Why is Sanitation & Food Safety Important?

- Unsanitary conditions increase inoculum of decay causing organisms
  - Increased product loss to decay
- Unsanitary conditions promote contamination by human pathogens
  - e.g., E. coli, Salmonella, Cyclospora, etc.
- Good Sanitation practices improve BOTH food Quality and Safety

Food Quality vs. Food Safety

- Food Quality – Negotiable
  - Internal (i.e., Brix, acids, juice content, etc.)
  - External (blemishes, diseases & disorders)
  - If not perfect, can often still sell but at a lower price
- Food Safety – Not negotiable. All or nothing!
  - Everyone is entitled to a product that is safe to consume
Hazards

- Biological
- Chemical
- Physical
- Now also includes undeclared allergens

Importance of Good Food Hygiene

- Millions of microorganisms may be on the product surface
  - Most are not harmful to people and will not cause fruit decay
- Packinghouse procedures do not remove all microorganisms or chemicals
  - Even if 99.99% is removed, hundreds will remain
- Thus, minimizing contamination with human pathogens is still important!

Possible Sources of Microbiological Contamination

- Animals that have access to the field and produce-handling areas
  - Birds, insects, rodents, etc.
  - Animal feces - a main source for pathogenic organisms
- Contaminated water
- Poor hygiene of harvesters and field workers
- Contaminants from nearby or previous loads – e.g. frozen or chilled meats
Possible Sources of Chemical & Physical Contamination

• Foreign materials or debris
  – Soil, metal, glass, wood fragments, etc.
• Agricultural chemicals, insecticides, fungicides, fertilizers
  – Also see maximum residue limits for the U.S. and important export markets
• Cleaning/sanitizing chemicals
• Misused food chemicals (preservatives, additives, etc.)

Many Food Safety Requirements

• Buyer Imposed Standards – Food safety/hygiene standards imposed by various domestic and international buyers. Examples include:
  – GLOBALG.A.P.
  – Safe Quality Food
  – British Retail Consortium
  – Primus Global Food Safety Initiative (GFS)
  – USDA Harmonized Food Safety Standard for Field & Harvesting
  – Etc.
• Federal Regulations – Food Safety Modernization Act (FSMA)
  – Produce Safety Rule (PSA)
  – Preventive Controls Rule (FSPCA)

FSMA Foundational Rules

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*Supplemental proposals published September 2014
Produce Safety Rule Training Requirements

- At least one person at each company must complete training recognized as adequate by the Food and Drug Administration
  - All:
    - Principle of Food Hygiene & Food Safety
    - The importance of health and personal hygiene
    - Training specific for their particular job responsibility
  - Harvesters:
    - Recognize what produce must NOT be harvested
    - Inspecting harvest containers & equipment
    - Correcting problems

What does the produce safety rule establish?

- The PSR establishes science-based minimum standards for the safe growing, harvesting, packing, and holding of produce on farms
- To that end, the rule requires new standards in the following major areas:
  - Worker Training and Health and Hygiene
  - Agricultural Water
  - Biological Soil Amendments of Animal Origin
  - Domesticated and Wild Animals
  - Equipment, Tools, and Buildings

Worker Health & Hygiene

- Reassignment of ill workers
- Personal cleanliness
- Avoid animal contact
- Hand washing
- Visitor policy
Agricultural Water

- Untreated water that directly contacts the harvested produce preharvest:
  - Geometric Mean <126 CFU E. coli in 100 ml
  - Statistical Threshold Value <410 CFU E. coli in 100 ml

- Untreated water that directly contacts the harvested produce during harvest or postharvest:
  - No detectable E. coli in 100 mL

Equipment, Tools, And Buildings

- Design must allow adequate cleaning and maintenance
- Storage should prevent contamination and harborage of pests
- Clean and sanitize as necessary
- Adequate drainage of discharge in and near buildings
- Restrooms & hand washing facilities

- Likely to contact covered produce:
  - Knives, implements, containers, bins, packing material, dump tanks, flumes and other equipment used for transport, harvesting, waxing, cooling, packing, etc.
Harvest & Transport to the Packinghouse
- Do not harvest product that may have been contaminated
- Do not place product in contact with potentially contaminate equipment (bins, totes, etc.)
- Avoid bruises or cuts to fruits that may allow internal contamination

Packinghouses
- Produce from many fields pass through packinghouses!
  - Any errors preharvest, can contaminate clean fruit at the packinghouse
  - Errors at the packinghouse are amplified

Packinghouse Hazards
- Packing and storage facilities should always be maintained in a clean condition
  - Water sanitation
  - Equipment sanitation
  - Animal exclusion
  - Employee sanitation practices
Packinghouses Operations
- Handle produce carefully to prevent wounds
- Remove injured product from the facilities
- Discard fruit that fall on the floor
- Remove cull fruit and debris promptly

Packinghouse Operations
- Keep dirty produce from the field separated from the clean, packed produce
  - When possible, remove dirt in the field
  - Wash dirty produce outside the packinghouse

Packinghouses Operations
- Keep dirty fruit from the field separated from the clean, packed fruit
- Start off with high-quality water (no detectable E. coli) & use an approved sanitizer
**Packinghouses Operations**

- Clean and sanitize packing areas, storage rooms, fruit bins, and equipment. Prime sites for pathogen growth are:
  - Areas that remain wet (brush/sponge rolls; floors)
  - Plant debris left on the line or packinghouse floor

**What are biofilms?**

- Biofilms are sticky to slimy accumulations of fungi and bacteria that accumulate and grow on wet surfaces
- Regular cleaning and sanitizing will prevent their formation, but cannot penetrate and remove existing biofilms
- Existing biofilms can only be removed by scrubbing

Plant residues + moisture + microbes + warm temperatures = **biofilms**

**Sanitation in the Packinghouse**

- Sanitize facilities & equipment regularly
  - **More frequently (i.e., daily)**: Change dump tank water; packing line equipment (particularly areas that remain wet); floors; drains; breakrooms/bathrooms
  - **Less frequently (i.e., monthly)**: Ripening, degreening, cold room – floors, walls, ceilings, refrigeration coils, doors, and curtains
Packinghouse Pest Control

- Maintain an effective animal & pest control program
  - Maintain good records
- No animals in packinghouse (domestic or otherwise)
- Remove dead or trapped animals (e.g., rats, birds, etc.) promptly
- Prepare cartons only as needed

Temperature Management

- Low temperatures supplement good sanitation practices
  - Most human pathogens grow slowly or not at all below 45°F (7°C)
    - Listeria monocytogenes is a special concern in refrigerated environments
  - Low temperatures extend pathogen survival, but reduce proliferation

Traceback: proper labeling ensures that the crop can be tracked back to the grower

This label on the packed crop links it back to harvest information on the field log.
Transportation

- Watch for incompatibilities of previous or current mixed loads
  - Use separate shipping containers for animal products and produce
- Thoroughly clean, sanitize and rinse product environment
  - Shipping containers – incl. floor ducts and evaporator coils
  - Product loading and receiving areas
  - Prevent recontamination (e.g. from rodents, birds, etc.)

Recordkeeping

- Recordkeeping includes documenting practices, monitoring, and corrective actions
- There are many templates available
- Recordkeeping should be convenient, or else it will not get done
- Records must be signed and dated after they are reviewed
- Keep all records for at least 2 years