Food Safety for Farm to School

Pre-Conference Workshop
National Food Hub Conference
Tuesday, March 29, 2016

Beth Oleson
Director of Produce Food Safety Services
GA Fruit & Vegetable Growers Association
Meet & Greet...

- Food Safety Practices?
- Food Safety Programs?
- Total F.S. Newbie?
- Certified Organic?
- Naturally Grown?
- Traditionally Grown?
- Integrated Farm with Animals?
Above the Mason-Dixon Line...

FSMA UPDATE
Final Rule on Produce Safety
http://www.fda.gov/fsma
Coverage of Rule

Covers

- Domestic and imported produce
- Produce for human consumption

Does not cover

- Produce for personal or on-farm consumption
- Produce not a “raw agricultural commodity”
- Certain specified produce rarely consumed raw
- Farms with produce sales of ≤ $25,000 per year

Eligible for exemption (with modified requirements)

- Produce that will receive commercial processing (“kill-step” or other process that adequately minimizes hazards)
- Qualified exemption
Exemptions from Produce Safety

Produce that is rarely consumed raw, specifically the produce on the following exhaustive list:

- asparagus
- beans, black
- beans, great Northern
- beans, kidney
- beans, lima
- beans, navy
- beans, pinto
- beets, garden (roots and tops)
- beets, sugar
- cashews
- cherries, sour
- chickpeas
- cocoa beans
- coffee beans
- collards
- corn, sweet
- cranberries
- dates
- dill (seeds and weed)
- eggplants
- figs
- ginger
- hazelnuts
- horseradish
- lentils
- okra
- peanuts
- pecans
- peppermint
- potatoes
- pumpkins
- squash, winter
- sweet potatoes
- water chestnuts
Farms

• “Farm” definition was revised to clarify that the relevant entity is the farm business
• First defined as part of Implementation of the Bioterrorism Act of 2002, for registration and recordkeeping regulations (21 CFR Part 1, subparts H and J)
Primary Production Farm

• An operation under one management in one general, but not necessarily contiguous, physical location

• Devoted to the growing of crops, the harvesting of crops, the raising of animals, or any combination of these activities

• In addition to these activities, a primary production farm can:
  – Pack or hold RACs (regardless of who grew or raised them)
  – Manufacture/process, pack, or hold processed foods so long as:
    • all such food is consumed on that farm or another farm under the same management; or
    • the manufacturing/processing falls into limited categories
Secondary Activities Farm

• An operation not located on a primary production farm devoted to harvesting, packing, and/or holding RACs
• The primary production farm(s) that grow, harvest, and/or raise the majority of those RACs must own or jointly own a majority interest in the secondary activities farm
• The definition also allows certain, limited additional manufacturing/processing, packing, and holding
  – Same as those for a primary production farm
Activities That Do Not Fall Under Farm Definition

• Manufacturing/processing that goes beyond activities within the farm definition

• Examples include:
  – Pitting dried plums, chopping herbs
  – Making snack chips from legumes
  – Roasting peanuts or tree nuts
Qualified Exemption

Farms are eligible for a qualified exemption (and must meet certain modified requirements) if:

• Less than $500,000 annual food sales; and
• Majority of food sales to “qualified end-users”, i.e.,
  • Consumer of the food; or
  • Restaurant or Retail food establishment located in the same state or Indian reservation, or located within 275 miles of farm

(The term “consumer” does not include a business.)
Final Rule for Preventive Controls for Human Food

Produce Industry
October 2, 2015

http://www.fda.gov/fsma
Who is Covered by PCHF?

- Facilities that manufacture, process, pack or hold human food
- In general, facilities required to register with FDA under sec. 415 of the FD&C Act
  - Not farms or retail food establishments
- Applies to domestic and imported food
- Some exemptions and modified requirements apply
Other Exemptions

• Farm mixed-type facilities are establishments that are farms that also conduct activities outside the farm definition that require registration.

• Certain low-risk manufacturing/processing, packing, and holding activities conducted on specific foods by small/very small businesses on farms are exempt from PCs.
Food Safety Plan

• Hazard analysis
• Preventive controls
• Supply-chain program
• Recall plan
• Procedures for monitoring
• Corrective action procedures
• Verification procedures
Produce packing houses

- Produce packing houses that fall under the new farm definition → produce safety rule
- Produce packing houses that do not fall under the new farm definition → PCHF
- Specific steps necessary to ensure the safety of produce would generally be the same
Produce Safety vs. PC rule

**Produce Safety Rule**
- Qualified Individual
- Employee training
- GMPs

**Preventive Controls rule**
- Same as Produce Safety, *PLUS:*
- Earlier compliance date
- Written Food Safety Plan, with
  - Written Hazard Analysis for biological (environmental), chemical, physical and economically motivated adulteration hazards
  - Written Preventive Controls (sanitation, allergen, process)
  - Written Supply-chain Program
  - Written Recall Plan
  - Written Monitoring procedures
  - Written Corrective Action procedures
  - Written Verification procedures
- Records of performance of above procedures
- Written Validation of Process Controls
- Reanalysis of Food Safety Plan
Produce Safety Regulation Compliance Dates

Publication of Final Rule
Nov 27, 2015

Effective
Jan 26, 2016

Sprouts - All Others
All Provisions
Jan 26, 2017

Sprouts - Very Small
All Provisions
Jan 26, 2019

Farms - Small
Except Water *
Jan 26, 2021

Farms - Very Small
All Provisions
Jan 26, 2022

Full Implementation & Transition to Operational Mode
2022

* Only applies to certain water requirements
Small Businesses – average produce sales over 3 years > $250,000 and ≤ $500,000
Very Small Businesses – average produce sales over 3 years > $25,000 and ≤ $250,000
≤ $25,000 in average produce sales over 3 years is not a covered farm
Preventive Controls Human Food Regulation Compliance Dates*

Publication Date of Final Rule
Sept 17, 2015

Effective
Nov 16, 2015

Very Small Businesses retain records to support Qualified Facility Status
Jan 1, 2016

Businesses Other than Small or Very Small
Sept 19, 2016

Small Businesses
Sept 18, 2017

Qualified Facilities (including Very Small Businesses)
Sept 17, 2018

Full Implementation & Transition to Operational Mode
2019

Businesses subject to the Pasteurized Milk Ordinance
Sept 17, 2018

Small Businesses – business with fewer than 500 full-time equivalent employees
Very Small Businesses – average less than $1M per year in sales of human food plus the value of such food manufactured, processed, packed or held without sale

*Compliance dates for supply-chain program may differ.
Planned Guidance

Produce Safety Rule

• Updated GAP Guidance
• Classification of Activities as Harvesting, Packing, Holding, or Manufacturing/Processing: Guidance for Industry
• Agricultural Water Guidance
• Produce Rule Compliance Guidance
• Sprout Guidance
• Produce Small Entity Compliance Guide
MEANWHILE BACK ON THE FARM...
Where Credit is DUE...

- Thanks to the following for slides and/or slide content in this presentation:
  - Dr. Bill Hurst, University of GA
  - Dr. Keith Schneider, University of FL
  - Dr. Jeff Brecht, University of FL
  - Diane Ducharme, NC State University
  - Dr. Trevor Suslow, UC-Davis
  - Dr. David Gombas, United Fresh Produce Association
What is a Food Safety Certification?

- Verify Good Agricultural Practices and Procedures from Suppliers
- Certification is recognized for 12 months
- Basically additional liability for your suppliers
## Types of 3rd Party Food Safety Certifications

<table>
<thead>
<tr>
<th>Type of Operation</th>
<th>Areas Covered</th>
<th>Audit Schemes</th>
</tr>
</thead>
</table>
| **GAP Audits**    | • Harvest crew  
                  • Ranch  
                  • Greenhouse | • PrimusLab  
                  • PrimusGFS*  
                  • Global GAP*  
                  • USDA GAP  
                  • Harmonized Field Operations |
| **GMP Audits**    | • Cooling/cold storage  
                  • Packinghouse  
                  • Processing  
                  • Storage & distribution center | • PrimusLab  
                  • PrimusGFS*  
                  • Global GAP*  
                  • USDA GMP  
                  • Harmonized Post-Harvest Operations |

*Meet global food safety initiative (GFSI) requirements*

Thanks to Katie Odrobina
Why Do We Need Food Safety Certification?

- **Food Quality is an option.**
  Good quality is something we hope for and base buying practices upon

- **Food Safety is an entitlement!**
  We have the right to expect that food is safe.
What Can We Do To Minimize Risks?

Focus on risk reduction, not risk elimination.

“Current technologies cannot eliminate all potential food safety hazards associated with fresh produce that will be eaten raw.”

Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables
What Is The Key???

PREVENTION

PREVENTION

PREVENTION

PREVENTION

Prevention of any contamination of fresh produce is favored over corrective action once contamination has occurred.
1st Things 1st....

- Deep Breaths

- Designate a food safety point person for your operation
  - ONE person cannot do it all, but at least one person needs to know what to do, how, why, when, etc.

- Attend a food safety course if possible
  - Bring key farm/office staff with you
Attitude

- Understand that this is a lifestyle change, not a once a year clean up

- Accept the challenge
  - You don’t have to like it, but most of the time you can’t stop it. Look at it as a challenge...one that you will beat!

- First year is the most difficult
What are GAPs?

- *Good Agricultural Practices*
  - FDA, October 1998
What are GAPs?

- **Good Agricultural Practices**
  - FDA, October 1998
  - Recommends we be aware of potential contaminations and manage operations as to minimize potential risks
  - Microbial, chemical and physical hazards

- **Be on the look out for an updated Guidance document from FDA**
  - Also be aware of Commodity Specific Guidance documents for Tomato, Leafy Greens and Melons
Learn the Lingo

- **GAP – Good Agricultural Practices**
  - Requirements & guidelines for production of safe crops
  - Primarily used in the field
- **GMP – Good Manufacturing Practices**
  - Primarily used in the packing facility
- **BMP – Best Management Practices**
  - Synonymous with GAPs but can also refer to postharvest operations
- **HACCP – Hazard Analysis Critical Control Points**
  - Primarily used in processing
- **SSOP – Sanitation Standard Operating Procedure**
  - Written directions...What you are gonna do, how you are gonna do it, and who’s gonna do it
**GAPs vs. SOPs**

- **A GAP tells WHAT should be done.**
  - Harvest containers & packing lines need to be cleaned daily to prevent product cross-contamination or build-up of human pathogens.

- **An SOP tells HOW the GAP should be accomplished.**
  - Use a chlorine dip to sanitize harvest containers after cleaning.
  - Scrub down leafy greens pack-out table at the end of each production day.
What are SOPs?

- **Standard Operating Procedures**
  - Detailed, written action plan
    - Objectives and Procedures
  - Gives specific directions/instructions
    - How to monitor and document a GAPs food safety program.
    - Checklists, Corrective Actions, Personnel Training, Posting Materials in English & Spanish
  - I.D. responsible individuals
    - Verify competition

William C. Hurst, Ph. D. Extension Food Science Outreach Program
The University of Georgia, Athens, “What is an SOP? How do I write one?”
What are SOPs?

- **Standard Operating Procedures**
  - Detailed, written directions that give specific instructions on how to monitor and document a GAPs food safety program.
    - Documentation
    - Checklists
    - Personnel Training
    - Posting Materials in English & Spanish

William C. Hurst, Ph. D. Extension Food Science Outreach Program
The University of Georgia, Athens, “What is an SOP? How do I write one?”
SOPs 411

- A written action plan (objective, procedures)
- Identifying responsible individuals
- Designated person must verify full completion.
- Written documentation of corrective actions taken on monitoring form, log, checklist, etc.
- Daily records of sanitary activities kept on file.

William C. Hurst, Ph. D. Extension Food Science Outreach Program
The University of Georgia, Athens, “What is an SOP? How do I write one?”
STANDARD OPERATING PROCEDURE (SOP) for

Vegetable Packing Line Equipment

Date issued: __________________________ Facility: __________________________

SOP #: 4.5 Owner: __________________________

Description: Hopper elevator, brush washer, pre-grader, belt grader, sizer, sizer conveyor belts, box closing machine.

Objective: To properly clean and sanitize all packing line food contact and non-contact surfaces.

Frequency: Daily.

Responsible Individual(s): __________________________ Phone ext. __________

Worker Safety Precautions:
1. Ensure that the equipment is LOCKED OUT to a zero mechanical state prior to beginning work or cleaning. Unplug any electrical service cords.
2. Use safety equipment when cleaning with chemicals: wet suit (rain slicker), rubber boots and chemical-resistant gloves.
3. Always wear goggles or full-face shield whenever handling cleaning and/or sanitizing products.
4. Wear goggles when using compressed air.
5. Follow the chemical label instructions. Do not mix chemicals without appropriate authorization from supervisor.
6. Do not spray electrical panels, boxes or motors directly with water hose. Hand clean if necessary, then cover with plastic. Place plastic bags over electric motors, electrical boxes, connections, etc. Remove bags after the work is completed.

Required Materials/Chemicals:

<table>
<thead>
<tr>
<th>Category</th>
<th>Type</th>
<th>Name</th>
<th>Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaner</td>
<td>Alkaline chlorinated</td>
<td>Fast Clean™️</td>
<td>1 gal/10 gal water</td>
</tr>
<tr>
<td>Sanitizer</td>
<td>Chlorine based</td>
<td>12.5% sodium hypochlorite</td>
<td>1 gal/10 gal water</td>
</tr>
</tbody>
</table>
Cleaning Procedure:
1. Remove all product from the packing line equipment.
2. Put waterproof coverings over electrical motor, electrical boxes, etc. Remove side panels and covers to expose all equipment.
3. Dry clean with air hose, removing as much debris as possible; deposit into appropriate container.
4. Rinse equipment from the top downward to prevent debris or soil from splashing onto equipment already cleaned.
5. Set up portable high-pressure sprayer to inject FAST CLEAN™ detergent as wet foam. Foam entire line, working from the top of an item downward. Pay particular attention to ledges, brushes, nozzles, frame supports, underneath roller conveyors and polyethylene belts where debris accumulates. Do not let foam dry on equipment surfaces!
6. Run all belts, conveyors, brushes slowly while foaming to clean upper and lower sides.
7. Follow with a post-rinse to remove all foam, beginning at the tom and working down each piece of equipment.
8. Inspect all surfaces for proper cleaning; re-clean where necessary.
9. Sanitize with sodium hypochlorite at 200 ppm (0.25 oz 12.5% chlorinated solution per gallon of water). Begin sanitizing from the bottom of each piece of equipment and work upwards to ensure complete coverage. Do not rinse off sanitizer!
10. Remove coverings that were applied in Step 1.

NOTE: Brushes or any other utensils used to clean the inspection conveyors must be identified for this use and stored separately from the brushes, or other cleaning utensils used to clean non-produce contact surfaces, and other produce-contact surfaces.

NOTE: Removable panels and other parts must be placed on a clean surface during disassembly. All contact with floors or other possibly contaminated surfaces must be avoided.

Monitoring:

Daily, using vegetable packing line sanitation checklist. (CL 4.3.2)

Reviewed by: ____________________________  Date: ____________________
Perspective

Take things...

- *One* step at a time
- *One* question at a time
- *One* SOP at a time
Perspective

Take things…

• One step at a time
• One question at a time
• One SOP at a time
Building Your Own Food Safety Program

- Food Safety is an **integral** part of any produce operation
- Food Safety programs are **dynamic** in nature requiring ongoing review and change
- Success comes in making Food Safety the **responsibility of all employees**, not just management
Take Home...

Your unique operation needs to have GAPs that are tailored to your commodity(s), your management practices & your workers in order to effectively reduce microbial risks and prevent contamination on your farm everyday.
Where Can Contamination Occur?

- In fields or orchards
- During harvesting and transport
- During processing or packing
- In distribution and marketing
- In restaurants and food service facilities
- In the home
A Food Safety Plan Evaluates the Whole Operation

**Pre-plant**
- Irrigation and Wash Water Sources

**Product**
- Manure Source, Use and Handling

**Harvest**
- Employee Training and Hygiene
- Farm and Equipment Sanitation

**Post Harvest**

**Transportation**
Production Area
(The Field)

- Manure
- Water
- Hygiene
- Field sanitation
- Recall information
Exclude Animals

- Keep wildlife out of production areas as much as possible.
- Be aware of areas of high animal ‘traffic’
  - Licensed hunts, fencing, other barricades
- Be aware of adjacent land use
  - What is it currently used for? Past few months?
  - Uphill or Downhill?
- No dogs or other pets in the fields.
Manure = Microbes

- **Human or animal:** DO EVERYTHING you can to keep manure off produce.
- **Preventing contamination** is the goal.
Think Through it ALL

What could be wrong in this picture?

What mitigation steps could be taken?
Manure

- Handle compost according to regulation to kill potential pathogens.
- Time application properly.
- Know the source.
DISCLAIMER - FSMA Final Rule on Produce Safety

- **Raw Manure**: The FDA conducting a risk assessment and extensive research on the number of days needed between the applications of raw manure as a soil amendment and harvesting to minimize the risk of contamination.
  - Currently, no objection to USDA’s NOP standards: 120-day interval between application of raw manure for crops in contact with the soil and 90 days for crops not in contact with the soil.
  - Final rule requires untreated/raw manure, must be applied so that it does not contact produce during application and minimizes potential for contact with produce after application.

- **Stabilized Compost**: Microbial standards that set limits on detectable amounts of bacteria (including *Listeria monocytogenes*, *Salmonella* spp., fecal coliforms, and *E. coli* 0157:H7) have been established - be applied in a manner that minimizes the potential for contact with produce during and after application.
Nature’s Fertilization

- Inorganic fertilizers originate from synthetic chemicals

- Incompletely composted manure may contain pathogenic bacteria
  - Pathogens can survive in raw manure for one year or longer
  - No one knows how long pathogens survive after application
  - Where possible DO NOT use raw manure

- Maintain records of all organic fertilization practices
BMP for Raw Manure

- **To Reduce Potential Contamination:**
  - Proper Storage
  - Incorporate
  - Target Time of Application
    - Apply and Incorporate at least 120 days before harvest
  - Target Crop
    - Don’t apply manure or manure-containing litter while edible produce is present.
  - Proper and Thorough Composting

- Maintain records of all organic fertilization practices
Composting guidelines often based on federal biosolids law (40CFR503):

- At or above 131°F for
  - At least three days (within-vessel or static aerated pile) OR
  - 15 day (windrow)
- Turned at least five times (windrow only)
Biosolids

- Use of “sewage sludge generated during the treatment of domestic sewage in a treatment works” is regulated by federal law (40CFR503) as “residuals”
  - Class A – Exceptional Quality - Can be used without a permit and sold directly to public
  - Class B - Applied by producer, under permit that states how long before harvest it must be applied
#1 Source of Contamination:

WATER
Water Considerations

- **Agricultural Water**
  - Irrigation
  - Pesticide or Nutrient Sprays

- **Rinse Water**
  - Dump, Wash, Rinse, Cool
Water Management

- Know the source of the water and intended use.
- Evaluate the irrigation method.
- Test water before it’s used and ≥ annually for generic E.coli and fecal coliforms. Keep records of test results and corrective actions.
Irrigation Practices

- Overhead Irrigation is more likely to spread contamination

- Consider proximity of water source to livestock
  - Water Runoff
    - Water isn’t the only thing that runs downhill.
  - Maintain a “safe” buffer zone between livestock areas and water sources
What ARE the Standards for Safe Irrigation Water?

There are NONE!

“In the absence of definitive microbial standards for irrigation water, the authors of the California Leafy Greens Market Agreement Best Practices Document have chosen to use EPA’s recreational water standards.”

David Gombas, Ph.D., Senior Vice President
Food Safety and Technology
United Fresh Produce Association
California’s Microbial Guidelines for Lettuce & Leafy Greens

Commodity Specific Food Safety Guidelines for the Production and Harvest of Lettuce and Leafy Greens was issued by the California leafy greens industry.

The current update of August 4, 2010 is online at http://www.caleafygreens.ca.gov/food-safety-practices/downloads
California’s Microbial Guidelines for Lettuce & Leafy Greens

- **PREHARVEST**
  - Foliar Applications Whereby Edible Portions of the Crop ARE Contacted by Water
    - (e.g. overhead sprinkler irrigation, pesticides/fungicide application, etc.)
  - **Acceptance Criteria:**
    - $\leq 126$ MPN (or CFU*)/100 mL (rolling geometric mean $n=5$) and $\leq 235$ MPN/100mL for any single sample
California’s Microbial Guidelines for Lettuce & Leafy Greens

- **PREHARVEST**
  - Non-foliar Applications Whereby Edible Portions of the Crop are NOT Contacted by Water
    - *(e.g., furrow or drip irrigation, dust abatement water)*
  - **Acceptance Criteria:**
    - $\leq 126$ MPN /100 mL (rolling geometric mean $n=5$) and $\leq 576$ MPN /100 mL for any single sample
2nd Greatest Potential for Contamination

EMPLOYEES
Worker Hygiene & Sanitation

Worker hygiene and sanitation practices during production, harvesting, sorting, packing and transport play a critical role in minimizing the potential for microbial contamination of fresh produce.
There are many opportunities for fresh produce to be contaminated by in the field by farm workers.
Personal Health and Hygiene

- The major source of human pathogens are worker’s hands
  - The single most effective public health measure to disease prevention is *proper hand washing*. 
When Hands Should Be Washed

- Before beginning work
- After each restroom visit
- Before and after eating/smoking/other breaks
- After other activities not including produce handling
- Anytime hands become dirty
How to Wash Hands Properly

- Use running water.
- Use soap.
- Lather hands, wrists, fingers.
- Don’t forget to scrub your thumbs, under your nails and in between your fingers.
- Wash your hands for 20 seconds.
- Fully dry your hands with disposable paper towel.
Workers in Your Fields

- Train workers about proper health, hygiene and personal sanitation.
- Train workers to use the toilet and not the woods or the field.
- Designate a break/eating area in the field
  - It CANNOT be in the active harvest area or rows
  - Roads, edge of the field, shade trees, etc.
- Infants and children are not allowed in the field
  - Diaper is the issue
Field Toilets and Sanitation

- **OSHA: 1 per 20 workers**
  - This includes field toilets AND handwash facilities

- **Within ¼ mile or 5 minute walk**

- **Locate toilet and hand wash facilities so they can not become a source of contamination**

- **Hand wash water must be captured and disposed of away from the field, not just fall on the ground**
Field Toilets and Sanitation

- Field Toilet stations must be equipped with:
  - Toilet
  - Toilet paper
  - Signage to remind to wash hand in English and other native languages spoken by workers
  - Hand wash facility with potable water
  - A catch basin for capture and storage of gray water
  - Antibacterial liquid hand soap
  - Single use hand towels
  - A trash can with liner and lid
Restrooms and Hand-Washing Facilities
Design of an Improved Portable Hand Washing Facility

Rod Gurganus

NC MarketReady™
www.ncmarketready.org
A Program of NC Cooperative Extension
Why Build a Portable Facility?

- Industry
- Commercial units available, but often inadequate
- Needed:
  - Scalable
  - Portable
  - Serviceable
  - Easily constructed
NC State Mobile Handwash Facility – Large Unit
NC State Mobile Handwash Facility – Small Unit
Sanitary Facilities Service and Disposal

- Think through the process of where to service portable toilets
  - If at all possible, do not service in the field.
  - Even when cleaning, consider the splash and aerosols coming out of the facility

- Plan for the containment and treatment of any effluent in the event of a leak.

- Hand wash facilities should have potable water tanks as well as a catch tank for gray water.
Workers Showing Symptoms or Injury

- Employees should be encouraged to report illness and injury to their supervisors.
- Supervisors should put workers showing symptoms of illness or workers with injuries on tasks that do not involve direct contact with produce.
  - Protection of produce and other workers
  - Examples:
    - Toilet monitor in the field
    - Hand wash monitor in the facility
HARVEST OPERATIONS
Pesticides

- **Keep records of pesticide usage**
  - Same requirements as state and federal regulation

- **Properly store pesticides**
  - Locked facility
  - Signage
  - Store off the ground
    - Pallet, shelves
  - Do not store liquids above powders
  - Spill kit (bucket, broom, Quick Dry)
Harvest Tools

- Gloves, knives, buckets, bins, etc.

- Must be cleaned & sanitized before the daily harvest begin
  - Discourage workers taking equipment home
    - What are they using them for when they are not in the field?
Single-Use Gloves

- Can be an added hygienic practice, *if used properly*.
  - Just before going into the work area, wash hands then GET and put on gloves

- Is especially useful with wounds and open sores
  - Cover wounds and sores with band aid then put on glove

- Each time the worker leaves the harvest area, gloves must be discarded, hands washed and new gloves applied.
Reusable Gloves

• Can be an added hygienic practice, *if used properly.*
  - If possible, reusable gloves need to be collected at the end of each day
  - Reusable gloves must be sanitized before use the following harvest day

• Each time the worker leaves the harvest area, gloves must be removed, stored in a sanitary manner, hands washed and gloves put back on.
Prep for the Field

Clean AND Sanitize Daily or Regularly
- Harvest Tools
- Harvest Containers & Bins
- Field Equipment
- Field Packing
Harvest Bin & Lug Sanitation

- Clean and sanitize harvest bins and buckets
  1. before harvest begins and
  2. daily/regularly during the harvest season.

- Avoid standing in harvest bins or using picking bins for personal storage.
Sanitizing Harvest Containers

Harvest lugs and bins collect soil, plant debris and decay organisms and should be cleaned and sanitized prior to reuse.
Sanitizing Harvest Containers

Manual methods include use of power washers, water hoses, and portable steam generators.
Bin Sanitation

Automated systems wash and sanitize field bins after each use
Harvest Considerations

- Leave fruit that has bird droppings on it.
- Cool product quickly.
- Teach workers about proper hand washing.
  - How to wash their hands
  - Before harvesting
  - After any breaks
  - After using the restroom
Field conditions may increase risks
A Story About Plastic Bins: Once Upon A Time...

This could easily be a story about buckets, RPC’s or boxes.
The Packing Facility
AN ENVIRONMENT FOR SANITATION
Being “Sanitation Conscious” doesn’t just happen...

...it must be deliberate, from harvest through shipping. Example of implementation of GAP and BMP programs
Packing House Sanitation

- **Packing Facility Sanitation**
  - Pre-season sanitation of ceiling, walls, beams, floors and floor drains

- **Clean and Sanitize Equipment**
  - Belts, rollers, stools, catwalks

- **Pest Control**
  - Exclude all pests: insects, birds, rodents, cats, etc.

- **Detectable Sanitizer (Chlorine) in Wash Waters**

- **Enforce Good Worker Practices and Hygiene**
Packing House Sanitation

- If catwalks are over any produce lines, they must be fitted with solid, cleanable floors and a 2-3” kick-plate
- Eliminate all wood that may come in contact with produce
  - Anywhere on a line, a device to “move” or dislodge produce, bins, etc.
  - This can be a process over “x” number of years
WATER...AGAIN
Post-Harvest Water per FSMA

- Visual monitoring the quality of water used during harvest, packing, and holding activities for build-up of organic material
- Microbial monitoring for water and prohibits using untreated surface water for post harvest activities
Packinghouse Sanitation: Recirculated Water Systems

- Melons and other crops are transferred onto packing lines using water flumes systems
Tomatoes are normally transferred from field bins or gondola wagons into dump tanks.
Hydrocoolers rapidly remove field heat prior to or after packing.

Melons hydrocooled in a single layer prior to packing.

Palletized sweet corn being loaded into a tunnel hydrocooler.
Whenever crops contact recirculated water there is the opportunity for cross-transfer of decay and human pathogens.
What is the purpose of a sanitizer in post-harvest water?

To sanitize the water

Side benefit of sanitizer decreases pathogenic, spoilage, and decay organisms.
Postharvest Water Disinfection Strategies

- Some Options:
  - Chlorine gas, Sodium hypochlorite, Calcium hypochlorite, Chlorine dioxide, Acidified sodium chlorite, Surfactants, Ozone, Ionizing radicals, Hydrogen peroxide, Peroxyacetic acid, Ultraviolet Illumination.

- Monitoring effectiveness is paramount to success.
Sanitation in the Packinghouse

- Maintain constant sanitizer levels in dump tanks and spray washers
  - Regularly check automated equipment during packing

- Sanitize facilities & equipment regularly
  - Daily: Change dump tank water; packing line equipment (particularly areas that remain wet); floors; drains; breakrooms/bathrooms
  - Monthly or between loads: Cold room - floors, walls, ceilings, refrigeration coils, doors; and curtains
Post Harvest Water Must Contain a Sanitizer

Regular monitoring is critical

Manual measurement

Automated ORP and pH monitoring/control system
Use potable water for all produce washing, cooling, dipping, icing, and processing.

Test water annually.

Avoid water temperatures in dump tanks that are more than 10°F cooler than produce.
Rinse water must be potable

Tomatoes exiting the dump tank
Final washing, rinsing must be with potable water
Chlorination of Water

- Maintain constant chlorine by monitoring
  - Usually 150-200 ppm or 550-650 mV ORP

- Monitor pH of water
  - Optimum range 6.0-7.0

- High water temp. results in quicker pathogen kill, but also results in rapid loss of chlorine

- Monitor and document chlorine and pH levels at a minimum of every 2 hours.
WORKERS IN THE PACKING FACILITY
Restroom Supplies

- Potable Water
- Antibacterial liquid soap
- Single-use hand towels
- Trash can
- Sign reminding to wash hands

Courtesy of Dr. William Hurst
Is this a cultural problem?

No! It’s an education issue.

Courtesy of Dr. William Hurst
Is Worker Training Really A Priority?

- Farm workers are sometimes the last/only people to handle the produce before the consumer.
  - Workers are capable of learning about food safety issues.
- Teach workers about food safety and their role in preventing microbial contamination of fresh fruits and vegetables.
  - Effective training results in better employees and safer produce.
Employee Awareness & Education

Courtesy of Dr. William Hurst
Handling Smocks, Aprons & Gloves

Courtesy of Dr. William Hurst
Is his mind on safety?

Courtesy of Dr. William Hurst
Good Intentions

Courtesy of Dr. William Hurst
Training and supervision are a must
Farm Worker Hygiene

- Teach workers about food safety and *their role* in preventing microbial contamination of fresh fruits and vegetables.

- Enforce proper use of facilities.
Locate hand-washing stations outside of restrooms
Handwashing Stations

Hands-free operation reduces risk of recontamination
Sanitizer Handwashing Stations

Only as a supplement to proper handwashing
THE PACKING LINE
Lights

- All light bulbs must be shatterproof OR covered
  - Anywhere produce or packaging may be stored or transported
  - Over packing lines
  - In production/sorting areas
  - In coolers
  - On forklifts

- Halogen, fluorescent, flood lights, etc.
Sorting and grading are critical points and must be done consistently throughout the packing day to remove produce that is injured and decayed.
One decayed fruit can harbor human pathogens, infecting fruit in the same carton and spreading to nearby cartons.
Unloading and washing operations introduce plant debris into the packing area.
There are numerous transfer points on packing lines.

Contact surfaces accumulate waxes, trapping soil and microbes over time.
These surfaces include:

- Conveyor belts
- Transfer plates
- PVC and metal rolls
- Brush and “donut” rolls

Contact surfaces accumulate waxes, trapping soil and microbes over time.
Why is daily sanitation of packing lines important?

- Microbes survive and grow on surfaces that remain wet.
- Upon contact of plant material with surfaces:
  - Waxes and plant sap accumulate.
- Partially decayed plant material:
  - Sticks to surfaces.
  - Is loaded with microbes.
- These conditions create biofilms.
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**
An established cleaning and sanitation program is crucial
Cull fruit should be promptly removed from the facility
Sanitation in the Packinghouse

- Discard fruits and vegetables that fall on the floor
- Prepare cartons only as needed
- Maintain sanitation records

Courtesy of Jeff Brecht
PEST CONTROL
Pest Control Is Important

12”-18” Inside Wall Perimeter

Correct Problems BEFORE The Day Begins

Courtesy of Trevor Suslow
Pest Control

- NO dogs, cats, or any other pet may have access to the packing facility
- Pest control involves removal of all animal and insect nests...as well as their presence and "presents"
  - Rodent control is important no matter how entertaining
  - Live traps inside...
    - no pesticides allowed
  - Bait traps outside

Ever wonder what they are doing when you are not watching?
Pest Control

- Inside is important...but outside must be considered
- Prevent “harboarage” areas around the facility
  - Keep all “storage” and trash off the building 3-5 feet
  - Keep grass and weeds trimmed
- Dumpster should be 30-50 feet with a lid and no leaks
PACKAGING AND BINS
Develop a System for Maintaining Packaging Hygiene
Packaging materials should be stored in protected areas

Corrugated cartons are stored off the floor on pallets until assembly

Plastic shroud protects sanitized RPC’s
COOLERS & LIGHTS
Coolers (Permanent or Trailer)

- **Pre-season cleaning and sanitation**
  - Ceiling, walls, beams, floors, drains, racks, cooler curtains, etc.

- **Annual service and sanitation of cooling units**

- **Cooler curtains**
  - Whole and intact, none missing
  - Hang TO the floor without DRAGGING on the floor

Courtesy of Jeff Brecht
Coolers (Permanent or Trailer)

- Decide temperature range for your commodity(s)
  - If 34°F is optimum, set your range between 30-38 °F

- Check and document temperature of all coolers at least 2x a day

- Install 2-3 thermometers in each cooler
  - Door, middle, back
  - Non glass, non mercury
  - Able to Calibrate

Courtesy of Jeff Brecht
Transportation

- Visual and Documented Truck Inspection
  - Cleanliness, Off-Odors, Debris

- Temperature Management
  - Write Temp on Manifest
  - Temperature Recorder

- Worker Hygiene

- Loading Patterns
TRACEABILITY
Field Traceability to LINK Packing Information

- **Keep a record of your DAILY harvest**
  - Pocket calendar, formal log, etc

- **Keep record of:**
  - Date
  - Field or block or lot
  - Harvest crew(s) if multiple

- **Be able to [link](#) between harvest records and delivery records/invoices/receipts**
Traceability and Recall Plan

- Traceability must be on *at least the pallet*, box is better
- Pick/Pack Date or Date Code
- Grower Name or ID
- Weight or Number of Boxes on Pallet
- Repacker or Large Broker Firm Name
- Anything to help traceback to packing facility, specific grower, field, day of harvest
This label on the packed crop links it back to harvest information on the field lug.
Traceability and Recall Plan

- Ways to Label and Trace
  - Electronic Systems with Printers
  - Grocery Store Guns
    - Number System to Represent Farm, Field, Commodity, Pack Type, etc.
  - Markers/Crayons
  - Stickers
  - Pallet/Box Tags with Carbon Copies
Traceability and Recall Plan

- Create or Modify a Traceability and Recall Plan then,
- Practice
- Practice
- Practice
- www.primuslabs.com
During an Audit, there are 2 simultaneous audits:

Audit of Record & Documentation vs. Inspection of Facilities
PEP-TALK
No Regrets

- If you did not RECORD IT, it’s as if you did not do it.
- Record keeping allows you to keep track of farming operations and worker training.
- Record keeping documents your activities should this information ever be required.
Be Active and Be Ready

- Make changes to management practices as needed.
- Keep good records of all production practices.
- Teach employees the importance of prevention strategies and provide proper facilities.
- Work with upstream neighbors and local watershed committees on management goals.
- Update your plan regularly.
We Are Only As Strong As Our Weakest Link!

ARE YOU THE WEAKEST LINK?
“OO7”…(Double ‘O’, 7)

- Primus Labs
  - www.primuslabs.com
- FDA
  - www.foodsafety.gov
- Western Growers Association
  - http://www.wga.com/
- United Fresh Produce Association
  - www.unitedfresh.org
- Florida Tomato Committee
  - www.floridatomatoes.org
- USDA
- AIB
  - https://www.aibonline.org/auditservices/foodsafety/index.html
- Georgia GAP
  - www.gfvgga.org
- UC Davis
  - http://ucgaps.ucdavis.edu/
- National GAPs Program
  - www.gaps.cornell.edu
- NC State Market Ready Food Safety Portal
  - http://ncsu.edu/enterprises/ncfreshproducesafety
Questions?

Beth Bland Oleson
Director of Produce Food Safety Services
Georgia Fruit and Vegetable Growers Association
boleson@asginfo.net
Ofc 1-877-994-3842