Food Safety

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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** – Nonegotiable. All or nothing!
  - Everyone is entitled to a product that is safe to consume

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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**

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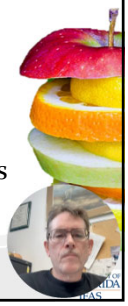
Hazards

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



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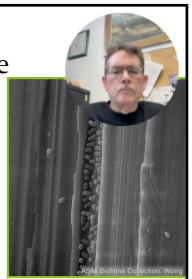
Importance of Good Food Hygiene

- **Millions of microorganisms may be on the product surface**
  - It takes about 10^6 cfu/mL for bacteria to be visible
  - Most are not harmful to people and will not cause decay or food poisoning
- **Packinghouse procedures do not remove all microorganisms or chemicals**
  - Processed foods require 5-log pathogen reduction
  - Even if 99.99% (3-log) is removed from fresh produce, thousands will remain
- **Thus, minimizing contamination with human pathogens is still important!**



Polished stainless steel

http://www.asmusa.org/edusrc/biofilms/hires/ss4h.jpg

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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

➢ *E. coli* is a common microorganism in animal guts that is used as an indicator of fecal contamination – some strains are pathogenic

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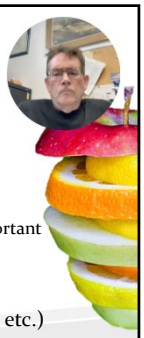
Possible Sources of Chemical & Physical Contamination



- 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.)

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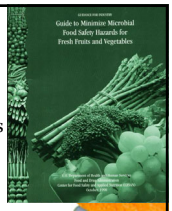
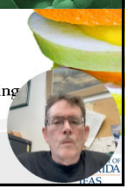
Many Food Safety Requirements



- **Buyer Imposed Standards** – Beginning in 1998, food safety/hygiene standards imposed by various domestic and international buyers.
- Examples include:
  - PrimusLab Global Food Safety Initiative (GFS)
  - GLOBALG.A.P.
  - Safe Quality Food
  - Leafy greens, Melon, Tomato GAPs standards
  - USDA Harmonized Food Safety Standard for Field & Harvesting
- FDA: Food Safety Modernization Act (FSMA)
  - Produce Safety Rule (PSA)
  - Preventive Controls Rule (FSPCA)



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FSMA Foundational Rules

Regulation	Proposal	Final (consent decree)
Preventive Controls (Human Food)*	Jan. 16, 2013	Sept. 17, 2015
Preventive Controls (Animal Food)*	Oct. 29, 2013	Sept. 17, 2015
Produce Safety*	Jan. 16, 2013	Nov. 27, 2015
Foreign Supplier Verification Program*	July 29, 2013	Nov. 27, 2015
Third Party Accreditation	July 29, 2013	Nov. 27, 2015
Sanitation Transport	Feb. 5, 2014	April 6, 2016
Intentional Adulteration	Dec. 24, 2013	May 27, 2016
Traceability (pending)	Nov. 7, 2022	Jan. 6, 2025

**Supplemental proposals published September 2014*

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Produce Safety Rule Training Requirements

- At least one person at each company per rule must complete training recognized as adequate by the FDA
- All:
  - Principles 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

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Worker Health & Hygiene

- Identification & Reassignment of ill workers
- Personal cleanliness
- Avoid animal contact
- Hand washing
- Visitor policy

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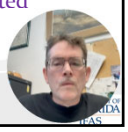
Agricultural Water

- Untreated water that directly contacts the harvested produce preharvest:
  - **Subpart E most recently revised**
  - **Alowed "enforcement discretion" until January January 2023 to 2025 (based on business size)**
- Untreated water that directly contacts the harvested produce during harvest or postharvest:
  - Municipal & well water is ok
  - No detectable *E. coli* in 100 mL allowed
  - No use of surface water



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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

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Equipment, Tools, And Buildings

- 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.

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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

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Packinghouses

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

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Packinghouse Hazards

- ➢Packing and storage facilities should always be maintained in a clean condition
  - ➢Water sanitation
  - ➢Equipment sanitation
  - ➢Animal exclusion
  - ➢Employee sanitation practices

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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

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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

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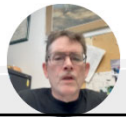
Packinghouses Operations

- 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**



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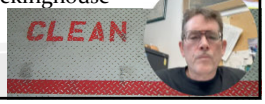
Packinghouses Operations

- 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



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Sanitation in the Packinghouse

- Clean & sanitize facilities & equipment regularly
  - –More frequently (i.e., daily): Change dump tank water; packingline equipment (particularly areas that remain wet); floors; drains; breakrooms/bathrooms
  - –Less frequently (i.e., monthly): Ripening, degreening, and cold rooms - floors, walls, ceilings, refrigeration coils, doors, and curtains

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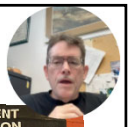
Packinghouse Pest Control

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



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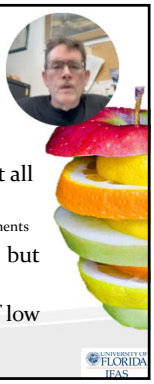
Temperature Management

- 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
  - –Chilling sensitive crops don't allow for use of low temperature to minimize pathogen growth



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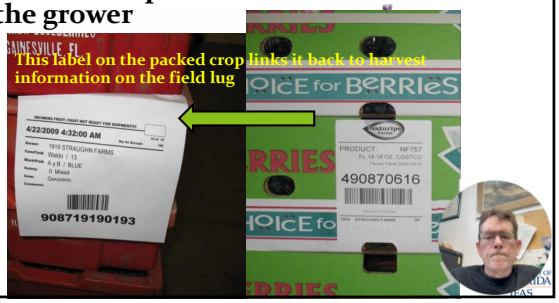
Traceback: proper labeling ensures that the crop can be traced back to the grower



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Transportation

http://imomus.com/dailyphoto161200.jpeg

- 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
  - Trailers & marine containers – incl. floor ducts and evaporator coils
  - Product loading and receiving areas
  - Prevent recontamination (e.g., from rodents, birds, etc.)

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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

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