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.
Sanitation and FSMA

“The Preventive Controls for Human Food regulation requires the implementation of sanitation preventive controls, as appropriate to the facility, and the food, to significantly minimize or prevent hazards such as environmental pathogens, biological hazards due to employee handling, and food allergen handling.”

_FSPCA Training Curriculum – 2016_

*Effective sanitation is the cornerstone of product quality*
Goals of Sanitation

• Remove Soil – Soil is food 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 the processing day
• Prevent migration of bacteria between zones
Clean Break and Lot Control

- An important principle that is critical for the fresh cut
- Foundational in the meat processing industry particularly for ground beef and RTE products
- Have a clear definition of what constitutes a “lot”
- Validated clean break separation/sanitation between lots
- No comingling of lots within or between production periods, shifts or days
- Tool to limit liability and minimize the extent of any recall
- Potential area of weakness for the produce industry
  - 1 day = 1 lot
  - Carry over of product from day to day
  - Comingling of product between packing lines
SOIL – What is it?

• **Definition:**
  • Any substance that is found on a surface but is not an intended part of that surface and therefore is unwanted;
  • Any substance that is suspended in air and may deposit on a surface but is not intended to be present there

• **Synonyms:** Dirt, Contamination, Biofilm

• Produce Plant Soils Include: field dirt, natural waxes, mineral deposits, protein, carbohydrates, rust

• Soil harbors, and provides food for, microorganisms
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
Prerequisites

A SUCCESSFUL SANITATION PROGRAM REQUIRES:

• Commitment from Ownership and Management – from the “C” suite down

• Engagement of all departments – Sanitation, Maintenance, QA/QC, Operations

• A Cleanable Plant and Cleanable Equipment – Sanitary Design

• An Operational Cleaning and Sanitation Program

• Adequate Numbers of Properly Supervised Trained Personnel

• Adequate Supply of Potable Water Suitable, Functioning Sanitation Equipment

• Effective Cleaning and Sanitation Products

• Ongoing Employee Training in Sanitation and Safety
Sanitary Design - Hidden Areas
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 <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
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 Cleaning
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 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

• Can we reuse water 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
• Clean the drains to avoid contaminating previously cleaned surfaces and equipment
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 sit on surface but not dry
• Foam collapses and releases solution to the surface
• Four factors affect how the chemicals work
  • Time
  • Temperature
  • Concentration
  • Mechanical Action
Cleaning Chemistry

Cleaning Agents

- Acid Cleaners
- Alkaline Cleaners
- Non-Caustic Cleaners
- Chlorinated Caustic Cleaners
- Neutral Cleaners
- Solvent-Based Cleaners
- Displacement cleaners
- Combination Cleaners (Blend On-Site)
Selecting Cleaners

- Soil to be removed
- Substrate
  - Stainless steel
  - Softer metals
  - Plastics or synthetic
  - Porous materials
- Water and Waste Water Considerations
Detergent Components

• Surfactants and Wetting Agents – aid soil penetration, emulsification

• Builders – Add alkalinity and improve surfactant performance by lessening water hardness (chelating agents)

• Solvents – help dissolve or disperse fatty soils

• Corrosion Inhibitors – protect substrate surfaces from adverse effects of acidic, caustic and chlorinated cleaning compounds
Verifying 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
• 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
Verification of Cleaning

- Visual Inspection – is it clean flashlights
- Pre-Operational Swabs
- ATP (Adenosine Triphosphate) testing swabs
- Use test program to provide feedback to the sanitation team
CLEANING PROCESS 7

Sanitizing

- Application of an approved compound to kill bacteria
- Concentration – mix it correctly as specified is SSOP
- Contact time – leave it on the surface for the time specified on the label and SSOP.
- Do not need to be rinsed
Sanitizers

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
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 with a low-pressure spray 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
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
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
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
Fruit Sizer - Sorters

- Not designed to be cleaned
- Exposed electronics
- Porous materials
- PLU Stickers
- Spray and wipe cleaning
- Built in CIP systems
- Potential for antimicrobial surface coatings
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 blocks in cooling unit condensate trays

• 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
Preventive or Remedial Sanitation

Deep Cleaning

• Either as a response to persistent environmental Listeria positives or as a periodic preventive measure
• Scheduled over a weekend or a plant shut down
• More extensive dismantling of equipment than is 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
What is Verification?

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 validate?

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

Validation 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
Verification Follow Up

• If you didn’t document it, it never happened!
• Review the verification data 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 cornerstone of product quality and that a quality product is a safe product
Final Thoughts

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.

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