The Why’s of Sanitation

• Remove Soil
  • Soil can provide a harborage site for bacteria
  • Soil may serve as a food source for bacteria
• Kill any bacteria remaining on food processing surfaces
• The “destroy” component of a *Listeria* control program
• Remove or prevent the formation of persistent biofilms
• Provide a clean and sanitary environment for processing
• Maintain a clean and sanitary environment throughout processing day
• Prevent migration of bacteria between zones
Produce Industry Specific Challenges

• Poor Sanitary design of facilities and equipment
• Materials incompatible with sanitation chemistry or process
• Lack of knowledge & “we’ve always done it this way” thinking
• Wooden or plastic bins move between field or orchard and processing facility that may be immersed in flume water
• WAX – both natural and applied and brush beds
• Sizer sorters with exposed electronics
• PLU Stickers!
• Controlled atmosphere storage rooms
• Absence of a kill step before consumption
**Terminology**

**Cleaning**
Use of chemical and mechanical processes to remove soil from a surface

**Sanitation/Sanitizing**
The application of a specific chemical (a sanitizer) or other treatment to a previously cleaned surface to kill bacteria

**Sanitation**
Also used to describe the combined cleaning and sanitation process - sanitation team, sanitation shift etc.
Prerequisites

A SUCCESSFUL SANITATION PROGRAM REQUIRES:

• Commitment from Ownership and Management – from the “C” suite down
• Engagement of all departments – Sanitation, Maintenance, QA/QC, Ops
• A Cleanable Plant and Cleanable Equipment – Good Sanitary Design
• A Documented Cleaning and Sanitation Program
• Appropriate Resources
  • Adequate time to clean what need to be cleaned
  • Sufficient Trained and Supervised Sanitation Personnel
  • Adequate Supply of Potable Water with Appropriate Suitable and Functioning Sanitation Equipment/Tools
  • Effective Cleaning and Sanitation Products - Chemistry
• Ongoing Employee Training in Sanitation, Food and Personal Safety
Types of Sanitation

VARYING APPROACHES NEEDED AT DIFFERENT TIMES:

• Daily Sanitation
  • Cleans processing space and equipment between production days, provides “clean break separation between lots/days

• Weekly Sanitation
  • Deeper clean or additional cleaning steps performed over the weekend when more time is available

• Deep Clean
  • Annual or Semi-Annual Process that uses production down time to deep clean the entire facility

• Remedial Cleaning
  • Intended to restore the sanitary environment after an outbreak event, or other abnormal event such as construction or disaster recovery
Personal Safety

The plant gets clean and everyone goes home

• Appropriate Personal Protective Equipment
  • Safety Glasses, Goggles, Face Shields, Gloves, Rain-Suit, Sleeves, Boots etc.

• Safe Access to equipment
  • Ladders, Catwalks, Steps, Platforms, Extension poles

• Safety Showers and Eye Wash Stations
  • In the chemical storage area and around the plant

• Lock-Out, Tag-Out Precautions

• Confined Space Awareness and Training

• SDS Access and Secondary Container Labelling
Documented Program

- Sanitation Plan – Master Sanitation Schedule
- What you clean
- When you clean it - Frequency
- How you clean it – SSOP’s
  - Does it need to be disassembled, if so how and who
  - What products do I use
  - What dilution rate is optimal
- Verification – is it clean
- Sanitation step = product, ppm, contact time
Water Quality Considerations

- Water needs to be potable
- Water Chemistry can have a profound effect on cleaning!
- Plant water should be analyzed for:
  - Hardness - both Ca & Mg – reacts form soap scums
  - Silicates – avoid acid cleaners will leave a white film
- Some water conditioning may be required
- Water chemistry can vary seasonally & by source
- Retest or review annually
- Cold water predominant in produce
- May need hot water for some applications
Wash Down Hoses and Spray Guns

- Water is a precious resource
- Enough hoses to get the work done
- Booster pumps are an option
- Plant pressure should be sufficient for cleaning and to support the number of hoses in use, but generally <160 psi to avoid aerosol formation
- Adjustable spray pattern – fan to jet
- Water saving designs – Auto Shut off
- Pressure Washers not recommended in-plant use but may be suitable for field harvest equipment
Sanitation Tools

• Sanitation and Production Tools need to be color coded by use
• Clear Signage indicating what tools are for what application
Equipment – Foaming Systems

• Portable – tank foamers
• Wall-Mounted
• Centralized Systems
  • High Efficiency
  • Reduce Water Use
  • Reduce Chemical Use
  • Speed Up Cleaning Process
  • Save Labor
Wall Mounted Sanitation Stations
Centralized System for Large Plants
The 7 Steps of Effective Sanitation

A systematic approach to the sanitation process

1. Dry Clean-Up
2. Pre-Rinse
3. Chemical Application
4. Scrub
5. Rinse
6. Inspect and Re-Clean
7. Sanitize or Disinfect, Rinse and Sanitize
CLEANING PROCESS - 1

Dry Clean-Up / Dry Pick-Up & Preparation

• Remove all raw product, finished goods and packaging materials from the area to be cleaned
• Sweep, scrape, scoop and pick up all gross soil for disposal as solid waste
• Clean sensitive equipment by hand and cover
• Dismantle equipment as required by SSOP
• Can be an ongoing continuous part of production
• Water is not a broom!
CLEANING PROCESS - 2
Pre-Rinse / Rough Down Rinse / Wash Down

- Potential for water reuse from e.g. flumes for this
- Work from top to bottom
- Work from the walls toward the center of room or where ever drains are located
- Inspect – is area ready for foaming
- Avoid pressure washers due to aerosol risk although may be appropriate for certain applications
- **Clean the drains to avoid contaminating previously cleaned surfaces and equipment**
Drains

• Major harborage area for *Listeria*
• Clean early to minimize risk of cross contamination
• Dedicated color coded tools and supplies
• Dedicated employee(s)
• Employees change wash change rain-suits and PPE between cleaning drains and other tasks
• Prime location for biofilm
• Be aware of water backing up from drains during production
• Sterilex™ drain program recommended weekly
Biofilms – Sterilex™ Products

• The first EPA-approved biofilm remover
• Removes *E. Coli, Salmonella, Listeria* and other problem persistent microbial contaminants
• Used as a weekly “shock treatment” in drains and troughs or plant surfaces
• Indicon gel – biofilm finder
CLEANING PROCESS - 3

Chemical Cleaning

• Apply appropriate detergent, usually as a foam application
• Apply foam starting at the bottom and work up to the top
• Cover all surfaces
• Allow to foam to sit on the surface but do not allow to dry
• Foam collapses gradually and releases cleaner to the surface
• Four factors affect how the chemicals work

  Time  Temperature  Concentration  Mechanical Action

• Change one, change others to maintain balance
Selecting Cleaners

- Soil to be removed
- Substrate
  - Stainless steel
  - Soft metals
  - Plastics or synthetic
  - Porous materials
- Cleaning Application – foam-on vs CIP vs COP
- Water and Waste Water Considerations
Checking the Concentration

**Chemical test kits**
- % alkalinity
- % acidity
- ppm chlorine
- SSOP should specify concentration
- Test and document what was used
- 1% = 10,000ppm

**Test Strips**
- Inconsistent
- Quick and dirty guide
- Not accurate for concentration
CLEANING PROCESS - 4

Mechanical Action - Scrubbing

- Start before the foam dries
- Green Scrub pads – can scratch delicate surfaces
- White (Doodlebug Pads) are softer
- Extension Poles with pad holders
- Nylon bristle brushes
- Belt-Brite system for conveyors
- Pumping the solution in a CIP system
CLEANING PROCESS - 5

Rinsing

Removes the cleaning chemicals and the soil before they dry or soil is redeposited on the surface

• Potable clean water
• Rinse from the top down and periphery toward the drains
• Avoid overspray and splashing from floors and drains
• Remove all chemical residues
CLEANING PROCESS - 6

Inspection of cleaned surfaces & re-clean if needed
• Inspect all surfaces for residual soil, use flashlights
• Flashlights are essential
• Water sheets off a clean surface
• Water beads up on a dirty surface
• Other verification steps such as ATP testing
• Re-clean areas where residual soil remains
CLEANING PROCESS 7

Sanitizing – Post or No Rinse application

• Application of an approved compound to kill bacteria remaining on the surface

• Concentration – mix it correctly as specified is SSOP

• Contact time – leave it on the surface for the time specified on the label and SSOP

• Should not be rinsed before production starts, but excess should be drained from food contact surfaces

• *Effective Cleaning is 99% of the sanitation job. The remaining 1% is the job of sanitizers*
Sanitizer Terminology

• Sanitizers are EPA regulated under FIFRA Statute
• Sanitizers vs. Disinfectants.
• Sanitizers kill most bacteria present  
  (5 Log Reduction = $10^5$ down to 1)
• Post Rinse sanitizers – used on food contact surfaces  
  without a subsequent rinse – drain excess
• Disinfectants kill nearly all bacteria present  
  (6 Log Reduction = $10^6$ down to 1)
• Sterilization kills **ALL** bacteria present
CIP Cleaning

• CIP (Clean-In-Place) – applicable to flume systems or juice plants

• Enclosed tanks and pipe work are cleaned using the system’s own circulating pumps or an external CIP system.

• Low-foaming cleaners and sanitizers are used

• Follows the same general steps outlined above

• The CIP process may be fully automated on larger systems
COP Cleaning

• CIP (Clean-Out-Of-Place) – applicable small parts or tools
• Parts to be cleaned are immersed in a tank or trough of cleaner
• Can be a simple soak tank or an engineered tank with heating and recirculation
• An effective solution for brush bed brushes if they are easily removeable
Brush Beds – Sanitation Strategies

• Have two sets of brushes
  • Swap out if possible and use a COP tank
  • Sanitize and allow to air dry between use

• Steam wands to melt excess wax before chemical cleaning

• Retrofit brush beds with spray bars and clean using a CIP approach

• Specialist chemistry formulated to remove waxes such as BIRKO WAX-OFT
Organic Certified Facilities

- Bacteria don’t discriminate between organic & conventional
- Food safety risks are the same if not greater with organic produce (incorrectly composted bio-solids)
- Clean using the same products and procedures that you would use in a conventional facility
- Rinse thoroughly with potable water
- Test for residues if appropriate
- Sanitize using an National Organic Program Approved Sanitizer
  - PAA
  - Chlorine
  - Chlorine Dioxide
  - Ozone
Protecting the Sanitary Space

• Isolate the work area and keep it sanitary

• Entryway Foamers – quat foam

• Clean boots, truck tires and fork lift wheels

• Combine with floor powder (not sanitizing but helps control soil and inhibit bacterial growth

• Quat based paste as a temporary filler for cracks and holes

• Divide the plant into clean and dirty sides – with physical barriers to movement
Sanitation During Production

- Drain Rings and Condensate tray quat blocks
- Continuous slow release of sanitizer to inhibit bacteria
- Control liquid accumulation on floors
- Sanitation personnel working during processing
- Clearly distinguish from processing employees
- On going trash and debris pick up during production
- Train and Monitor – what they do can be problematic
- Rinse and sanitizer rinse at break and between shifts
- Maintenance tools – do they ever get cleaned
Sanitation Follow Up

- If you didn’t document it, it never happened!
- Review the verification data ATP tests, EMP swabs and use it as a tool to drive process improvements
- Share the data with the sanitation team – both the good and the bad!
- Use the data to incentivize your sanitation team
- Sanitation is not just a third shift activity – it should be a continuous component of your production processes
- Remember – sanitation is the corner stone of product quality and that a quality product is a safe product
Final Thoughts

• Effective Sanitation is fundamental to product quality and safety

• What is the experience you want to give your customers?

The Beef Industry's Pledge to Consumers

As leaders in the beef industry, representing each link in the beef production chain, we reaffirm our commitment to further reduce the risks associated with foodborne pathogens by utilizing scientifically proven production practices and technologies. Our united goal is to produce, deliver and serve wholesome and safe beef for each and every family.

Beef Industry Food Safety Council 2012
Additional Information in PDF

- Fogging
- Remedial Sanitation
- Other Sanitation Activities
- Sanitizer use Precautions
- Validation and Verification
- Verification of Sanitation
- In Process Verification
- Post Process Verification
- Verification Follow-up
- Bio film – Key Concepts
Fogging

- Periodic Spray or Mist Application of Sanitizer into the air
- Reaches Ceiling and Penetrates cracks and Crevices
- Follow Sanitizer Labelling and be Aware of Employee Safety
Remedial Sanitation

Deep Cleaning During a Plant Shut Down

• Either as a response to persistent environmental Listeria positives, restoration after construction or as a periodic preventive measure
• Scheduled over a weekend or during a plant shut down
• More extensive dismantling of equipment than normal
• Escalating chemistries
  • Standard sanitation products with a disinfection step
  • Sterilex™ at remedial concentrations 3 days in a row
  • Decon 7 – 3 part chemistry applied both as a foam and a fog
Other Sanitation Activities

• Passivation – creating a protective oxide film on stainless steel
  • Pretreatment to protect stainless steel surfaces on new equipment
  • Repeated periodically

• Acid cleaning for hard water scale removal

• Cleaning new/used equipment before installation

• Keeping things clean during or after construction
Sanitizer Use Precautions

- Sanitizers should be precisely mixed to the application concentration defined in your SSOPs
- Under-mixing or over-mixing can be problematic
- Sanitizers are applied after the rinse and inspection steps
- Usually applied with a low-pressure spray or flood applicator.
- All surfaces of equipment and environmental surfaces to be sanitized are wetted
- Contact Time! - The label will specify a minimum amount time necessary for efficacy
- Rotate Sanitizers – Quat to PAA, Quat to NaOCl, weekly, every other night
- “Nuclear Option” - Disinfect, Rinse then Sanitize
- Be aware of negative interactions between sanitizer and product
- The label is the law when it comes to sanitizers
Validation vs. Verification

• **Validation** is a series of tests conducted to ensure that a process is achieving the intended result
  - *Allergen testing to demonstrate that if a tank is CIP cleaned using a specific set of conditions then all allergens are removed*

• **Verification** is a planed series of measurements to check that the conditions of a validated process are being met
  - *Verification is a planned series of monitoring and testing activities that a facility performs on a regular schedule to ensure that their preventive controls are being consistently implemented and are effective.*

**Under FSMA** - Sanitation is considered a Preventive Control
Verification of Sanitation

What result are we trying to verify?

• Removal of soil from the processing equipment
• Removal of soil from the processing environment
• Removal of microbial load (spoilers and pathogens)
• Removal of allergens

Verification Plan

• Measurements, observation and testing that demonstrate that sanitation procedures are operating as intended and having the intended results
In Process Verification

Measurements made during the sanitation process that validate how things are being done

- Visual Inspection and Observation
- Conformance to SSOP’s
- Correct dispensing and mixing of sanitation chemicals
- Titration of chemical concentration
- Process Parameters, temperature, flow rate, hand scrub, contact time etc
Post Process Verification

**Post Process Verification** - Measurements after sanitation process is complete

Immediately Actionable Results – allow suspect areas to be re-cleaned before production resumes

- Visual Inspection, ATP Swab testing, Allergen Swab testing program

Monitoring Activities – measure and report on the overall robustness of the sanitation program

- Environmental Monitoring Program, Product Microbiological Testing
- Verification the Master Sanitation Schedule is being followed
Biofilm – Key Concepts

A cluster of microbes irreversibly attached to a surface and encapsulated by a polysaccharide matrix

• Preferred lifestyle for bacteria in the environment
• Persistent biofilms may be resistant to conventional cleaning and sanitation processes
• Persistent biofilms can shed bacterial contamination on to product and be a major problem in food processing facilities
• Can harbor and be a source of pathogens
• Specialty products and procedures may be required for remedial removal