Produce Safety-An overview of the FSMA

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Produce Safety



Cornell University



Module 1: Introduction to Produce Safety

Learning Objectives

- Develop a better understanding of produce safety on your fresh fruit and vegetable farm
- Identify types of human pathogens that can contaminate fresh produce
- Understand common ways that produce might become contaminated on the farm
- Describe strategies to prevent and reduce risks of contamination by human pathogens
- Understand the value of commitment to implementing food safety practices



Relevance to the Farm

- You can prevent and reduce risks on the farm
- You know your farm and practices better than anyone, but you may not know the consequences of your current practices on food safety risks
- Your actions directly impact food safety and the financial viability of your farm



The Food Safety Modernization Act (FSMA)

FDA FOOD SAF

• FSMA includes:

- Produce Safety Rule
- Preventive Controls for Human Food
- Preventive Controls for Animal Food
- Foreign Supplier Verification Programs
- Accreditation of Third-Party Auditors/Certification Bodies
- Sanitary Transportation of Human and Animal Food
- Prevention of Intentional Contamination/Adulteration
- Focused on prevention of food safety issues and encompasses the entire food system



Produce Safety Alliance Curriculum

- Covers both FSMA Produce Safety Rule requirements and many produce safety practices including Good Agricultural Practices (GAPs)
- At least one supervisor from the farm must complete food safety training at least equivalent to the standardized curriculum

 The PSA training satisfies this FSMA requirement
- Keep an eye out for the 'Section §' symbol
 - This indicates a specific FSMA Produce Safety Rule requirement is presented on the slide or referred to in the slide notes
- Pay attention to the words 'must' and 'should'
- FSMA Regulatory Reference Table is provided to align the curriculum with the regulation
- Glossary terms are in **bold** throughout



FSMA Produce Safety Rule

- First ever mandatory federal standard for growing, harvesting, packing, and holding of fresh produce
- Some growers may be eligible for an exemption or excluded based on:
 - Commodities grown (e.g., rarely consumed raw)
 - Processing activities that include a 'kill step'
 - Average annual produce sales
 - Average annual food sales and sales to 'qualified end users'
- Ultimately, <u>all</u> growers should understand and take action to reduce food safety risks on the farm







Outbreaks Associated with Produce

FDA Outbreaks Linked to Produce Contamination Likely Prior to Retail: 1996-2014



Microorganisms of Concern in Fresh Produce

- Bacteria
 - Salmonella, toxigenic E. coli, Shigella, Listeria monocytogenes
- Viruses
 - Norovirus, Hepatitis A
- Parasites
 - Giardia lamblia, Cryptosporidium parvum,
 Cyclospora cayetanensis, Toxoplasma gondii









Bacteria in the Farm Environment

 Bacteria are microorganisms that can multiply both inside and outside of a host



- Bacteria include pathogens such as *E. coli* O157:H7, *Salmonella*, and *Listeria monocytogenes*
- Bacteria can multiply rapidly given the right conditions: water, food, and the proper temperature
- Good Agricultural Practices can reduce risks by minimizing situations that support bacterial survival and growth





• Viruses are small particles that multiply only in a host, not in the environment or on produce



 Contamination most often linked to an ill worker handling fresh produce (fecal-oral route) or contaminated water

Preduce Safety

- It only takes a few virus particles to make someone ill
- Can be very stable in the environment
- Prevention is the key to reducing viral contamination
- Limited options for effective sanitizers





Parasites

- **Parasites** are protozoa or intestinal worms that can only multiply in a host animal or human
- Commonly transmitted by water
- Can be very stable in the environmen often not killed by chemical sanitizer
- Can survive in the body for long periods of time before ever causing signs of illness









How Contamination Is Spread

Humans

Workers can spread pathogens to produce because they directly handle fruits and vegetables.

- Improper health and hygiene practices
 - Lack of adequate training and handwashing practices

Preduce Safety

- Lack of or inadequate toilet facilities
- Illness or injury
 - Working while sick
 - Injuries that result in blood contacting fresh produce



Routes of Contamination



Feces



Clothing



Hands



Footwear







Illness &

Injury

Visitors

Growers must:



- Make visitors aware of the farm's food safety policies
- Provide access to toilet and handwashing facilities

Other key information for visitors should include:

- Areas of the farm they are allowed to visit
- The importance of not visiting the farm when ill
- How to wash their hands
- Instructions to keep pets at home



Resources Provided to Support Food Safety Practices

- Toilets
- Toilet paper
- Soap
- Clean water
- Paper towels
- Container to catch wastewater
- Garbage cans
- First Aid Kit
- Break Areas







Toilet & Handwashing Facilities

- Provide a sufficient number of toilets and sinks to meet worker and visitors' needs
 - OSHA requires one facility per 20 workers within $^{1\!\!/}_4$ mile of the working area
- Facilities must be fully serviced on a regular schedule
- Toilet and handwashing facilities must be well stocked
- Facilities should be monitored every day when in use



Worker Injury

- Worker injuries may pose food safety risks
 - A first aid kit should be available, stocked, and monitored
 - Clean and bandage all wounds
 - If the wound is on the hands, a glove should be worn to create a double barrier
 - Discard any produce that may be contaminated
 - Clean and sanitize any items that came in contact with bodily fluids
 - Report all injuries to supervisor





Summary

- Worker health and hygiene is critical to food safety because workers can introduce food safety risks
- Everyone should be trained but anyone who handles covered produce must be trained
- Visitors must be made aware of policies too
- Training should emphasize health and hygiene practices that reduce risks
- A written training program should be developed, implemented, and documented



How Contamination Is Spread

Animals

Domesticated and wild animals can carry and transmit human pathogens to produce.

- Field intrusion may result in direct fecal contamination of crops and fields
- Animal feeding, rooting, and movement through fields may spread contamination
- Animals can contaminate water sources used for produce production
- Manure runoff can contaminate fields, water sources, and crops







Animals Are A Produce Safety Concern Because They:

- Can carry human pathogens
 - e.g., E. coli O157:H7, Salmonella, Listeria monocytogenes
- Can spread human pathogens
 - By depositing feces in fields
 - By spreading fecal contamination as they move
- Are very difficult to control
 - Birds and small animals travel unnoticed
 - If fencing is used, even the best fence can be breached
 - Complete exclusion is not possible







Assessing Risks: Wildlife

- Do you find wildlife feces in your produce fields?
 - How often? Is it widely distributed? Is it in contact with produce?
- Is your farm in an area that large numbers of animals visit

(e.g., flocks of migrating birds, herds of deer)?

 What management practices can limit wildlife contamination of produce fields and water sources?

Preduce Safety





Monitoring Wildlife Activity

During the growing season:

- Monitor for feces and evidence of intrusion
- Evaluate the risk of fecal contamination on produce (e.g., tree vs. root crop)
- Consider past observations and wildlife attractants
- Immediately prior to harvest
 - Monitor for fecal contamination, signs of animal activity (e.g., trampling, rooting, feeding, tracks)
 - Assess risks and decide if the crop or a portion of the crop can be safely harvested







Deterring Wildlife

Decoys

Fencing & Netting















Deterring Wildlife

Visual Deterrents







Noise Deterrents Tactile Repellent

Relocation









Domesticated Animals on the Farm

- Domesticated animals, such as livestock and pets, may harbor human pathogens
- Domesticated animals are sometimes used in fields
 - As working animals
 - As wildlife management (i.e., dogs)
 - To graze crop residues/culls
- Assess the risk if animals are allowed or are likely to ente your production fields





Assess Risks BEFORE Planting

- Assess the field location
 - Topography, wind patterns, water movement



- Previous uses (e.g., grazing, landfills, manure approactions)
- Impact of domesticated animals
- Assess adjacent land uses
 - Animal production, compost, or manure storage
 - Residential, commercial, or other land uses
- Assess wildlife risks
 - Number, movement, likelihood of fecal contamination



Working Animals

 The best way to minimize risk is to not allow working animals in the field when the edible portion of the crop is present



- If working animals need to be used close to harvest:
 - Establish paths to minimize contact with growing areas
 - Have an SOP that outlines practices to take if an animal defecates (poops) in the field near or on produce
- Anyone working with the animals should understand risks and be trained to minimize risks
- Develop SOPs for animal and manure handling
 - e.g., handwashing, cleaning and sanitizing tools, practices to complete after handling animals



Pets

- Should be excluded from produce fields
- Visitors to the farm should be instructed to leave their pets at home
- Farms with petting zoos should have handwashing sinks available and signage instructing visitors of the food safety policies








Pre-Harvest Assessment

A process to assess fields before harvest to help determine if:

- Fecal contamination is present, or signs indicate a risk (e.g., tracks, trampling, rooting, feeding)
- Fresh produce has been contaminated and cannot be harvested
- Corrective actions, such as no-harvest buffer zones, are necessary
- Harvest can safely proceed





Corrective Actions: What To Do If There's Contamination

- 1. Do not harvest any produce that may be contaminated
- 2. Determine if no-harvest buffer zones around the contamination are sufficient to reduce risk to allow harvest of the <u>uncontaminated</u> produce
 - Suggested no-harvest buffer zones vary from a 0-25 foot radius, depending on the crop, climate, contamination event, and harvest equipment

Preduce Safety

 Consider other corrective actions that could reduce contamination risks



Corrective Actions Continued

- 4. Make a decision about what to do with the contamination
 - Remove, leave, bury, or use other strategies



- Consider risks that could result from these actions (e.g., cross-contamination of equipment with feces)
- 5. Document all actions
 - Monitoring, deterrence, and corrective actions





Summary

- Feces and urine from domesticated and wild animals can contaminate produce fields and water sources
- Conduct pre-planting and pre-harvest assessments
- Presence of animals in the environment does not necessarily mean that produce is contaminated
- If animal intrusion occurs, fields must be monitored during the growing season for evidence of contamination
- Steps should be taken to reduce risks from animals
- Co-management should be used to balance food safety and conservation goals
- Document all actions taken to reduce risks from animals and adjacent land uses



How Contamination Is Spread

• Water

Water can carry and spread human pathogens, contaminating entire fields or large amounts of produce.

- Production water
 - Irrigation, crop sprays, frost protection
- Postharvest water
 - Fluming, cooling, washing, waxing, cleaning
- Unexpected events
 - Flooding, runoff







Two Sections on Water

• Part I: Production Water

- Water used in contact with produce during growth
- Irrigation, fertigation, foliar sprays, frost protection

• Part II: Postharvest Water

- Water used during or after harvest







Agricultural Water Quality

- All agricultural water must be safe and of adequate sanitary quality for its intended use
 - Applies to water used for purposes outlined in both Parts I and II of this module





Production Water Uses Include:

- Irrigation
- Crop sprays
- Cooling

- Frost protection
- Fertigation
 Dust abatement
 - Other uses where water directly contacts produce







Evaluating Risks Related to Production Water

Three main impact points for produce safety risks related to production water are:

- 1. Production water source and quality
 - Public water supply, ground water, surface water
 - Testing frequency and sampling location
- 2. Application method
 - Water that does not contact the harvestable portion
 - Water that contacts the harvestable portion of the crop
- 3. Timing of application
 - At planting or close to harvesty





Potential Sources of Surface Water Contamination



Less Contact with Water = Lower Risk

A key question for evaluation of risk is:

- "Is the water applied using a direct water application method?"
- If the answer is "never", the risk from water is very low
- If the answer is "yes", the type of commodity, quality of the water and the timing of the application should be revious risks







Pathogens on Produce May Die Off Over Time

- Environmental conditions can influence die-off rates includit
 - Desiccation (drying out)
 - Sunlight (ultraviolet irradiation)
 - Temperature and humidity
 - Starvation and competition
- Some pathogens may be 'protected' on the plant and survive for extended periods of time
- Under some conditions, pathogens can even regrow on a plant so avoiding contamination is best





Water Quality Criteria for Water Used During Growing Activities

- Apply to water used with a direct water application method to covered produce
- Each source of production water must be tested to evaluate whether its water quality profile meets the following criteria:
 - 126 or less colony forming units (CFU) generic
 E. coli per 100 mL water geometric mean (GM)
 <u>AND</u>
 - 410 or less CFU generic *E. coli* per 100 mL water statistical threshold value (STV)



Requirements for Public Water Sources

Source	Testing Requirement
Public Water Supply	Copy of test results or current certificates of compliance

 With appropriate documentation, there is no requirement to test water that meets the requirements for public water supplies.



Microbial Water Quality Profile: Survey of Ground Water Sources

Source	Initial and Annual Testing Requirement
Ground	4 or more times during the growing season or over the period of a year 1 or more samples rolled into profile every year after initial year

 Profile samples must be representative of use and must be collected as close in time as practicable to, but before, harvest



Microbial Water Quality Profile: Survey of Surface Water Sources

Source Initial and Annual Testing Requirement

20 or more times over a period of 2 to 4 years

Surface 5

5 or more samples rolled into profile every year after initial survey

 Profile samples must be representative of use and must be collected as close in time as practicable to, but before, harvest



Corrective Measures

- Three types of corrective measures are allowed if the microbial water quality profile does not meet water quality criteria:
 - 1. Apply a time interval for microbial die off
 - i. Between last application and harvest
 - ii. Between harvest and the end of storage and/or removal during activities such as commercial washing
 - 2. Re-inspect the water system, identify problems, and make necessary changes and confirm effectiveness
 - 3. Treat the water



Summary

- Contaminated agricultural water has been implicated in some foodborne outbreaks associated with fresh produce
- Knowing the water quality through long-term testing will help establish management practices for appropriate use of the water
- If the water IS NOT applied by a direct application method to the harvestable portion of the crop, the risks are lower
- Extend time between last application of water and harvest to reduce risks, if water quality is a concern
- Treating water is an option to reduce risks
- Keep copies of all water test results
- Document all water management practices



Why Focus On Postharvest Water?

- Cannot eliminate every food safety risk in the field
- Postharvest water has the potential to spread contamination widely







Many Postharvest Water Uses

- Rinsing/washing
- Commodity movement (i.e., dump tanks/flumes)
- Cooling
- Ice making
- Postharvest fungicide and wax
- Handwashing
- Cleaning and sanitizing







Water Quality Criterion for Harvest and Postharvest Activities

- Water used for the following must han no detectable generic *E. coli* per 100 sample
 - Direct contact with covered produce during or after harvest
 - Direct contact with food contact surfaces
 - To make ice
 - For handwashing
- Untreated surface water may not be used for these purposes







Single Pass Water

- Must not have detectable generic *E. coli* in 100 mL sample
- Produce Safety Rule does not require water treatment
- Antimicrobial products, such as sanitizers, can be added as a commonly recommended Good **Agricultural Practice**
 - May reduce the buildup of microorganisms (biofilms) in



od contact s

Recirculated and Batch Water

- Must have no detectable generic E. coli in 100 mL sample at the beginning of use and maintain safe and adequate sanitary quality throughout use
- Treatment is not required but can be used to maintain water quality and reduce cross-contamination risks
- Any antimicrobial product used in the water must be labeled for use with fruits and vegetables
- A schedule must be established for changing batch water or a process in place for minimizing the buildup of organic material in the water



Key Water Quality Variables

- Quality at start of use
 - No detectable generic *E.coli* in 100 mL of sample



- pH
 - Can impact the effectiveness of antimicrobial treatments
- Temperature (toms 10d more, greens 10d less)
 - Must be monitored to minimize potential for infiltration
- Turbidity
 - Can be used to manage water change schedule



When Should I Change My Water?

- Post-harvest water must be managed, including changing water when necessary
- Water changing schedules should consider:
 - Organic load (soil, leaves, decaying or damaged product)
 - Turbidity measurements
 - Volume of produce
 - Type of produce
 - Product flow and operating conditions
 - Type of antimicrobial product
 - Type of equipment





Summary

- Postharvest water management can help prevent a small contamination event from becoming a BIG one
- For harvest and postharvest uses, use only water that has no detectable generic *E. coli* in 100 mL water sample
- Batch as much as possible.
- Consider adding a sanitizer to postharvest water
- Develop SOPs for key water management steps
- Monitor key variables of both the water and any sanitizer used to ensure postharvest water quality
- Take corrective actions when needed
- Keep detailed records



How Contamination Is Spread

Soil Amendments

Raw manure and other soil amendments can be a source of contamination if not properly handled and applied.

- Application too close to harvest
- Improper/incomplete treatment
- Improper storage
- Runoff
- Wind spread
- Cross-contamination due to improper sanitation procedures





What Is A Soil Amendment?

- Soil amendments are any chemical, biological, or physical materials intentionally added to the soil to improve and support plant growth and development
- May reduce soil erosion and sediment runoff
- Many different types of soil amendments are available
- Soil amendments can present produce safety risks
- Assessing risks and implementing GAPs can reduce risks





Soil Amendments & Food Safety Risks



- Biological soil amendments, especially those that include untreated (raw) manure, pose significant microbial risks
- Synthetic (chemical) soil amendments can also impact food safety, if not prepared and applied properly
- Risks should be assessed when selecting and applying all soil amendments on produce fields



Non-Manure Based Soil Amendments of Animal Origin

 Should be processed to eliminate pathogens or must be considered untreated biological soil amendments of animal origin Bone meal

Blood meal

Feather meal

Fish emulsion



Composting Options

Must use a scientifically valid process:

- Aerated static composting: aerobic, minimum 131°F (55°C) for 3 days, followed by curing with proper management to ensure elevated temperatures throughout all materials
- Turned composting: aerobic, minimum of 131°F (55°C) for 15 days, minimum 5 turnings, followed by curing
- 3. Other scientifically valid, controlled composting processes





Minimum Application Intervals

- There are currently no application intervals for raw manure outlined in the FSMA Produce Safety Rule
- Untreated Soil Amendments
 - FDA is currently pursuing further research to su intervals for raw manure



 Raw manure must not be directly applied to the harvestable portion of the crop

Treated Soil Amendments

Zero day application interval for compost treated by a scientifically validated process



Storage Area Recommendations

- Minimize runoff, leaching, and wind drift to reduce contamination of crops, water sources, and handling areas by soil amendments
 - Cover piles
 - Build berms to prevent runoff
- Do not store in locations that are likely to experience runoff or areas that are close to wate
- Keep raw manure and finished compost in separate areas to prevent cross-contamination
- Minimize animal access to compost piles





Recordkeeping: On-Farm Composting

Key factors in the composting process must be documented. These may include the following steps depending on the process use

- Time
- Temperatures
- Turnings
- Other processing steps







Recordkeeping: Soil Amendments Supplied by a Third Party

Documentation should be kept of:

- The name and address of the supplier
- What soil amendments were purchased
- The date and amount purchased
- Lot information, if available



Documentation must be collected from the supplier:

- To ensure the supplier has used scientifically validated treatment processes and monitoring during the production of the treated amendment (including compost)
- To ensure proper handling requirements have been met
 Preduce Safety
Summary

- Soil amendments can introduce produce safety risks, especially those that contain raw manure
- To reduce risks associated with soil amendments:
 - 1. Apply untreated manure to non-produce fields
 - 2. Treat raw manure using a scientifically validated, controlled process
 - 3. Extend the time between application of raw manure and harvest
- Make sure storage areas do not contaminate fields, water sources, or packing areas
- Train workers who handle and apply soil amendments
- Develop sanitation steps for tools and equipment
- Keep records of soil amendment applications and treatments



How Contamination Is Spread

Surfaces, equipment, tools, and buildings

Any unclean surface that contacts produce can harbor pathogens and serve as a source of contamination.

 For example, not having an established schedule for cleaning or sanitizing food contact surfaces, including tools

Facility management can also impact risks

- Areas outside buildings that are not kept mowed or clean can serve as pest harborage areas
- Standing water or debris present in the packinghouse can become a source of cross-contamination





Keeping Things Clean

- Continue produce safety practices by keeping things clean during harvest and postharvest handling
- Consider everything that touches or impacts produce
 - Packing and picking containers
 - Packing equipment
 - Hands and clothing
 - Postharvest water
 - Buildings (i.e., coolers, storage areas)
 - Transport vehicles





Worker Training for Harvest and Postharvest Practices

- Workers must never harvest covered produce contaminated with feces
- Workers must never harvest or distribute dropped covered produce
- Worker health and hygiene practices should include:
 - Wearing clean clothing and footwear
 - Following glove, hairnet, and jewelry policies
 - Using worker break areas, handwashing stations, and restrooms



Not All Packing Areas Are The Same

Open Open to the environment, may or may not be covered

<u>Closed</u> Has doors and windows, with some ability to control entry into the building







Reduce Risks in All Packing Areas

Proper hygiene facilities & break areas for

Keep it clean







Pest management



Avoid standing



Keep it organized





Zones in the Packinghouse

Help prioritize cleaning and sanitation efforts by designating areas or 'zones' within the packing

Zone 1 (direct food contact surface)

Zone 3 (floor)



Cleaning vs. Sanitizing What is the difference and why does it matter?

- **Cleaning:** Physical removal of dirt (soil) from surfaces which can include the use of clean water and detergent
- **Sanitizing:** Treatment of a cleaned surface to reduce or eliminate microorganisms

Important point: You cannot sanitize a dirty surface. Cleaning always comes first!



 Step 1: Remove any obvious dirt and debris from the food contact surface



• **Step 2:** Apply an appropriate detergent and scrub the surface



• Step 3: Rinse the surface with clean water, making sure to remove all the detergent and soil



• Step 4: Apply a sanitizer approved for use on food contact surfaces. Rinsing may be necessary. Let the surface air dry.



Best Case Is Not Always Possible

- Many farms have old or wooden equipment that is not easy to clean or sanitize. All hope is not lost!
 - Most things can be cleaned, even old equipment!
 - Keep equipment clean (sanitize when necessary)
 - Establish cleaning schedules that reduce contamination risks and prevent biofilm formation
 - Air dry wooden surfaces after washing
 - Equipment and tools that cannot be maintained or cleaned properly may need to be discarded
 - Be sure <u>new</u> equipment and buildings are designed to be easily cleaned and sanitized



Reduce Risks BEFORE Entering the Packing Area

- Clean harvest bins before using them
- Develop practices to minimize harvest bin contact with the soil and remove soil before entering the packing and storage areas
- This reduces:
 - Risk of contamination entering packing and storage areas



- Organic load in wash water
- The frequency of which wash water needs to be changed
- Risks when stacking produce bins on top of each other

Ice and Ice Slurries

• If ice or ice slurries are used for postharvest cooling, it must be made from water that is free of detectable generic *E. coli*/100 mL



- Equipment used to make and distribute ice should be cleaned and sanitized on a regular schedule
- Ice should be stored in clean containers
- Do not stack boxes containing iced produce above other boxes to avoid dripping and crosscontamination risks Preduce Safety

Transportation Considerations

- Many different types of vehicles are used to transport fresh produce
 - Open trucks, closed trucks, vans, wagons



- Some farms may use vehicles for many farming purposes and for personal use
 - Vehicles must be cleaned before hauling produce
 - A clean liner may be used as a barrier if adequate to prevent contamination



Physical Food Safety Risks

- Physical risks include wood, metal, glass, plastic or other foreign objects that can end up in the produce
- To reduce physical food safety risks:
 - Screen or cover overhead light bulbs or replace with shatterproof fixtures
 - Inspect bearings and other moving equipment to make sure they are in good working condition and not introducing metal parts or pieces into the fresh produce
 - Cover packing materials and produce containers to reduce the risk of physical hazards entering



Summary

- All packing areas, regardless of age or design, must have sanitation practices that minimize contamination risks
- Identify all of the food contact surfaces as produce moves through the packing and storage areas—focus on keeping these surfaces clean as a first priority
- Cleaning and sanitizing are not the same thing
- You cannot sanitize a dirty surface
- Food safety practices such as cleaning, general maintenance and housekeeping, and pest control need to be in place to reduce risks



Produce Safety Begins With Your Commitment

- Identifying produce safety risks on your farm
- Supporting the implementation of food safety policies and practices to reduce risks
- Providing equipment and facilities necessary to implement practices that reduce risks
- Supporting effective food safety training so everyone can actively be involved in reducing risks
- Setting a good and consistent example on your farm





Assessing Risks



- Assess your farm and practices
 - Location of farm, fields, and adjacent land activities that may represent risks to the crops you grow
 - Fecal contamination risk from domesticated or wild animals
 - Use of water and manure in crop production
 - Worker training programs and hygiene facilities
 - Practices used to grow, harvest, pack, or hold produce and the tools and equipment
 - Typical and atypical (e.g., flooding) situations



Implementing Practice to Reduce Risks



- Focus on preventing contamination
 - Cannot reliably remove contamination
- Address risks most likely to have the biggest impact on produce safety first
- May require modification of current practices and additional training for farm employees
- May require capital investment
- You may already be doing the right thing!
- Ask for help and seek training if you are unsure



Standard Operating Procedures (SOPs)

- A written document defining how to complete a specific food safety practice
- SOPs include:
 - 1. Step-by-step instructions to ensure that even a person who has never done a practice before can complete the practice correctly by following the instructions
 - 2. Location and name of any supplies needed to complete the practice
 - 3. When and how often the practice should be completed
 - 4. What records are needed/necessary



Monitoring

 Performed on a schedule or during a specific activity



- Allows you to verify practices are being completed properly
- Helps identify problems before they impact safety
 - Frequent high generic *E.coli* counts in water test results
 - Evidence of animal intrusion and fecal contamination
 - Improper cleaning and sanitation practices resulting in dirty equipment and tools



Corrective Actions

- Can be established in advance
 - Negative consequences for workers not following practices
 - Plans for a spilled portable toilet
- Fix problems that are identified during monitoring
 - Restocking toilet and handwashing facilities
 - Retraining supervisors and farm workers
- May require short and long term planning
 - Establishing sanitation programs (short term)
 - Replacing equipment (long term)





Recordkeeping

- Recordkeeping includes documenting practices, monitoring, and corrective actio
- There are many templates available
- Recordkeeping should be convenient, or else it will not get done
- Required records must be dated and signed or initialed by the person who performed the activity



- Some records must be periodically reviewed, signed, and dated by a supervisor or responsible party
- Keep all records for at least 2 years

Recordkeeping Benefits

- You can verify practices were done
 - And done properly!
 - Assures you that everyone is sticking to the food safety policies
- Look for trends or outliers and eliminate potential problems
- May be required for certain activities



Third party audits





Recordkeeping Basics

• Records can be handwritten (pen & paper) or electronic (handheld data entry or scanner)

Preduce Safety

- Invest in tools that make it work
 - Clip boards
 - Pens tied to long pieces of string attached to a clipboard with the recordkeeping logs
 - Plastic page sleeves
 - Duct tape
- Use technology to your advantage
 - Phones, apps, tablets, computer software



Recordkeeping Tips

- Establish record keeping schedules that make sense for the record keeper <u>and</u> the action
 - When does it need to be recorded?
 - Who is in charge of documenting it?
 - How often does it need to be documented?
- Build recordkeeping into normal routines
 - Place recordkeeping logs in accessible areas with necessary supplies (e.g., pens, paper)



A Farm Food Safety Plan

- Gets you thinking about YOUR farm and practices
- Keeps you organized so you can focus your time and resources more effectively
- Gives you a plan to follow and assure everyone is involved
- Documents your progress
- Is required by third party audits and some buyers
- Is not required by the FSMA Produce Safety Rule,





Summary

- Produce safety impacts your farm
- Microorganisms are the primary produce safety concern
- Your commitment is critical to success
- Produce safety includes:
 - Assessing risks, implementing practices, monitoring practices, using corrective actions, and keeping records
 - Providing the necessary resources to get it done
- A written Farm Food Safety Plan guides your produce safety efforts

Food Safety software solutions

The Software Solutions

Over 60 software solutions considered

17 were selected for further study

5 are being shown for consideration

We are still looking into software solutions that popup- and following up on additional information about software in our selection process

What is the shortlist of Solutions?

	Farm planning focused			Focused on both		Traceability focused
Name of Product	Agsquared	FarmOS	Tend	GAP Pro	HarvestMark	Foodlogic Q
Geared towards	Small/medium	Small/medium	Small/medium	Small/medium	Large	Large
General / Overal Rating	37	32	21	40	41	37
Cost	299+	50+imp	Free	129/year	1000+2000+ imp	??+ imp
CSV upload	3	2	Implimenting	2	3	2
Mobile Friendly	4	3	4	4	4	4
Mobile off-network	4	1	Implimenting	1	4	4
Bilingual ability	4	1	4	4	4	4
Ease of use	2	2	1	3	2	1
Data export?	2	3	coming	3	3	3
purpose built for GAP/FSMA?	NO	No	No	Yes	Yes/ for large farms	No
Willingness to make changes	Yes+for a fee	Yes+ for a fee	Open to feedback	Yes	For a fee	For a fee
FSMA requirements						
Employee training and health	3	3	Implimenting	4	3	3
Soil amendments	4	4	3	4	3	3
Compost	2	2	2	2	1	1
Land Assessment	3	3	1	3	4	2
Water	2	3	2	4	4	4
Harvest and Traceability	2	2	2	4	4	4
Document Center	2	3	2	2	2	2

4=fits the requirements exactly, compliance super easy
3=Fits requirements, maybe not super easy
2= there is a workaround for this but its annoying
1= doesn't work, try something else

Tend- not recommended but being shown as a representative of other software and one that has some promise.

Agsquared



- built around farm management, many food safety features are workarounds
- good mobile app, allows off-line access, still building out
- limited CSV import functionality
- company will customize platform for bigger clients (for reasonable fee)
- company will slowly add FSMA record keeping

FarmOS- software Farmier- hosting



- a complete farm tracking/operating system software with workarounds for food safety
- hHard to track sales to customers- but commerce module available and in works to be implemented
- good mobile app, although doesn't allow off-line access
- API feature now, but CSV in works to add at latter point
- all logs and assets allow picture and document upload
- company willing to make changes as needed -a lot of potential here
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Cog-pro.com

Create GAP Water Test

Save & New

Save & Return

Save & Clone

Date:

Format: 01/19/2017

Water Source:

Location:

Sample ID:

Date Sample Sent to Lab:

Format: 01/19/2017

Lab ID:

Date Results Received:

Format: 01/19/2017

Laboratory:

Results:

GAP Pro

- Ccompanion to COG pro, a farm planning software which it integrates with. Built around helping farmers go GAP compliant
- great mobile app, although doesn't allow off-line access
- doesn't allow CSV imports currently
- allows some document upload but not across platform
- company willing to make changes as needed

GAP Pro

GAP Pro Record-keeping for Good Agricultural Practices	=	You are our your recirio	renity logged s, prease cick	in as "Guest." There to kig o	Contrant in ut of Guest	the Guest account i and po to the signu	a periodically res p paye.	set. To begin s	aing CDG-Pro	for								
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Certified Organic CONTACT VS			_	_				_		_	_			_				

HarvestMark

- requires integration of two different products
- from reading reviews, high customization fees
- good mobile app, allows off-line access
- field system focused on large, commodity farms- didn't have a chance to trial yet
- looking at 3000+ for implementation

Foodlogic Q

- built for the wholesaler or communal packing house with multiple farm members
- can be customized to exactly what you want
- never got back to me with pricing, but seemed very high
- good mobile app, allows off-line access
- field system focused on large, commodity farms- didn't have a chance to trial yet
- company alternatively great/hard to get information from

Major weaknesses of current software

- hard to account for produce sold at farmers' markets
- customization available but can be expensive
- good traceability software out there but no really good complete solution besides GAP pro
- best may be google sheets plus a traceability option

FARM OS Produce Safety Module

Adding a solution

http://go.uvm.edu/producetracking

FARMOS Walkthrough

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Spreadsheets

A Free solution that integrates with FARM OS

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Sample spreadsheet

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