

**WHOLESALE SUCCESS**

**Agricultural Water**

**IN CLASS**  
Water Use Descriptions and Test Plan

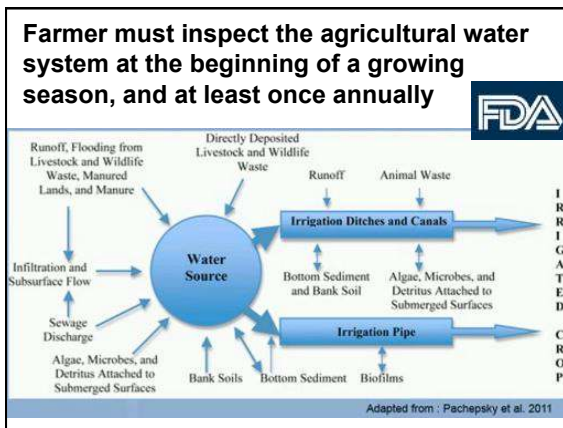
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**MAP IT: Water Sources and Distribution Systems on Your Farm.**

*Water can be contaminated at the source, or it can become contaminated in the **distribution system***

1. Identify the water sources that are available to your farm: wells, irrigation hydrants, streams, ponds. **(ID CODE FOR RECORDS)**
2. With arrows show water flow and wind direction.
3. Identify any potential contamination risks that may exist for these sources.
4. Describe or diagram how water is used for irrigation on your farm.



**Inspect and Record Routinely**

**Contamination can occur at the source**

- biological: livestock or wildlife
- chemical: running into water source

**Within the conveyance and at the point of emission**

- microbes can enter or grow inside irrigation systems
- chemigation improperly cleaned after

**Prevent Contamination of Water**

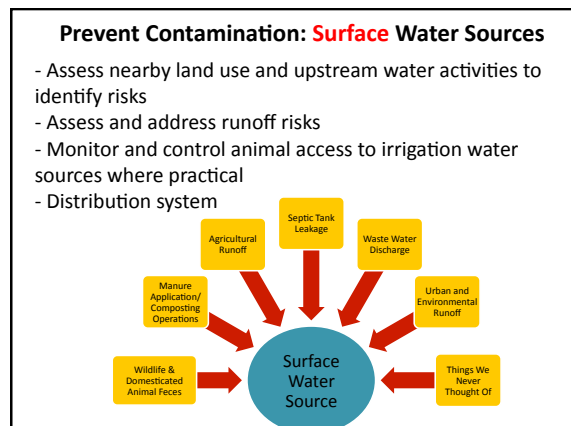
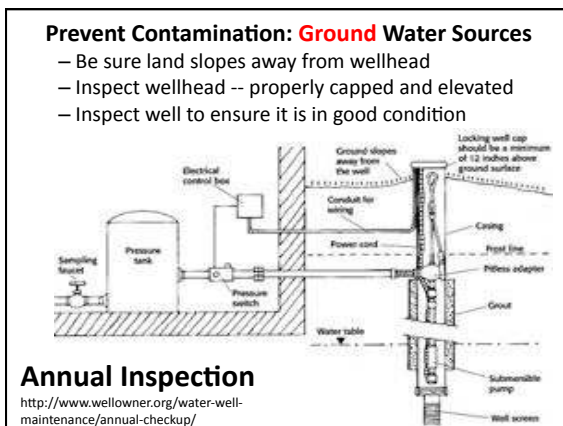
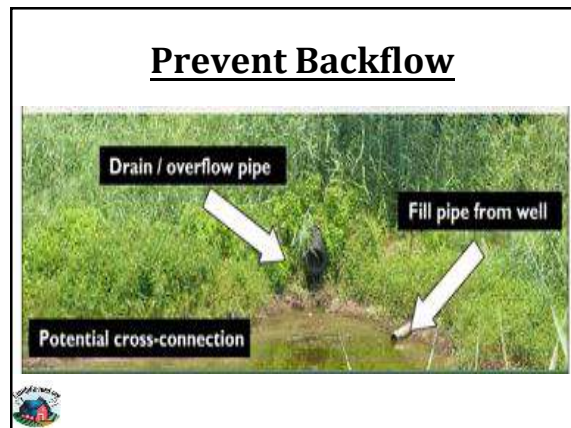
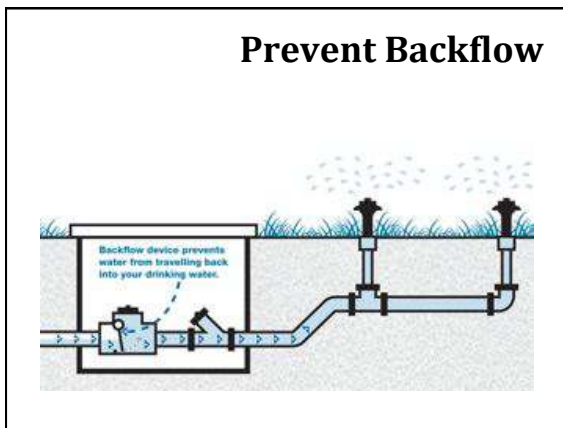
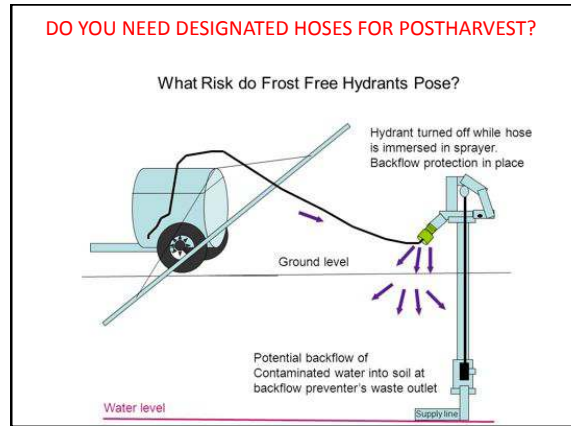
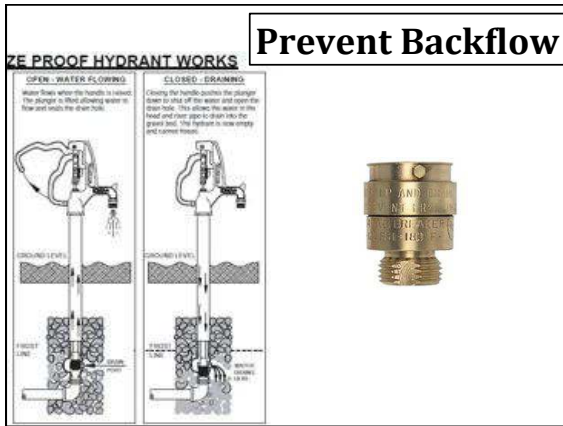
*Keep the surrounding area free of debris, pesticides, petroleum products, fertilizer and manure, chemicals, animal enclosures*

**Probability of Contamination**

← Lower Risk      Higher Risk →

<b>Public Water Supply</b>	<b>Ground Water</b>	<b>Surface Water</b>
Treated		Open to Environment

**Prevent Contamination Water Systems**



**Water**

**1. Use**

**Postharvest Water**  
- Water used during or after harvest

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

**2. Microbial Quality**

**3. Testing**

**Postharvest Water MUST BE free of detectable generic E-coli**

- washing hands during and after harvest
- on food-contact surfaces and ice for post harvest
- used to directly contact produce during or after harvest
- used for sprout production
- for agricultural tea

**Water for these uses may not be from untreated surface water**

**All "Post Harvest Water" Must Be free of**  
**Detectable generic e-coli per 100 ml of water**

**PRODUCE RULE WATER TEST REQUIREMENTS**

Public Water – Treated	Copy of test results or current certificate of compliance
Ground Water – Untreated	1 <sup>st</sup> year: 4 times within the year then 1 or more per year
Surface Water – Untreated	Do not use for postharvest

- Where to take the sample
- Keep records of test results

**What Type Of Water Test Does FDA Require?**

1. "Method 1603" or;
2. A scientifically valid method that is at least equivalent to the method of analysis in § 112.151(a) in accuracy, precision, and sensitivity

**Postharvest Water**  
**If Generic E. Coli Is Detected:**  
Stop using the water source until:

1. You re-inspect your water distribution system to see if you can determine what's wrong
2. Rectify it
3. Test: verify that your action was effective to bring the water back under the threshold
4. Repeat 4 test in a year (ground water)

**Microbial Water Quality Profile: Ground Water**

**START:**  
Establish initial water quality profile  
At least 4 samples over 1 year


**ANNUALLY AFTER START:**  
Collect at least 1 sample for analysis  
Insert annual data into rolling data set

**IF YOUR WATER CHANGES:**  
If the water quality profile no longer represents the quality of the water source, establish a new profile

**IF YOUR PROFILE DOES NOT MEET GM OR STV CRITERIA:**  
As soon as practicable and no later than the following year, discontinue use of the water unless an allowed corrective measure is applied

**ALLOWED CORRECTIVE MEASURES:**

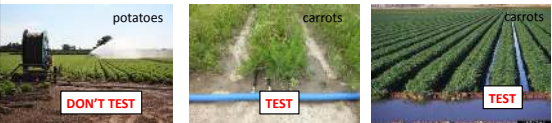
1. Apply a time interval to allow die-off (before harvest or end of storage) or removal
2. Re-inspect the water system, identify problems, and make necessary changes
3. Treat the water



**Production Water: Directly Applied To Growing Produce**

**TESTING Required:** Water directly contacts the harvestable portion of a crop

**TESTING NOT Required:** If irrigation water does not contact the harvest portion of covered produce



**Audit Standards On Water Testing**

Most audit standards do not differentiate

- application methods or crops rarely eaten raw
- or between water that touches edible portion and non-edible portion.


Thus they generally require all irrigation water be tested.

**Water Testing Frequency For Production Water**

PRODUCE RULE WATER TEST REQUIREMENTS	
Public Water Treated	Copy of test results or current certificate of compliance
Ground Water Untreated	1 <sup>st</sup> : 4 times within a year Then: 1 or more per year – rolling profile
Surface Water Untreated	1 <sup>st</sup> : 20 or more in 2 to 4 years. Then: 5 annual samples – rolling profile

**Profile samples must be:**

- representative of use
- collected as close in time as practicable to, but before, harvest




**WATER QUALITY:** The criteria are based on two values, the geometric mean (GM) and the statistical threshold (STV):

- o **126 or less** colony forming units (CFU) generic *E. coli* per 100 mL water geometric mean (GM)

**AND**

- o **410 or less** CFU generic *E. coli* per 100 mL water statistical threshold value (STV)

**Geometric Means and Statistical Threshold Values**

- o The geometric mean (GM) is a log-scale average, the “typical” value
- o The statistical threshold value (STV) is a measure of variability, the estimated “high range” value

- Online Calculator <http://agwater.arizona.edu/onlinecalc/>
- <http://wcfs.ucdavis.edu/>

**What Type Of Water Test Does FDA Require?**

1. "Method 1603" or;
2. A scientifically valid method that is at least equivalent to the method of analysis in § 112.151(a) in accuracy, precision, and sensitivity

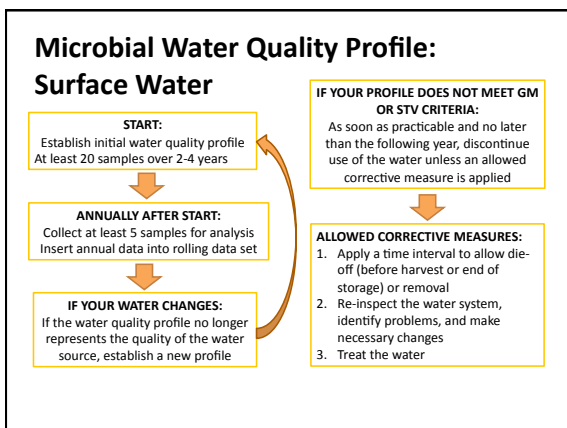
Meanwhile – test for Generic E. Coli Absence/ Presence or Quantified

**Produce Rule Compliance dates**

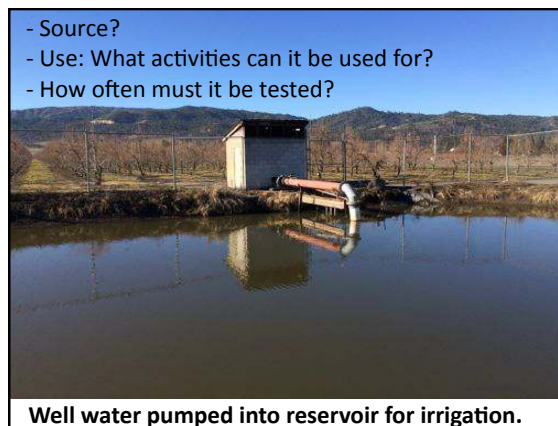
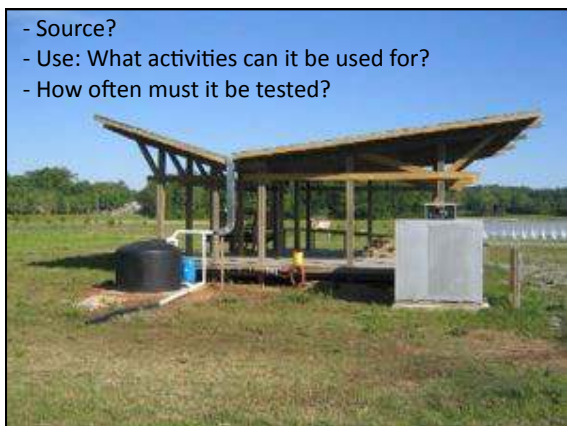
Exempt, or not, what is your compliance date?

Time period starting from effective date 1.27.2016


Size of Covered Farm	For Certain Water Requirements	For All Other Requirements
Very small: Less than \$250,000	6 years – 2022	4 years - 2020
Small: \$250,000 to \$500,000	5 years – 2021	3 years - 2019
Large: More than \$500,000	4 years – 2020	2 years - 2018



- Corrective Measure: Treating Production Water**
- Any chemicals used to treat water must be EPA registered and labeled for intended use
  - Non-chemical treatments, called pesticide devices, may be used if they adequately reduce microbial risks
    - Filter units, UV light units, ozonator units
  - You should avoid water treatments that may have negative environmental and soil quality impacts
  - You must keep records of all treatment monitoring done



Source?  
Use: What activities can it be used for?  
How often must it be tested?



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Use: What activities can it be used for?  
How often must it be tested?



**For spray applications?**



**Produce Rule Record Keeping**

**Records Must Be Kept Of:**

- Inspection of agricultural water sources and systems, and pooling of water
- Water test results
- Public water (annual) documentation
- Water treatment monitoring
- Microbial die-off or removal rates, and scientific documentation of method

**FILL IN YOUR WATER ACTION PLAN**

Agricultural Water Quality Testing And Use Action Plan

Lab Information (name, address, phone) \_\_\_\_\_

Lab Information (name, address, phone) \_\_\_\_\_

Area of FS Action	Source and ID	How often is this source tested?	Who is responsible	Where	Record	Use	Check-in	
	Ground, surface, or municipal and identifying number		Who collects the samples, records the results, and oversees corrective actions.	Lab name	What records are kept for this action? Where?	What agricultural activities is this water is used for?	Done:	Will By:
Water Quality Testing								
Water Quality Testing								

**WHOLESALE SUCCESS**

**Soil Amendments**

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### Soil Amendment Risk Assessment


*Material added to soil to improve nutrient value or condition.*

**What type** of soil amendments?  
 - Biological Origin:  
   - **Animal origin - Treated or untreated**  
   - **Plant origin – Not regulated**  
 - Synthetic (chemical)

**What crops** receive soil amendments?  
 - Fresh produce or agronomic crops

**When applied and incorporated?**  
 - Days to harvest, time of year

**How are they applied? Contamination**  
 - Incorporated, injected, surface applied




Human waste is prohibited for use on produce crops, unless it meets the EPA regulation for biosolids (40 CFR part 50)

**& BUYERS DON'T ACCEPT IT.**

### PR Encourages Compost Use


- Zero day application interval for animal compost treated by a scientifically validated process
- Apply in a manner that minimizes the potential for contact with produce during and after application.



### Composting Options

**Must use a scientifically valid process:**

1. 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
2. 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




### Produce Rule

**Records that need to be kept for treated BSAs**

- Documentation that process controls (for example, time, temperature, and turnings) were achieved.
- It is handled, conveyed and stored in a manner and location to minimize the risk of contamination

**Bought It? Ask supplier for Certificate Of Conformance**




### Non-Manure Based Soil Amendments Of Animal Origin

*blood, bone and feather meal, fish emulsion*

- Are generally processed to eliminate pathogens
- If not, they are untreated BSA
- Ask for Certificate of Compliance






**Fish Emulsion**

- Ask for documentation
- Use water free of detectible E. coli

**OMRI LISTED**  
For Organic Use

**COMPOST (Agricultural) TEA**

- Use treated compost to rule standards
- Use water with no detectible E. coli.
- Prevent Contamination
- Side dressing is considered safer than foliar feeding
- Adding molasses/nutrients? Now it's untreated.



**Agricultural tea:** means a water extract of biological materials (such as stabilized compost, manure, non-fecal animal byproducts, peat moss, preconsumer vegetative waste, table waste, or yard trimmings), excluding any form of human waste, produced to transfer microbial biomass, fine particulate organic matter, and soluble chemical components into an aqueous phase.

Agricultural teas are held for longer than one hour before application.


Agricultural teas are soil amendments for the purposes of this rule.

**Untreated BSA of Animal Origin**

*Considered high risk since it has not been treated to reduce or eliminate pathogens*

**YES! IT'S UNTREATED**

- Raw manure
- 'Aged' or 'stacked' manure
- Untreated manure slurries
- Untreated manure teas
- Agricultural teas with supplemental microbial nutrients
- Any soil amendment mixed with raw manure



**Untreated Application/Incorporation Interval**


**- Must be applied in a manner that does not contact covered produce during or after application."**

**PRODUCE RULE:** There are currently no application intervals required for raw manure.  
FDA is pursuing research to support application intervals for raw manure

**GAP:** Incorporated at least 2 weeks prior to planting and a minimum of 90/120 days prior to harvest.

**NOP:** 90/120 days prior to harvest


**LEAFY GREENS AGREEMENT:** at least one year.



**Soil Management Affects the Survival of Human Illness Pathogens**

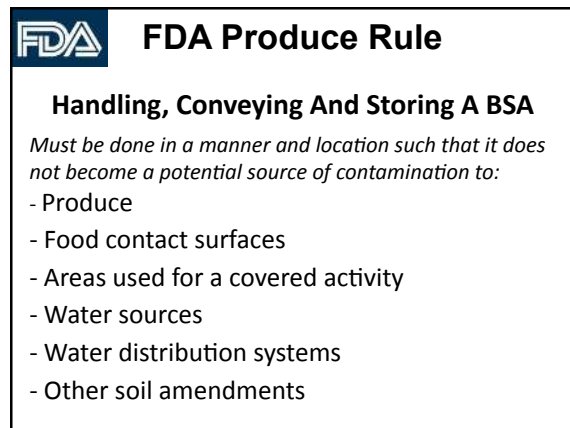
**Microbial diversity helps to reduce pathogen survival**

- Cover crops significantly reduced e-coli in a field with raw dairy manure solids
- E-coli declined faster in organic systems than non-organic



A.D. van Diepeningen, O.J.de Vos, and A.H.van Bruggen 2005





**Pre-Consumer Vegetative Waste**

**Should not be considered zero risk, may contain:**

- Chemical hazards
- Physical hazards
- Biological hazards

**Examples include:**

- Produce food preparation waste
- Out of date vegetables
- Food products removed from their packaging

**RISK ASSESSMENT:** Evaluate the potential for contamination and level of control that you do or don't have.

**Chemical Soil Amendments**

**Usually do not present microbial risks because they:**

- Do not support the growth of human pathogens of
- Are processed in such a way that eliminates pathogens
- Synthetic fertilizers, minerals

**Can pose chemical risk to humans**

- Train worker to apply properly and use personal protective equipment
- Follow all application instructions
- Proper labeling and storage
- Keep a log

### Soil Amendment Log

**Keep Records Of Soil Amendment Applications and Treatments**

The Produce Rule and Biological Soil Amendments of Animal Origin – Action Plan and Record

Biological Soil Amendments Of Animal Origin: Manure, Compost, Compost Tea, Fish Emulsion, Blood And Bone Meal, And Other

Date of Application	What Is Applied Supplier's Name	Treated & Method Or Untreated	Growing Area ID	Application Plan - Crop - Contact with crop	Earliest Allowable Harvest Date	Applicator's Name

### The Produce Rule On Domestic and Wild Animals

**PR:** *“take all measures reasonably necessary to identify and not harvest produce that is likely to be contaminated”*

**Difference In Ease Of Control**




**You've Identified a risk. How will you mitigate it?**

### Domestic Animals

- Avoid direct contact with animals other than working animals.
- Take steps to minimize the likelihood of contamination when in direct contact with working animals
- Take steps to minimize animal feces getting on produce and contact surfaces

- **USE A SOP**
- **TRAIN**
- **MONITOR**
- **CORRECT**





### Working Animals? Develop SOPs: Train animal handlers.

- Is edible portion in the field? How close to harvest?
- To do if animal poops in the field near or on produce
- Practices to complete after handling animal: Handwashing, cleaning and sanitizing tools

**USE A SOP & TRAIN/MONITOR/CORRECT**



**You've Identified a risk. How will you mitigate it?**

### Pet Or Working Domestic Animal?

Working dogs and cats are not prohibited in PR Audits? Pick your battles.

- **SOP**
- **Train**
- **Monitor**
- **Correct**
- **Audits**

Visitor's PETS should be left at home



**Animals, Domestic Or Wild In Produce Fields.**

Although the Produce Rule does not require establishing waiting periods between grazing and harvest, the FDA encourages farmers to voluntarily consider applying such intervals as appropriate for the farm's commodities and practices.



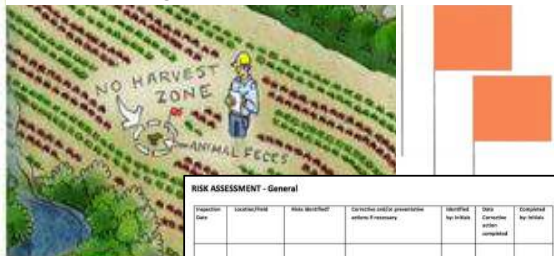
Be aware, that most audit programs do require waiting periods or have specific standards.

**Number of Animals**

High concentrations of wildlife in the growing and harvesting environment increase risk.



**MONITOR: Immediately prior to harvest:** PR requires farms to visually examine the growing area and produce to be harvested, regardless of the harvest method used.



PR does not require documentation on monitoring. Many 3<sup>rd</sup> party audits do require documentation.

**Immediately Prior To Harvest**

- 1. MONITOR** for fecal contamination & signs of animal activity (trampling, rooting, feeding, tracks, broken fence)
- 2. ASSESS** risks and decide if the crop or a portion of the crop can be safely harvested
- 3. CORRECT: Make Decisions About Harvest**
  - Do not harvest any produce that may be contaminated
  - Determine if no-harvest buffer zones around the contamination are sufficient to reduce risk to allow harvest of the uncontaminated produce
  - Suggested no-harvest buffer zones vary from a 0-25 foot radius, depending on the crop, climate, contamination event, and harvest equipment



**CORRECT: Make Decision:** What to do with the contamination

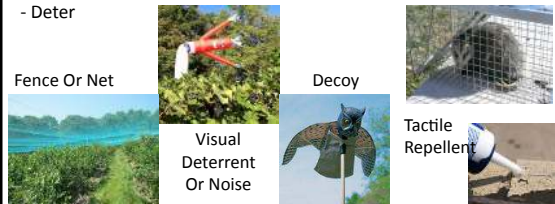
- Remove, leave, bury, or other
- Consider risks that could result from these actions (e.g., cross-contamination of equipment with feces)

**During The Growing Season**

*PR also requires assessments during the growing season.*

If significant evidence of potential contamination by animals is found, take measures reasonably necessary

- Monitor for feces and evidence of intrusion
- Evaluate the risk of fecal contamination on produce
- Deter



## WORKER TRAINING

**Workers must receive training to:**

- Recognize and not harvest contaminated produce
- Inspect and correct problems with harvest containers and equipment or report issues to a supervisor, so they do not become a contamination source

**Workers must:**

- Take measures to not harvest contaminated produce
- Wash hands after handling animal feces or any time hands may be contaminated

**Workers should:**

- Report food safety concerns to a supervisor



## THANK-YOU

• Evaluations

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