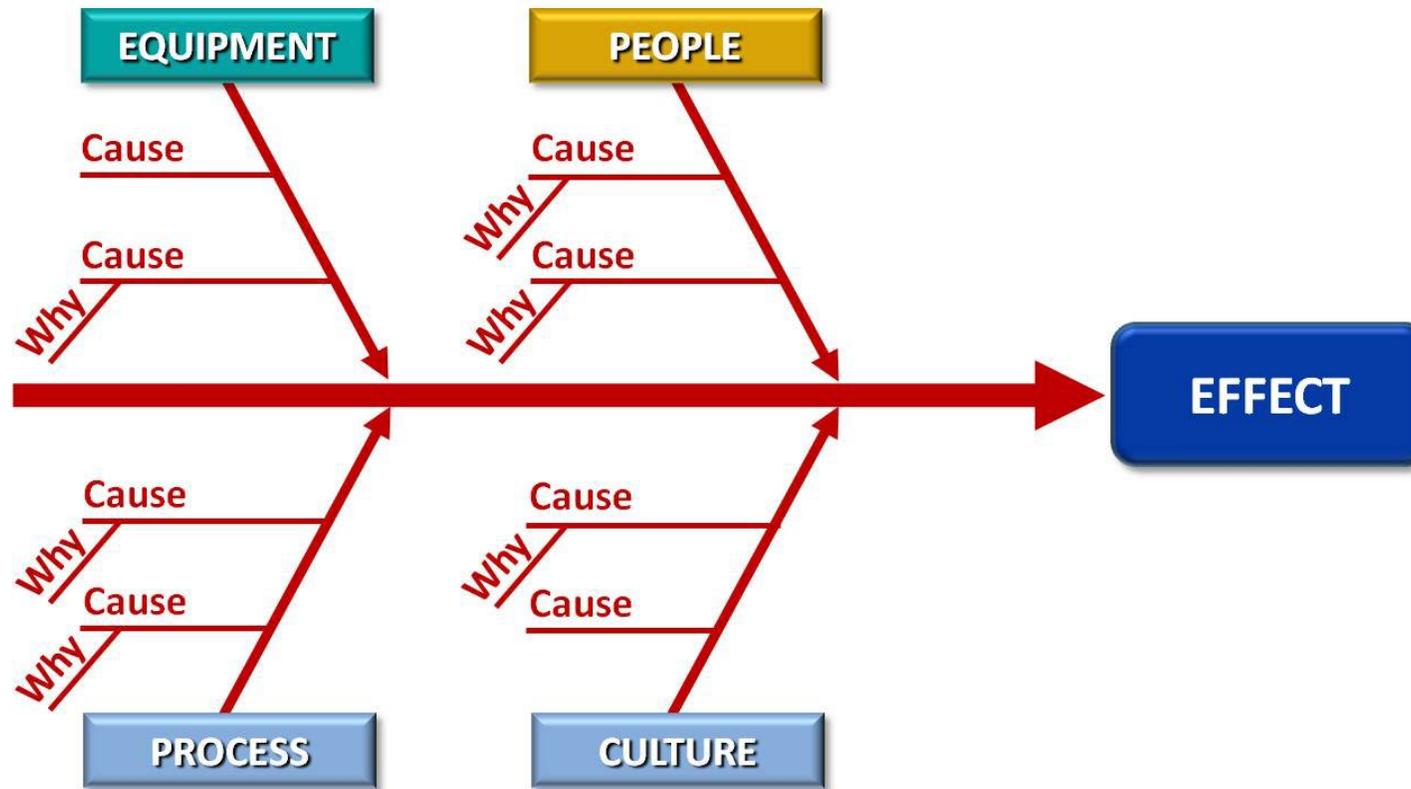
Root cause analysis



5 Whys Analysis

- 5 Whys is a simple and effective tool used to get to the root cause of a problem.
- Subjective in its approach, it relies on the group analyzing the problem, to come to their agreed conclusions as to what the root causes are to the problem at hand. It also relies on technical experts being present to drill down through the symptoms to get to the root cause.
- The 5 Whys are set around asking 'why' to a problem, getting the answer and then asking why again and again, until you come up with the real root cause of a problem.

Fishbone diagram



From <http://www.blog-bizedge.biz/2011/10/getting-to-root-of-problems-part-1.html>

1. Company Practices

3. Facilities

5. Raw materials

7. Other?

- 1.1 Education and training
- 1.2 Resources provided to employees
- 1.3 Routes for employee feedback
- 1.4 Enforcement of cGMPs
- 1.5 Verification and validation procedures
- 1.6 Quality culture

- 3.1 Overall building structure
- 3.2 Floor and walls
- 3.3 Drains
- 3.4 Maintenance facilities and equipment

- 5.1 Raw material suppliers and supplier qualification
- 5.2 Raw material specifications and testing
- 5.3 Raw material storage

- 7.1
- 7.2
- 7.3
- 7.4

- 2.1 Management
- 2.2 Food safety and quality personnel
- 2.3 Maintenance personnel
- 2.4 Processing/ engineering personnel
- 2.5 Cleaning and sanitation team
- 2.6 Line workers

- 4.1 Procedures
- 4.2 Schedules
- 4.3 Equipment and materials
- 4.4 Training and education

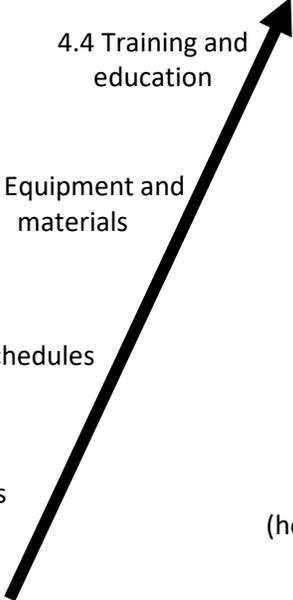
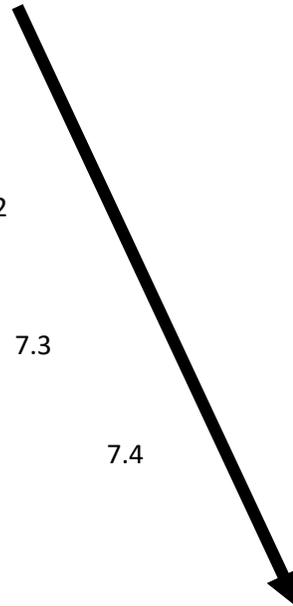
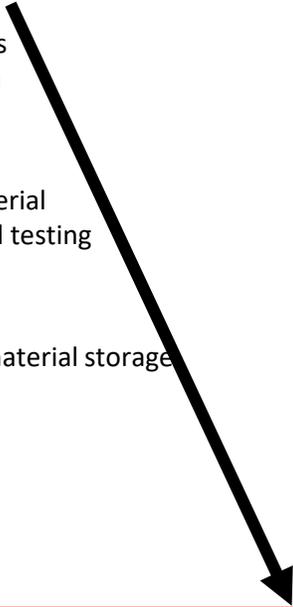
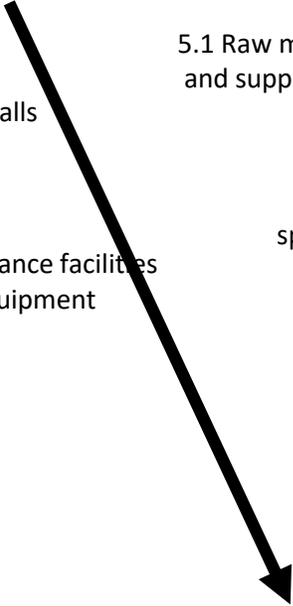
- 6.1 Pre-UHT (homogenization etc.)
- 6.2 UHT
- 6.3 Filling
- 6.4 Storage and distribution

2. Personnel

4. Cleaning and Sanitation

6. Processing Equipment

*Food safety issue
X/Listeria
finished product
positive*



Food safety culture

- Improve training of everyone in the facility
 - Need to include everyone in facility
- Sanitary equipment and facility design
 - Not investing into sanitary equipment and facilities may be seen as showing lack of food safety culture
- Make sure food safety is part of the culture of your company
 - Make sure it's included in your Enterprise Risk management plans

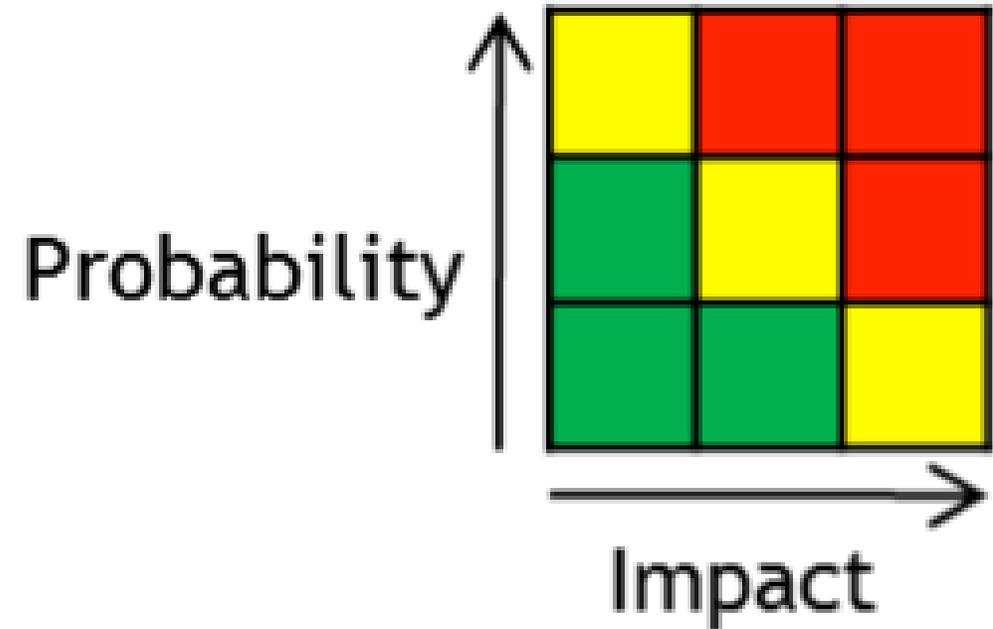
What is Enterprise Risk Management?

- Several definitions
 - A process to assist resource allocation decision making designed to
 - identify potential events (risks) that may affect the enterprise;
 - manage risk to fall within the identified risk tolerance/risk appetite; and
 - provide reasonable assurances that such risk management is being achieved (metrics)
- ERM is an enterprise-wide correlation of the risk to all other portfolio risks
- In short=A Material Balance Sheet Risk
- Sparked by financial crises of early 2000's

ERM is the discipline, culture, and control structure an organization has in place to continuously improve its risk management capabilities in a changing business and risk environment.

Examples of Enterprise Risk

- Food Safety
- IT; Cyber-Security
- Exchange Rates
- Commodity Prices
- Labor / Union
- Epidemics/Pandemics
- Workforce Injuries
- Retention of critical employees



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 - Digital transformation
 - Root cause analysis
 - Food safety culture
 - Training
 - Sanitary equipment design
 - Integration of food safety into Enterprise Risk management
- **Cornell is here to help:**
 - **And it’s not just workshops**

Cornell Dairy Foods Extension Certificate Program



Program Structure

- 5 Core Courses
 - *Dairy Science and Sanitation*
 - *Food Safety Course*
 - *Pasteurizer Course*
- 5 Specialized Courses
 - *Certificates may be earned in one or more tracks*
- 3 Advanced Core Courses
 - *Environmental monitoring*
 - *SOP and Technical Writing*
 - *Leadership Skills for Success*
- 4 Advanced Courses

Core Courses

(Dairy Science and Sanitation, a Food Safety Course, and a Pasteurizer Course required)

Dairy Science and Sanitation	Food Safety Course (one required) • Accredited HACCP • Preventive Controls Qualified Individual	Pasteurizer Course (one required) • HTST • Vat
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Specialized Courses

(Choose one specialized course per certificate)

Science of Cheese (Basic Level)	Science of Yogurt (Basic Level)	Fluid Milk Processing for Quality and Safety	Ice Cream and Frozen Desserts (Basic Level)	Membrane, Evaporation, and Drying Technology
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Advanced Core Courses

(All courses required)

Environmental Monitoring Programs	SOP and Technical Writing	Leadership Skills for Success
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Advanced Specialized Courses

(Choose one advanced specialized course per certificate)

Science of Cheese (Advanced Level)	Science of Yogurt (Advanced Level)	Fluid Milk Processing (Advanced Level)	Ice Cream and Frozen Desserts (Advanced Level)
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4 Types of “Virtual” Formats

- All online – (Dairy Science and Sanitation, Certified HACCP)
- Virtual Live – (PCQI, SQF and HTST)
- Hybrid – pre work online and one day of virtual live – (Basic Ice Cream and Basic Fluid Milk)
- Hybrid- pre work online and one day in-person – Basic Cultured Products

In-person Training



- **A portion of our workshops will resume on-campus delivery**
 - **PCQI, May 15-17, 2022**
 - **HTST, July 12-14, 2022**
 - **SQF, August 23-25, 2022**
 - **Cheese Grading, October 20, 2022**

New Courses in 2022

- Intentional Adulteration, In-person, June 6
- **Applied Food Safety Plans– A refresher course, In-person, September 7-8**
- Dairy Processing Bootcamp for High School Students

Spanish Language Courses

- Spanish-language versions of multiple courses:
 - Dairy Science and Sanitation
 - HACCP
 - Intro for Food Safety Principles (subscription)



All on-line and self-paced

- Virtual “in-plant” trainings
- Plant/site visits with appropriate safety protocols

Schedule In-Plant Training

[Submit Request](#)

[Browse course descriptions](#)



In-Plant Delivery of Core Courses

- Dairy Science and Sanitation
- Preventive Controls Qualified Individual
- HACCP
- GMPs
- Hybrid courses as requested by specific plants
 - Yogurt and Fermented Dairy Products at Byrne Dairy
 - Dairy Basics and FSMA Overview at North Country Dairy

Specialized In-Plant Trainings

- Internal Auditing
- Sensory
- Unit Operations
- Milk Quality
- Food Defense
- Quality Systems
- Gap Audits
- Food Safety Plan Review

SERVICES

- Dairy Process Review
- Product Development
- Sensory Evaluation

<https://cals.cornell.edu/dairy-extension/what-we-do/services>



Dairy Process review and validation available for dairy products. Fees charged for initial review, research, and on-site review.



Food Processing and Development Laboratory

Experienced full time staff professionals are able to assist you in all aspects of food product development and processing.



Sensory Evaluation Center

We conduct Sensory Evaluation and Consumer Product Research. Among the standard services that are offered to commercial clients are Consumer Acceptability, Preference and

SERVICES:

CONSULTING AND DOCUMENT REVIEW ARE AVAILABLE TO PROCESSORS OF ANY SIZE, EITHER ON-SITE OR REMOTELY.

- Food Safety Plan Review
- Validation Sampling
- Pre-audit Consulting
- Food Defense Plan Review
- Food Safety Culture Plan Review

<https://cals.cornell.edu/dairy-extension/what-we-do/site-consultations>



Food safety plan and document review available, on-site and remotely.



Validation sampling of environmental monitoring programs available.



Preparing for a third-party audit and want to make sure that you're ready? Our team can visit your facility and conduct pre-audit consulting.

GAP Audits

Includes:

- Physical walk through observing GMPs
- Review of HACCP plan
- Review of Food Safety Programs
- Review of records
- A report is provided after the visit.

Other unique services and support

- Specialized professional mentoring:
 - For both leadership and managers
 - Various models
 - Very helpful for new QA manager with limited experience
 - We provide a support structure
- One off expert support
 - Call with FDA and want someone with technical expertise to be on your side
- Specialized troubleshooting
 - My lab finds Listeria positives, but can't confirm them

Take Home messages & action items

- We had an enforcement lull with COVID-19 and may have had reduced press attention with Ukraine
 - This will change
- “Smarter food safety” lays out a roadmap
 - Invest in digital and have a plan
 - This will benefit beyond food safety
 - Make sure you have a strong food safety culture and appropriate training efforts
 - Make sure you have formal and robust root cause analysis procedure
 - Develop SOPs
 - Integrate food safety into Enterprise Risk management
- Reach out to Cornell for help:
 - And it's not just workshops