Plant Sanitation: Quality and Profitability

Paul P. Winniczuk, Ph.D.
Sun Orchard Inc.

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Sanitation
Overview of
• What
• Why
• When
• How
• Some cost savings values
Sanitation

• One of a processing plants Four Letter Words meaning “a lot of hard work”.
• A process of cleaning and sanitizing
• A processing plants cost of production and sometimes unknown ROI but can be quantified.
• A processing plants nightmare if not completed correctly.
• Can be directly related to the quality of the product.
What is Sanitation?

Basic steps

1. Removing gross soils with water. (Cleaning)
2. Using a chemical cleaning agent to remove soil residues. (Cleaning)
3. Rinsing with water to remove cleaning agent and suspended soils. (Cleaning)
4. Using a chemical sanitizer or thermal sanitizer to remove, reduce, or eliminate residual microorganisms. (Sanitizing)
5. Using a final potable water rinse to remove sanitizer (if needed) or to cool the equipment down.

(Katsuyama 1993)
Why Sanitation?
Need to meet regulations.

- Federal Food Drug and Cosmetic Act
- FDA –
  - cGMP – Basic principle of food production
  - HACCP – Prerequisite to Food Safety
- USDA –
  - FSIS
  - Sanitation Program

- A facility can be shuttered if problems
  - $10,000 to $? in costs to restart.
  - Plant may not restart? What then?
  - Loss of business – no income.
Why Sanitation?

- Need to make a wholesome product
- Lack of good sanitation can lead to spoiled or contaminated product with reduced shelf life
  - Does not meet Quality parameters (black specks, micro, other)
- Rework?
  - Salvage product but loss of
    - Package – container, label, cap ~$1.00 per package
    - Time and labor costs – Man-hour costs to produce?
    - $7.50/hr to $20.00/hr in labor?
    - Quantity and Quality of Labor hours?
- Discard?
  - Loss of product and package and time.
  - Cost of disposal.
  - Major loss.
Why Sanitation?

- Customer satisfaction
  - What is the cost if a customer leaves?
    - $50, $1,000, $100,000, more?
- Replacement cost of product to appease
  - $500 to $?
- Withdrawal/Recall of product
- Brand equity
  - What is the cost of the brand name?
  - Who is in the wings?
    - Competition is waiting for a failure
Summary of **Why Sanitation**

1. Poorer quality product
2. Loss or no sales
3. Increase waste cost
4. Lower profits
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Sanitation

- Why remove gross soils?
  - Makes cleaning easier
    1. 90% of the soil can be removed with water.
    2. Gross soils can be rinsed out reducing detergent need and cost.
Sanitation

• Why use a chemical cleaning agent?
  • Aids in removing adhered soils.
  • Aids in removing biofilm.
  • Aids in physically removing microbes.
  • Allows chemical sanitizers to perform best without interference.
Sanitation

- Why water rinse?
  - Final removal of soils.
  - Soils can deposit on surfaces if abrupt pH change or non-compatible fluids.
  - Removes cleaning agent without settling solids.
Sanitation

- Why sanitizer use?
  - Final reduction/kill step of residual microorganisms.
  - Prepares surface.
  - Residual activity for longer periods compared to water rinse.
Cleaning

With cleaning solutions, a few things to think about:

- Time – Contact time of solutions ($)
- Action – Physical action of cleaning
- Concentration - Of cleaning solutions ($)
- Temperature – Of cleaning solutions ($)
- Water quality ($)
- Individual assets – Workers ability ($)
- Nature - Of soil.
- Surface - To be cleaned.

Marriott and Gravani 2006
A few more things to think about:

- Validate the cleaning
  - Visual - Inexpensive
  - Soil residue tests – Increase costs
    - Sugars
    - Proteins
    - ATP
- How clean is clean?
  - ATP limit = 0 RLU or 5,000 RLU or ?
  - Need to compare - micro swabs & residue kits
  - Interference of ATP test by other than ATP compounds, could be costly if the test results in a required re-cleaning that is not needed.
**Surface** (Cost Neutral – No choice)

- Mostly stainless steel.
- No choice but to deal with it.
- If not SS, upgrade!
**Nature of Soil** (Cost Neutral – No choice)

- Understand what you are cleaning.
  - Easy to clean - Sugars, juices
  - Hard to clean – Pectin, pulp, proteins, burnt sugar
- Research it!
  - A little review and experiments can help clean better and maybe save money.
Individual Assets (Cost sink)

- People
  - Investment
  - Get the right people
  - Training
  - Give right tools
  - Effective cleaning
  - Research the cleaning method to optimize assets

- Cost effective if performing correctly
Water Quality (Cost sink)

- Water Chemistry is important for cleaning agent makeup.
  - Hardness
  - Biology
  - TSS
- Get the right cleaning and sanitizing agents.
  - Hard water or other water issues may use more chemical agents.
  - Get a different one with new formulation.
- Cost can go up.
- Research it.
- Work with chemical supplier.
Temperature of cleaning (Cost sink)

- High temperatures cost fuel/money to achieve.
- Use lowest temperature to get the required performance.
- Research it and compare need to the soil, cleaning agents, and time requirements.
- Reduce temperature where possible.
  - Easier on equipment.
  - Easier on boiler.
  - 10°F decrease can save ~$20/cleaning; $200/week; $10,000/year.
Concentration sanitation agents (Cost sink)

- Detergents and Sanitizers cost money!
- Use lowest concentration needed to get the required performance.
- Research it with respect to the soil, temperature, and time requirements.
  - Easier soils can require less concentration.
  - Can reduce cost by 50% or more from typical usage for easy-to-clean soils (1.5% alkalinity to 0.75% alkalinity)
  - Savings potential up to ~$40/cleaning; $400/week; $20,000/year minimum.
**Action of cleaning (Cost ?)**

- Manual cleaning depends on personnel.
- CIP cleaning depends on pumps and flow rate.
- Are both adequate for the needed performance?
- Research it with respect to the soils to be removed, the cleaning agent type and concentration, and cleaning temperature.

- **For manual cleaning, what do you need to use?**
  - Brushes, Green Pads. High Pressure Cleaning

- **CIP systems**
  - Smallest sized pump required.
  - Reduced energy costs compared to oversized system.
  - Smaller pump can save $2,000 plus less power cost.
Time of cleaning (Cost sink)

- Cleaning takes time. How much time?
  - Use the least amount of time to get the needed performance.

- Research it!
  - Review soils, cleaning agent type, concentration, and temperature.
  - Adjust each to maximize performance.
  - Test and validate it to determine best results.

- Cost savings – Depends.
  - CIP time can be reduced by 25 to 40% with the right combination.
  - Production can proceed sooner resulting in more output.
  - Possible savings of ~$60/cleaning; $300/week; $15,000/year
Summary -- Finally

- Sanitation is not the Swamp Monster. **Gators are!**
- Sanitation does not have to be costly.
- Sanitation depends on what is considered clean for a safe and contamination free product.
- Research it to find what is best for your operations.
- Potential savings from various **efficient** uses of chemicals, time, temperature, etc can reach $40,000 per year.
- Result is increased profits!