GOOD AGRICULTURAL PRACTICES (GAP) & GOOD HANDLING PRACTICES (GHP) FOR PRODUCE FOOD SAFETY

Wholesale Grower Training

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- Delaware Department of Agriculture
- North East Center for Risk Management Education

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Water Melon Harvest and Packing

Cabbage Packing

Sweet Corn Packing

Potato Packing

Hand Packing – Smaller Scale

Field Picking

Farm Market – Retail Sales

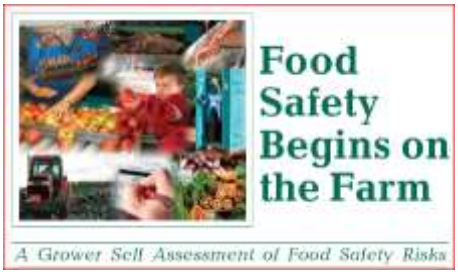
Farm Market - Retail

Farmers Markets

U-Pick

Planning Group

- UD Extension
  - Agriculture Agents
  - FCS Agents
- DSU Extension
- FVGAD
- DDA also cooperating



Training Sessions – March11 and 18

- Classroom Session – Thursday, March 11, 6-9 PM, UD Carvel REC, Georgetown
  - Microbial Risks
  - Good Agricultural Practices Basics
  - Good Handling Practices Basics
  - Record Keeping
  - Preparing for Audits
- Hands On-Session - Thursday, March 18, 6-9 PM, UD Carvel REC, Georgetown
  - Good Agricultural Practices in the Field
  - Good Handling Practices in the Packing House
  - Worker Training
  - Write Your Produce Food Safety Plan
    - Farm
    - Packing House

Self Assessments

- We will provide self assessment materials to all those that attend trainings and any others requesting. Will send materials to all FVGAD members.

	Worker Health & Hygiene	Pts	Yes	No	NA
G-3	Have you documented that potable water is available to all workers?	10			
G-4	Have you documented that your workers receive training on proper sanitation and hygiene practices	15			
G-5	Have you posted understandable signs at each hand washing station that instructs employees to wash their hands before beginning or returning to work?	10			
G-6	Have you documented that you require your employees to wash their hands before beginning or returning to work?	10			
G-7	Have you documented that you require all employees and all visitors to follow proper sanitation and hygiene practices?	10			
G-8	Are employees and visitors following good hygiene/sanitation practices?	15			
G-9	Are all toilets, restrooms, and field sanitation facilities clean and properly supplied with single use towels, toilet paper, and hand soap or antibacterial soap and potable water for hand washing?	15			
G-10	Do you have documentation that shows all toilets, restrooms, and field sanitation facilities are serviced and cleaned on a scheduled basis?	10			
G-11	Is smoking and eating confined to designated areas separate from where product is handled?	10			

Mock Audits

- We will offer to do mock audits on any produce farm in the state during the year to assess current practices and offer recommendations

Manure Applications log

Name of operation:

Please see the food safety plan for overall manure application procedures

Date	Field Applied	Rate	Incorporated (Yes or No)	Supplier	Crop Planted (Type and Date)	Crop Harvested (Date)	Initials

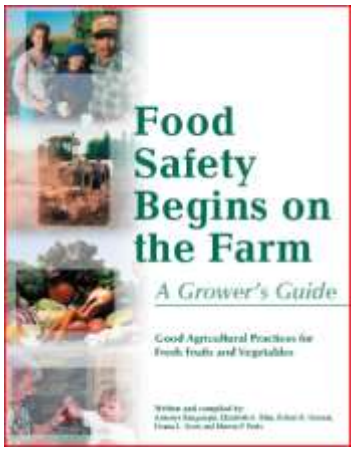
Worker Training

- We are offering to do training on produce safety and worker hygiene to your labor force during the year. In English or Spanish.

Voluntary Certification

- Those that complete this voluntary program will receive certification through the DDA

GAP/GHP Training For Wholesale Produce Growers and Produce Industry Professionals



Good Agricultural Practice for Produce Food Safety – Main Educational Areas

- Importance of Produce Food Safety for Growers
- Produce Contaminants
- Produce of Most Concern
- Good Agricultural Practices (Production)
  - **Water Safety**
  - **Manure, Compost, and Biosolid Use**
  - **Worker Hygiene and Personal Practices**
  - **Field Sanitation**
- Good Handling Practices (Packing and Distribution)
  - **Packing Area, Sales Area, and Transport Sanitation**
  - **Worker Hygiene and Personal Practices**
- Developing and Implementing a Farm Food Safety Plan
- GAP Audits

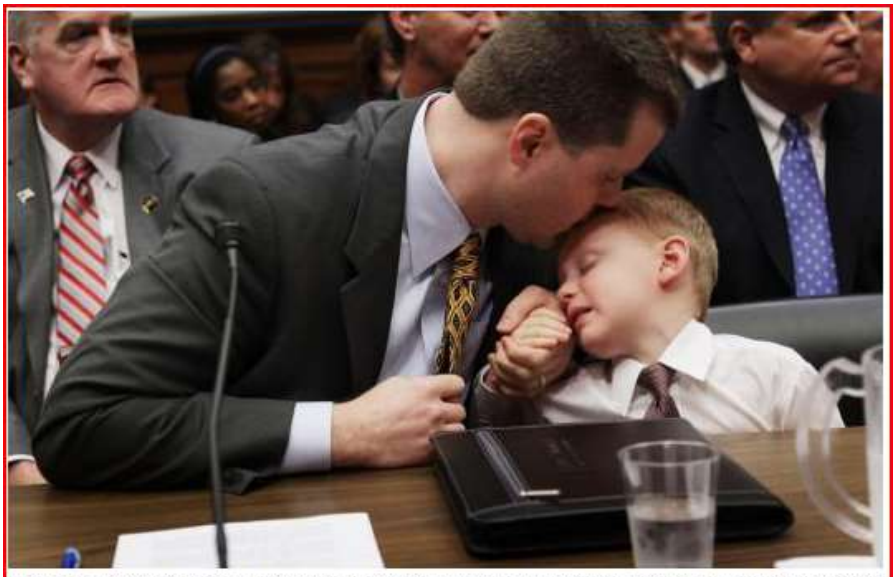
Where the Industry is Going?

- http://www.youtube.com/watch?v=zTdAmTLMHmA

Importance of Produce Food Safety – Human Impacts

- Human impacts of produce associated food borne illnesses
  - Numerous outbreaks
    - Almost every year
  - Thousands affected over last 10 years
  - Several deaths
  - Human face
    - Elderly & young most at risk
      - Grandparents, children
    - Parents afraid
    - Loss of loved ones

"Nobody knows exactly how many [Salmonella] cases result from eating animal products versus produce such as tomatoes or peppers, but salmonella-related illnesses, which can cause vomiting, severe abdominal pain and diarrhea, can be deadly to infants, the elderly and immune-compromised persons."



Peter Hurley comforts his son Jacob at the House Energy and Commerce Committee hearing on the salmonella outbreak. The boy got sick after eating peanut butter tainted by salmonella. (Mark Wilson/Getty Images)

Washington woman sickened by E. coli dies

John K. Wiley of the AP wrote today: **"Wash. woman sickened by E. coli dies"**

An 83-year-old Richland woman sickened by tainted spinach in September has died. Betty Howard died Friday of heart failure in a Richland rehabilitation facility, nearly five months after she was hospitalized with symptoms of sickness caused by eating contaminated spinach, said Bill Marler, a Seattle lawyer.

She had been living independently in her own home until she became ill, her son said.

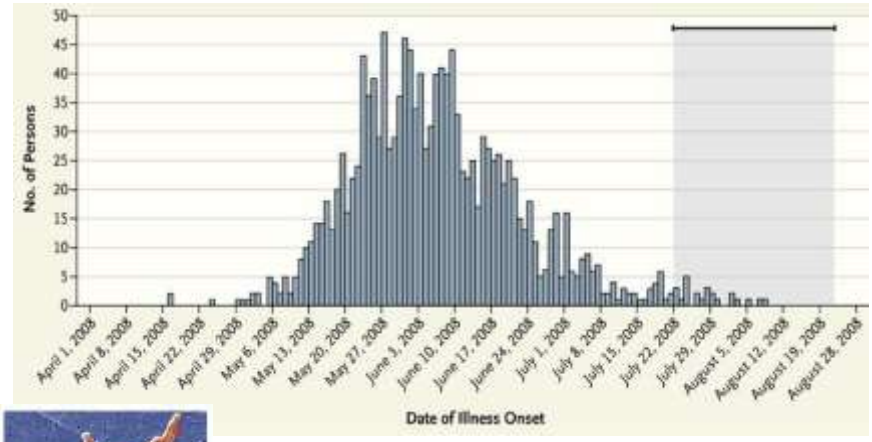
Some of that spinach found its way to the Matthew's dinner table. Michelle got sick, but her daughter, Arabella, almost died. Arabella was just two-years-old when she came down with E. coli. She spent nine days at Primary Children's Hospital, had an operation and was on kidney dialysis.

"To reimburse them for making people ill is just inappropriate," *Mrs. Matthews said.* ***"It's insane that my tax dollars and the tax dollars of my family are going to pay these spinach farmers for their bad spinach for things that were their fault in the first place."***

Tomatoes Suspected But Peppers Confirmed in 2008

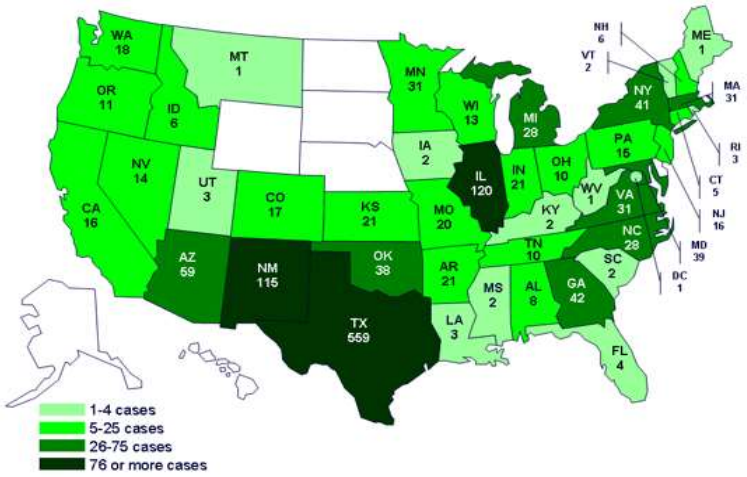
- http://www.youtube.com/watch?v=NyZXbBGbr7Q

Salmonella in Peppers Last Year



The NEW ENGLAND JOURNAL of MEDICINE

Cases Infected with the Outbreak Strain of *Salmonella* Saintpaul



Leafy Greens

- **2002, *E. coli* O157:H7 – pre-washed lettuce, 50+ ill, one with permanent kidney damage**
- **2003, *E. coli* O157:H7 – pre-washed lettuce, 40 ill, dozens hospitalized**
- **2004, *E. coli* O157:H7 – pre-washed spinach, 13 ill and 2 dead**
- **2005, *E. coli* O157:H7 – bagged pre-washed lettuce, 30 ill including children**
- **2006, *E. coli* O157:H7 – bagged pre-washed spinach, 192 ill, 98 hospitalized, 3 deaths**
- **2006, *E. coli* O157:H7 – Taco Bell, possibly lettuce, 71 cases**

2006 Spinach Outbreak

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- 199 persons infected with outbreak strain of E. coli O157:H7 from 26 states.
- 102 (51%) hospitalized.
- 31 (16%) developed hemolytic-uremic syndrome (HUS).
- Four confirmed deaths.
- Outbreak strain isolated from 13 bags in 10 States.
- 11 bags with lot-codes for a single day's production.

"…a number of conditions were observed that may have provided opportunities for the spread of pathogens, if [they] arrived on incoming spinach." CalFERT Report, at 3 (March 2007).

FOOD: the most dangerous product in the United States?

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"In fact, contaminated food products caused more deaths each year than the combined totals of all 15,000 products regulated by the U.S. Consumer Product Safety Commission; these products caused **only** 3,700 deaths in 1996."

See Buzby, *et al.* Product Liability and Microbial Foodborne Illness (2001) ERS Agricultural Economic Report No. 799.

THE COST OF FOODBORNE ILLNESS

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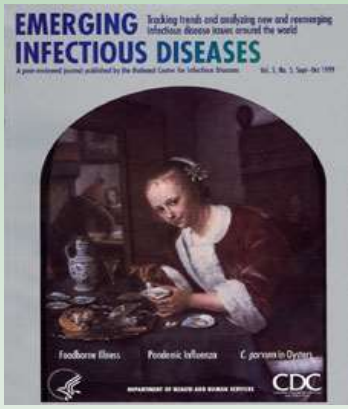
- Estimated 76 million cases of foodborne illness each year
- 325,000 hospitalizations, and over 5,000 deaths.
- *UNKNOWN AGENTS* account for 81% of illnesses and hospitalizations, and at least 64% of total deaths.



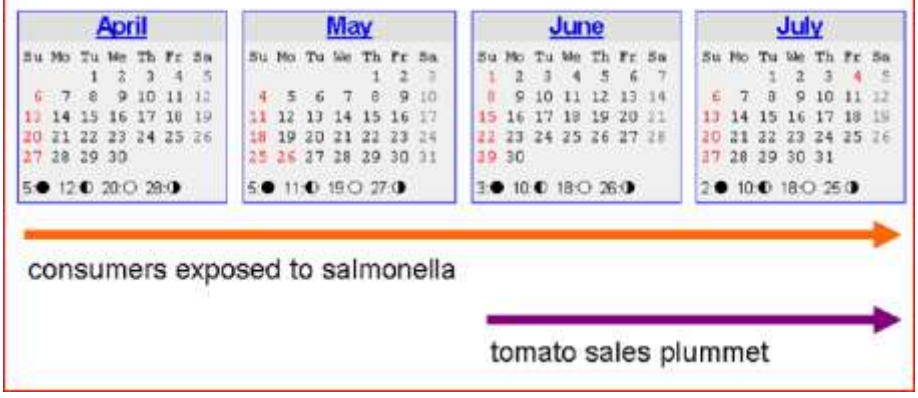
Importance of Produce Food Safety – Industry Impacts

69 Produce Outbreaks 1996-2006
by Commodity

Tomatoes	12	Green onions	3
Lettuce	14	Parsley	2
Romaine lettuce	4	Basil	4
Mixed lettuce	1	Basil or Mesclun	2
Cabbage	1	Green grapes	1
Spinach	2	Mango	2
Cantaloupe	7	Raspberries/berries	6
Melons	2	Snow Peas	1
Honeydew melon	2	Unknown	2
Squash	1		

The False Tomato Salmonella Scare

Taking a Toll on the Health of People and Businesses



Produce Associated Outbreaks Affect Business – Berries

Strawberry industry - $50 million Loss

mistakenly indicated as the source of outbreak

Odwalla shareholder value dropped approximately 41% ($12.4 million) in six months after outbreak

An Example: Fresh Spinach

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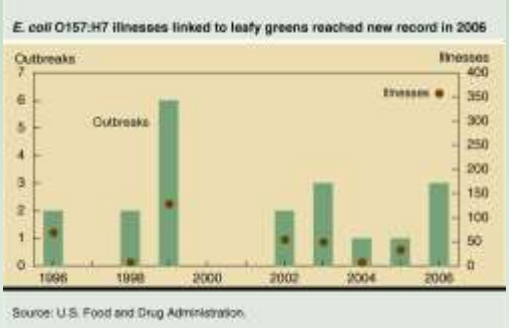
"With the fall 2006 outbreak, all spinach growers suffered from decreased consumer demand for their product, even though only one grower's spinach was contaminated."

See L. Calvin, *Outbreak Linked to Spinach Forces Reassessment of Food Safety Practices*, Amber Waves, June 2007,



2006 Spinach Outbreak Economic Effects on California Agriculture

- *E. coli* 0157:H7 linked to spinach produced in California. Shipping was halted by US FDA in early September, 2006.
- California industry lost $100 million.
- Lawsuits will likely magnify these losses.
- Fruit and vegetable shippers of other fresh commodities were affected in the USA.
- Many chain-store buyers now require farmers to pass third-party GAPs audits.

Economic Costs to Growers:

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~ On November 14, 2003, price of green onions peaked at $18.30 per box.

~ On November 20, FDA announced hepatitis-contaminated onions came from Mexico.

~ Next day, price of green onions declined to $12.43.

~ One week later, price was at $7.23 per box.*

And thus the mad-scramble for GAP-audits began.

GAPs costs for fresh strawberries

	Small u-picks		Florida		California	
Average farm size:	*4.8 acres*		*30 acres*		*47 acres*	
Season length:	1 month		5 months		11 months	
GAP	Total cost	Cost per acre	Total cost	Cost per acre	Total cost	Cost per acre
1. Toilet and handwashing facilities	$220.00	$46.00	$3,375.00	$113.00	$5,288.00 *	$113.00
2. Hygiene Training	60.00	12.00	691.00	23.00	1,056.00	22.00
3. Packing shed or cooling pad sanitation and single use trays for u-picks	402.00	83.00	534.00	18.00	1,138.00	24.00
4. Monitoring irrigation water	32.00	7.00	149.00	5.00	149.00	3.00
5. Developing a crisis management plan	670.00	140.00	750.00	25.00	750.00	16.00
Total	**$1,384.00**	**$288.00**	**$5,499.00**	**$184.00**	**$3,093.00**	**$66.00**

* Dropped from total since this cost is already included in the cost of production estimates from California

Importance of Produce Food Safety Legal Issues

- Legal issues
  - Criminal
    - Intentional contamination
  - Civil – Product Liability for Unintentional Contamination
    - Strict liability – product is unsafe
    - Negligence
    - Breach of Warranty
      - Expressed
      - Implied
  - Awards
    - Compensatory
    - Punitive

Lawsuits – Could They Reach You?

- http://www.youtube.com/watch?v=csZgx7GdyYI

Civil Litigation - How it works
(by Bill Marler)

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- Strict Liability - it is your fault - period
- The only defense is prevention
- Wishful thinking does not help
- If you manufacture a product that causes someone to be sick you are going to pay

House: Food Safety Enhancement Act (HR 2749)

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- Requires preventive food safety plans
- Risk-based inspections
- $500 registration fee per facility
- Pilot traceability studies, followed by mandatory programs
- Fruit/vegetable risk-based production standards; update GAPs
- Mandatory recall authority for FDA
- Broad records access
- New import requirements

Senate: Food Safety Modernization Act (S. 510)

44

- Expanded records access
- Preventive food safety plans
- Commodity-specific product standards
- Sanitary transportation
- Pilot traceability programs, then mandatory programs
- Mandatory recall authority for FDA
- Additional requirements for imports
- Accreditation of labs, 3rd party auditors

Federal Food Safety Efforts

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- GAPs: FDA to revise
- National Leafy Greens Marketing Agreement: USDA considering
- Reportable food registry: Now the law
- Traceability: FDA/USDA pursuing
- Implementation of food safety legislation
  - Senate must pass bill
  - Conference committee must marry House and Senate versions
  - President signs
  - Agencies go to work

FDA Seeking Input

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- By the end of 2010, FDA will issue a proposed rule to establish safety standards for the production and packing of fresh produce.
- Goal- reduce the risk of illness associated with fresh produce.
- Seeking input before rule is developed
- They want expertise and on-the-ground knowledge of those who grow, harvest and pack fresh produce.
- New Federal docket where you can leave your comments

FDA Seeking Input

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U.S. Food and Drug Administration
Protecting and Promoting Your Health

- The easiest way to get to the docket is to enter the docket number.
- On the Regulations.gov home page, enter the following in the "Keyword" field: FDA-2010-N-0085
- This will take you directly to the docket, "Preventive Controls for Fresh Produce: Request for Comments"
- In the far right of the screen under Actions, click on "Submit a Comment" A page will come up asking for some information about you or your organization.
- You can then type your comment directly into the field provided and/or you can attach any related documents to your comment.
- Press "Submit".
- You will be able to view your comment and comments others have submitted.

Product Liability – Are You Covered?

- Check your contracts
  - Who handles liability?
  - Is liability passed on?
- Check any sales agreements
  - Is liability passed on?
- Check any distributor or retailer policies in regards to suppliers?
- Check insurance policies

Importance of Produce Food Safety - Public Perception

- Consumers perspective
  - Importance of food safety to consumers
  - Consumers perception of food safety and produce growers

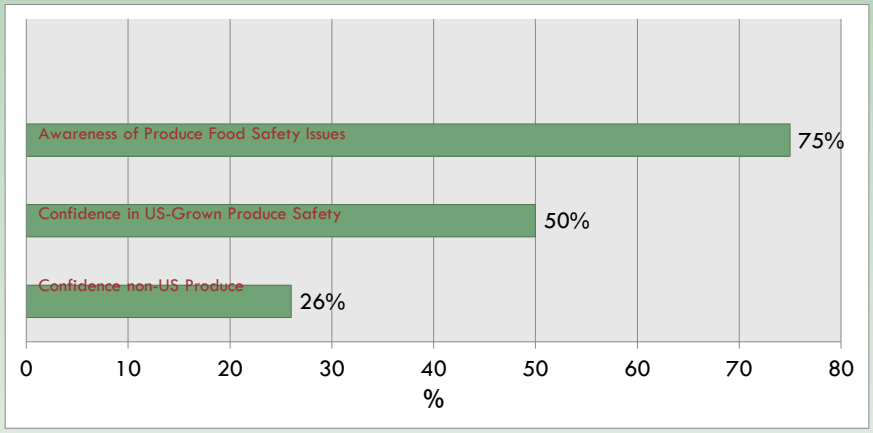
Consumer Concerns

What are your greatest concerns?

US economy > **food safety** > Iraq war > global warming > immigration

- Center for Food Integrity 2008

Consumer Confidence?



Consumer Confidence About Food Safety Programs

Educational Area II. Produce Contaminants

- Provide information on the different contaminants of produce
- Approach
  - Slides
  - Handouts
  - Show microbial cultures from produce

Who is the enemy?

Plant pathogen – a microorganism known to cause diseases or lesions in plant tissues.

Human or animal pathogen – a microorganism known to cause illness to humans or animals.

Why is food safety such an issue in 2009?

- Emerging pathogens
- More susceptible population
- Complacency about hygiene
- More global trade
- More fast paced society
- Improved detection

Pathogens associated with fresh produce

Between 1990 and 1998 - 55 outbreaks were tied to fresh fruits/vegetables

Between 1999 and 2002 - 97 outbreaks were tied to fresh fruits/vegetables

Contamination of Surface of Produce

- Soil
- Water
- Manure
- Sewage
- Air
- Humans
- Animals

Fresh Produce Associated with Foodborne Outbreaks

- Apple cider
- Alfalfa sprouts
- Radish sprouts
- Lettuce
- Melons
- Cabbage

- Raspberries
- Basil
- Strawberries
- Spinach
- Tomatoes
- Peppers

Recalls and Outbreaks Associated with Produce

- ***E. coli O157:H7*** - Iceberg lettuce, spinach, radish, sprouts, apple cider/juice
- ***Salmonella spp.*** - Tomatoes, bean sprouts, sliced watermelon, sliced cantaloupe, coleslaw & onions, alfalfa sprouts, root vegetables, juice
- ***L. monocytogenes*** - Cabbage
- ***Cryptosporidium*** - Apple cider
- ***Cyclospora*** – Raspberries
- **Hepatitis A** virus - Iceberg lettuce, raspberries, strawberries

"I can always wash the produce before I eat it or sell it"

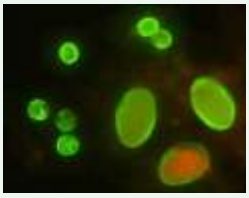
- **Preliminary studies indicate that once the fruit is contaminated the pathogens are difficult to remove**
- **Prevent contamination**
- **Control multiplication**

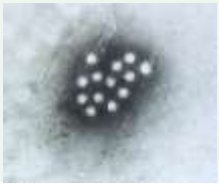
Where can pathogens be found?

- In soils…
  - *Listeria monocytogenes*
  - *Bacillus cereus*
  - *Clostridium botulinum*
  - *Clostridium perfringens*
- In human and animal gut…
  - *Salmonella species*
  - *E. coli O157:H7*
  - *Shigella species*
  - *Campylobacter jejuni*
  - Viruses and parasites

Microorganisms That Cause Foodborne Illness

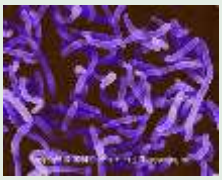
- **Bacteria**
  - Single-celled organisms that live independently.
- **Parasites**
  - Intestinal worms or microscopic protozoa that live in a host animal or human.
- **Viruses**
  - Small particles that can only replicate in a host.





Pathogens of Most Concern on Fresh Produce

- Bacteria
  - *Salmonella*
  - *Escherichia coli*
  - *Yersinia entercolitica*
  - *Shigella*
  - *Campylobacter*
  - *Staphylococcus aureus*
  - *Bacillus cereus*
  - *Clostridium species*
  - *Vibrio species*
- Parasites/Protozoa (*Giardia, Entamoeba, Toxoplasma, Sarccystis, Isopora, Cryptosporidium, Eimeria, Cyclospora*)
- Viruses (Hepatitis A, Norwalk)



Vibrio species

Bacteria

VEGETATIVE

- **Active cells**
- **Food eating**
- **Waste eliminating**
- **Multiply**

SPORES

- **Inactive cells**
- **Survive adverse conditions**
- **Don't multiply**

A Little Microbiology

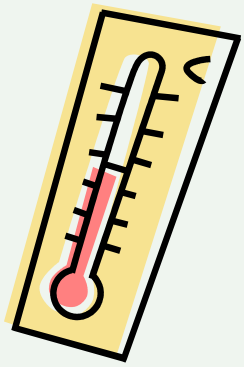
- In the right environment, bacteria replicate ~ every 20 minutes.
- A head of lettuce has 1 bacteria on it.
- How long will it take to multiply to 100 cells?

140 minutes / 2 hrs & 20 min

An infective dose of *E.coli* O157: H7 could be as few as 10 cells.

Control of Bacterial Growth

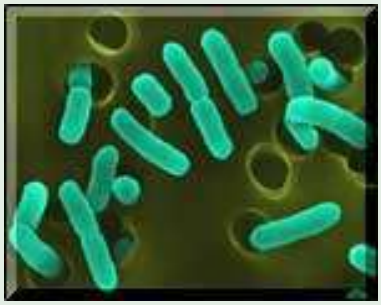
- **Food**
- **Acidity**
- **Temperature**
- **Time**
- **Oxygen**
- **Moisture**



FATTOM

E. coli O157:H7

- Naturally exists in animals without symptoms
  - cattle, deer, sheep, dogs, cats, birds, other animals
- Can contaminate/grow on fresh produce:
  - fresh cut cantaloupe
  - watermelon cubes
  - shredded lettuce
  - spinach
  - sliced cucumbers



Salmonella species

- Isolated from many types of raw fruits and vegetables – not a frequent event.
- Outbreaks linked to:
  - tomatoes
  - bean sprouts
  - melons
  - unpasteurized orange juice and
  - apple juice

Parasites

- Considerably larger than bacteria
- Organisms that live in another organism
- Only able to grow in host, but may be passed from one host to another by a non-host source
- Relative newcomers to the food safety scene
- May be waterborne
- Little known about ways to control

Viruses

- Smaller than bacteria
- More heat resistant than bacteria
- Unable to reproduce outside living cell
- Are host specific
- Enter the body though very specific sites
- Require only a few viral particles for illness
- Foodborne viral illness ONLY occurs when food is contaminated with human feces or urine

One Virus of Concern: Hepatitis A

- An infected person can spread the disease to others well before symptoms are present.

- Transmitted by person-to-person contact through fecal contamination, but can also be spread through food and water.

Viruses

Good handwashing is essential to eliminating foodborne illness due to viruses.

Produce of Most Concern

- Food safety risks associated with different types of produce
  - Raw = high, Cooked or processed = low
  - Soil contact = High, no soil contact = low
  - Touched a lot = high, limited handling = low
  - Consumed whole = high, Peeled/shelled = low
  - Overhead irrigated = high, drip irrigated = low

Why Are These Higher Risk Produce Types?

1998-2006 Produce Outbreaks

Five commodity groups account for > 75% of produce related outbreaks

Commodity	% Produce Outbreaks
Lettuce/leafy greens	30 %
Tomatoes	17 %
Cantaloupe	13%
Herbs (basil, parsley)	11%
Green onions	5%
Total % of top 5 commodities	75%

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

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High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

High Risk or Low Risk?

Leafy Greens, a Particular Risk?

Science News Share Blog Cite

Foodborne Outbreaks From Leafy Greens On Rise

ScienceDaily (Mar. 19, 2008) — Over the past 35 years the proportion of foodborne outbreaks linked to the consumption of leafy green vegetables has substantially increased and that increase can not be completely attributed to Americans eating more salads according to research presented March 17 at the 2008 International Conference on Emerging Infectious Diseases in Atlanta, Georgia.

"Consumption of leafy greens has increased over the years, but it does not completely explain the increase in the proportion of foodborne outbreaks due to leafy green consumption," says Michael Lynch of the Centers for Disease Control and Prevention (CDC), a researcher on the study.

Prompted by the high profile E. coli outbreaks associated with spinach and lettuce in 2006, Lynch and his colleagues decided to investigate the incidence of foodborne disease outbreaks associated with leafy greens in the past. Using data from the CDC foodborne disease outbreak surveillance system they analyzed

See also:

Health & Medicine
- Nutrition
- Healthy Aging
- Alzheimer's Research

Plants & Animals
- Food
- Agriculture and Food
- Bacteria

Reference
- Leaf vegetable
- Salmonella infection
- Foodborne illness
- Botulism

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Related Stories

Good Agricultural Practices

- What is a Good Agricultural Practice
- Key areas in applying Good Agricultural Practices
  - Water safety
  - Manure and biosolids
  - Worker hygiene and personal practices
  - Field sanitation

Tracebacks have identified four areas where outbreaks have originated

- Water
- Workers
- Wildlife
- Waste

We call these "The Four W's"

Standards are being developed to control each of these sources

Good Agricultural Practices What are GAPs/GHPs?

Good Agricultural Practices (GAPs) and ***Good Handling Practices (GHPs)***are sanitary procedures used during crop production, harvesting, packing and shipping to prevent or minimize produce contamination with human pathogens.

Good Agricultural Practices
Water Safety

- Microbial contamination
  - Natural/wildlife
  - Farm animals/manure
  - Sewage/human
- Chemical contamination
  - Pesticides
  - Other chemicals
- How water contaminates produce
  - Irrigation
  - Wash water
  - Spray water
- Water Testing
- Water Treatment

Terminology

- **Potable** - (clean) water – free of all **objectionable** material, including pathogens, tastes, odors, colors, toxins, radioactive material, organisms, oils, gases, etc.
- **Fresh** – non-salt or sea water
- **Pollution** – anything that makes it Non-Potable
- **Sewage** – the community waste or garbage that mother nature and we dump onto sewers or land

Typical Water Quality Standards

- Drinking Water
  - No coliforms contamination acceptable
- Recreational water
  - 200 fecal coliforms /100 ml
- Fish and wildlife habitat
  - 5000 fecal coliforms/100 ml

"Fresh Tomato Guidelines" Specified Standards for Water

Standards specified for irrigation water

US beach swimming requirements

123 cfu/100 ml E. coli

Standards specified for water contacting crop

US drinking water requirements

Zero cfu/100 ml fecal coliforms or E. Coli

Bacteria Found In Surface Water

Bacteria	Disease/ infection	Symptoms
Aeromonas	Enteritis	Very thin, blood- and mucus-containing diarrhea
Campylobacter jejuni	Campilobacteriose	Flue, diarrhea, head- and stomachaches, fever, cramps and nausea
Escherichia coli	Urinary tract infections, neonatal meningitis, intestinal disease	Watery diarrhea, headaches, fever, homiletic uremia, kidney damage
Plesiomonas shigelloides	Plesiomonas-infection	Nausea, stomachaches and watery diarrhea, sometimes fevers, headaches and vomiting
Typhus	Typhoid fever	Fevers
Salmonella	Salmonellosis	Sickness, intestinal cramps, vomiting, diarrhea and sometimes light fevers
Streptococcus	(Gastro) intestinal disease	Stomach aches, diarrhea and fevers, sometimes vomiting
Vibrio El Tor *(freshwater)*	(Light form of) Cholera	Heavy diarrhea

Protozoa Found in Surface Water

Microrganism	Disease	Symptoms
Amoeba	Amoebic dysentery	Severe diarrhea, headache, abdominal pain, chills, fever; if not treated can cause liver abscess, bowel perforation and death
Cryptospor-idium parvum	Cryptosporidiosis	Feeling of sickness, watery diarrhea, vomiting, lack of appetite
Giardia	Giardiasis	Diarrhea, abdominal cramps, flatulence, belching, fatigue
Toxoplasm gondii	Toxoplasmosis	Flu, swelling of lymph glands With pregnant women subtle abortion and brain infections

Agricultural Water

- **Identify source** and distribution of water used
- Be aware of current and **historical use of land**
- Review existing practices and conditions to identify **potential sources of contamination.**
- Maintain wells in **good working condition**
- How are you applying the water? **Minimize contact of edible portion of fresh produce with contaminated irrigation water.**

Characteristics of well water

- Can become contaminated by floods or heavy rains;
- Location too close to cesspools, septic tanks, agricultural sites, manure storage areas, or drainage fields may result in contamination

- Cracked or improperly sealed well casings or liners may cause contamination
- Requires annual monitoring
- Laboratory analysis for indicator microbes (eg. coliforms)

Characteristics of surface water

- Ponds, lakes, rivers, streams, ditches
- Highest potential for contamination
- Safety can vary greatly over short periods of time

Bacterial-Indicator Organisms Common Groups

- Coliforms
  - Total coliforms
  - Fecal coliforms
  - *Escherichia coli*
- Streptococci
  - *fecal streptococci*
  - *enterococci*
- Spore Formers
  - *Clostridium perfringens*

Indicator Organisms

- **General coliforms** – indicate water in contact with plant or animal life (universally present)

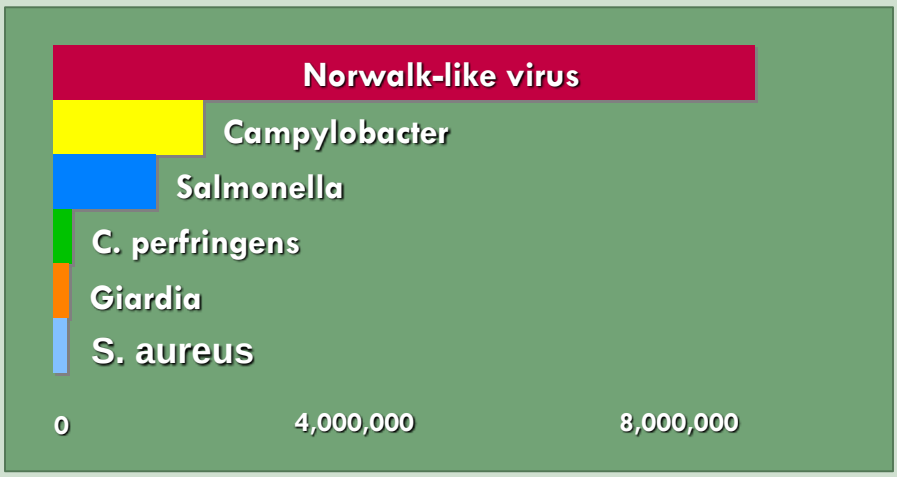
- **Fecal coliforms** – mammal or bird feces in water

- **Enterococcus bacteria** (type of fecal streptococci)– feces from warm blooded animals in water

Viral Sources of Waterborne Disease

- Hepatitis A: inflammation and necrosis of liver
- Norwalk-type virus: acute gastroenteritis
- Rotaviruses: acute gastroenteritis, especially in children
- Enteroviruses: many types affect intestines and upper respiratory tract
- Reoviruses: infects intestines and upper respiratory tract

New and Emerging Diseases: The most prevalent foodborne illness was only recently identified



UPDATE ON WATER SAMPLING 2008

Wesley Kline
Agricultural Agent
Rutgers Cooperative Extension of Cumberland County

- ***E. coli* 0157:H7 viewed primarily as a water-borne pathogen.**
  - **Many outbreaks associated with recreational water.**
- ***Salmonella, Giardia* and *Cyclospora* outbreaks on produce caused by contaminated water.**

Water Testing

- Water sources must be tested
  - **Irrigation, spray** and wash water
  - Surface water is not acceptable in the packing shed
- Schedule for testing
  - Municipal water – acquire test results annually
  - **Well water – Twice a year**
    - **Beginning of season and at peak use**
  - **Surface water – Three times a year**
    - **Beginning of season, peak use and near harvest**

- Two 100 ml water samples were collected on a weekly basis from July 8 to August 18.
- Five locations
  1. 1. River
  - 2. Spring fed pond
  - 3. Dam in river
  - 4. Spring fed pond
  - 5. Pond from a runoff area

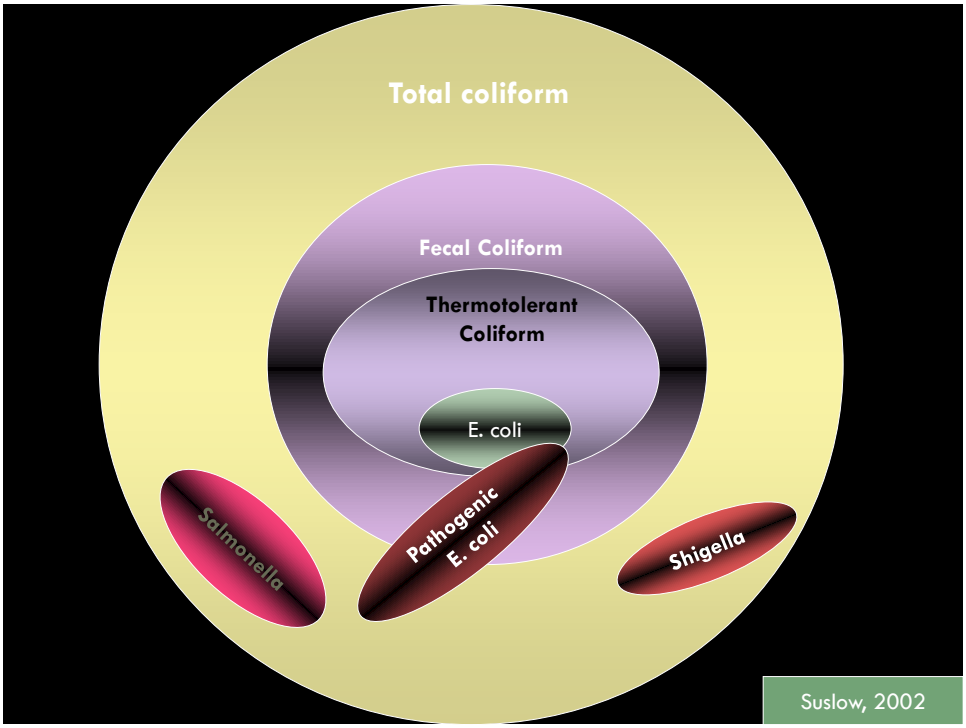
Standards For Irrigation Water

- Fecal Coliform - 200 CFU/100 ml
- E. coli
  - Geometric mean of 5 samples - <126 CFU/100 ml with no sample over 235 CFU/100ml
  - Non foliar contact - <576 CFU/100 ml

Date	River	Spring Fed Pond	Dam in River	Spring Fed Pond	Pond From Runoff
7/21					
E. Coli	0	0	0	0	0
Fecal	70	5	110	0	0
7/28					
E. Coli	30	0	15	0	65
Fecal	730	95	75	0	1,850
8/4					
E. Coli	CG	0	25	0	>200
Fecal	125	0	10	215	305
8/11					
E. Coli	>1,000	390	1,000	0	190
Fecal	>1,000	380	1,000	20	190
8/18					
E. Coli	90	5	5	0	420
Fecal	115	0	5	0	410

Conclusion

- Only one location (spring fed pond - 4) had no pathogen levels above the thresholds used in this study.
- The runoff location had levels above threshold for all dates except the first sampling date.
- The fourth (August 11) sampling date had thresholds above thresholds for all locations except the spring fed pond.
  - This was the result of heavy rains the day prior to sampling.
- Additional sampling over time and locations is required to obtain reliable data.



What Can Growers Do?

- Switch to well water
- Drip irrigate
- Try not to use surface irrigation for as long as possible after heavy rain
- Spring fed ponds with no runoff into the pond is the most acceptable surface water source
- Growers should be sampling for both fecal coliform and E. coli to develop baseline data for their water sources.

Technology Comparison

Technology	Pros	Cons
UV	Good disinfectant	No residual disinfection
	No added Chemicals	Need relatively clear water (filtration)
		Field-adaptability?
Ozone	Good disinfectant	Off-gases if not under pressure
	"people-friendly"	Subject to organic matter (indiscriminate). Need to measure ORP
		Field Adaptability?
Chlorine	Good disinfectant	Can be hard on system parts
	Cheap	Some forms have limited shelf life
Cu Ionization	No "chemicals" per se	Unknown broad-spectrum disinfection capabilities

Chlorination of Water

- Shock Chlorination (50-100 ppm, contact of at least 6 hours)
- Continuous Chlorination – for recurring bacterial contamination problems – a measurable amount of **free residual chlorine**

The most commonly used sanitizer!

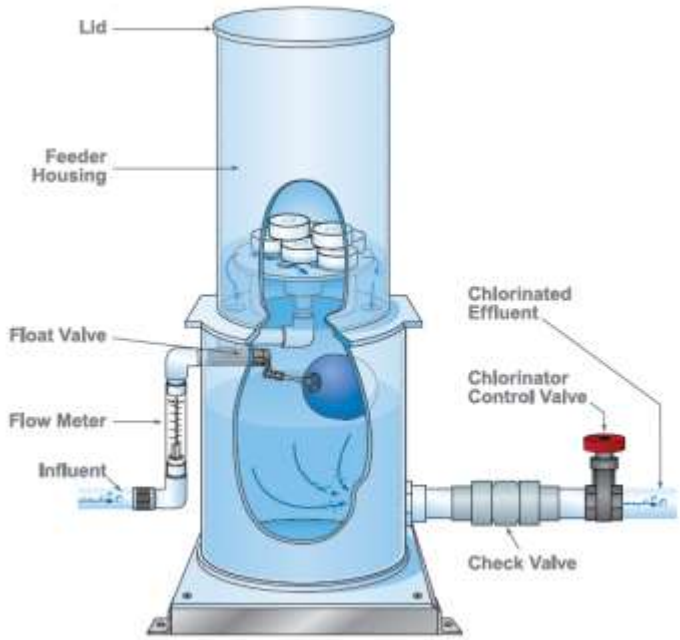
Material and injector costs, Chlorine

Cl_2 $0.27/acre-inch per ppm

Sodium Hypochlorite $0.48/acre-inch per ppm

Calcium Hypochlorite $0.56/acre-inch per ppm

Each Needs an Injection System - $500-$4,000

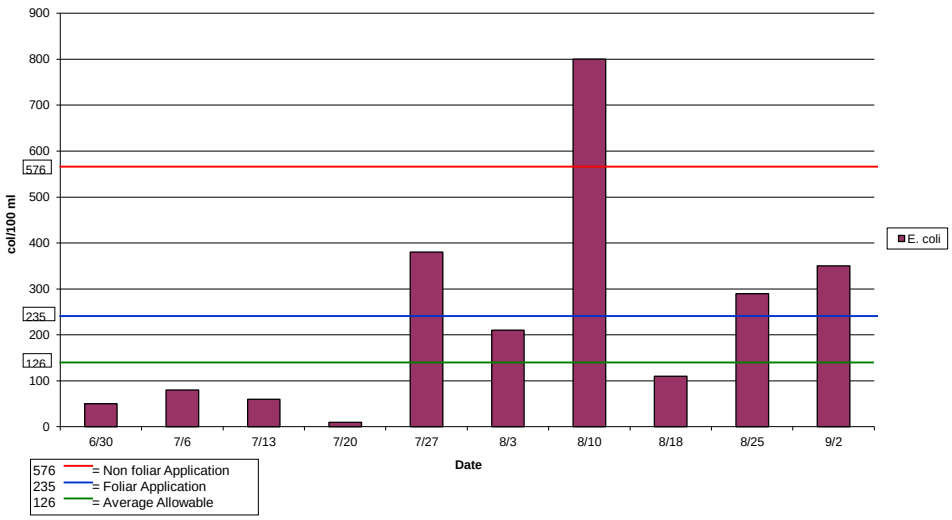


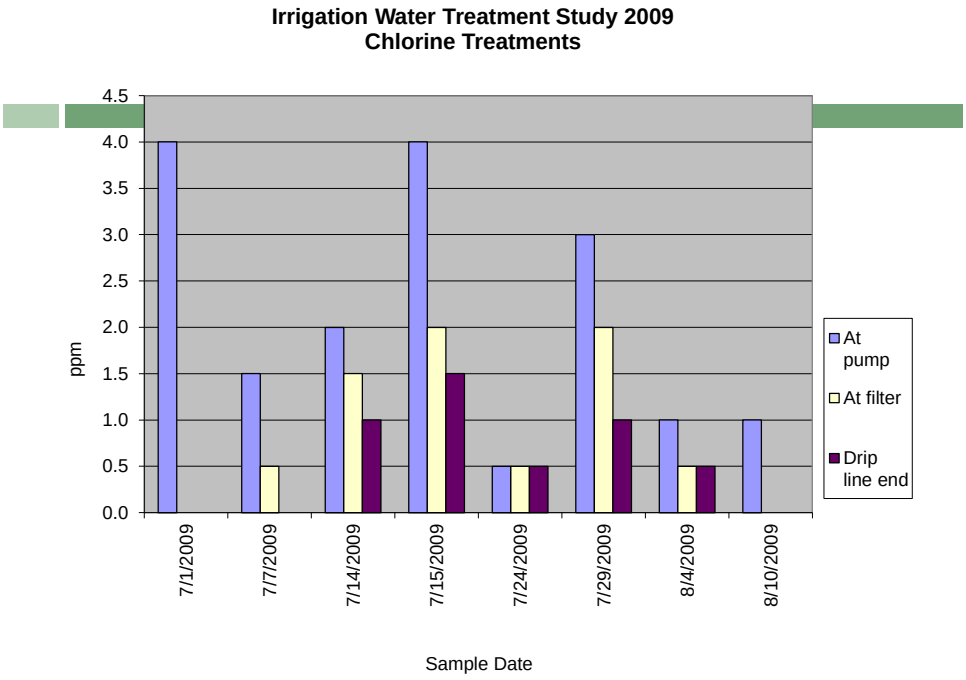
Monitoring Oxidizing Disinfectants

Chlorine test strips for "free chlorine"

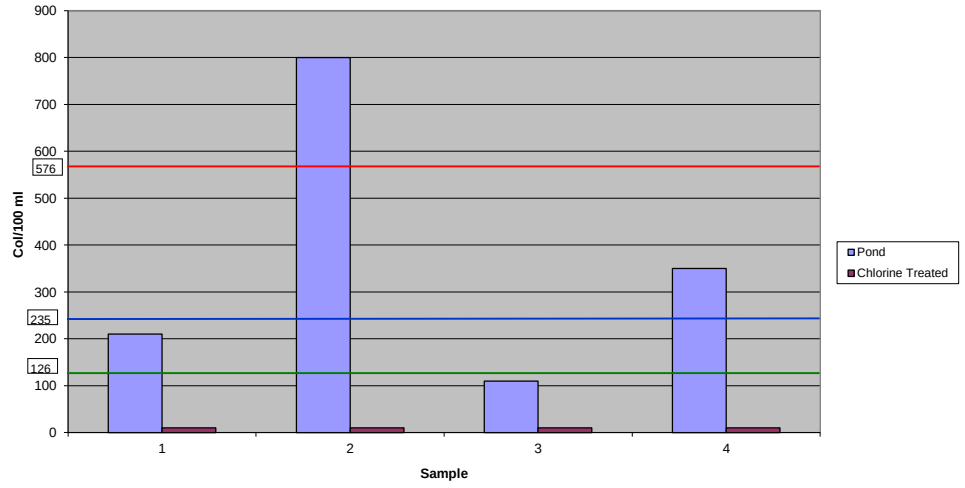
Oxidation-Reduction Potential (ORP) probes – must calibrate

E. Coli Levels in Irrigation Pond





E. Coli Levels in Irrigation Water



Chlorinator Summary

- Easy to install - no electrical required
- Easy to use - chlorinates when the pump runs
- Simple "swimming pool" test kit
- Easy to maintain low concentration
- Chlorinator ~ $1,800
- Operating cost:
  ~$0.10 per 1000 gallons

Conclusion

- E. coli levels are above acceptable levels for irrigation under certain environmental conditions
- Chlorine (calcium hypochlorite) will reduce E. coli to acceptable levels for irrigation
- The system tested is grower friendly

Bottom Line

- Test your water as required and anytime you suspect a problem
- Work with your Health Department
- Seek advise on interpreting the results – what do they mean?
- If you question the results, resample and retest

Chemical Contamination

- Pesticide spills
  - Irrigation water contamination
- Disconnect between fill water and sprayers
- Pesticide storage away from fields
- No off label applications

Good Agricultural Practices – Manure, Compost, and Biosolid Use and Contamination of Produce

- Proper use of manures, composts, and biosolids with produce production
  - Waiting periods and applications
  - Application methods
  - Storage and cross contamination
  - Proper composting
- Avoid fecal contamination of fields
  - Domestic and wild animals
  - Humans

Proper Manure Use

- Raw manure should be applied and incorporated into the soil at least **120 days** prior to harvest of a produce crop
- Raw manure may be applied to a field the year perennial fruits are planted but not during years when harvested
- Properly composted manure can be applied at any time
- Time between manure application and harvest is always maximized.

Manure Storage

- Manure must be stored where it will not contaminate growing areas.
- Temporary field storage areas must not contaminate growing areas

Composting Manure

- Compost must achieve a high temperature (131°to 160°F) for at least 5 days to eliminate pathogens
- Compost must be stored in a way to minimize risk of leaching, runoff, wind movement and possible recontamination by wild animals or compost is immediately applied to fields.

Case Study – Spinach

E. coli O157:H7 Spinach Outbreak
Fall 2006

- 205 confirmed illnesses
- 3 deaths
- A definite determination of how the contamination originated could not be made
- Environmental risk factors and the areas that were most likely involved in the outbreak were identified

Case Study - Spinach

San Benito County, California

Case Study - Spinach

Paicines Ranch

- The ranch was primarily utilized as grass-fed beef operation with only a small portion of land leased for ready-to-eat crop production
- Evidence of wild pigs in and around the cattle pastures, along adjacent river, near irrigation wells, and in the row crop growing regions
- The strain was found in river water, cattle feces, and wild pig feces

Case Study - Spinach

Paicines Ranch

- 2,000 head of cattle on 8,000 acres of grassy pastures on the hills, along with patches of dense vegetation surrounding the San Benito River.
- Cattle and wildlife have access to the river at multiple points on the ranch.

Case Study = Spinach

Pig Tracks on Dirt Road, Heading into Mission Organics Lot 5, Paicines Ranch

Animal and Pest Control

Courtesy of Trevor Suslow

Adjacent Use of Land
"Are there animals close by?"

Keep domestic animals out of growing areas

- Dogs, cats, goats, sheep, cows, horses, and poultry should be kept away from fresh produce fields, vineyards, and orchards especially close to harvest time.

Keep Animals Out!

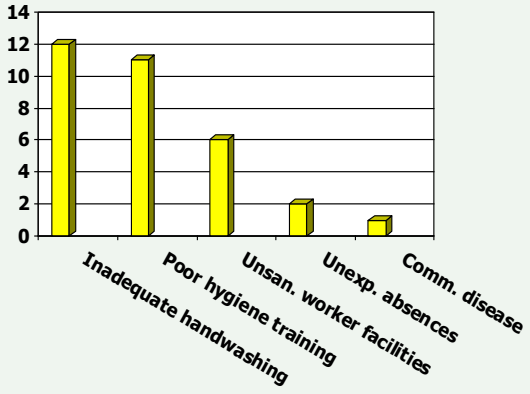
Good Agricultural Practices – Worker hygiene and personal practices in the field

- Worker hygiene in the field
  - Hand washing
  - Use of toilets and port-a-potties
    - Fecal contamination
  - Cuts
  - Reporting illnesses

Personal Hygiene on the Farm

Worker Health and Hygiene

- **In 2003, at 21 of 24 farms surveyed, worker health and hygiene were the major hazards to produce safety.**
- **Inadequate hand washing was the most frequent hazard noted.**
- **Inadequate hygiene training ranked #2, followed by unsanitary worker facilities.**



J. Guzewich, Food Protection Mtg. 2003

Proper hand-washing is the best method of reducing contamination

The #1 source of food borne illness is unsanitary worker conditions

Courtesy Dr. Jim Rushing

Manure = Fecal Matter = Microbes

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

Field Worker's Hands – a major source of human pathogens

Methods of Infecting Produce

- Fecal material
- Open lesions, boils, sores, infected wounds
- Personal illness

Staph infection

Why wear gloves?

Bandages

- Bandage on finger, no glove

- Cover bandage with waterproof glove

Handwashing Key to Prevention

- Handwashing cleans off dirt
- Must have warm water
- Good lathering soap
- Enough water to rinse properly
- Reduces pathogens on the hands
- Single use paper towels to dry hands
- Reduces GI illness ~ 80%

Let's Practice

Remember: Proper Facilities Reduce Risk

Easy Access

Your Role in the Operation Is Important

- When do you need to wash your hands?
- What can you do to reduce pathogens on your equipment/tools/ harvest boxes/sacks?
- What can you do to protect your clothing and shoes/boots from pathogens?
- What can you do to reduce the reproduction of pathogens?

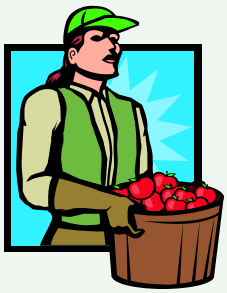
Promote Cleanliness at U Pick

- Invite customers to wash their hands prior to entering the fields.
- Provide clean and convenient restrooms for customer use.
- Supply soap, clean water, single-use towels for h


POR FAVOR, LÁVESE LAS MANOS FRECUENTEMENTE
ANTES Y DESPUÉS
DE USAR EL BAÑO, MANIPULAR FRUTAS Y VERDURAS, COMER, BEBER, O FUMAR
BEFORE AND AFTER
USING THE TOILET, HANDLING FRUITS AND VEGETABLES, EATING, DRINKING, OR SMOKING
PLEASE WASH YOUR HANDS OFTEN!


POR FAVOR, DEPOSITE EL PAPEL HIGIÉNICO USADO DENTRO DEL INODORO
EL PAPEL HIGIÉNICO NO ATORA LOS INODOROS
TOILET PAPER WILL NOT OBSTRUCT TOILETS
PLEASE PUT USED TOILET PAPER IN THE TOILET

Keeping Food Safe
It's in Your Hands



- Clean clothing and gloves
- Showering, bathing everyday
- Wearing hairnet or hat
- Protective clothing if applicable should be clean – aprons, gloves, etc.
- Tools, knives, cutters cleaned each day
- Baskets and bins should be cleaned every day
- Keep hands and equipment clean
- Enforce proper use of facilities

Train, Train, Train!

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

Good Agricultural Practices
Field Sanitation

- Proper field sanitation
  - Harvest procedures
    - Minimize soil contamination
    - Minimize hand contamination
  - Harvest tool/equipment sanitation
  - Harvest container sanitation
  - Transport equipment sanitation
  - Cull piles

Harvest Considerations 1

- Clean & sanitize the following prior to use and during harvest on a schedule
  - Harvest containers
    - Baskets, totes, bins, crates
  - Harvest tools
    - Knives, clippers
  - Harvest equipment/implements
    - Wagons, trucks
    - Harvest aids
    - Mechanical harvesters
  - Temporary harvest storage facilities
- Use harvest equipment appropriately to prevent contamination
  - Leaks – fuel, oil, grease
  - Produce damage
  - Glass, metal, other contaminants

Harvest Considerations 2

- Reduce/Eliminate Soil Contact
  - Don't stand in bins
  - Limit basket/bin contact with soil
  - Remove soil from bottoms of bins/baskets
- Clean and sanitize bins/baskets prior to returning to field

Harvest Considerations 3

- Worker hygiene during harvest
  - Hand washing or
  - Proper glove use
- Don't harvest damaged or contaminated produce
  - bruised or dropped fruit
  - animal or bird feces present
  - feeding marks
  - Insect damage or frass
- Picking conditions
  - As dry as possible
  - As little field heat as possible
- Remove quickly from field
- Avoid dust in transport

Field Container Sanitation

Clean harvest containers and tools daily.

Harvest Containers & Tools

Fruit Bin Dumper and Bin Rinse

This system, as designed, was built to receive plastic and wooden bins full of fruit, which has been loaded on an entrance feed conveyor. Each bulk bin is then to be automatically indexed into a dumping device. The dumping device will clamp the bin securely, rotate 115º and unload the fruit into a hopper. From this hopper the fruit is metered onto an inclined conveyor, size sorted and finally enters the plant to be processed.

When the bin is empty the dumper will automatically lower and eject the bin at 90º to the index feed conveyor onto a transfer conveyor which will transport the bulk bin to the first "Upender". This device will turn the bulk bin upside down and place it at the entrance of the bin rinse system.

The bin rinse system utilizes a reservoir of water contained beneath the conveyor, to flush the interior and exterior of the bin of leaves, mud and other debris. Then 300gal of water per min is flooded at 50psi over the slow moving bulk bin, effectively submerging it, however no chemicals or hot water are used. A small volume of additional water is added constantly via a final fresh water rinse to maintain the water levels.

Upon leaving the rinse system the bulk bi is upended again and ejected down onto an inclined raceway where it is picked up by an operator and transported to storage

Field Packing

Transportation equipment

- Transportation vehicles should be clean
- Reduce possible contamination by other vehicles on the roads, overhead contamination from overpasses, from birds or other means by tarping loads or using enclosed trailers

Cull Piles/Waste

Field Washing of Produce

Educational Area V. Good Handling Practices – Packing Facility and Transport Sanitation

- Packing facility sanitation
  - Packing area sanitation
    - Equipment
    - Facilities
  - Water
    - Wash
    - Cooling
  - Pest management
  - Handling rejects/culls
  - Transport sanitation
- Temperature monitoring

Packing Facility Sanitation and Worker Hygiene

Employees

Sanitation is about attention to details.

Foaming/rinsing packing line

Equipment

Harvesting bins

Arrival at Packing Facility

Protect harvested product from animals and animal feces

Image courtesy of Trevor Suslow

Packing Facility Grounds

Is waste removed frequently from the packing shed?

Is stagnant water controlled?

Bird Nesting = A Problem

Why is packing line sanitation important?

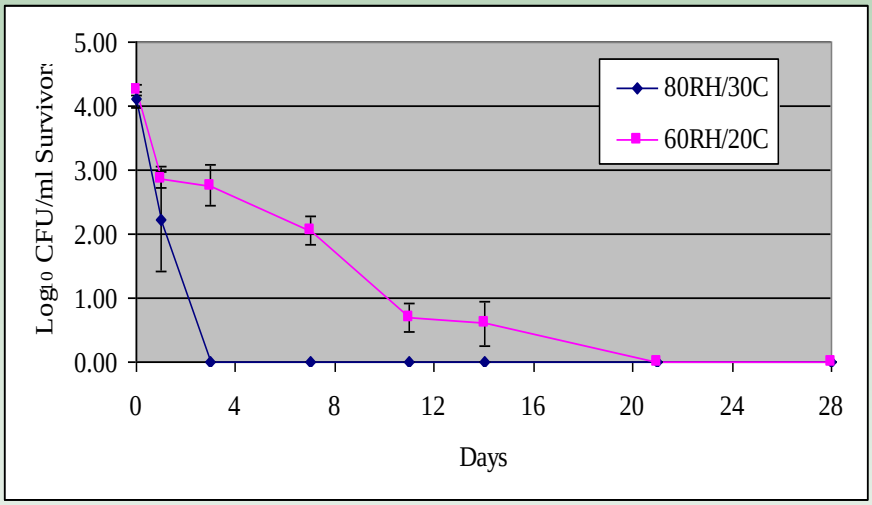
- To prevent human pathogen contamination of product by …

Listeria monocytogenes

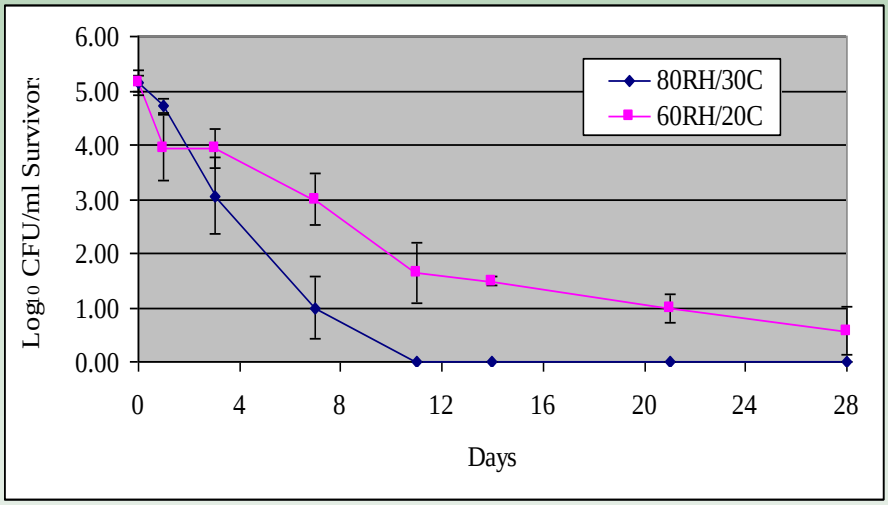
Salmonella

E. coli O157:H7

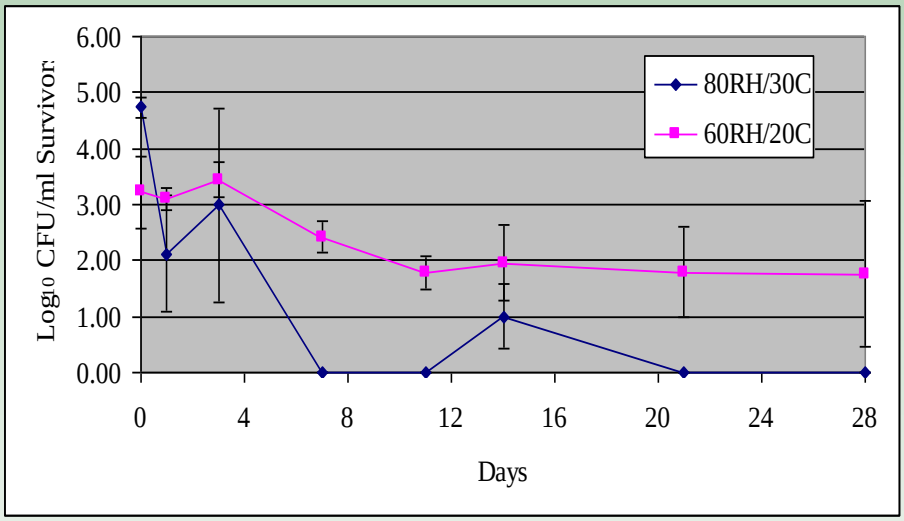
Salmonella Recovery from Conveyor Belt Surfaces at Different Humidity and Temperature



Salmonella Recovery from PVC Surfaces



Salmonella Recovery from Wood Surfaces



What's wrong on this packing line?

What happens at break time?

Water Safety

Water is critical to all phases of produce handling!

Washing

Icing

Cooling

Water

- Water sources must be tested
  - Irrigation, spray and wash water
  - **Surface water is not acceptable in the packing shed**
- Schedule for testing
  - Municipal water – acquire test results annually
  - **Well water – Twice a year**
    - **Beginning of season and at peak use**
  - Surface water – Three times a year
    - Beginning of season, peak use and near harvest

Wash Water Temperature – Tomato Example

- Pathogens such as Salmonella can enter produce such as tomatoes under certain temperature conditions related to the produce and the wash water.
- The temperature of the wash water should be 10 degrees F warmer than the tomato temperature to prevent infiltration.
- Cold water causes air cells in the tomato to contract and create a vacuum drawing water into the tomato.

Washing Won't Completely Solve the Problem And Sometimes Makes it Worse

Biological Hazards Hide on the Surface

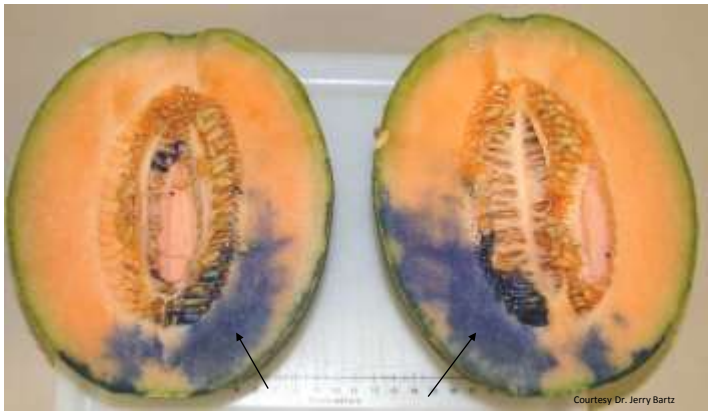
Some Commodities Cannot be Washed

Cantaloupe Infiltration Study

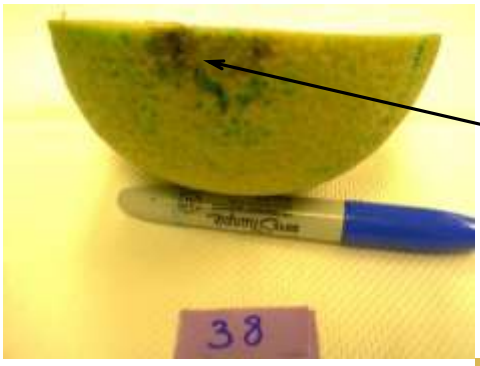
- **170 cantaloupes - internal temperature 36°C**
- **Immersed in ice water bath with dye to simulate hydrocooling**
- **Removed from bath after fruit pulp temperature reached 4-5°C (3.5 hours)**
- **Sliced and checked for dye infiltration**

Laboratory Study

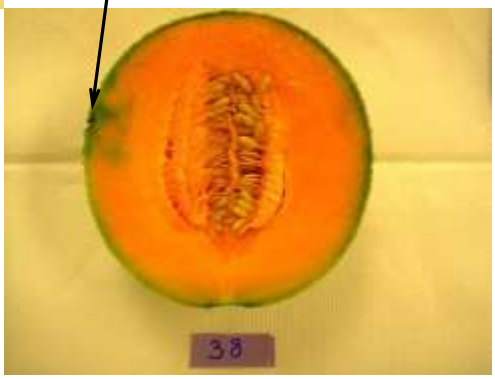
UFL Cantaloupe Dye Infiltration Research

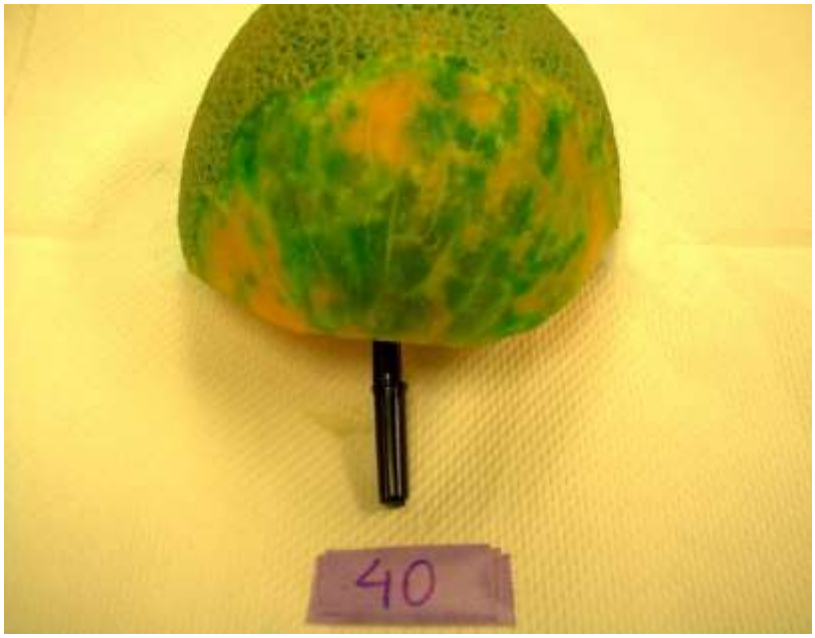


Could Be Bacteria

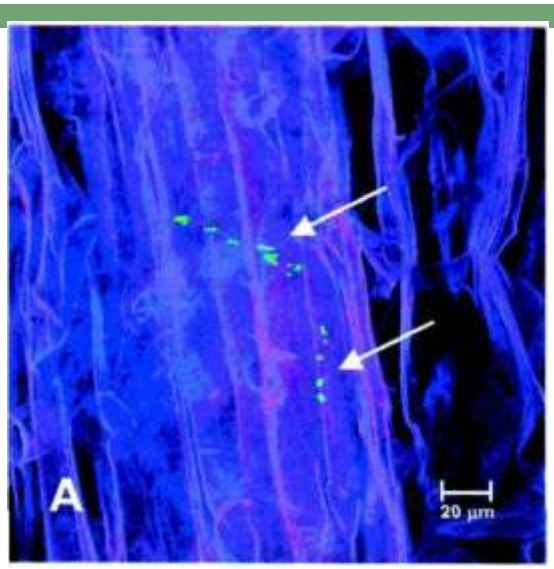


Dye buildup on canker (rind blemish)





No Magic Bullet



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Produce Washing… Some Additional Worries

- We can sanitize the water but not the product.
- Bacteria can hide in biofilms.
- Internalization of pathogens can occur.
- Bacteria can replicate in produce.

Washing Produce Does Not Eliminate Bacterial Hazards

Cabbage leaves

Before washing	2,000,000 cfu / gram
After washing	200,000 cfu / gram

(Frazier and Westhoff, 1991).

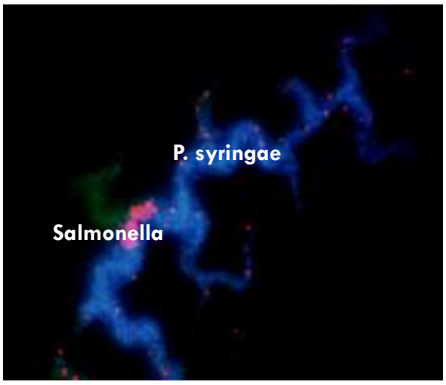
Water wash reduced bacteria by 90%.

Sanitizing requires a six-log reduction.

Washing Produce Does Not Eliminate Bacterial Hazards

When human pathogens are placed on produce they exude a protective matrix called a 'biofilm'.

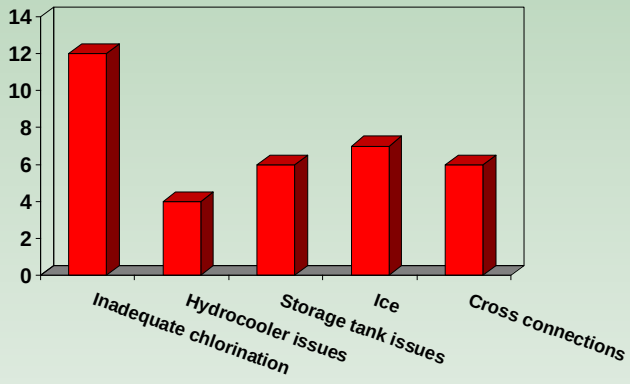
Once protected by this biofilm, it is much more difficult to wash, or kill bacteria with sanitizers.



A Biofilm from Pseudomonas protects Salmonella

On-Farm Packing Facility Water Issues

In a 2004 survey of 36 on-farm produce packing operations, inadequate chlorination was the predominant problem.



Courtesy Jack Guzewich, USDA/CFSAN 2004

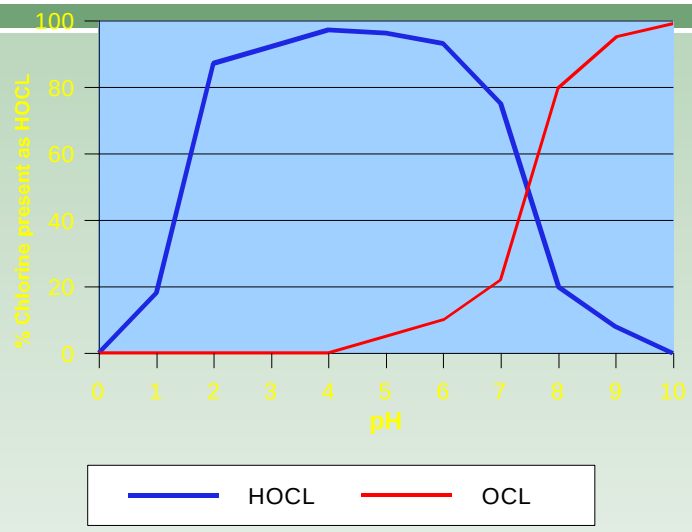
Wash Water Quality

Wash water must be properly chlorinated to keep it safe. Testing procedures must be implemented to insure the proper chlorination levels are consistently maintained in the water.

Factors Affecting Chlorine's Effectiveness

- Water pH
- Chlorine concentration
- Contact time
- Organic Matter
- Water temperature
- Stage of pathogen growth

Effects of pH on Chlorine



Quality Control Tools

"Free" chlorine test kit

pH meter

Chlorine/pH Daily Monitoring

Packing Line: Tomato grading line
Specific Location: Water in dump tank
Control Limits: Free Chlorine = 100-150 ppm/ pH = 6.5-7.5

Date	Free Chlorine				pH		Operator Initials
	Time	Time	Time	Time	Time	Time	

Verified by: _____
Tomato Line Supervisor

Transportation – Field and Market

Inspect the Truck

- Cleanliness
- Proper Temperature
- Loading Pattern
- Worker Hygiene

Other Issues

- Soil should be removed from produce and bins while in the field.
- Bins should be cleaned and sanitized prior to returning to field.
- All lighting fixtures in the packing area are screened to contain glass if light bulbs should break.
- Packing box and crate storage areas need be clean and pest free.
- Backflow devices are installed separating dump and flume tanks from the water source at each point of use.
- Only food grade approved and labeled oils or lubricants are used in the packing facility.
- Packing areas should be set up to reduce bruises or cuts of produce

Educational Area V. Good Handling Practices – Worker hygiene and personal practices

- Worker hygiene in the packing area
  - Hand washing
  - Use of toilets
    - Fecal contamination
  - Cuts
  - Reporting illnesses

E. coli in Produce from Poor Worker Hygiene

Employee Awareness

Is his mind on safety?

Handling Smocks, Aprons & Gloves

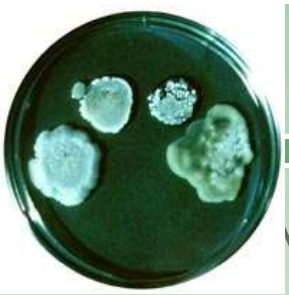
Is this a cultural problem?

- No! It's an education issue.

How do adults learn best?

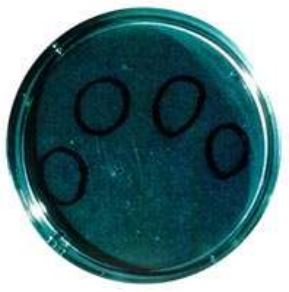
Method of Teaching	***How much information is recalled?***	
	3 hours later	***3 days later***
Lecture	70%	10%
Lecture + Demonstration	85%	65%

Effective communication is critical in employee sanitation training



Unwashed hands

What microbial load do YOU carry?



Hands washed & dipped in sanitizer

Unwashed gloves

Gloves washed & dipped in sanitizer

Worker Protection Safety (WPS)

- Combine *employee hygiene training* with EPA-mandated WPS (chemical safety) at the beginning of each harvest season
- Keep records of who attended what training and when, to document this training to an auditor.

Food Safety at Fifer Orchards, Inc.

Some practical points from Fifer Orchards Packing Operation

- Water Test
- Thermometers in cold storage – calibrate with ice water
- Rodent trap layout
- Rodent check records
- Food and Drink – away from harvest and packaging
- Tool Room – keep loose metal objects and junk away from packing
- Trash Cans- covered
- Chlorine test strips
- Brooms
- Clipboards

More practical points to remember from Fifer's

- Blood Spill Kit
- First Aid Kit
- Do not have empty soda or food wrappers around
- Break area for your workers to eat
- Enclose areas to keep rodents out.
- Bird exclusion
- Bathrooms
  - Towels, wash hand signs, soap, sheet to document
- Field wash sinks
  - Get your sanitary company to stock them
- Covered lights
- Training materials

Food Safety at Fifer Orchards, Inc.

Food Safety at Fifer Orchards, Inc.

Food Safety at Fifer Orchards, Inc.

Food Safety at Fifer Orchards, Inc.

Food Safety at Fifer Orchards, Inc.

Farm Markets, Farmers Markets

- Treat as packing or handling facility
- Clean containers
  - Container reuse
  - Bags
- Personal hygiene
- Clean display cases
- Minimize handling

Farmers Markets

•Follow GHP's

Samples

- Produce used for samples is always washed in potable, cool water prior to preparation.
- Everyone preparing samples or serving samples is trained to properly wash their hands and use clean sanitized utensils.
- Clean, disposable gloves are worn
- All utensils used for cutting samples including the cutting surface and knives, are washed, rinsed, and sanitized prior to use.
- Cut samples are stored in food grade containers and kept on ice or in a cool ice chest at or below 41°F until they are served.
- Single service items such as toothpicks or plastic utensils are provided for customers who choose to taste the samples.

Samples

Packing for Market

U-Pick

- Toilets and handwashing facilities are readily available for customer use
- Signs clearly mark toilet locations and request customers wash their hands after using the toilet, prior to entering fields, and before eating.
- Wild animals are excluded as much as possible.
- Clean picking containers
- Pesticide reentry intervals critical
- Signs display instructions for proper hand washing.
- Hand sanitizing stations near u-pick area
- Customers are asked to wash or sanitize hands before picking.
- Mulch used between rows is clean straw, that has not been used previously as animal bedding.
- Pets, including farm animals, are excluded

U-Pick

Educational Area VI. Developing and Implementing a Farm Food Safety Plan

- Develop a farm food safety plan
  - Plan goals
  - Plan contents
  - Plan examples
  - Required records

Good Agricultural Practices

Food Safety Plan

for

Name of Farm or Orchard

The information in this document is a true representation of the food safety conditions and practices followed at this location.

Owner or manager responsible for food safety | Signature | Date

Grower Information

Business name and mailing address

Site location (if different from above)

Person responsible for food safety program at this location:

Name/ Position	Address

Telephone	Fax	E-mail

Agricultural activities conducted at this site:

☐ Crop production only	☐ Both crop and animal production	☐ Permanent or temporary living facilities

Crop(s) grown on this property: (list acres owned, leased/rented, contracted, and/or consigned for each crop):

Crop(s)	Area currently under cultivation (acres)
1)	
2)	
3)	
Total area under cultivation	

Additional crops documented on separate sheet if necessary: Yes ☐ No ☐

Adjacent Properties (check all that apply):

☐ Crop production	☐ Dairy or livestock operation	☐ Watercourse (river, stream, pond, lake)	☐ Manure dumping, storage or handling
☐ Municipal or private landfill/ dumping site	☐ Residential with operating septic system	☐ Commercial or industrial development	☐ Golf course

Previous Land Use (check all that apply for area under cultivation):

☐ Current crop(s) grown at this location for LESS THAN 5 years	☐ Current crop(s) grown at this location for MORE THAN 5 years	Any expansion into previously unused land within the last 5 years? ☐ Yes ☐ No

Water Use and Source (check all that apply)

Use\Source	Municipal	Private Well	Surface water
Drinking	☐	☐	Not permitted
Hand Washing	☐	☐	→
Cleaning food contact surfaces	☐	☐	☐
Irrigation: ☐ None ☐ Overhead sprinkler ☐ Furrow ☐ Drip ☐ Flood	☐	☐	☐
Fertilizer application	☐	☐	☐
Pesticide / Fungicide application	☐	☐	☐

* Water used for hand washing in field sanitation units is not required to meet EPA potability standards if chlorine or other acceptable agents are added to reduce the possibility of microbial contamination.

Manure and Biosolids

Soil Amendments used at this location (check all that apply)

☐ No manure or municipal biosolids are applied to soil	☐ Raw manure is applied to soil	☐ Composted manure or municipal biosolids are applied to soil

Manure handling and storage

☐ No manure or municipal biosolids of any kind are stored on the premises	☐ No manure or municipal biosolids of any kind are stored on the premises	☐ No manure or municipal biosolids of any kind are stored on the premises

Sewage Treatment (check all that apply)

☐ Municipal	☐ Septic System	☐ Portable containment system

Toilet Facilities (check all that apply)

☐ Indoor facilities	☐ Portable units	☐ None on site

Cleaning and Maintenance of Toilets

☐ Performed by grower	☐ Contracted service

Availability of Field Sanitation Units

Maximum number of employees on site at any one time	Number of toilet facilities within ¼ mile walk	Ratio of employees to toilet facilities
Number _____	Number _____	Ratio _____

Field Map

Production, field packing, and staging areas, field sanitation units, active wells, surface water sources, regular or recent flooding areas, manure storage sites, and septic systems on audited land and adjacent properties.

Water Quality

Policy: Water used for drinking, that contacts harvested produce, or that contacts containers used to hold harvested produce meets the potable water quality standards prescribed by the US Environmental Protection Agency. If water used for hand washing does not meet EPA potability standards, it has been made safe by addition of chlorine or other acceptable agents.

Potable water is used for chemical or irrigation applications that come in direct contact with the edible portion of the crop.

Testing requirements:

- **Municipal water:** Test results are acquired from the local water authority annually.
- **Well water:** Water is tested biannually (twice each year) and the well is treated if fecal coliforms are present. Wells are monitored to make sure casings are secure and well-maintained and that livestock and manure storage areas are excluded from the well recharge and pumping area.
- **Surface water:** Water is tested three (3) times during the growing season – first at planting, second at peak use, third at or near harvest.

Applicable documentation: (Check all that apply)

Water testing documentation: (Check all that apply):

☐ Municipal water	☐ Annual water bill
	☐ Laboratory analysis
☐ Private well water	☐ Laboratory analysis
	☐ Monitoring checklist
☐ Surface water	☐ Laboratory analysis
	☐ Treatment procedure and schedule

Well condition and maintenance documentation

☐ Verification checklist

Manure and Municipal Biosolids

If no animal manures or biosolids are used as soil amendments, check the box below. No further action is needed and this section may be skipped.

☐	Raw or composted animal manure IS NOT used as a soil amendment at this site.

Policy: Whenever raw manure is used, it is applied to soil at least 120 days before harvest. Whenever treated or composted manure or biosolids are use, they are treated, composted, or exposed to the environment in a manner that reduces pathogens to safe levels.

Analysis reports document that the composted manure or treated biosolids are safe to use.

Actual practice at this site (Check all that apply):

☐	Raw animal manure is used as a soil amendment at this site
☐	Animal manure is composted at this site using an *active* process
☐	Animal manure is composted at this site using a *passive* process
☐	Municipal biosolids are applied to soil at this site

Applicable documentation: (Check all that apply)

☐	Verification checklist (for safe storage and handling practices)
☐	Raw manure application procedures (date, source, timing, rate)
☐	Onsite compost preparation procedures (composition, temp, time, duration)
☐	Compost / biosolids certificate of analysis (if purchased from outside vendor)
☐	Map indicating location of manure/biosolids storage and/or composting areas, manure lagoons, livestock/dairy facilities on this property

Worker Health, Hygiene, and Sanitary Practices

Policy: Employees who handle harvested produce are required to follow proper sanitation and hygiene practices including washing their hands at the following times:

1. Before beginning or returning to work
2. After using the toilet
3. After eating and smoking
4. After handling contaminated materials

Workers are instructed to understand where the toilet facilities are located and how to use them so they do not contribute to product contamination. Workers are encouraged to use the toilet facilities and are given reasonable access to them throughout the harvesting period.

Workers are instructed to drink or eat food only in designated areas that are sufficiently far enough away from growing areas to prevent contamination (see map for location). A continuous supply of potable drinking water and single serving cups or bottled water in unbreakable, capped containers made available to workers at these areas.

Workers are instructed that they may carry and use water in growing areas if the containers are unbreakable and capable of being capped as long as they are careful not to spill onto the harvested products.

Workers with a diarrheal disease or symptoms of other infectious disease are instructed to report this to their supervisor and are assigned to non-produce handling areas.

Applicable documentation: (Check all that apply):

- ☐ Verification checklist (for compliance with hand washing and other appropriate hygiene practices)
- ☐ Training log (for proper procedure and frequency of hand washing)

Toilet and Hand Washing Facilities

Policy: Sanitary facilities are provided to reduce the potential for produce contamination and ensure that employees and consumers are protected from foodborne diseases.

(1) Hand washing facilities:

- A basin, container, or outlet with an adequate supply of potable water, soap, and single-use towels are provided for each toilet facility. Each station has a sign, written in a language(s) that all employees can understand that reminds them when and how to wash their hands.

(2) Toilet and hand washing facilities.

- One toilet facility and one hand washing facility is provided for each twenty (20) employees. Toilet and hand washing facilities are accessible and located in close proximity to each other and within a one-quarter-mile walk of each hand laborer's place of work in the field. Where due to terrain or it is not feasible to locate facilities as required above, the facilities are located at the point closest to vehicular access and workers are provided reasonable access throughout the day.
- Toilet facilities are adequately ventilated, appropriately screened, have self-closing doors that can be closed and latched from the inside and are constructed to insure privacy.
- Where employees who perform field work for a period of three (3) hours or less (including transportation time to and from the field) during the day, toilet and hand washing facilities are available at alternative sites.

(3) Maintenance: The following maintenance procedures are followed:

- Toilet and hand washing facilities are regularly maintained and supplied as necessary to keep them clean, sanitary, and functional.
- Water for drinking and hand washing is continuously supplied.
- Wastes are regularly disposed of so that unsanitary conditions do not occur.
- If a major spill or leak of field sanitation units or toilet facilities occurs, access to the facility and the affected area around it is blocked off until clean up occurs. The facility cannot be used by workers until a supervisor has inspected the site for cleanliness.

(4) Reasonable use: Employees are notified of the location of the sanitary facilities and water and are allowed reasonable opportunities to use them.

Applicable documentation: (Check all that apply):

- ☐ Grower information sheet (for number of toilet facilities)
- ☐ Verification checklist (for condition, maintenance, use by workers)
- ☐ Map indicating location of field sanitation units and handwashing stations
- ☐ Field sanitation service and cleaning contract / service report
- ☐ Training log (for notification of reasonable access and proper use)

Adjacent and Previous Land Use

Policy: Potential hazards due to previous land use and/or adjacent property activities including regular or recent flooding, manure handling and storage areas, cattle/dairy operations, or surface water sources have been identified. When adjacent or previous land use history indicates a possibility of contamination, preventative measures have been taken to minimize the known risks.

Previous land use:

- If the land was used as a dairy or feedlot within the last three (3) years or as a waste site at any time in the past, soil tests have been conducted to assure that crops will not become contaminated.
- Land where annual crops are grown and that have recently been subjected to flooding must be tested for potential microbial hazards.

Adjacent land use:

- Crop production areas are sufficiently separated from dairy, livestock, or fowl production facilities, manure lagoons, or other sources of contamination to minimize opportunities for wind and/or water contamination from occurring.
- Entry of domestic animals into growing areas is forbidden.
- Crop production areas are monitored for the presence or signs of wild or domestic animals entering the land. If there are signs that deer, or other large wild animals have entered growing areas, all reasonable measures are taken prevent reentry.

Applicable documentation: (Check all that apply):

- ☐ Grower information sheet (for previous and adjacent land use)
- ☐ Map indicating adjacent properties presence of manure/biosolids storage areas, manure lagoons, livestock/dairy facilities, grazing areas, and flooding areas
- ☐ Verification checklist (for evidence of flooding, presence of domestic or wild animals
- ☐ Soil chemical and/or microbiological test results (if previous land use indicates potential hazards)

Harvesting, Field Packing, and Transportation

Policy: Measures are taken to prevent microbial and chemical contamination of crops during harvesting, handling, and field packing operations.

1) Harvesting and Field Packing

- All harvesting containers that come in direct contact with product are cleaned and/or sanitized prior to use and kept as clean as practical.
- Harvesting containers, totes, etc. are not be used for carrying or storing non-produce items during the harvest season.

2) Transportation:

- Transportation equipment that comes into contact with harvested produce must be clean and in good repair.
- Vehicles used to transport containers of harvested crops are kept clean.
- As harvested product is moved from field to storage areas or to packing or processing areas, it is protected from sources of contamination.

3) Product contamination policies

Hazardous chemicals. Workers are instructed to throw away any product that has become contaminated by toxic chemicals such as fuel, pesticides, or other harmful substances during harvesting operations and to report the incident to their supervisor. Supervisors are to determine the cause of the incident and to correct procedures and conditions if necessary.
Glass, metal, hard plastic policy. Workers are instructed to throw away any product that has become contaminated by glass, metal fragments, and hard plastics or other harmful foreign objects not normally found in fresh produce and to report any incidents to their supervisor. Supervisors are to determine the cause of the incident and to correct procedures and conditions if necessary.
Bodily fluids. Workers are instructed to dispose of any product that has been contaminated with bodily fluids (blood, saliva, sweat, mucus) and to report this promptly to their supervisor. Workers are instructed to sneeze or cough away from the product or into the inside of their shirt to prevent product contamination. If hands are used to cover a cough or sneeze, they are to be properly washed before continuing work. If a food contact surface (e.g. utensils, containers, tables, conveyers) has become contaminated with bodily fluids, supervisors are required to make sure it is cleaned and sanitized before it is used again.

Applicable documentation: (Check all that apply):

- ☐ Grower information sheet (for previous and adjacent land use)
- ☐ Verification checklist (for evidence of safe harvest, handling, and transportation practices
- ☐ Training policy and log (sanitary harvesting and handling instructions)

Training

Policy: Training on proper sanitation and hygiene practices is provided to all harvesters and handlers at least once each season before harvesting begins. If a worker does not follow acceptable sanitary practices, he/she is verbally corrected and retrained if needed. Repeated lapses in good sanitary and hygienic practices are grounds for dismissal.

1) All workers who handle harvested product are trained in the following knowledge areas

- When and how to correctly wash hands
- Requirement to wear reasonably clean clothes that protect the product from bodily sources of contamination
- Prohibition from handling produce if symptoms of an infectious disease exist
- Knowledge and proper use of pre-harvest and/or post harvest application materials
- Prohibition of use of harvest containers for carrying or storing non-produce items during the harvest season
- Requirement to seek prompt treatment with clean first aid supplies for cuts, abrasions and other injuries
- Requirement to dispose of produce that has come into contact with blood or other body fluids and to report this to a supervisor
- Requirement to report product contamination by chemicals, petroleum, pesticides, glass, a major spill or leak of field sanitation units or toilet facilities, or other contaminating factors

2) Training records are kept on file for the duration of the growing season and include:

- When training occurred
- Who attended each training session
- What topics were covered

Applicable documentation: (Check all that apply):

- ☐ Verification checklist (to document that all food handlers have been trained)
- ☐ Training log

Pre-Harvest Checklist

To be conducted before harvesting begins

Shaded boxes indicate that a N/A response is not permitted

General Questions

Implementation of a Food Safety Program	Yes	No	N/A	Comments (required for No or N/A responses)
A documented food safety program that incorporates Good Agricultural and Handling Practices has been implemented	☐	☐*		
The operation has designated someone to implement and oversee an established food safety program	☐	☐*		

*Answering "No" to this question will result in failure of the audit

Worker Health & Hygiene Procedures	Yes	No	NA	Comments (required for No or N/A responses)
Potable water is available to all workers for drinking and hand washing	☐	☐*		
Training on proper sanitation and hygiene practices is provided to all staff	☐	☐		
Readily understandable signs are posted to instruct employees to wash their hands before beginning or returning to work	☐	☐	☐**	
Employees are trained, or will be trained prior to harvesting, to wash their hands before beginning or returning to work	☐	☐	☐**	
All employees and visitors to the location are trained, or will be trained prior to harvesting, to follow and regularly practice proper sanitation and hygiene practices	☐	☐	☐	
All toilet/restroom/field sanitation facilities will be kept clean, properly supplied with single use towels, toilet paper, and hand soap or antibacterial soap and potable water for hand washing	☐	☐	☐**	
Arrangements have been made to have all toilet/restroom/field sanitation facilities serviced and cleaned on a scheduled basis	☐	☐	☐	

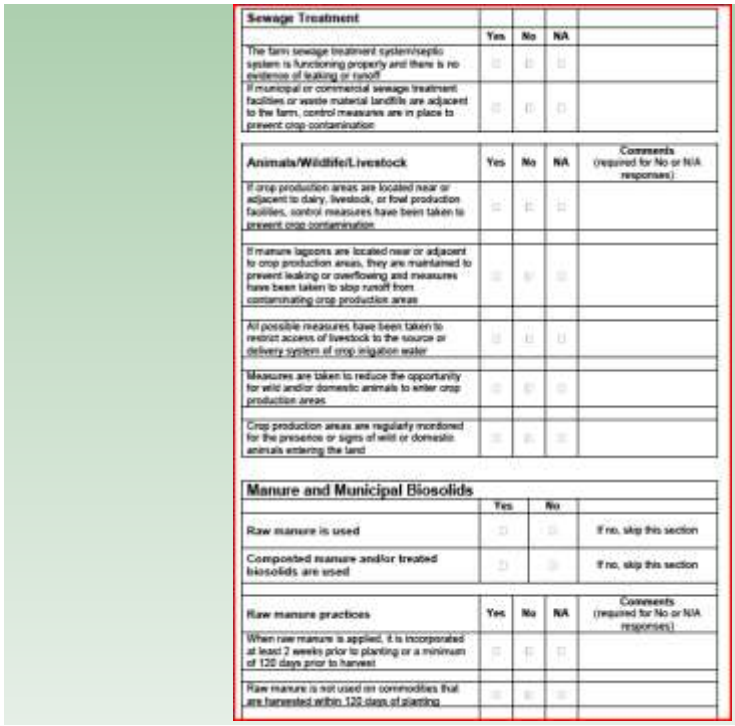
Workers will be trained, or will be trained prior to harvesting, that smoking and eating are confined to designated areas separate from where product is handled	☐	☐	☐	
There is a policy in place that requires workers with diarrheal disease or symptoms of other infectious disease to be prohibited from handling fresh produce	☐	☐	☐	
There is a policy in place that describes procedures which specify handling/ disposition of produce or food contact surfaces that have come into contact with blood or other body fluids	☐	☐		
Workers are trained, or will be trained prior to harvesting, on the necessity for seeking prompt treatment of injures	☐	☐		
Company personnel who apply pre-harvest and/or post harvest materials are trained on their proper use.	☐	☐	☐	
All applicable Local, State and Federal training and licensing requirements are met by persons applying pesticides and other regulated materials.	☐	☐	☐	

* Water used for hand washing in field sanitation units is not required to meet EPA potability standards if chlorine or other acceptable agents are added to reduce the possibility of microbial contamination.

** This question can only be answered N/A when toilet facilities are not required

Part 1 – Farm Review

Water Quality and Safety Risks				
	Yes	No	NA	Comments (required for No or N/A responses)
It has been established through laboratory testing that water quality is adequate for the crop irrigation(s) and/or fertigation method(s) used and crop being irrigated	☐	☐	☐	
All private wells on the property have been inspected to ensure that well casings are secure and well-maintained, and that livestock and manure storage areas are excluded from well recharge and pumping areas	☐	☐	☐	
If necessary, steps have been taken to protect irrigation water from potential direct and nonpoint source contamination	☐	☐	☐	

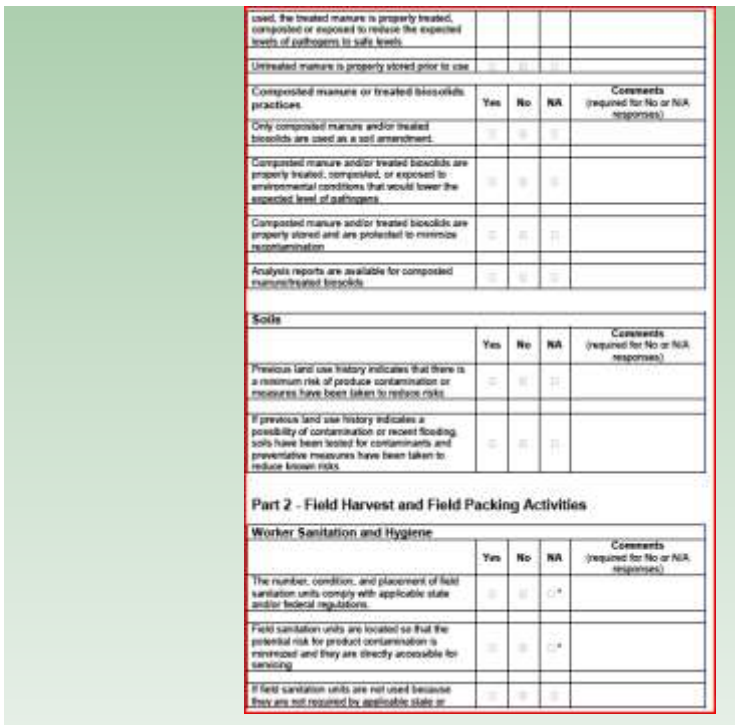


Sewage Treatment				
	Yes	No	NA	
The farm sewage treatment system/septic system is functioning properly and there is no evidence of leaking or runoff	☐	☐	☐	
If municipal or commercial sewage treatment facilities or waste material landfills are adjacent to the farm, control measures are in place to prevent crop contamination	☐	☐	☐	

Animals/Wildlife/Livestock	Yes	No	NA	Comments (required for No or N/A responses)
If crop production areas are located near or adjacent to dairy, livestock, or fowl production facilities, control measures have been taken to prevent crop contamination	☐	☐	☐	
If manure lagoons are located near or adjacent to crop production areas, they are maintained to prevent leaking or overflowing and measures have been taken to stop runoff from contaminating crop production areas	☐	☐	☐	
All possible measures have been taken to restrict access of livestock to the source or delivery system of crop irrigation water	☐	☐	☐	
Measures are taken to reduce the opportunity for wild and/or domestic animals to enter crop production areas	☐	☐	☐	
Crop production areas are regularly monitored for the presence or signs of wild or domestic animals entering the land	☐	☐	☐	

Manure and Municipal Biosolids			
	Yes	No	
Raw manure is used	☐	☐	If no, skip this section
Composted manure and/or treated biosolids are used	☐	☐	If no, skip this section

Raw manure practices	Yes	No	NA	Comments (required for No or N/A responses)
When raw manure is applied, it is incorporated at least 2 weeks prior to planting or a minimum of 120 days prior to harvest	☐	☐	☐	
Raw manure is not used on commodities that are harvested within 120 days of planting	☐	☐	☐	



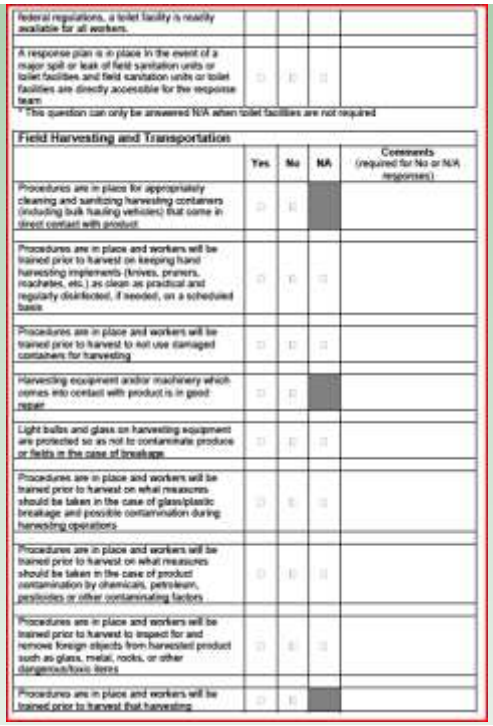
used, the treated manure is properly treated, composted or exposed to reduce the expected levels of pathogens to safe levels				
Untreated manure is properly stored prior to use	☐	☐	☐	

Composted manure or treated biosolids practices	Yes	No	NA	Comments (required for No or N/A responses)
Only composted manure and/or treated biosolids are used as a soil amendment.	☐	☐	☐	
Composted manure and/or treated biosolids are properly treated, composted, or exposed to environmental conditions that would lower the expected level of pathogens	☐	☐	☐	
Composted manure and/or treated biosolids are properly stored and are protected to minimize recontamination	☐	☐	☐	
Analysis reports are available for composted manure/treated biosolids	☐	☐	☐	

Soils	Yes	No	NA	Comments (required for No or N/A responses)
Previous land use history indicates that there is a minimum risk of produce contamination or measures have been taken to reduce risks	☐	☐	☐	
If previous land use history indicates a possibility of contamination or recent flooding, soils have been tested for contaminants and preventative measures have been taken to reduce known risks	☐	☐	☐	

Part 2 - Field Harvest and Field Packing Activities

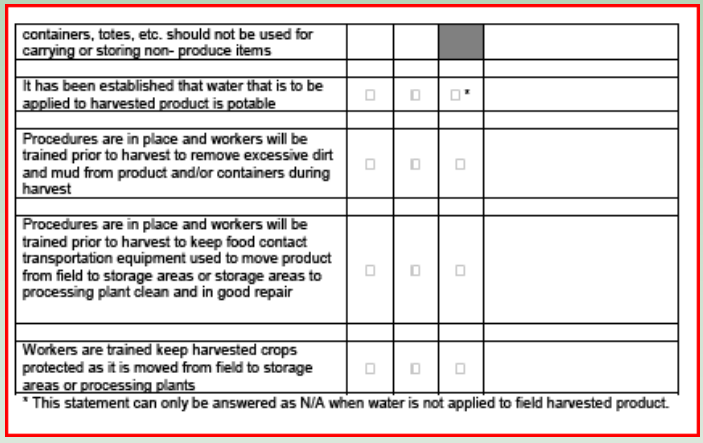
Worker Sanitation and Hygiene	Yes	No	NA	Comments (required for No or N/A responses)
The number, condition, and placement of field sanitation units comply with applicable state and/or federal regulations	☐	☐	☐*	
Field sanitation units are located so that the potential risk for product contamination is minimized and they are directly accessible for servicing	☐	☐	☐*	
If field sanitation units are not used because they are not required by applicable state or	☐	☐	☐	



federal regulations, a toilet facility is readily available for all workers.				
A response plan is in place in the event of a major spill or leak of field sanitation units or toilet facilities and field sanitation units or toilet facilities are directly accessible for the response team	☐	☐	☐	

* This question can only be answered N/A when toilet facilities are not required

Field Harvesting and Transportation				
	Yes	No	NA	Comments (required for No or N/A responses)
Procedures are in place for appropriately cleaning and sanitizing harvesting containers (including bulk hauling vehicles) that come in direct contact with product	☐	☐		
Procedures are in place and workers will be trained prior to harvest on keeping hand harvesting implements (knives, pruners, machetes, etc.) as clean as practical and regularly disinfected, if needed, on a scheduled basis	☐	☐	☐	
Procedures are in place and workers will be trained prior to harvest to not use damaged containers for harvesting	☐	☐	☐	
Harvesting equipment and/or machinery which comes into contact with product is in good repair	☐	☐		
Light bulbs and glass on harvesting equipment are protected so as not to contaminate produce or fields in the case of breakage	☐	☐	☐	
Procedures are in place and workers will be trained prior to harvest on what measures should be taken in the case of glass/plastic breakage and possible contamination during harvesting operations	☐	☐	☐	
Procedures are in place and workers will be trained prior to harvest on what measures should be taken in the case of product contamination by chemicals, petroleum, pesticides or other contaminating factors	☐	☐	☐	
Procedures are in place and workers will be trained prior to harvest to inspect for and remove foreign objects from harvested product such as glass, metal, rocks, or other dangerous/toxic items	☐	☐	☐	
Procedures are in place and workers will be trained prior to harvest that harvesting	☐	☐		



containers, totes, etc. should not be used for carrying or storing non- produce items				
It has been established that water that is to be applied to harvested product is potable	☐	☐	☐ *	
Procedures are in place and workers will be trained prior to harvest to remove excessive dirt and mud from product and/or containers during harvest	☐	☐	☐	
Procedures are in place and workers will be trained prior to harvest to keep food contact transportation equipment used to move product from field to storage areas or storage areas to processing plant clean and in good repair	☐	☐	☐	
Workers are trained keep harvested crops protected as it is moved from field to storage areas or processing plants	☐	☐	☐	

* This statement can only be answered as N/A when water is not applied to field harvested product.

Harvest Checklist

To be conducted at least once during active harvesting times
Shaded boxes indicate that a N/A response is not permitted

Conditions for Automatic Failure (A "No" answer can be expected to result in immediate failure of an audit)	Yes	No
Is there a documented food safety program in place that incorporates GAP and/or GHP principles?	○	○
Has someone within the operation been designated to implement and oversee the established food safety program?	○	○
Is the operation free from any immediate food safety risks during growing, packing, or storing that would cause produce to become unsafe to eat?	○	○
Are produce growing and handling areas free of rodents, excessive amounts of insects, or other pests that might represent a food safety risk?	○	○
Are all employees following proper personal or hygienic practices that could jeopardize the safety of the produce?	○	○
Have all required documents been honestly recorded with no indication of deceit or falsification?	○	○

General Conditions

Worker Health & Hygiene Procedures	Yes	No	NA	Comments (required for No or N/A responses)
Potable water is available to all workers for drinking and hand washing	☐	☐		
All workers who handle produce have been trained on proper personal hygiene practices	☐	☐		
Each hand washing facility has a sign, written in a language(s) that all employees can understand, that reminds them when and how to wash their hands	☐	☐	*	
All toilet/restroom/field sanitation facilities are maintained so that they are properly supplied with • single use towels, • toilet paper, • soap, and • potable water for hand washing	☐	☐	**	
All toilet/restroom/field sanitation facilities are	☐	☐	☐	
serviced and cleaned on a scheduled basis	☐	☐	☐	
Smoking and eating occurs only in designated areas separate from where product is handled	☐	☐	☐	
Workers who handle produce do not have an infectious disease	☐	☐	☐	
Workers who handle produce do not have unprotected wounds	☐	☐	☐	

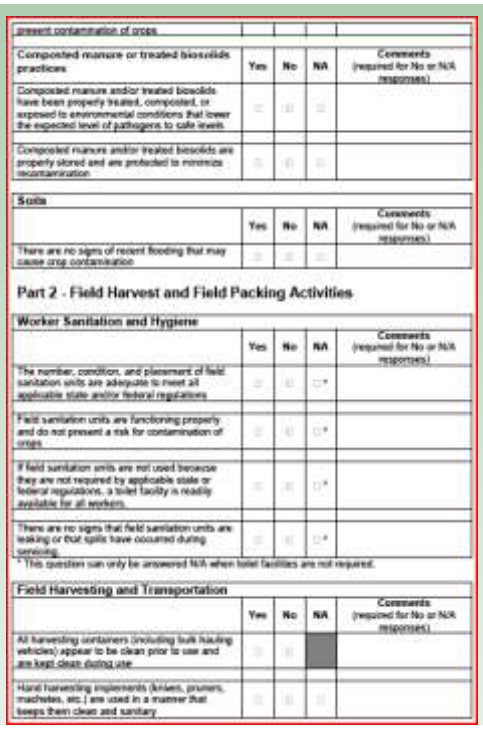
* This question can only be answered N/A when toilet facilities are not required. Water used for hand washing in field sanitation units is not required to meet EPA potability standards if chlorine or other acceptable agents are added to reduce the possibility of microbial contamination.

Sewage Treatment	Yes	No	NA	
If there is a farm sewage treatment system or septic system in place, it is functioning properly and there is no evidence of leaking or runoff	☐	☐	☐	

Animals/Wildlife/Livestock	Yes	No	NA	Comments (required for No or N/A responses)
Manure lagoons located near or adjacent to crop production areas are not leaking or overflowing into production areas	☐	☐	☐	
Measures are taken to restrict access of livestock to the source or delivery system of crop irrigation water	☐	☐	☐	
There is no evidence that wild and/or domestic animals have entered crop production areas	☐	☐	☐	

Manure and Municipal Biosolids	Yes	No	
Raw manure is used	☐	☐	If no, skip this section
Composted manure and/or treated biosolids are used	☐	☐	If no, skip this section

Raw manure practices	Yes	No	NA	Comments (required for No or N/A responses)
Raw manure was incorporated into the soil at least 2 weeks prior to planting or a minimum of 120 days prior to harvest	☐	☐	☐	
If a combination of raw and treated manure is used, the treated manure was properly treated, composted or exposed to reduce the expected levels of pathogen	☐	☐	☐	
Untreated manure is properly stored prior to	☐	☐	☐	



prevent contamination of crops				
Composted manure or treated biosolids practices	**Yes**	**No**	**NA**	**Comments (required for No or N/A responses)**
Composted manure and/or treated biosolids have been properly treated, composted, or exposed to environmental conditions that lower the expected level of pathogens to safe levels	☐	☐	☐	
Composted manure and/or treated biosolids are properly stored and are protected to minimize recontamination	☐	☐	☐	

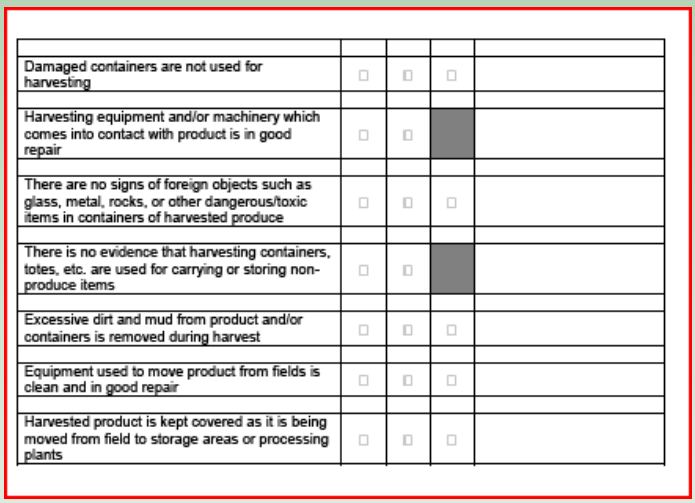
Soils				
	Yes	**No**	**NA**	**Comments (required for No or N/A responses)**
There are no signs of recent flooding that may cause crop contamination	☐	☐	☐	

Part 2 - Field Harvest and Field Packing Activities

Worker Sanitation and Hygiene				
	Yes	**No**	**NA**	**Comments (required for No or N/A responses)**
The number, condition, and placement of field sanitation units are adequate to meet all applicable state and/or federal regulations	☐	☐	☐*	
Field sanitation units are functioning properly and do not present a risk for contamination of crops	☐	☐	☐*	
If field sanitation units are not used because they are not required by applicable state or federal regulations, a toilet facility is readily available for all workers	☐	☐	☐*	
There are no signs that field sanitation units are leaking or that spills have occurred during servicing	☐	☐	☐*	

*This question can only be answered N/A when toilet facilities are not required.

Field Harvesting and Transportation				
	Yes	**No**	**NA**	**Comments (required for No or N/A responses)**
All harvesting containers (including bulk hauling vehicles) appear to be clean prior to use and are kept clean during use	☐	☐	■	
Hand harvesting implements (knives, pruners, machetes, etc.) are used in a manner that keeps them clean and sanitary	☐	☐	☐	



Damaged containers are not used for harvesting	☐	☐	☐	
Harvesting equipment and/or machinery which comes into contact with product is in good repair	☐	☐	■	
There are no signs of foreign objects such as glass, metal, rocks, or other dangerous/toxic items in containers of harvested produce	☐	☐	☐	
There is no evidence that harvesting containers, totes, etc. are used for carrying or storing non-produce items	☐	☐	■	
Excessive dirt and mud from product and/or containers is removed during harvest	☐	☐	☐	
Equipment used to move product from fields is clean and in good repair	☐	☐	☐	
Harvested product is kept covered as it is being moved from field to storage areas or processing plants	☐	☐	☐	

Forms - Field

Manure Applications Log

Name of operation:

See the food safety plan for manure application procedures

Date	Field Applied	Rate	Incorporated (Yes or No)	Supplier	Crop Planted (Type and Date)	Crop Harvested (Date)	Initials

Reviewed By: Title: Date:

Forms – Packing Shed

RUTGERS
New Jersey Agricultural Experiment Station

Packing House and Storage Facility-Daily Inspection Log

Date	Floors		Drains & Trenches		Break Room & Restrooms		Rodent Traps		Hand Washing Facility		Food Contact Surfaces		Waste Dumpster Areas		Employee Name
	Checked	Cleaned	Checked	Cleaned	Checked	Cleaned	Checked	Baited	Checked	Cleaned	Checked	Cleaned	Checked	Cleaned	

Sheet Reviewed by: _____ on _____
(Management) (Date)

Sample record keeping sheet. Modify to fit your operation.

Writing and Implementing the Plan

- Identify physical changes and costs
- Know what type of audit
- See sample plans that meet audit requirements

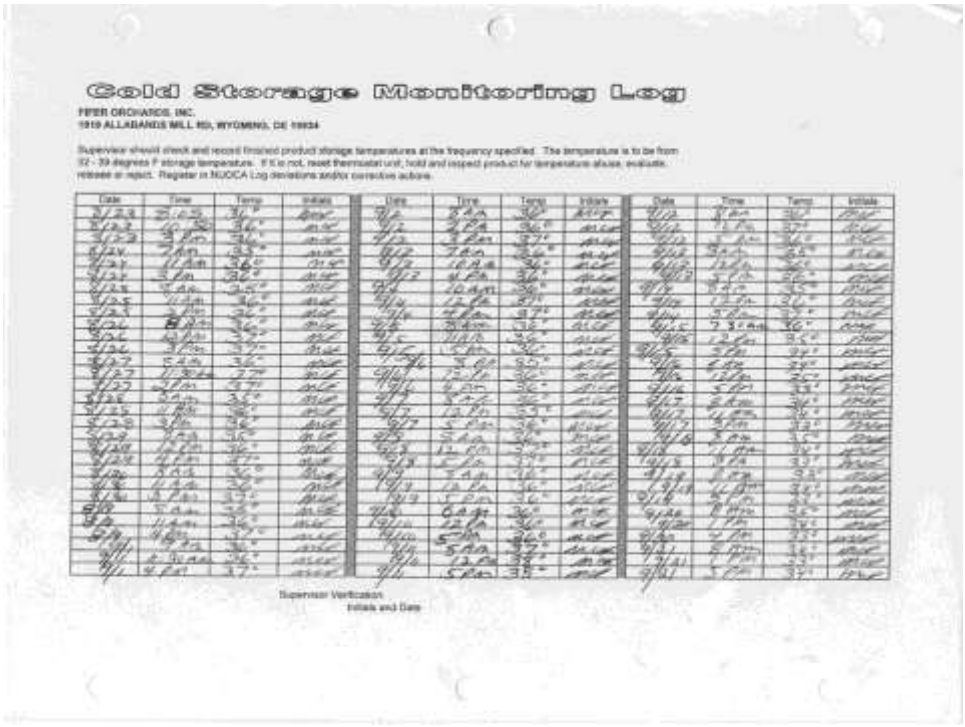
- Write GAP
- Write GHP
- Make up charts and documents
  - According to the audit requirements
- Gather signs and training materials

Daily, Weekly, Monthly and Yearly Logs

- Wash water logs
  - Chlorine and temperature
- Daily Inspection and Sanitation Logs
  - Check lists of floors, packing line, trash cans, bath rooms, rodent stations, etc.
- Cold Storage Logs
  - Monitoring Temperature
- Employee Education Log
- Shipping Carrier Logs
  - Cleanliness of trucks
- NUOCA Logs
  - Unusual Occurrence and Corrective Action Logs
- Harvest Operations Checklist
  - Bathrooms in field
- Delivery Receiving Logs
- Verification of Gauges Logs

CHARTS – Comments from Fifer's

- Document and Log Almost EVERYTHING!
  - You should have dozens of charts to mark off to show that you did what you did.
- Food Safety Inspectors will spend much/most of their time looking at your paperwork and records.



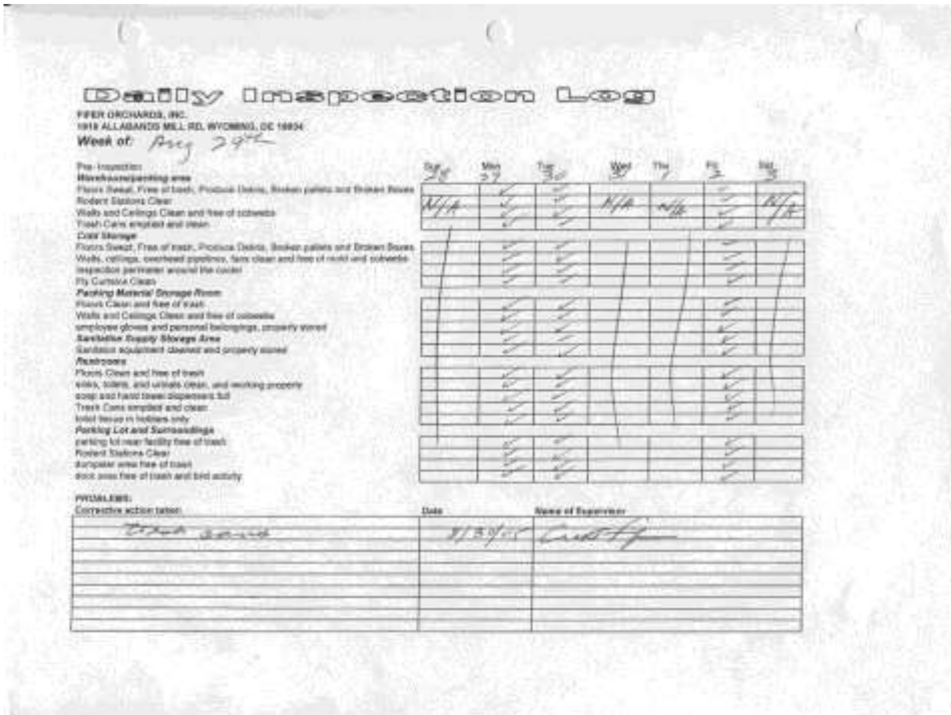
Cold Storage Monitoring Log

FIFER ORCHARDS, INC.
1919 ALLABANDS MILL RD, WYOMING, DE 19934

Supervisor should check and record finished product storage temperatures at the frequency specified. The temperature is to be from 32 - 39 degrees F storage temperature. If it is not, reset thermostat unit, hold and inspect product for temperature abuse, evaluate, release or reject. Register in NUCA Log deviations and/or corrective actions.

Date	Time	Temp	Initials	Date	Time	Temp	Initials	Date	Time	Temp	Initials

Supervisor Verification
Initials and Date



Daily Inspection Log

FIFER ORCHARDS, INC.
1919 ALLABANDS MILL RD, WYOMING, DE 19934

Week of: Aug 29th

Pre-Inspection

Warehouse/packing area
Floors Swept, Free of trash, Produce Debris, Broken pallets and Broken Boxes
Rodent Stations Clear
Walls and Ceilings Clean and free of cobwebs
Trash Cans emptied and clean

Cold Storage
Floors Swept, Free of trash, Produce Debris, Broken pallets and Broken Boxes
Walls, ceilings, overhead pipelines, fans clean and free of mold and cobwebs
inspection perimeter around the cooler
Fly Curtains Clean

Packing Material Storage Room
Floors Clean and free of trash
Walls and Ceilings Clean and free of cobwebs
employee gloves and personal belongings, properly stored

Sanitation Supply Storage Area
Sanitation equipment cleaned and properly stored

Restrooms
Floors Clean and free of trash
sinks, toilets, and urinals clean, and working properly
soap and hand towel dispensers full
Trash Cans emptied and clean
toilet tissue in holders only

Parking Lot and Surroundings
parking lot near facility free of trash
Rodent Stations Clear
dumpster area free of trash
dock area free of trash and bird activity

PROBLEMS:

Corrective action taken	Date	Name of Supervisor
[illegible]	[illegible]	[illegible]

Educational Area VII. GAP and GHP Third Party Audits

- Educate about third party audit program
  - Why audits are needed
    - Wholesale buyers
    - Government buyers
  - Who does the audit
    - Private companies
    - USDA
  - What happens in an audit
    - Announced
    - unannounced
  - Keys to passing an audit

USDA Good Agricultural Practices & Good Handling Practices
Audit Verification Checklist

USDA

This program is intended to assess a participant's efforts to minimize the risk of contamination of fresh fruits, vegetables, nuts and miscellaneous commodities by microbial pathogens based on the U.S. Food and Drug Administration's "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables."

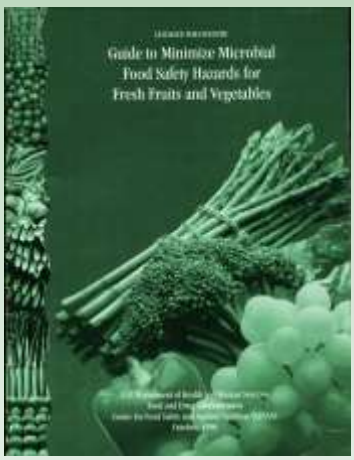
Firm Name:
Contact Person:
Audit Site:
Main Address:
State: Zip: Telephone No:
Fax: E-mail:
Auditor(s): (list all auditors with the lead listed first)
USDA or Fed-State Office performing audit:
Date & Time Arrived: Date & Time Departed:
Travel Time: Code:
Person(s) Interviewed: (use back of sheet if necessary to list all persons interviewed)

What is the USDA GAP & GHP Audit Program?

- Established at industry request
  - Retailers began requiring suppliers to meet FDA's GAP & GHP, and Good Manufacturing Practices (GMP).
- Voluntary, competitively priced user fee
- Verifies participant's efforts to minimize microbial hazards in fresh fruits and vegetables

GAP & GHP Audit Program

- USDA's Audit program is based on established scientific principles and utilizes the Food Drug Administration's (FDA) guidance document
- Published in October 1998



Additional FDA Guidance Documents

- Fresh Cut Fruits & Vegetables
- Lettuce & Leafy Greens
- Melons
- Fresh Tomatoes

- To obtain copies of FDA guidance documents:

  http://www.fda.gov

GAP & GHP Audit Program

- USDA works closely with:
  - Other USDA Programs such as the Agricultural Research Service
  - Academia; specifically the National Good Agricultural Practices Program based at Cornell University

    http://www.gaps.cornell.edu
  - Association of Fruit and Vegetable Inspection and Standardization Agencies (AFVISA)
  - Association of Food and Drug Officials (AFDO)

GAP & GHP Program

At the request of individual commodity groups, commodity specific audit checklists have been developed for use based on established industry best practices.

- Leafy Greens
- Tomatoes
- Mushrooms



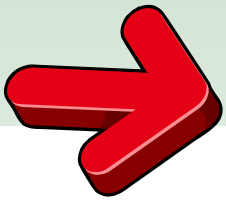
GAP & GHP Program

- USDA GAP & GHP audits are a requirement for all fresh fruit and vegetable purchases by the USDA, AMS, Commodity Procurement Branch. These purchases typically go into the domestic feeding programs such as the school lunch program.

USDA United States Department of Agriculture
Food and Nutrition Service

GAP & GHP Program

- Program covers entire production chain "farm to fork" and is broken down into 6 sections or "scopes".
- Optional food defense scope.


General Questions

- Mandatory component of all audits
- Covers employee & visitor hygienic practices
- Training of employees
- Sanitation of farm/facility



Good Agricultural Practices Scopes

- Part 1 - Farm Review
  - Water
  - Manure
  - Animal/Wildlife
  - Land Use

Good Agricultural Practices Scopes

- Part 2 - Field Harvest and Field Packing
  - Field Sanitation
  - Field Harvesting and Transportation

Good Handling Practices Scopes

- Part 3 - House Packing Facility
  - Water use
  - Packing Line Operation
  - General Sanitation

Good Handling Practices Scopes

- Part 4 - Storage and Transportation
  - Containers and Pallets
  - Pest Control
  - Temperature Control
  - Transportation/Loading

Good Handling Practices Scopes

- Part 6 Wholesale Distribution Center/Terminal Warehouses

Traceback

- Part 5 Traceback
- Part 6a Traceback for Wholesale Distribution Center
  - Track produce containers from the farm, to the packer, distributor, and retailer
  - Should indicate date of harvest, farm identification, and who handled the produce

Prerequisites

- Must have implemented a food safety program (Question G-1).
- Must have a designated person(s) to oversee implementation of program (Question G-2).

Passing Score

- Must achieve a minimum passing score of 80% for each scope audited in order to "pass" the audit.
- Five automatic unsatisfactory conditions
  - Immediate food safety risk is present when product is grown, processed, packed, or held under conditions that promote or cause the product to become contaminated

Program Requirements

- Agreement between auditee and USDA
  - Allows for unannounced verification visits
  - Outlines expectations for each party
  - Must be signed before audits can commence

Program Requirements

- Unannounced verification visit.
  - 1 announced yearly audit as close to beginning of season as practical.
  - At least 1 unannounced verification visit performed sometime during the remainder of 12 month cycle.

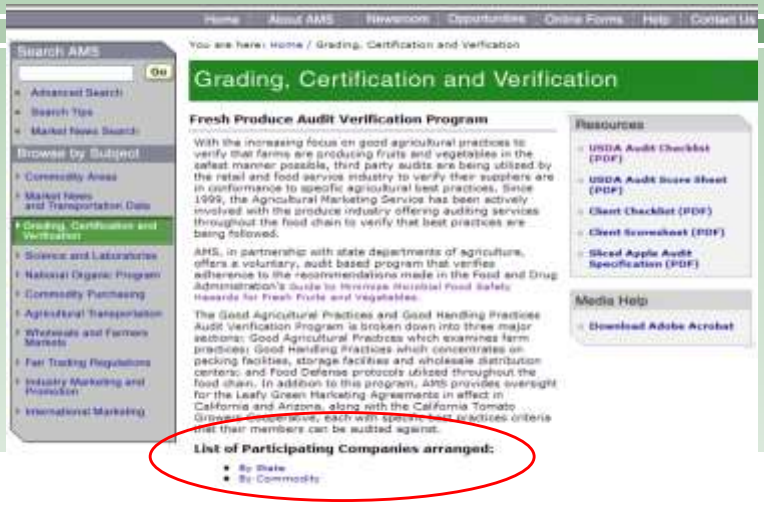
Program Requirements

- Corrective Actions
  - Any audit that does not meet minimum score or has an automatic unsatisfactory must file corrective action report before being re-audited.
    - Short term
    - Root cause

Website

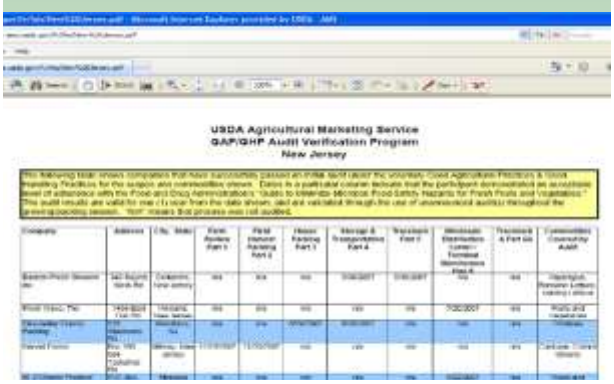
- **Program information**
- **Current audit checklist and score sheet**
- **Specific audit specifications**

http://www.ams.usda.gov/gapghp



Website shows farms & facilities that have successfully passed an audit. It is broken down by state and commodity.

Website



Downloadable .pdf files for each commodity/state showing individual farm/facilities and the audit scopes.

Website Posting

- Auditee must pass all scopes requested in order to be posted to USDA website.
- Any auditee which does not meet a passing score on an unannounced verification visit will be removed from the website until corrective actions are taken and re-audited.

Requesting an Audit

Contact your local USDA or state inspection office

Delaware Dept. of Agriculture

302-698-4544

USDA Fresh Products Branch in Washington DC

(800) 560-7956

USDA Good Agricultural Practices & Good Handling Practices
Audit Verification Checklist

This program is intended to assess a participant's efforts to minimize the risk of contamination of fresh fruits, vegetables, nuts and miscellaneous commodities by microbial pathogens based on the U.S. Food and Drug Administration's *"Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables."*

Firm Name: _____

Contact Person: _____

Audit Site(s): _____

Main Address: _____

State: _____ Zip: _____ Telephone No: _____

Fax: _____ E-mail: _____

Auditor(s): (list all auditors with the lead listed first) _____

_____

USDA or Fed-State Office performing audit: _____

Date & Time Arrived: _____ Date & Time Departed: _____

Travel Time: _____ Code: _____

Person(s) Interviewed: (use back of sheet if necessary to list all persons interviewed) _____

_____

_____

General Questions

Implementation of a Food Safety Program

	Questions	Points	YES	NO	N/A	Doc
G-1	A documented food safety program that incorporates GAP and/or GHP has been implemented.	15				D
G-2	The operation has designated someone to implement and oversee an established food safety program. Name _____	15				D

Worker Health & Hygiene

	Questions	Points	YES	NO	N/A	Doc
G-3	Potable water is available to all workers.	10				D
G-4	Training on proper sanitation and hygiene practices is provided to all staff.	15				D
G-5	Readily understandable signs are posted to instruct employees to wash their hands before beginning or returning to work.	10				
G-6	Employees are required to wash their hands before beginning or returning to work.	10				D
G-7	All employees and all visitors to the location are required to follow proper sanitation and hygiene practices.	10				D
G-8	Employees and visitors are following good hygiene/sanitation practices.	15				
G-9	All toilet/restroom/field sanitation facilities are clean. They are properly supplied with single use towels, toilet paper, and hand soap or anti-bacterial soap and potable water for hand washing.	15				
G-10	All toilet/restroom/field sanitation facilities are serviced and cleaned on a scheduled basis.	10				D
G-11	Smoking and eating are confined to designated areas separate from where product is handled.	10				
G-12	Workers with diarrheal disease or symptoms of other infectious disease are prohibited from handling fresh produce.	15				D

Part 2 - Field Harvest and Field Packing Activities

Field Sanitation and Hygiene

	Questions	Points	YES	NO	N/A	Doc
2-1	The number, condition, and placement of field sanitation units comply with applicable state and/or federal regulations.	10				
2-2	If field sanitation units are not used and are not required by applicable state or federal regulations, a toilet facility is readily available for all workers.	15				
2-3	Field sanitation units are located in a location that minimizes the potential risk for product contamination and are directly accessible for servicing.	10				
2-4	In the event of a major spill or leak of field sanitation units or toilet facility, a response plan is in place, and field sanitation units or toilet facilities are directly accessible for the response team.	10				D

Field Harvesting and Transportation

	Questions	Points	YES	NO	N/A	Doc
2-5	All harvesting containers (including bulk hauling vehicles) that come in direct contact with product are cleaned and/or sanitized prior to use and kept as clean as practicable.	5				D
2-6	All hand harvesting implements (knives, pruners, machetes, etc.) are kept as clean as practical and are disinfected on a scheduled basis.	5				D
2-7	Damaged containers are properly repaired or disposed of.	5				
2-8	Harvesting equipment and/or machinery which comes into contact with product is in good repair.	10				
2-9	Light bulbs and glass on harvesting equipment are protected so as not to contaminate produce or fields in the case of breakage.	10				

Good Agricultural Practices & Good Handling Practices Systems Audit Scoresheet

USDA GAP & GHP website: http://www.ams.usda.gov/gapghp

Facility Name (Print) as it Should Appear on Certificate:

Street Address (Print): | City (Print): | State (Print): | Zip:

Date Audit Requested: | Date Audit Began: | Date Audit Completed:

Date of Previous USDA GAP/GHP audit: | Time Audit Began: | Time Audit Completed:

EVALUATION ELEMENTS

Scope Requested	Element	Possible Points	Less N/A Points	Adjusted Points	Packing Score	Facility Score	Pass/Fail	Date Passed	General Questions	Reviewing Official	Un-announced
	General Questions	100									
	Part I – Farm Review	160									
	Part 2 – Field Harvesting & Field Packing Activities	130									
	Part 3 – House Packing Facility	300									
	Part 4 – Storage and Transportation	100									
	Part 5 – Traceback	100									
	Part 6 – Wholesale Distribution Center/Terminal Warehouse	100									
	Part 6-A Traceback	80									
	Part 7 – Preventative Food Security Procedures	130									

*A Passing Score is 80% of the Possible Points or the Adjusted Points, if adjustment is necessary. Part 7 results will not get posted on USDA website.

Commodities Reviewed (Print):	Commodity									
	Acres:									

Lead Auditor Name: (Print Name and Office) _____ (Sign) _____

Reviewing Official Name/Signature: (Print) _____ (Sign) _____

Facility Representative Sign: _____ Date: _____ ALL SCOPES COMPLETED _____

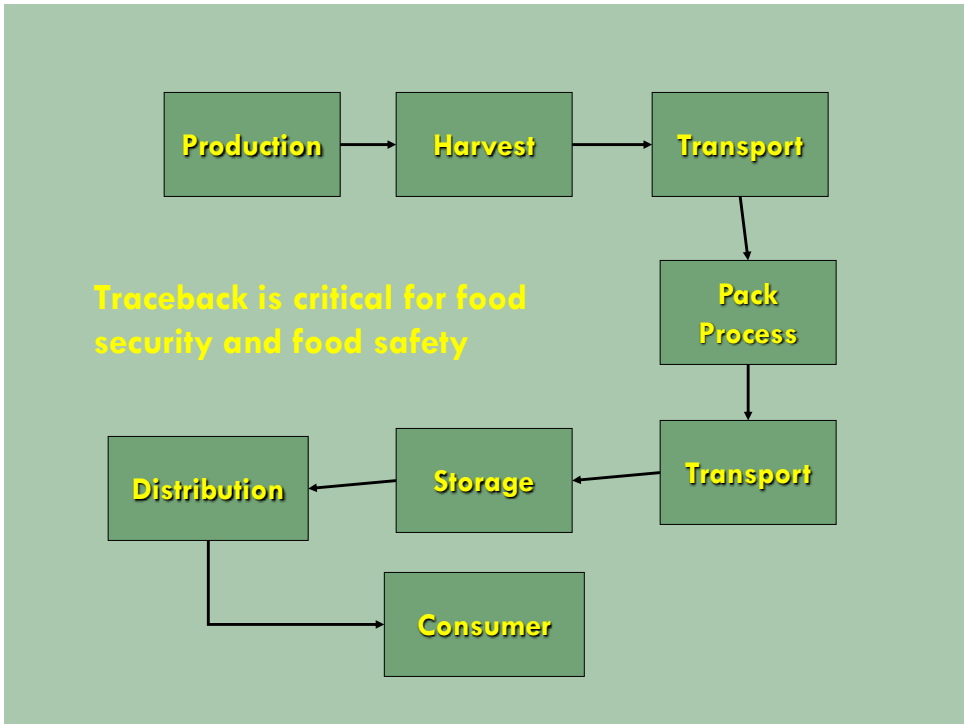
By signing this form, the facility representative agrees to have company information posted to the USDA website. A company will only be listed on the USDA website upon all scopes audited receive a passing score.

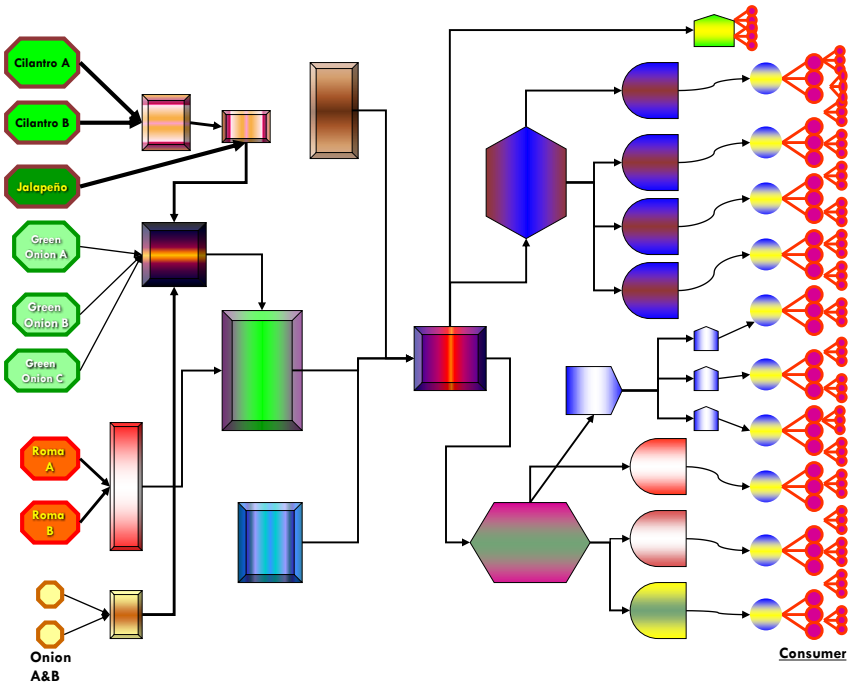
For USDA HQ use: Date Audit Received: _____ Date Certificate Mailed: _____ Date Posted to USDA Website: _____

To verify a company's continued good standing in the USDA GAP/GHP Program Please visit: http://www.ams.usda.gov/gapghp

Revised July 16, 2008
USDA, AMS, FVP, TPB For Official Government Use Only


TRACEBACK


Production
Harvest
Transport
Pack Process
Transport
Storage
Distribution
Consumer
Traceback is critical for food security and food safety



Positive Lot Identification, Tracking, and Traceback

The GS1 standards

- Used in 145 countries worldwide, by more than 2 million companies in over 25 industries
- Already used by every retail operation using a UPC on packaged goods

CASE label

What is being asked of industry

1. Brand owners get GS1 Company Prefix: **Q1 2009**
2. Brand Owners assign 14-digit GTINs to all case configurations: **Q1 2009**
3. Brand Owners provide and maintain their GTINs (and corresponding data) to their buyers: **Q3 2009**
4. Case packers provide human-readable information on each case (GTIN and Lot #): **Q3 2010**


CABBAGE