

Clean First, Don't Sanitize the Dirt

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Quick Reminder of Definitions

- **Sterilize**
 - Statistical destruction/removal of all living organisms
- **Disinfect**
 - Kill 100% of vegetative cells
- **Sanitize**
 - Reduction of microorganisms to safe level (surface needs to be clean)
- **Clean**
 - Physical removal of debris (e.g., soil, etc.) from surfaces which can include the use of clean water and detergent or sweeping or vacuuming



Why Clean?

- **To remove the food for bacteria to grow**
 - Prevent cross contamination
 - Minimize potential biofilms
- **To prepare for application of sanitizer**
 - Cannot sanitize a dirty surface
 - All sanitizers to varying degrees are impacted by debris
- **To comply with FSMA PSR, audits**
 - PSR Subpart L, 112.123



Microorganisms of Concern



Bacteria

- *Salmonella, Listeria, shiga-toxin producing E. coli*
- Multiply outside and inside a host
- Multiply rapidly given the correct conditions: food, moisture, time, others
- Managed by GAP's and proper cleaning and sanitation programs



Viruses

- Norovirus, Hepatitis A
- Small protein particles that multiply only in a host
- Stable in the environment and high infective capacity by few particles
- Managed by prevention and worker health and hygiene practices

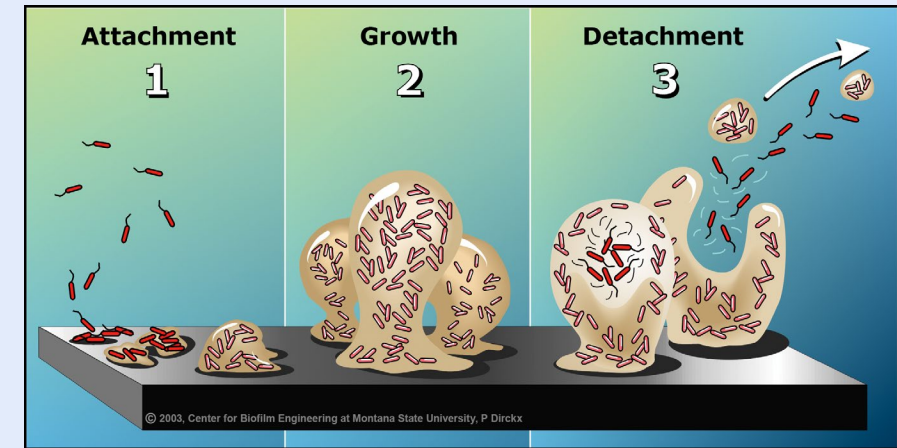


Parasites

- Protozoa or intestinal worms that multiply only in a host animal or human
- Commonly transmitted by water or fecal-oral route
- Sanitizers are ineffective at killing
- Long incubation periods
- Managed by worker health and hygiene practices

Biofilms and Biofilm Formation

- Collection of microorganisms that have attached to a surface and each other (polysaccharides) in the interest of survival
- Formation:
 - **Surfaces:** rough, penetrable, worn, or hard to reach surfaces (cracked, pitted, corroded, scratched surfaces)
 - **Nutrient availability:** residue, soil, organic matter
 - **Moisture**
 - **Time:** extended time between cleaning allows for buildup
 - **Lack of effective cleaning:** sanitary design or improper worker training



FSMA Produce Safety Rule – Subpart L

- Equipment and tools covered by the requirements:
 - Any intended to, or likely to, contact produce (e.g., knives, harvesters, belts)
 - Any used to transport produce (e.g., bins, flumes, vehicles)
 - Any instruments or controls used to measure, regulate or record conditions in the interest of preventing the growth of microorganisms that could contaminate them (e.g., thermometers)
- Food contact surfaces (FCS) and non-food contact surfaces (NFCS) requirements
 - FCS = Cleaning and, when necessary and appropriate, sanitizing
 - NFCS = Cleaning



Let's Talk about Wood and Foam?

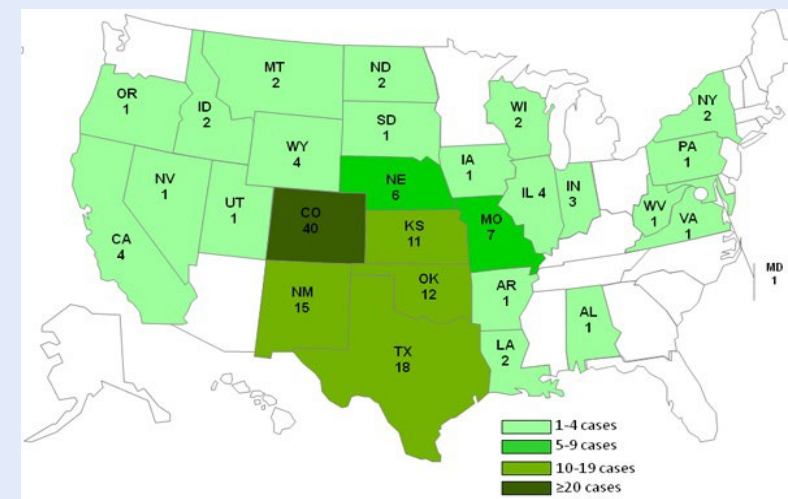
- Porous materials, such as wood, fabric, or foam, can be used, **BUT** it is recommended to use non-porous materials, if possible (stainless steel, PVC)
 - If used, these materials must be of adequate design, construction, and workmanship to enable them to be adequately cleaned and properly maintained
- Porous materials can trap moisture, making it difficult to remove organic material and bacteria



Past Outbreaks

Whole Cantaloupes, 2011

- *Listeria monocytogenes*:
147 reported cases, 28 states, 143 hospitalized, 33 deaths
- Problems: repurposed processing equipment (potato), culls truck that frequented livestock areas, standing water, **lack of proper cleaning and sanitation**



CDC.gov

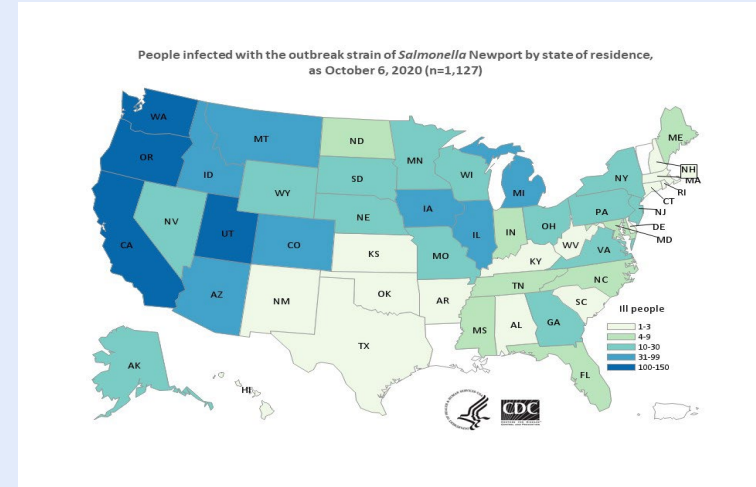


Outbreakmuseum.com/Jensen Farms

Past Outbreaks

- **Red Onions, 2020**

- *Salmonella* Newport: 1,127 illnesses, 167 Hospitalizations, 0 deaths
- Isolates linked back to one packing facility and multiple farms that supplied red onions
- Possible problems (strain not confirm in environmental samples) pest intrusion and **food contact surfaces which had not been inspected, maintained, cleaned, or sanitized as frequently as necessary to protect against the contamination of produce**



CDC.gov

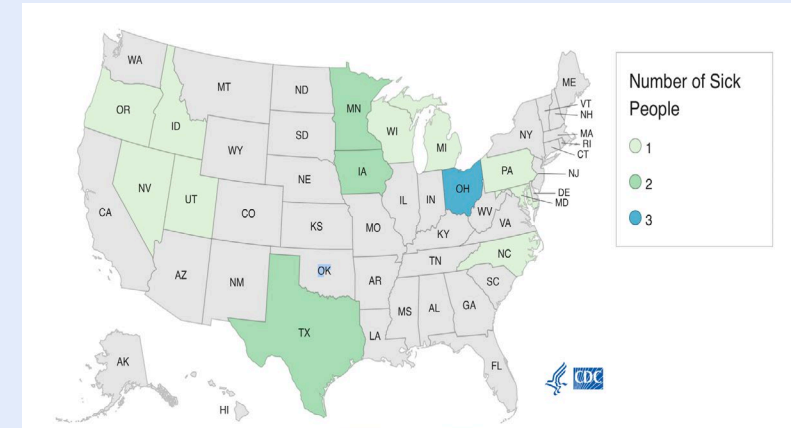


FDA gov

Past Outbreaks

Iceberg Lettuce, 2021

- *Listeria monocytogenes*:
18 people hospitalized and 3 people died from 13 states
- Problems: isolates linked to harvest equipment. **Likely cleaning and sanitation**



CDC.gov



Food Business News



So, Sanitation is Important, and Requires Critical Thinking

- Training (the why, how to do it properly and protect yourself)
- Cleaning (under §112.123)
- Sanitizing, when necessary and appropriate
- Proper Equipment
- Design considerations
- Monitoring (chemicals, schedules, management)
- Verification
- Recordkeeping



Hazard Assessment of Surfaces

Identifies hazards/areas of risks and determines what practices are necessary to prevent, reduce, or eliminate the risk

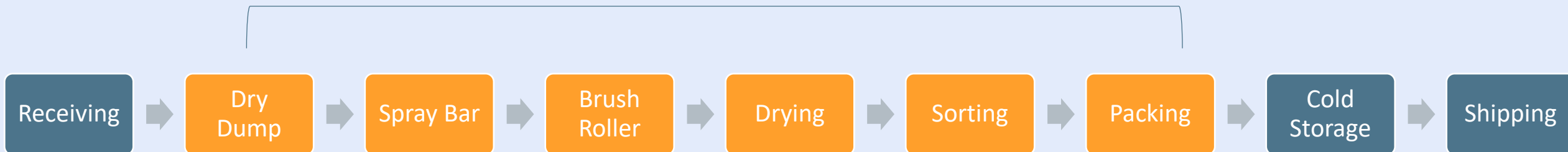
Step 1: Map the flow of product and determine the area where increased risks are present

Step 2: Identify these areas and design practices to reduce risks

Factors to consider:

1. Food contact surfaces
2. Adjacent surfaces that are likely to contaminate food contact surfaces
3. Cleaning and sanitation practices

Food contact surfaces

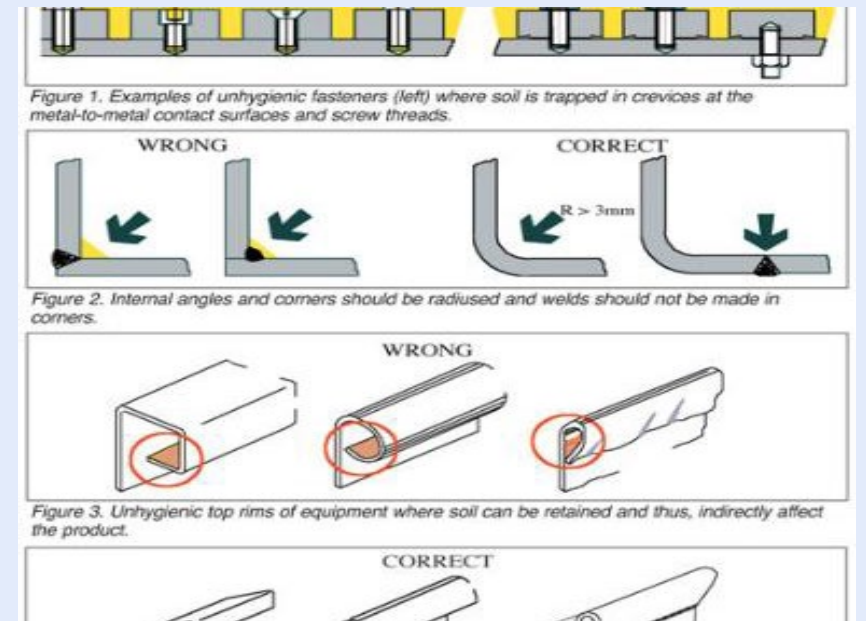


Sanitary Design

- Design that makes surfaces and equipment easier to clean and sanitize

Sanitary design principles:

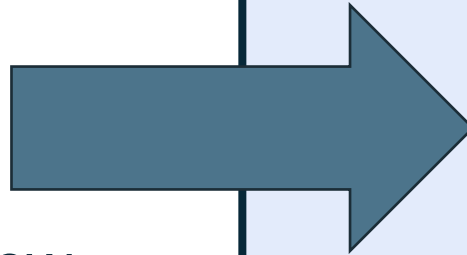
1. Visible and reachable
2. Smooth and Cleanable
3. No Collection Points
4. Compatible materials for commodity and cleaning and sanitation.
5. Prevents cross contamination



The Problem with Sanitary Design...

Best case scenario is not the real scenario

- Old or repurposed equipment
- \$\$\$
- Limited options with new equipment
- Hard to clean (and sanitize) surfaces like laminations, bolts, drains, forklifts, hollow areas, buttons, brushes, evaporator coils, poor welds, cushion pads, joints, etc.



Identify issues with sanitary design and...

- Train workers
- Increase frequency of cleaning and sanitation
- Make necessary modifications
- Ensure current/future modifications do not increase risks
- Add cleaning verification activities

Reality... Where to Begin?

- What needs to be cleaned?
 - What types of soil/debris present
 - What microorganisms are of concern (if there is an answer, are they sanitizing the surface...)
- When/how often does it need to be cleaned, sanitized?
- How should it be cleaned, sanitized?
 - Tools, equipment, and chemistry needed
- Who is going to clean, sanitize it?
 - Including training for personnel on protocol and personal protective equipment
- Determine resources and infrastructure



Go Beyond a Review of Records

- Farms may have detailed SOPs, and robust records, but unless you look at the food contact surface(s) and have a conversation about the practices and execution, something could be missed!

Sample SOP: Cleaning and Sanitizing Surfaces, Tools, and Equipment

Revision: 3.0
Date: MM/DD/2020

1—Purpose

Describes how food contact surfaces, tools, and equipment are to be cleaned and sanitized.

2—Scope

Applies to farm and packinghouse personnel including

3—Responsibility

Workers are responsible for following the SOPs to properly clean and sanitize. Farm owners and food safety managers are responsible for providing necessary resources such as tools, detergents and sanitizers, and ensuring that sanitizing steps are followed correctly.

4—Materials

- Detergent name, brand, and concentration (label **name here**)
- Sanitizer name, brand, and concentration [**Provide name here**]
- Container(s) as needed for mixing and using detergent
- Brushes, sponges, or towels for scrubbing tools
- Clean water (microbial equivalent to drinking water)

5—Procedure

1. The surface should be brushed or rinsed with water. The water used for this step must contain no detectable germs.
2. Prepare the detergent [**Add detergent mixing instructions here**].

Sample Produce Storage Area Inspection and Cleaning Log

Name of farm: _____

Storage Area Location(s): _____

| Date | Cleaning List (check if completed) | | | | Corrective actions needed: | Cleaned by (initials): |
|---------|------------------------------------|-------------------|-------------------------------|------------------|--|------------------------|
| | Sweep floors | Inspect for pests | Check for condensation, water | Check door seals | | |
| 9-17-20 | x | x | x | x | 1. Found mouse poop in corner. Removed poop, set trap and will monitor. 2. Small amount of condensation from cooling unit, discarded wet produce and emptied pan. | GLW |
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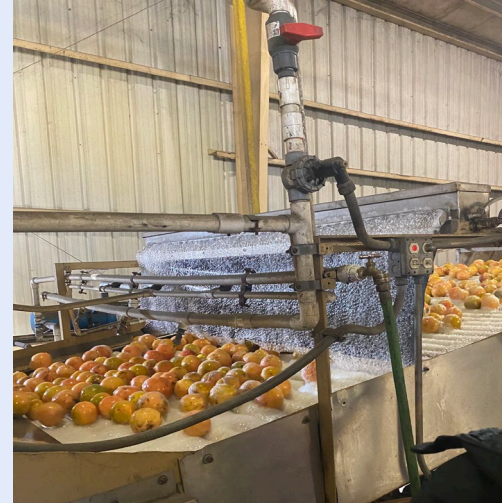
Reviewed by: _____

Title: _____

Date: _____

Confidential Record

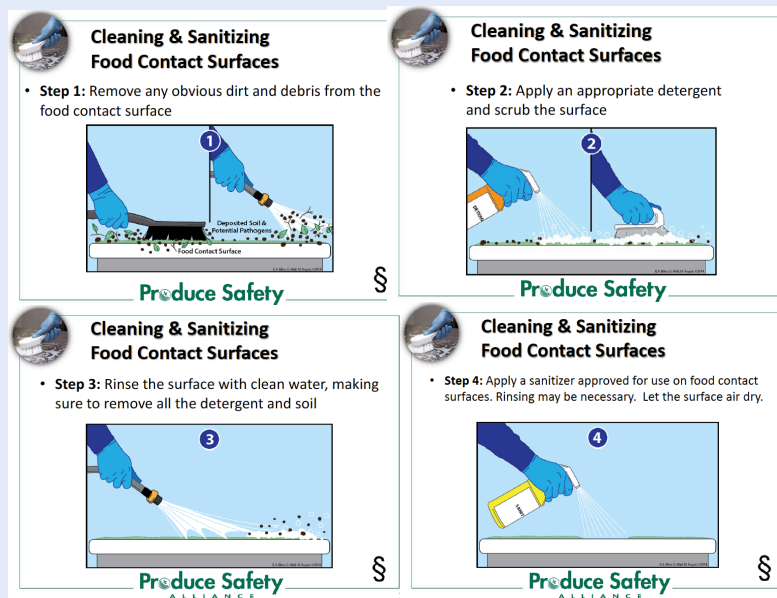
Observe the Environment and Sanitation Process



Wet vs Dry Cleaning

Wet

- Use of water to remove soil/debris
- Combination of aqueous solutions and or detergents



Dry

- Avoid the use of water
- Most dry cleaning will require a combination of cleaning options to dislodge the soil and then remove it
 - Sweeping, vacuuming, steam...
- May be used during operation or periodically between wet cleanings in all packinghouses

Factors to Consider in Evaluating Cleaning/Sanitizing Programs

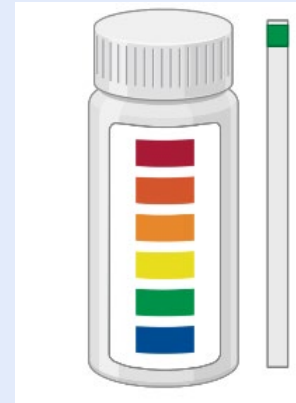
- Time of contact
- Action – physical force, velocity, flow
- Concentration – amount of cleaner used
- Temperature
- Water quality
- Individuals (personnel)
- Nature of soil
- Surface condition and type

**TACT
WINS**



Components of Sanitation Program that Change Infrequently (WINS)

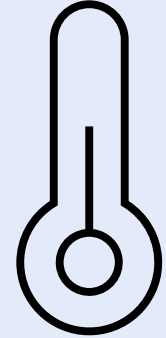
- Water
 - Hard, soft, pH, cold, hot...
- Individual (personnel)
 - Who are they, how many, how long, are they trained?
- Nature of Soil
 - Organic, inorganic, combination...
- Surface
 - Stainless steel, plastic, concrete, wood, painted...
 - non-porous, porous (can it dry?)



Components of Sanitation Program that One Can Control (TACT)

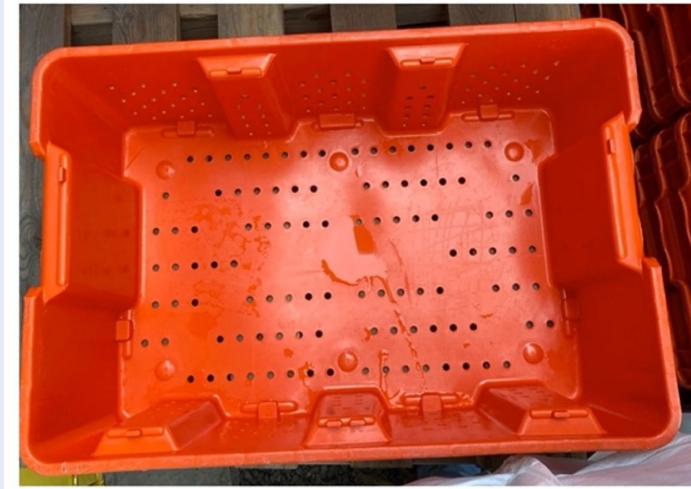
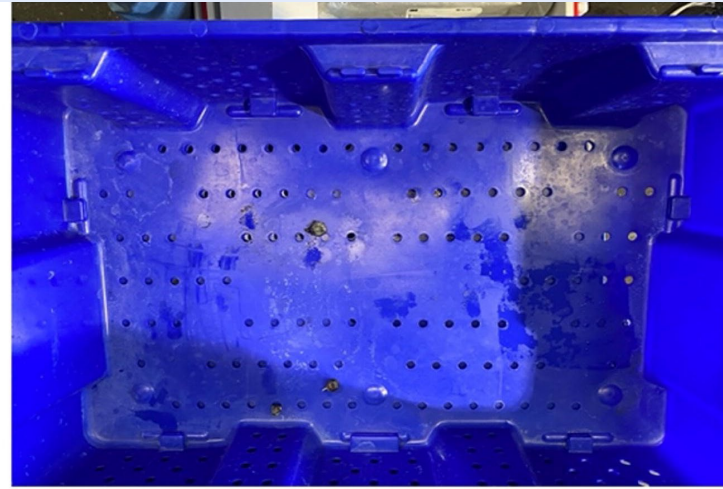
1. Time
2. Action
3. Concentration
4. Temperature

These are interdependent
changing one affects the others

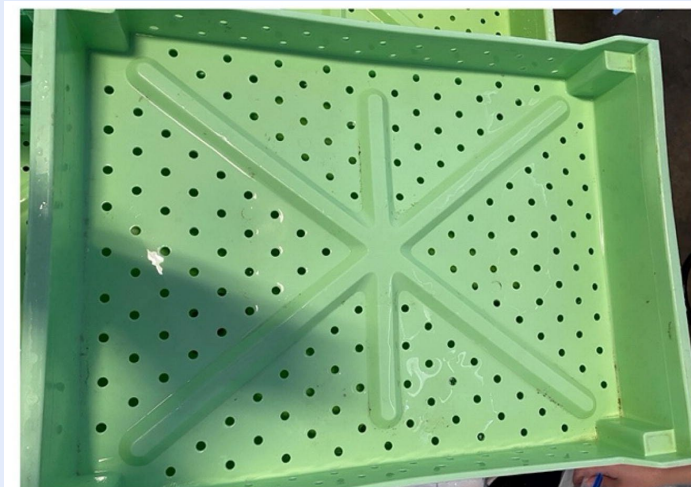
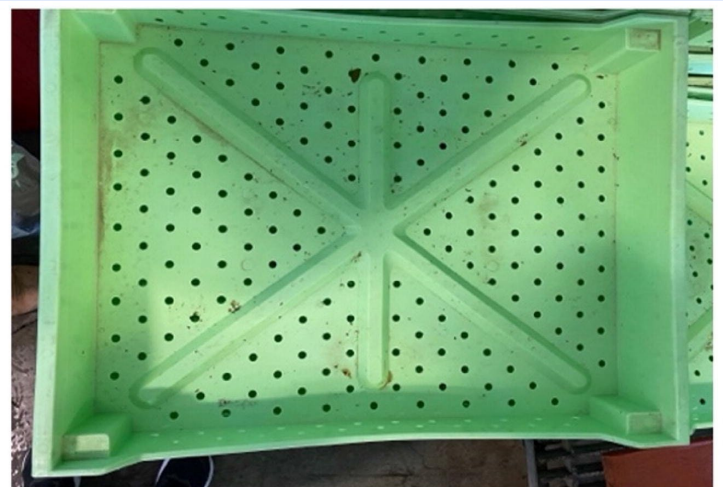


“In-Use” v “Cleaned” Containers

In-Use

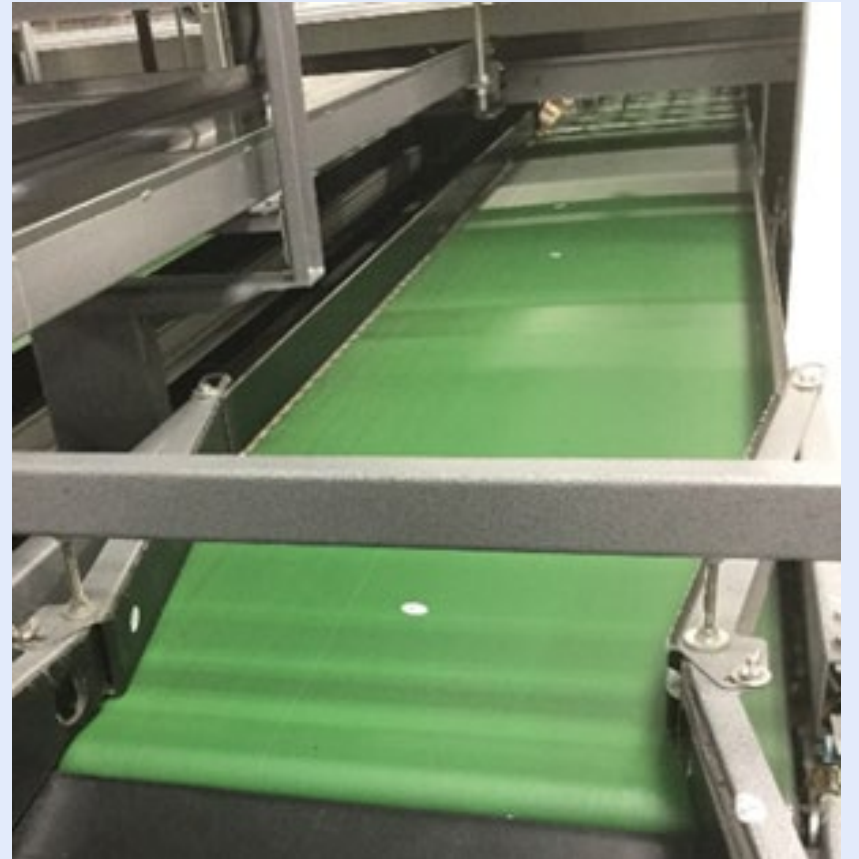


Cleaned



Why Sanitize?

- Produce Safety
 - Reduction of microorganisms
- Product Quality
 - Shelf-life extension



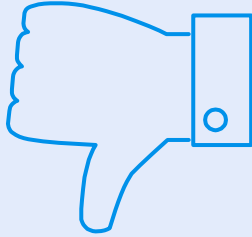
What IS and ISN'T a Sanitizer

- A sanitizer does



- Reduce microbial contamination to a safe level
- Food contact surface sanitizer kills 5 logs (99.999%)

- A sanitizer does not



- Sterilize
- Disinfect

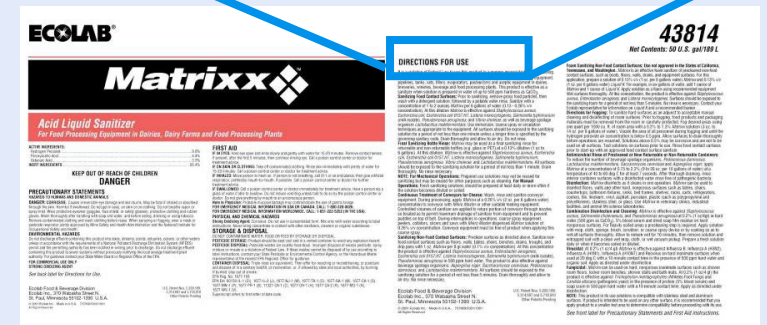
Regulations for Use of Sanitizers

U.S. Environmental Protection Agency

- Regulated through the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
- Sanitizer Registration:
 - Antimicrobial efficacy data
 - Product chemistry
 - Toxicology data
 - Label & Technical literature
- EPA Registration Number (EPA Reg. #)
- Registration nationally and locally.

DIRECTIONS FOR USE:

It is a violation of Federal law to use this product in a manner inconsistent with its labeling

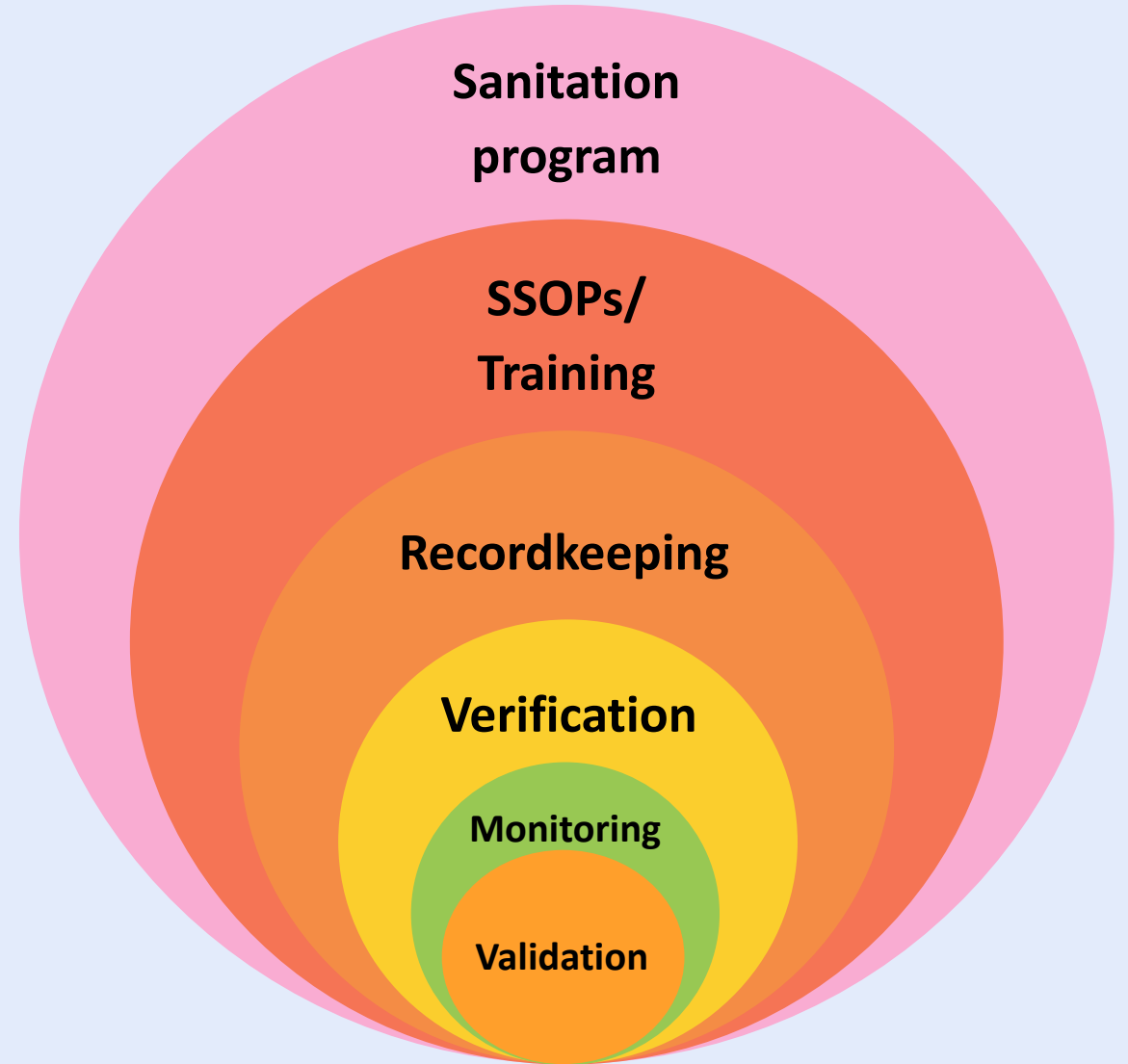


Usage Restrictions

- “It is a violation of federal law to use this product in a manner inconsistent with its labeling”
- Prepare only in potable water
- Accurate concentration (not too high nor too low)
- Fresh solution

Systematic Sanitation Process

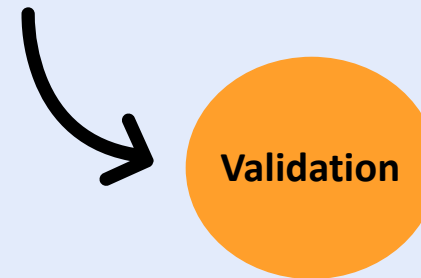
How can one check
cleaning and
sanitizing is an
actual food safety
program?



Systematic Sanitation Process

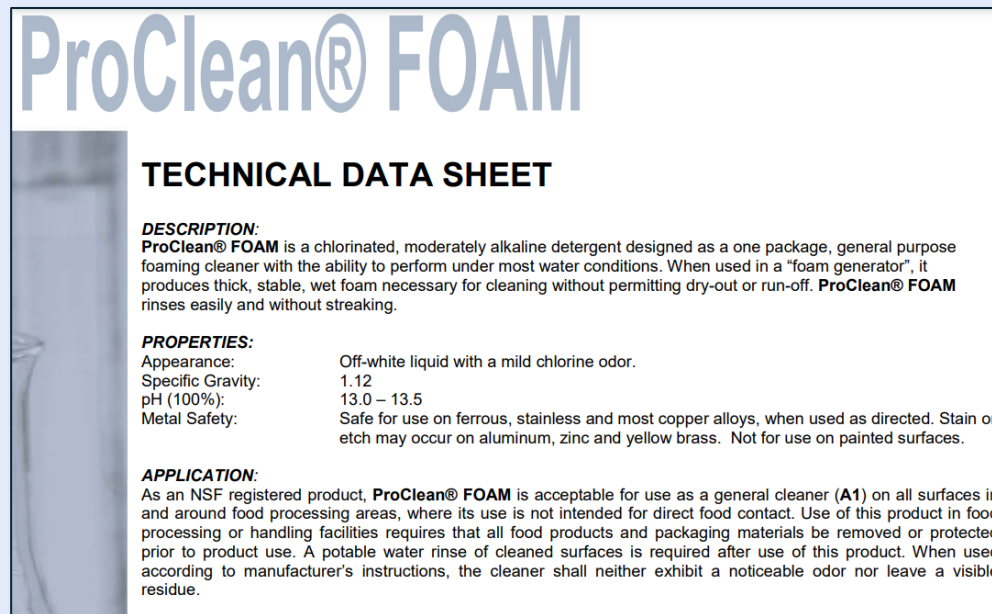
**How can one check
cleaning and
sanitizing is an
actual food safety
program?**

Cleaning/Sanitizing in
a way that proves it
will work (parameters)



Validation

- Labels can help identify parameters to clean and sanitize correctly

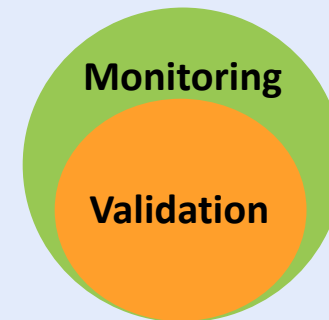


- Parameters
 - Contact time
 - Mechanical action
 - Sanitizer concentration
 - Temperature
- Examples
 - “Rinse all detergent from surfaces until no visible debris remains”
 - “Spray sanitizer to saturate a surface and allow to air dry completely”

Systematic Sanitation Process

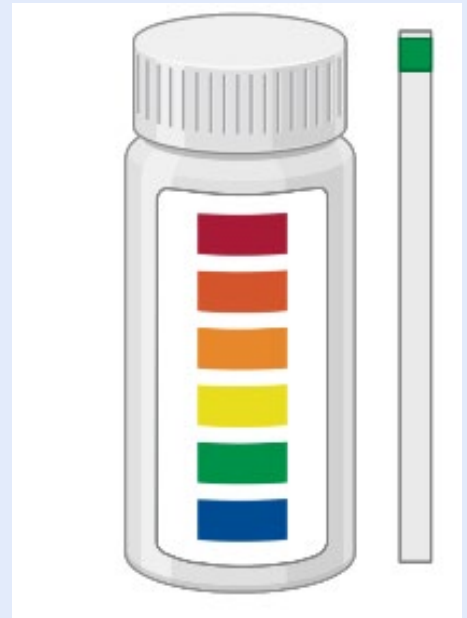
**How can one check
cleaning and
sanitizing is an
actual food safety
program?**

Check that the
cleaning/sanitizing
event follows the
parameters



Monitoring

- Are farmers **checking** to make sure they are meeting the parameters (like sanitizer ppm)
- This is the **only** way to know that a cleaning/sanitizing event is going properly
 - “Properly” means “following the validation” or “adhering to the label”



Monitoring: Cleaning

Observe After Cleaning

- An inspection should be done to ensure the area is **visibly clean** and no plant material or other visible debris remains
 - If not visibly clean, ask if they reclean and check again
 - Suggest retrain employees



Photo credit: Dr. Alexis Hamilton

Monitoring: Sanitizing

Before sanitizing

- Are they using the correct...
 - Sanitizer
 - Concentration, if diluted
 - PPE
 - Tools

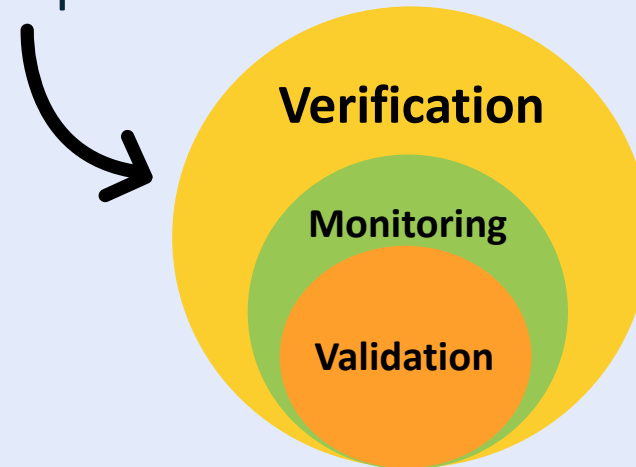
| Description | Dilution for Use |
|------------------------------|----------------------------------|
| Foaming Chlorinated Cleaner | 2-4 oz./Gal |
| Quaternary Ammonia Sanitizer | 0.25-0.5 oz/Gal (200-400ppm) |
| 2-Part Disinfectant cleaner | 12.8 oz of EACH per Gal of water |
| Chlorinated Cleaner | 2-10 oz./Gal. |

Photo credit: Justin Kerr, Factor IV Solutions

Systematic Sanitation Process

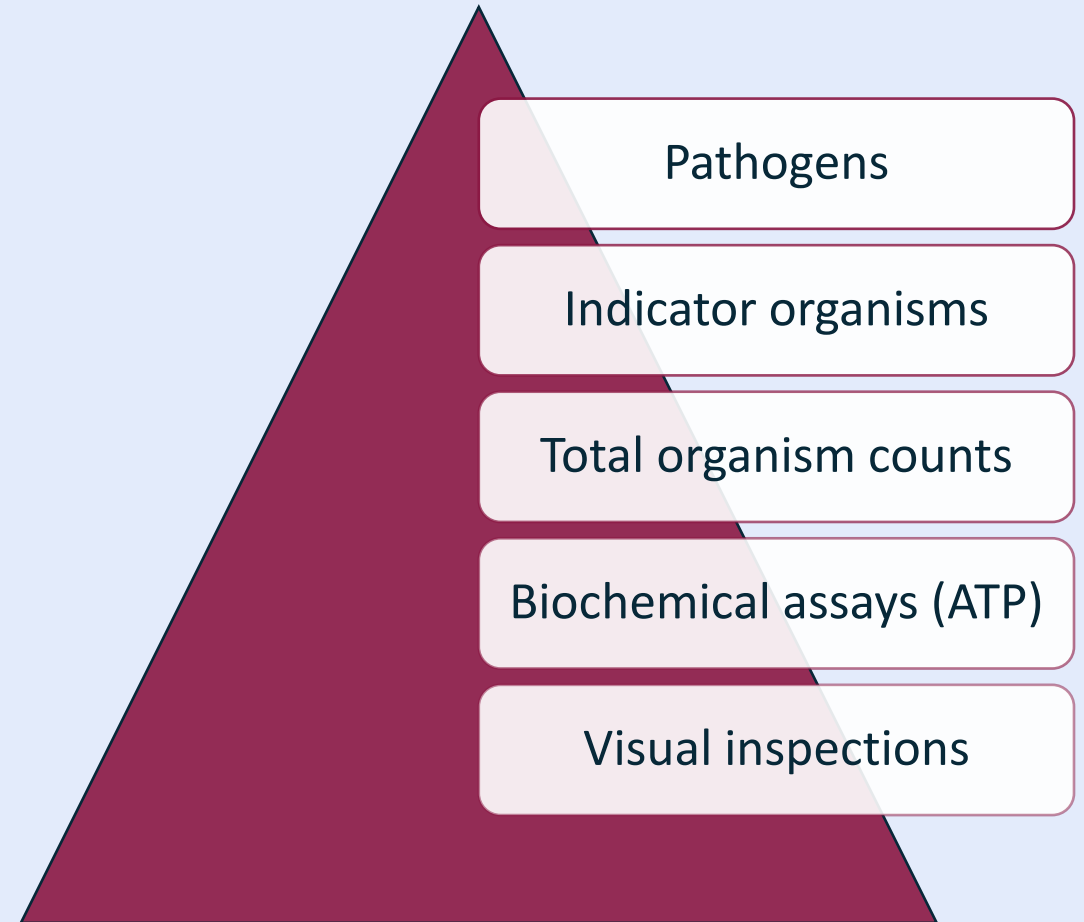
**How can one check
cleaning and
sanitizing is an
actual food safety
program?**

Check that the
cleaning/sanitizing
process can/is
following the steps
of the plan



Verification

- Verification includes procedures to show the effectiveness of cleaning procedures or the entire sanitation program
- One of the ways they can do this is to use tools that can check the environment (not required by PSR)



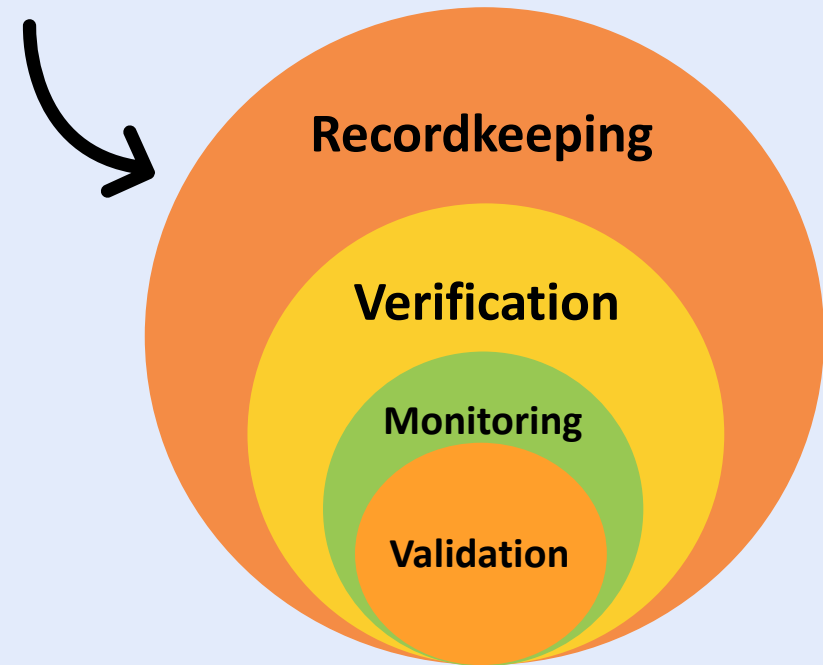
*"You must inspect, maintain, and clean and, **when necessary and appropriate**, sanitize all food contact surfaces of equipment and tools used in covered activities **as frequently as reasonably necessary** to protect against contamination of covered produce."*

-21 CFR 112.123(d)(1)

Systematic Sanitation Process

How can one check
cleaning and
sanitizing is an
actual food safety
program?

Proof of cleaning and
sanitizing



PSR Recordkeeping Requirements

- § 112.140(b)(2) - establish and keep documentation of the **date** and **method of cleaning and sanitizing of equipment** to this part used in covered harvesting, packing, or holding activities.
- All records must be kept for 2 years
- Required records must be dated and signed or initialed by the person who performed the activity (and REVIEWED)

Food Contact Surface Sanitation Record Template

Name of farm: _____

C=Cleaned S=Sanitized

| Date | Food contact surface cleaning checklist | | | | | | | | Corrective actions needed: | Cleaned by (initials): |
|------|---|---|----------------|---|-------------------|---|-----------------|---|----------------------------|------------------------|
| | Belts | | Grading tables | | Washing equipment | | Rollers/brushes | | | |
| | C | S | C | S | C | S | C | S | | |
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Reviewed by: _____ Title: _____ Date: _____

Cleaning and Sanitizing Record Template

Name and address of farm: _____

List the date, time, tool or equipment name, and method for each cleaning or sanitizing activity.

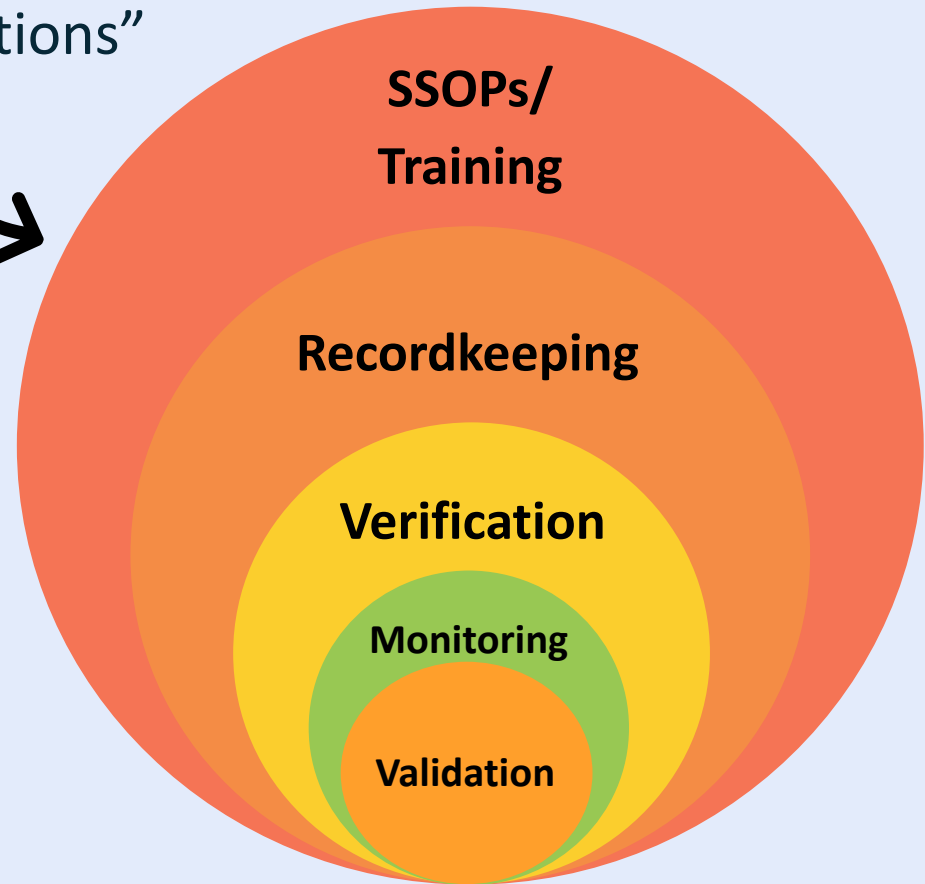
| Date | Time | List tools/equipment | Cleaned and/or Sanitized? | Method used | Cleaned By (initials) |
|----------|----------|----------------------|---------------------------|---|-----------------------|
| 10/11/20 | 10:07 AM | Harvest tools | cleaned | See Cleaning SOP (Removed dirt with brush, washed with detergent, rinsed, air dried) | EAB |
| 10/11/20 | 10:30 AM | Dump Tank | cleaned and sanitized | See Dump Tank Cleaning and Sanitizing SOP (drained tank, washed with detergent, rinsed, sanitized with 150 ppm NaOCl) | EAB |
| | | | | | |
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Reviewed by: _____ Title: _____ Date: _____

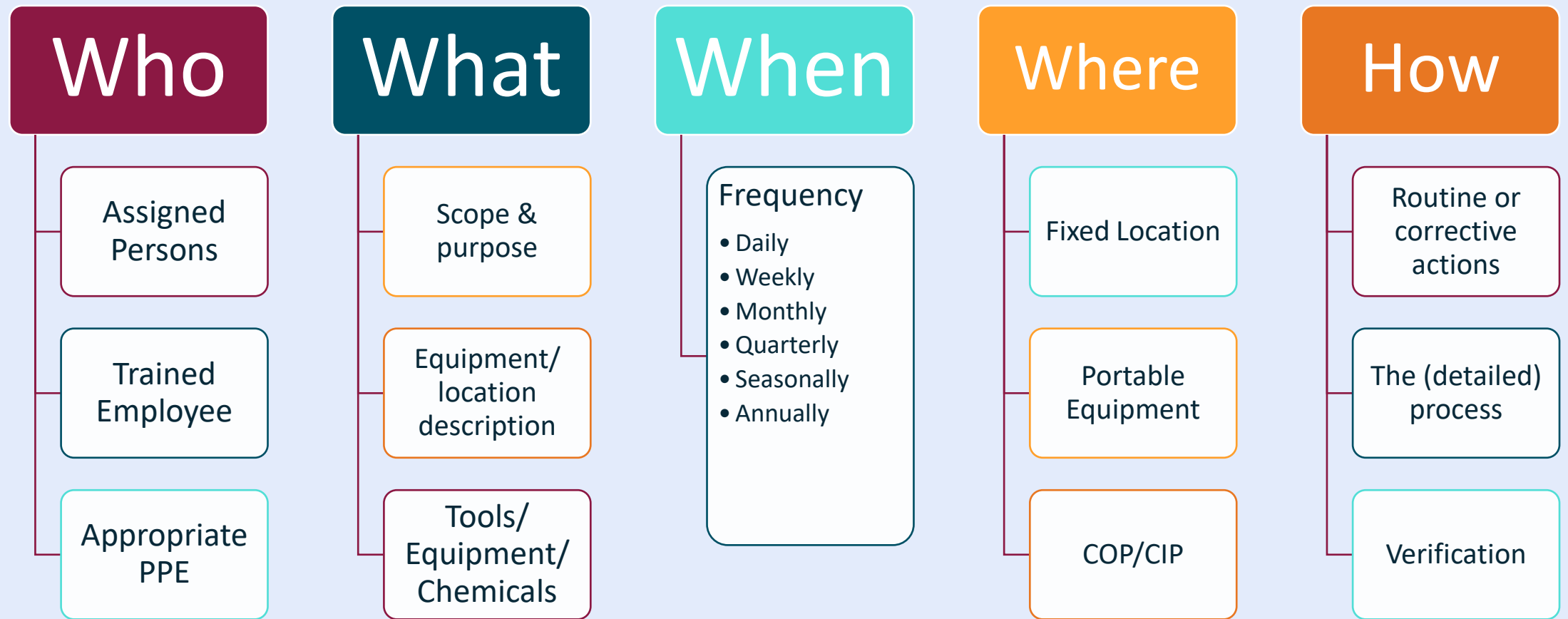
Systematic Sanitation Process

How can one check cleaning and sanitizing is an actual food safety program?

Train people on what/how to do it
“Directions”



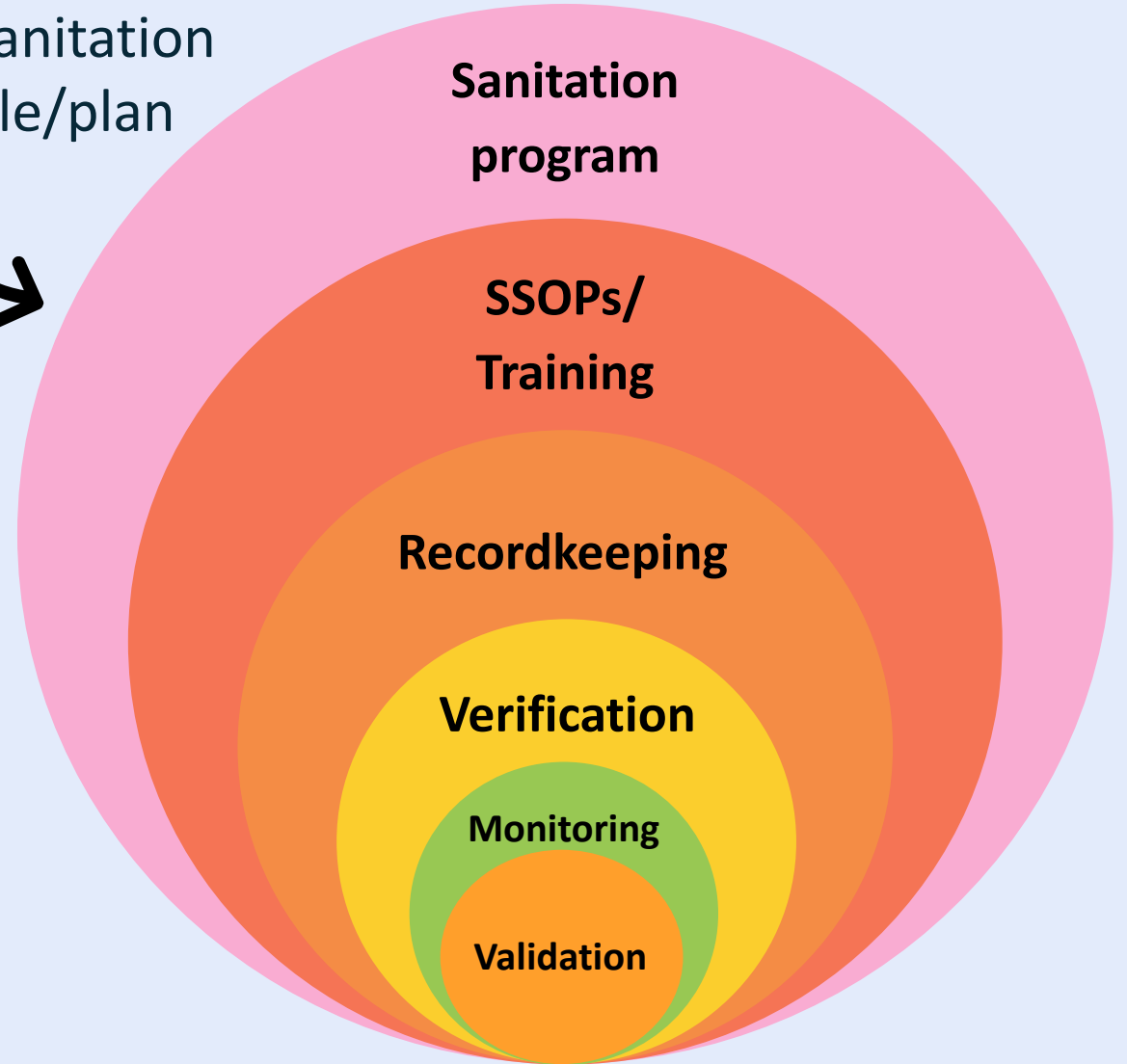
While not required, Sanitation Standard Operating Procedures can be helpful



Systematic Sanitation Process

How can one check cleaning and sanitizing is an actual food safety program?

Inquire about a master sanitation schedule/plan



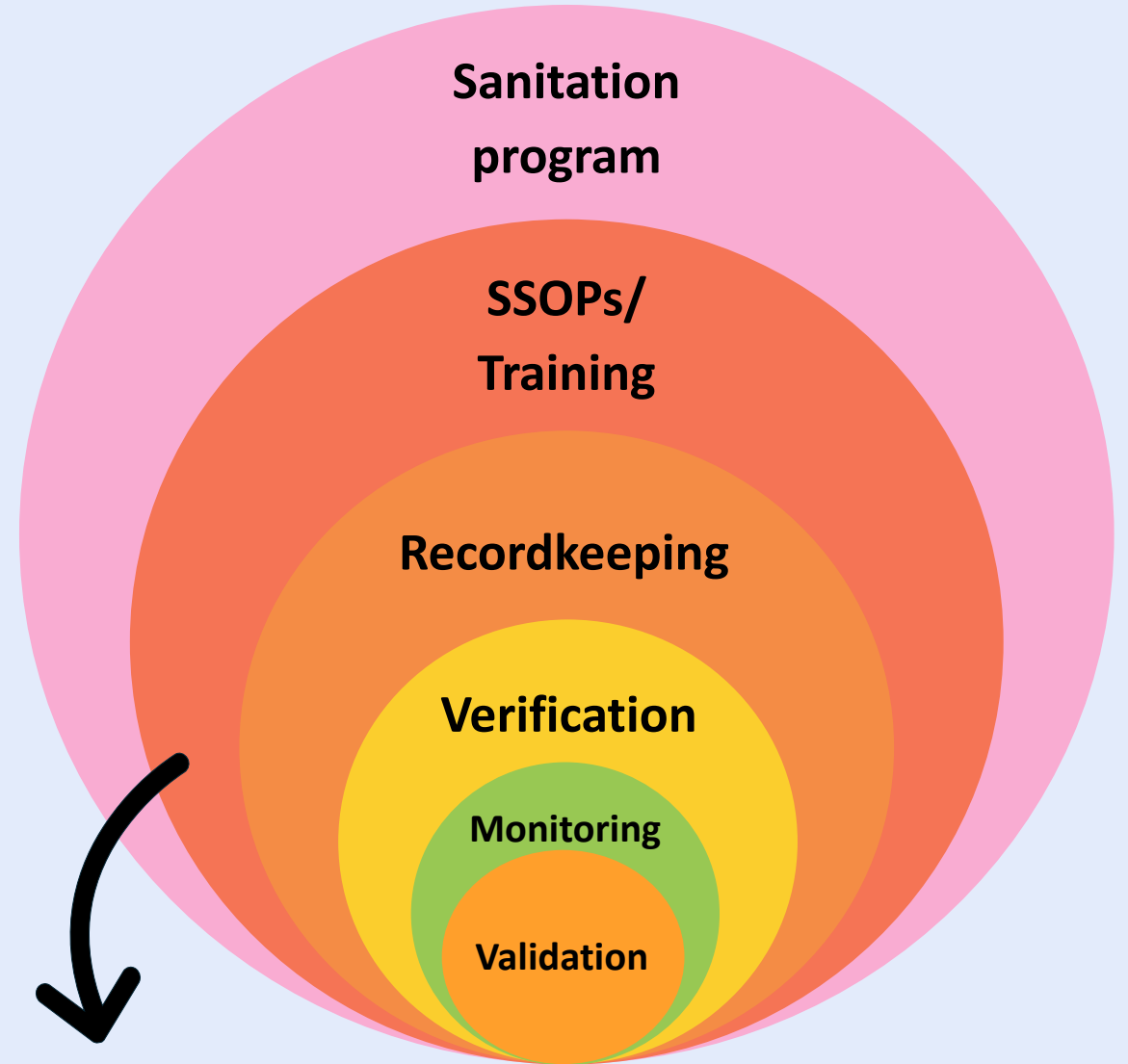
Master Sanitation Schedule

- There are multiple types of sanitation events
 - Routine
 - Deep
 - End of season
- Not every surface is cleaned and sanitized every day
 - Creating a schedule can help make sure surfaces are cleaned and sanitized as necessary



Systematic Sanitation Process

How can one check cleaning and sanitizing is an actual food safety program?



Reminder: Standard Operating Procedures are NOT required under the FSMA PSR

Summary

- Go beyond reviewing records, observe practices and engage in conversations about a farm's practices
- A proper cleaning and sanitizing program is required to prevent contamination and biofilm formation in postharvest settings
- A robust cleaning and sanitizing program requires a systems thinking approach to reduce and prevent hazards by ensuring the different practices, processes, and programs are working together on the farm
- Sanitary design is the goal, but most surfaces can be cleaned and sanitized. They might just require extra care and monitoring

