
Finding the Gaps:

Auditing Environmental Monitoring Programs in Dairy Facilities

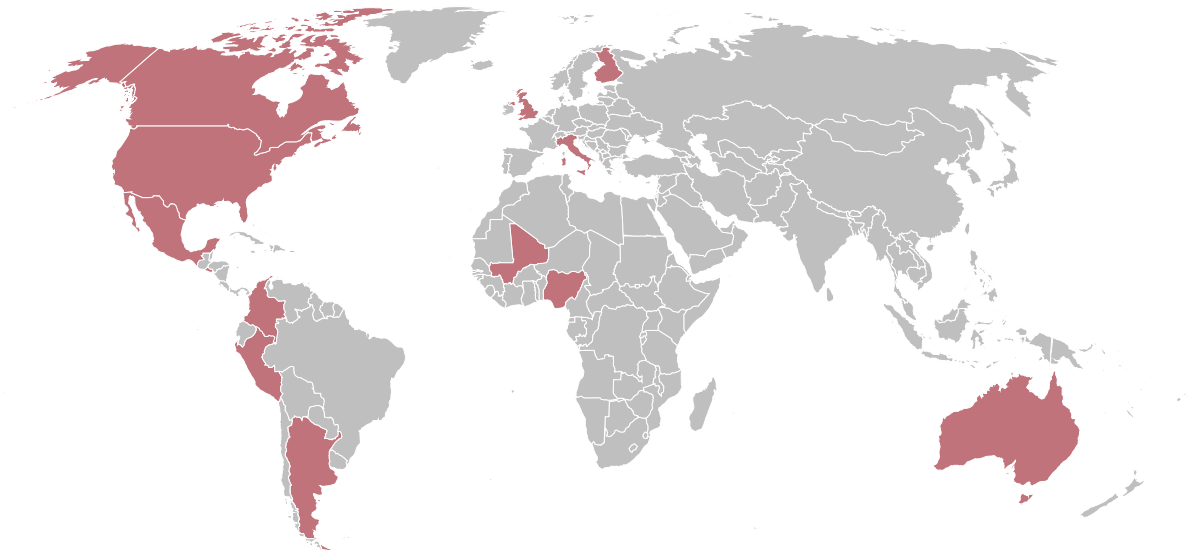
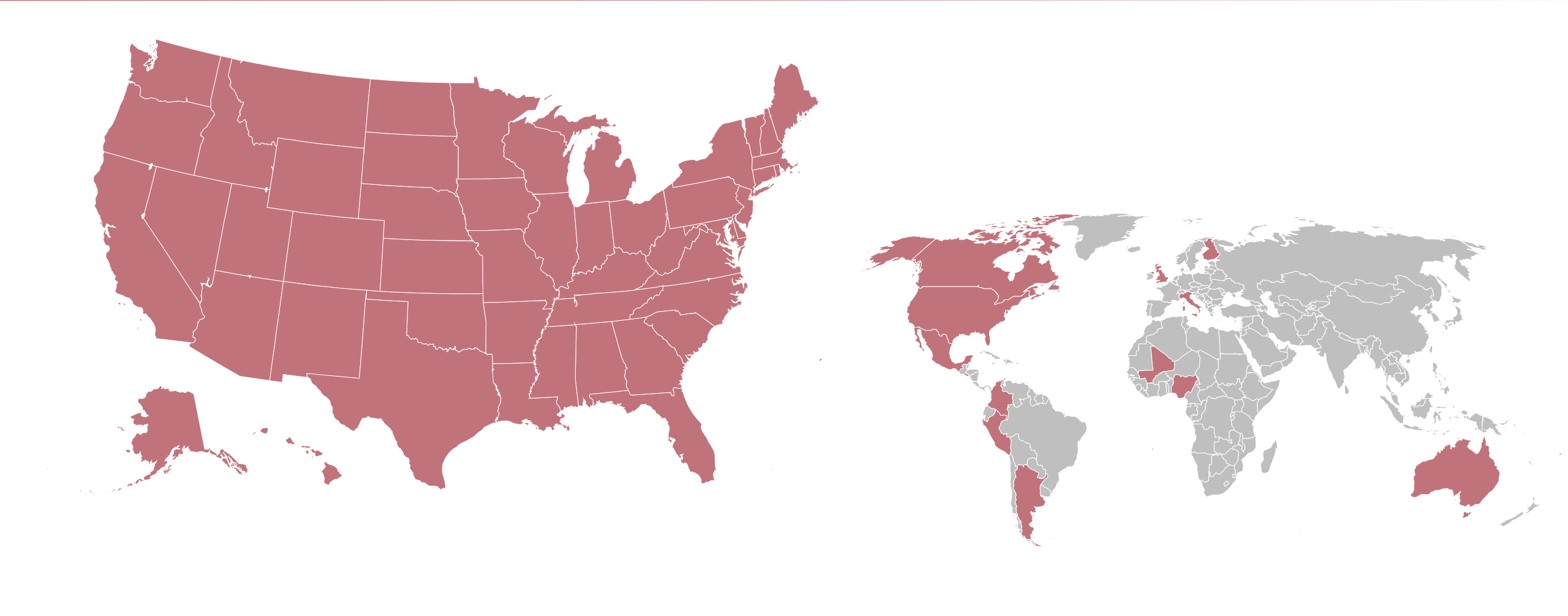


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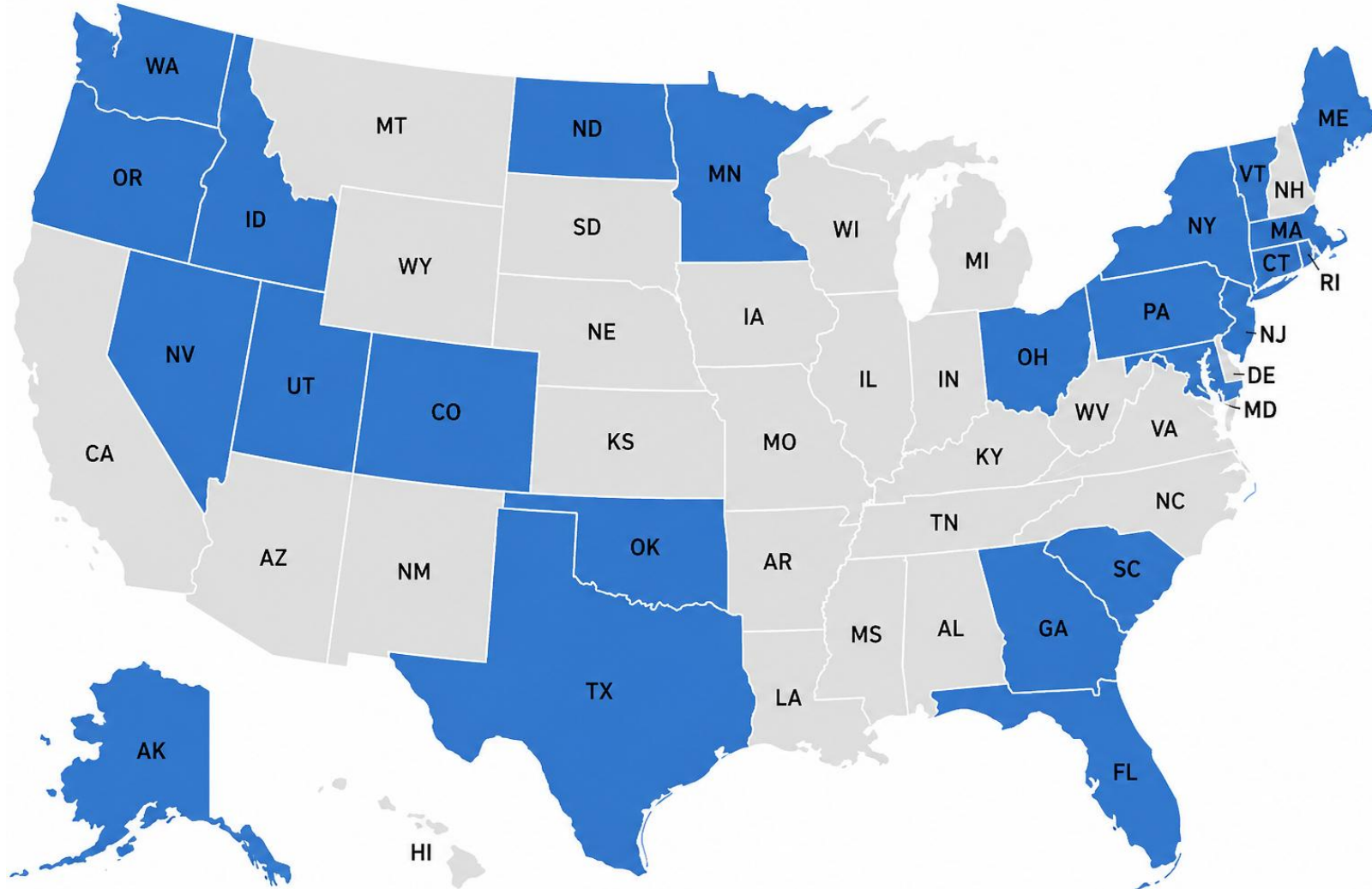
Dairy Foods Extension



Workshop Attendees: Across the U.S. and Around the World



Regulatory Workshop Attendees by State



Cornell Dairy Foods
Extension Course Calendar



Dairy Foods Certificate Program

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

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

Advanced Core Courses

(All courses required)

Environmental Monitoring
Programs

SOP and Technical Writing

Leadership Skills for Success

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)

Successful completion of Core Courses and appropriate Specialized Course required for Basic Certification. Certificate valid for 3 years. 15 hours every 3 years of approved course work or meeting attendance required for renewal. See examples on the back page.

Dairy Foods Certificate Program

*Example: I want to earn an Advanced Science of Cheese Certificate. What courses should I take? **

Core Courses

Basic Dairy Science and Sanitation

HACCP

Vat Pasteurizer

Specialized Courses

Science of Cheese (Basic Level)

Advanced Core Courses

Environmental Monitoring Programs

SOP and Technical Writing

Leadership Skills for Success

Advanced Specialized Course

Science of Cheese (Advanced Level)

*(*Example progression. Our team will work with you to customize your progression.)*

*I need to renew my Basic and/or Advanced Certificate. How do I do that? **

Example renewal suggestions listed below. Our team will work with you to customize renewal.

Attend Association
meeting

- NYS Association for Food Protection
- NYS Cheese Manufacturers
- Northeast Dairy Foods Association
- American Cheese Society
- IAFP
- IFT
- NADRO
- AFDO
- SQF
- Dairy Practices Council
- Other meetings, pending approval

Attend Dairy Foods
Extension Workshop

- Any Dairy Foods Workshop
- Any track
- Other Dairy Foods workshops outside of the Certificate program

Attend State and Federal
regulatory webinar,
training, or meeting

- Processing Plant Superintendent
- Dairy Lab Seminar
- CMI Scool
- CMI Update
- NCIMS

Self paced online workshops

Dairy Science and Sanitation

HACCP

Vat Pasteurization

In Person/Hybrid Workshops

High Temperature Short Time Pasteurizer (with NYSDAM)

Environmental Monitoring

Introduction to Artisan Ice Cream and Frozen Desserts

The Science of Yogurt (basic)

Preventive Controls for Human Food 2.0

Certified Milk Inspectors School (with NYSDAM)

Membrane Processing

Implementing SQF Systems

Leadership Skills for Success

Science of Cheese (basic and Advanced)

Live Via Zoom

Fluid Milk Processing for Quality and Safety

Fundamentals of Labeling (with NYSDAM)

SOP and Technical Writing

Preventive Controls for Human Food 2.0

HTST (October)

AI in Food Safety

Learning Objectives

By the end of this session participants will be able to:



Identify elements of an effective EMP



Identify common audit deficiencies



Assess corrective actions



Evaluate trend analysis



Apply risk-based auditing principles

What is an Environmental Monitoring Program?

A program that organizes the monitoring process to help prevent cross-contamination of finished product.



EMP may include:

Cleaning and sanitation procedures	Sampling and frequency	Corrective actions	Data analysis	Trending
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Environmental Monitoring Does Not Control Pathogens



What Makes an Effective EMP?

A good EMP should be:

Risk based

Science based

Written

Routinely implemented

Reviewed

Updated

Why Environmental Monitoring Matters



EMPs are verification tools



Critical for controlling environmental pathogens



Dairy is high risk

Wet

Complex equipment

Harborage niches

Environmental Monitoring as Verification

Outbreaks and recalls are often traced back to failures of pre-requisite programs (not CCP failures)

Strong pre-requisite programs include:

- Monitoring
- Verification
- Corrective actions and corrections

Environmental monitoring programs are essential verification tools

What are you looking for?



Listeria spp. / *Listeria monocytogenes*

#1 priority for wet RTE environments (cheese, ice cream, post-pasteurization areas).



Salmonella: important for dry areas/powders



Indicator organisms (e.g.,
Enterobacteriaceae/coliforms)
process control signals



ATP / protein swabs

sanitation verification tools—do not replace pathogen swabs.

How Often To Test?

Daily/
Weekly/Monthly
(facility
dependent)

- Risk Based
- High risk areas swabbed more frequently

Master site list

- Rotate through master sites
- Randomize sampling day

Master site list
should be
dynamic

- New sites added as they become apparent
- Swabbers choice
- No positives does not equal success

When to Sample?

Mid-operation (recommended for Listeria testing)

- At least 4 hours into production
- Harborage sites may be easier to detect
 - Vibrations of equipment
 - High moisture conditions

Pre- operation (after sanitation, but before production)

- Less likely to yield positive samples
- Used to indicate weaknesses in sanitation procedures

Positive Results- Don't Panic!!!

1

DID THEY REACT
QUICKLY?

2

DID THEY FOLLOW
THE PROCEDURE
FOR A POSITIVE
RESULT?

3

DID THEY
PERFORM A ROOT
CAUSE ANALYSIS?

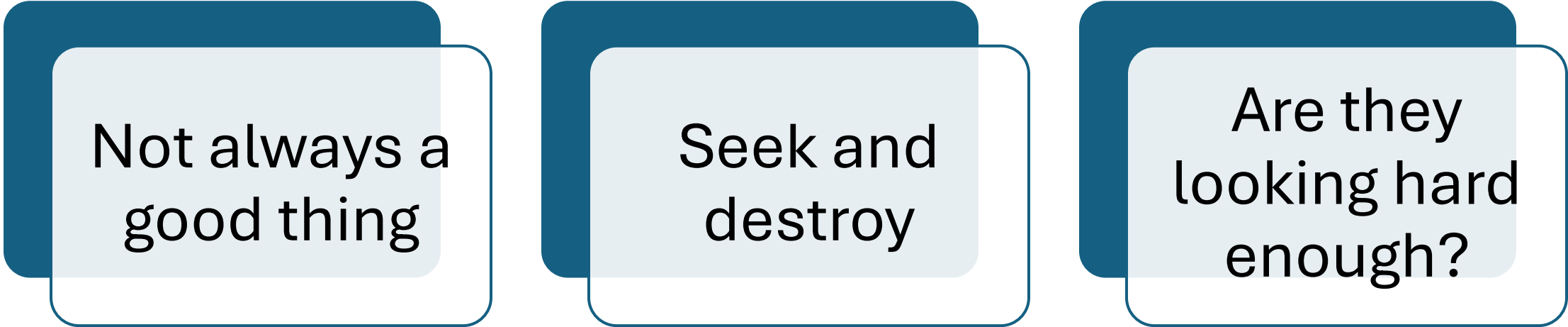
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DID THEY TREND
THE SITE TO SEE IF
IT IS POSITIVE
AGAIN?

What Should Be Done With Testing Results?

Review	Results should be reviewed immediately
Keep	Results should be kept accessible and organized
Trend	Trend results regularly • Long term trends of positives may require corrective and preventative actions

All Negative Results



Not always a
good thing

Seek and
destroy

Are they
looking hard
enough?

Swabbing Technique Reduce False Negatives

Define the area

Use the right tool: sponge vs swab

Pressure + pattern: firm pressure; change direction (horizontal/vertical/diagonal).

Keep samples cold, ship fast, and document chain of custody.

Train for consistency

Trending



By site: repeat positives indicate niches/harborage.



By zone: drift toward Zone 1 is an urgent signal.



By vector: e.g., “drain cluster,” “forklift wheels,” “hose stations.”



By time: seasonal patterns, shift-to-shift differences, post-maintenance spikes

Elements of an EMP Program

Written Program

Facility Risk Assessment

Sampling Design

Sampling Practices

Laboratory Testing

Data Review & Trending

Corrective Actions

Regulatory Perspective

Why assess EMPs as a regulator?

Pathogen Control

- Removing pathogens from the environment
- Finished product testing vs EMP

Sanitation effectiveness

- EMP results will show if routine cleaning is working as intended

Preventive controls

- RTE food exposed post pasteurization

Auditing the Written Program

Does the written program include:

Scope

Organisms tested

Sampling procedures

Site map

Frequency

Laboratory methods

Corrective actions

Trending process

Responsibilities

Written Program

Common Audit Findings

No written rationale for:

- Sample locations
- Frequency
- Organisms selected
- Follow-up sampling

No procedures for:

- Positives
- Resampling
- Escalation

Does the written program match what the facility is doing?

Risk Assessment

Is sampling risk based?

High risk areas should receive more attention

Examples:

- Fillers
- Packaging equipment
- Conveyor systems
- Coolers
- Brine systems
- Cheese molds
- Drains near fillers

The Zone Concept

Zone 1- Finished product
contact surfaces

- fillers, air blows, work tables

Zone 2- Non-food contact
surfaces adjacent to Zone 1

- Framework of equipment

Zone 3- Non product
contact distant from Zone 1

- Carts, drains, floors, wheels

Zone 4- Areas remote from
finished product handling

- Locker rooms, cafeteria, loading dock, maintenance

Auditors Mindset

Don't ask only:

- Do you have an environmental monitoring program?

Also ask:

- Why were these sites selected?
- How often are sites reviewed or changed?
- How are results reviewed? Are they trended?
- Does the program improve sanitation?
- Were new equipment installations evaluated?
- Have construction projects changed risks?

Common Audit Findings

Weak Response

Re-cleaned the area

Re-sampled only the original site

Retrained employees without evidence of a performance issue

Treated each positive independently

Closed the investigation after one negative re-sample

Strong Response

Investigated and eliminated the contamination source

Conducted risk-based vector sampling around the positive location

Implemented corrective actions targeted to the identified root cause

Reviewed historical data to identify recurring patterns and trends

Verified effectiveness through follow-up monitoring and documented review

Common Sampling Problems

Using swabs instead of sponges

Not applying pressure

Only sampling “clean” locations

Missing difficult to clean areas

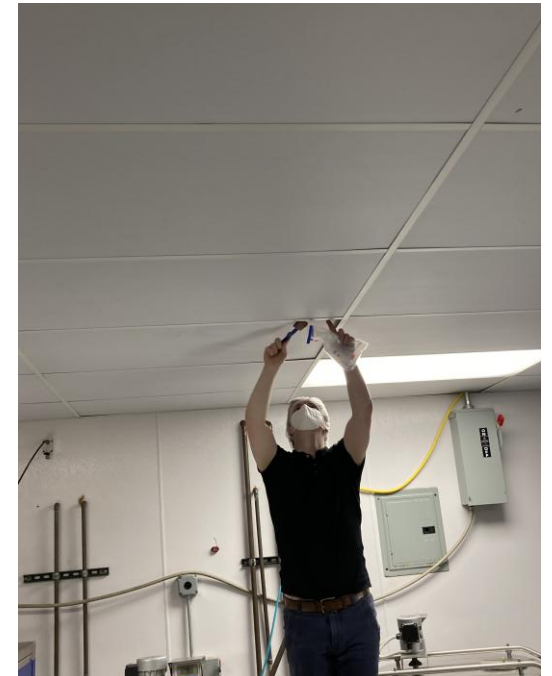
Sampling immediately after sanitation

Never sampling during production

Sampling predictable locations

Sites That Are Difficult to Clean and Sanitize

- Pitted concrete
- Cracks in floors
- Areas with standing water
- Door sweeps and thresholds
- Wooden surfaces
- Drains
- Condensate on walls and ceilings



Growth Niches

Equipment that is not disassembled or sanitized can provide growth niches for organisms



How Do Organisms Travel Around The Facility?

Forklifts

Pallet
jacks

Carts

Squeegees

Brushes

Crates

Buckets

Employee
boots

Aerosols



Positive Findings Should Trigger:

- Immediate response
- Intensified cleaning
- Root cause analysis
- Vector sampling
- Resampling
- Review of sanitation
- Management review
- Documentation

Root Cause Investigation

Don't accept:

- We cleaned it

Ask:

- Why was contamination present?
- What allowed survival?
- What changed?
- Could product have been affected?

What Makes a Good Corrective Action?

Identify source

- Vector swabs, inspections

Eliminate niches

- Repair facility or equipment

Modify sanitation

- Is the current procedure effective?

Improve traffic flow

- Traffic flow
- Hygienic zoning

Records Review

Look For:

Missed samples

Late corrective actions

Repeat positives

Repeat sanitation failures

Changing sample sites after positives

Incomplete documentation

A Good Start to auditing an EMP Program:



When was your last positive?



Show me exactly what happened from the moment the lab reported the positive environmental same until the investigation was complete.

Evaluate What Happens After a Positive

How quickly did they act on the results?

Are there different escalations defined for zones, 1-4

Does the investigation show more than re-cleaning?

- Inspection of the area
- Evaluation of equipment
- Evaluation of traffic flow
- Water accumulation
- Potential harborage sites



Evaluate Follow Up (Vector Sampling)

Procedure should include
how follow up sampling is
conducted after a positive

Sampling original site

Sampling adjacent sites

Expanding sampling up and down
from original positive

Is additional sampling needed

Criteria to return to routine
sampling



Red Flags

- No trending
- Same sites for years
- Only zone 3 testing
- Never any positives
- No follow up sampling
- No root cause investigations
- Repeat positives with identical corrective actions
- No management review or involvement

Case Study:

Is the EMP Working?

You are conducting a regulatory inspection at **ABC Dairy**, a Grade "A" facility that manufactures pasteurized cottage cheese and sour cream. The products are filled into ready-to-eat containers after pasteurization.

The facility has an Environmental Monitoring Program (EMP) focused on **Listeria spp.** testing.

Management states that the EMP has been in place for five years and is reviewed annually.

ABC Dairy Facility Information

4 production days per week

Two production shifts

Environmental samples collected every Tuesday

60 routine samples collected each month

Samples collected after sanitation and before production begins

Laboratory tests for **Listeria spp.**

Observations during your inspection:

Water pooling around the filler

Employees pushing carts through standing water

High pressure hoses used during sanitation

Condensation above the filler

Floor drains draining slowly

Several cracked floor areas

	Jan	Feb	Mar	Apr	May
Total Samples	60	60	60	60	60
Positives	0 Positive	1 Positive Drain under cottage cheese filler	2 Positives Same drain Floor crack 4 ft away	3 Positives Same Drain Floor crack Equipment leg of filler	4 positives Same drain Floor crack Equipment leg Forklift entering packaging
Zone of positive		Zone 3	Zone 3	Zone 3 Zone 2	Zone 3 Zone 2 Zone 4
Corrective Actions		Cleaned drain Resample	Cleaned and sanitized Resample	Intensified sanitation Resample	Cleaned Reminded employees about sanitation
Re-swab result		Negative	Negative	Negative	Negative

Auditing the Root Cause Analysis Form

Stated root cause: “Area needed additional cleaning”

Corrective action: “Area re-cleaned”

Preventive action: “Employees reminded to clean thoroughly”

No equipment inspections performed

No maintenance work orders generated

What Concerns You About This EMP?

Recurring
positives

Positives
spreading
outward

No trend
analysis

No root cause
identified

Re-cleaning the
only corrective
action

No evaluation of
equipment or
facility design

Water
management
issues

Potential traffic
related
contamination

Vector Swabbing?

The site only resampled the original sites



Stronger response should have included:

Nearby drains

Equipment
framework

Undersides of filler

Wheels and carts

Air
handling/condensate
drip areas



Would you consider this an isolated event or persistent harborage site? Why?



What Should The Facility Do Next?

Conduct formal root cause investigation

Disassemble equipment

Repair damaged floors

Clean or repair drains

Eliminate standing water

Modify sanitation procedures? Reduce Aerosolization

Expand EMP?

Review employee and material traffic

TREND data!!!

Key Takeaways An effective Environmental Monitoring Program should:



Be science and risk-based



Be Preventive



Focus on finding contamination before it reaches product



Drive meaningful investigations and corrective actions



Trend to identify emerging risks



Continuously evolve as equipment, processes, and risks change

As Regulators, Ask These Five Questions

Is the program
designed
around the
facility's risks?

Will the
sampling plan
detect
contamination
before it
reaches
product?

Does the
facility
investigate
positives
thoroughly and
identify true
root causes?

Are corrective
actions
effective and
verified?

Is
environmental
monitoring
data used to
improve the
food safety
system?

An environmental monitoring program should not be judged by how few positives it finds, but by how effectively it detects, investigates, and eliminates environmental risks before they impact product



Questions?
