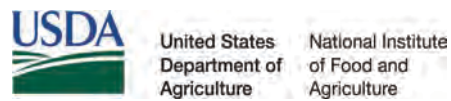


# Fresh Produce Good Agricultural Practices Workshop Series





# Fresh Produce Good Agricultural Practices Workshop Series

## ***3 Part Series: Principles of Fresh Produce Safety Navigating the USDA GAP Audit Food Safety Program and Plan Development***



Funding for the presentation of the Fresh Produce Good Agricultural Practices Workshop Series was made possible by NC Growing Together, a Center for Environmental Farming Systems initiative supported by the National Institute of Food and Agriculture, U. S. Department of Agriculture, under award number 2013-68004-20363. <http://www.ncgrowingtogether.org>



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This publication was developed by N.C. Cooperative Extension at the Plants for Human Health Institute.



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# About this Manual

## **Development:**

The Fresh Produce Good Agricultural Practices Workshop Series was created as a training tool to educate growers about food safety on the farm, explain the audit process, and assist in the creation of a food safety plan.

## **The workshop series consists of the following components:**

### **Principles of Fresh Produce Safety**

- Four-hour on-farm training covering nine modules. These modules include an introduction to food safety, land, worker health and hygiene, restroom and sewage, water, animals, manure, harvesting and packing equipment and containers, and traceability.

### **Navigating the USDA GAP Audit**

- Four-hour classroom session presenting an overview of what to expect during a USDA GAP Audit inspection with review of the General, Part 1, and Part 2 sections of the USDA GAP audit.

### **Food Safety Program and Plan Development**

- Seven-hour computer lab session offering an introduction to writing a food safety plan. Participants will actively write their food safety plans during the workshop.

### **Follow-Up**

- This optional component allows farmers to receive feedback on their food safety plans. Growers have the option of submitting their food safety plan electronically for review or contacting instructors to receive a one-on-one on-farm follow-up.

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# Part 1: Principles of Fresh Produce Safety

Presentation material for Principles of Fresh Produce Safety was developed and adapted from:

*N.C. MarketReady Fresh Produce Safety - Field to Family Good Agricultural Practices (GAPs) Training Initiative by Diane Ducharme (Project Coordinator and contributing author), Keith Baldwin, Leah Chester-Davis, Ted Feitshans, Mary Helen Ferguson, Ipek Goktepe, Garry Grabow, Chris Gunter, Natalie Hampton, Cathy Hohenstein, Jimo Ibrahim, Andrew Kennedy, Billy Little , Maria Noriega, Trevor Phister, Rod Rejesus and Dee Shore.*


This publication was developed through grants from the Sustainable Agriculture Research and Education Professional Development Program Grant (SARE), the N.C. Tobacco Trust Fund Commission, and the Risk Management Agency.

The creation of module *Harvesting and Packing Equipment and Containers* was created by Katie Baros and Diane Ducharme.





**Introduction to Fresh Produce Safety**



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**Learning Objectives**

- Develop an understanding of food-borne illness and the agents associated with produce
- Distinguish the concepts of Good Agricultural Practices (GAPs)



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**Topics**

- Challenges associated with fresh produce
- Pathogens of concern
- Good Agricultural Practices



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**Why Is Produce a Risky Food?**

- Each person consumes about 20 pounds more fresh produce today compared to two decades ago.
- Fresh produce is increasingly imported.
- Pathogens not previously associated with fresh produce (e.g., *Escherichia coli* O157:H7, *Salmonella*, Norovirus) have emerged.
- The distribution chain of produce is much different than 25 years ago:
  - Produce now comes from all over the world – it's not limited by seasonality.
  - Better packaging technology is available, with more "fresh-cut" options.

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**Challenges Associated with Fresh Produce**

- Contamination persists from farm to fork
- Educating produce handlers and consumers
- Fresh produce often consumed raw - no kill step
- Outbreaks of food-borne illness challenge production methods and economics of fresh produce industry

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**Food-borne Illnesses**

- Each year, about 48 million cases of food-borne illnesses result in an estimated
  - 128,000 hospitalizations
  - 3,00 deaths
- Recent study suggested that produce-related illnesses accounted for the largest number of cases (29%)
- Costs associated with food-borne illness
  - \$78 billion in health care expenses
  - Lost productivity
  - Reduced quality and loss of life

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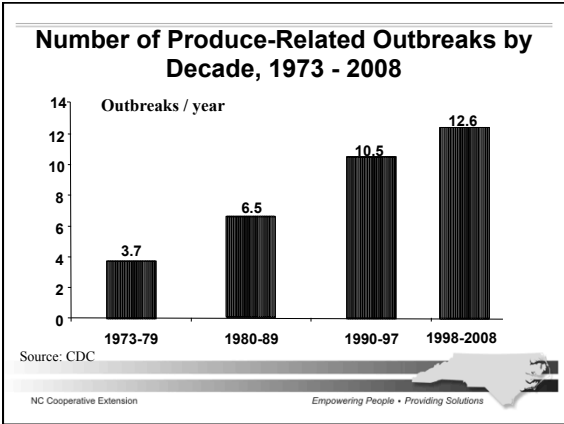
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### Produce-Associated Outbreaks Affect Business

- Bagged spinach outbreak of *E. coli* O157:H7 in September 2006 resulted in 276 illnesses, 3 deaths, and cost \$350 million in lost sales in the first year.
- Strawberry industry lost an estimated \$50 million in 1996 after mistakenly being indicated as the source of pathogens in an outbreak.
- Apple juice (Odwalla Inc.) shareholder value dropped approximately 41 percent (\$12.4 million) in six months after *E. coli* O157:H7 outbreak in 1996.

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### Pathogens of Concern

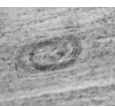
- Pathogen: an organism that causes infection and/or disease
  - Bacteria: Single-celled organisms that live independently
  - Viruses: Small particles that live and replicate in a host
  - Parasites: Intestinal worms or protozoa that live in a host



Viruses



Bacteria



Parasites

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## Pathogens Associated with Fresh Produce

- *E. coli* O157:H7
- *L. monocytogenes*
- *Salmonella* spp.
- *Shigella* spp.
- *Vibrio cholerae*
- *Bacillus cereus*
- Hepatitis A
- *Cyclospora*
- *Cryptosporidium*

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## Where Do Pathogens Normally Live?

- Pathogens are present all around us
  - Soil
  - Human and animal intestinal tracts



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## How Do Pathogens Get Transferred?

- Human-to-human/produce contact
- Human-to-soil contact
- Soil-to-produce contact
- Container/equipment-to-soil contact
- Contaminated water contact
- Improper sanitation
  - Oral-fecal contact
  - Produce-fecal contact

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**Good Agricultural Practices**

- Good Agricultural Practices (GAPs) are the basic environmental and operational conditions, and the growing and harvesting practices, necessary to safely produce wholesome fruits and vegetables

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**Principles of Good Agricultural Practices**

1. Prevent microbial contamination
2. Start program of GAPs
3. Human/animal feces
4. Water
5. Animal manure
6. Worker hygiene/sanitation
7. Follow all applicable laws
8. Traceability/recordkeeping/documentation

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**Course Topics**

- This course is designed to give you an introduction to the principles of fresh produce safety
  - Land
  - Worker Health and Hygiene
  - Restroom and Sewage
  - Water
  - Animals
  - Manure
  - Harvesting and Packing Equipment and Containers
  - Traceability

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**Land**



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**Learning Objectives**

- Recognize hazards associated with previous land use and take action to mitigate risks
- Identify potential hazards on adjacent properties
- Understand risks associated with flooding and take action to mitigate risks



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**Topics**

- Land use history
- Adjacent properties
- Flooding
- Site Selection
- Recordkeeping



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## Land Use History

- Previous land use will affect what contamination risks might be present in soil and waterways
- Conduct a site evaluation to determine what hazards may be present
  - Gather a history of the land dating back at least 5 years

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## Site Evaluation

- Has the site been exposed to activities or conditions in the past that might have resulted in contamination?
  - Was the land previously used for farming, livestock operations, sewage treatment facilities, or as a landfill?
  - Potential site contaminants include microbial hazards such as manure and flooding, and non-microbial hazards such as hazardous chemicals and heavy metals.

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## Potential Contamination

- If it is determined contamination may have occurred in the past, take action to mitigate potential risk
  - Test soil for contamination
    - Soil should be tested for fecal bacteria, heavy metals and chemical contamination
    - Use land for cover crop or crops with minimal contact with soil until soil tests show contaminant levels below safe threshold levels

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## Adjacent Properties

- Adjacent properties may have an effect on crop production areas
- Is adjacent land being used for purposes that might result in contamination of crop land?
  - Potential risks include livestock operations, sewage treatment facilities, and landfills

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## Risk of Runoff

- If crop production areas are located downhill from a potential source of contamination, proactive steps to mitigate runoff must take place
  - Can include ditches, berms, relocation of crop production areas, and additional water testing

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## Flooding



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## Flooding

- Because floodwaters may contain potential contaminants, the FDA (Food and Drug Administration) considers crops where the edible portion has come into contact with floodwaters to be adulterated and are not to be sold for human consumption
  - FDA Flood Guidance:  
<http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/EmergencyResponse/ucm287808.htm>

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## Flooding

- If crop production areas have been flooded it is important to consider:
  - Floodwaters may contain contaminants such as raw manure or feces, agricultural chemicals, fuel, heavy metals, other chemical contaminants, and microbial contaminants such as bacteria, viruses, and parasites
  - Water from heavy rainfall that pools on surface of saturated soils is NOT considered flooding

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## What to do in Case of Flooding

- If your land has been flooded, evaluate the following:
  - Assessment of flood water
  - Types of crops and stage of growth
  - The likelihood for crops to absorb/internalize contaminants
  - Degree/duration of crop exposure
  - Soil should be tested for possible contaminants (mycotoxins, heavy metals, human pathogens, pesticides, etc.)
- ❖ Refer to FDA Flood Guidance for more information

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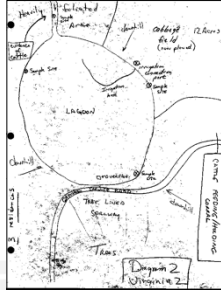
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## Site Selection



Farm layout



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## Site Selection

- In evaluating a site, the grower should consider the past uses of the particular site as well as current and possible future uses of adjacent land
- Growers should also consider topography in order to determine where drainage from other areas into water sources or produce fields may be a problem
- Creating a farm map will help identify potential hazards

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## Recordkeeping

- Keep a record of previous land use dating back at least 5 years
- Document any soil testing
- Keep a current map of farm with fields, buildings, and adjacent properties labeled
- Record any unusual events such as flooding noting the date, fields/product involved, and any corrective actions taken

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## References

- N.C. MarketReady. 2009. Fresh Produce Safety Field to Family Good Agricultural Practices (GAPs) Training Initiative V.2. <http://ncfreshproducesafety.ncsu.edu/agent-resources/good-agricultural-practices-gaps-training-curriculum/gaps-training-curriculum-tier-1-version-2>
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- U.S. Food and Drug Administration. 2011. Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption <http://www.fda.gov/food/guidancecomplianceregulatoryinformation/guidancedocuments/fooddefenseandemergencyresponse/ucm274683.htm>.

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# Worker Health and Hygiene



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## Learning Objectives

- Understand importance of worker health and hygiene on the farm
- Recognize proper health and hygiene practices
- Identify common symptoms of food-borne illness
- Be able to conduct effective health and hygiene training with employees and visitors



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## Topics

- Proper health and hygiene
- Hand washing procedures and glove use
- Illness and injuries
- Health and hygiene policies
- Training employees and visitors



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**Importance of Proper Hygiene**

- There is a direct link between poor personal hygiene and food-borne illness
- Poor hygiene is one of the three major causes of contamination on the farm
  - Other two causes related to water and manure

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**What is Proper Health and Hygiene?**

- Proper hand washing
- Proper glove use
- Personal physical appearance
- Proper produce handling
- Proper employee health policies

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**Hand Washing**

- Hands can be a major source of pathogens
  - Hands are the part of the body most exposed to micro-organisms because they touch many things every day
- Proper hand washing can reduce contamination and the spread of bacteria



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**When Should Hands be Washed?**

- Before beginning or returning to work
- After each restroom visit
- Before and after eating/smoking/other breaks
- After other activities not including produce handling
- Any time hands become dirty

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**Proper Hand Washing Procedures**

1. Remove any jewelry
2. Using running, potable water
3. Use soap
4. Lather hands, wrists, and fingers
5. Don't forget to scrub thumbs, under nails, and in-between fingers
6. Wash hands for 20 seconds
7. Fully dry hands with disposable paper towel

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**Glove Use**

- Wearing gloves should not take the place of proper hand washing
- Only single-use gloves should be worn
- Especially useful to cover injuries
- Gloves should be replaced on the same schedule as hand washing
- Must be discarded, hands washed, and new gloves changed each time the wearer needs to wash hands

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## Hand washing facilities

- Hands should be washed with potable water
- Each hand washing station should be equipped with the following
  - Basin
  - Water
  - Liquid soap
  - Single-use towels
  - Waste container
- Waste water should not be allowed to run off into crop production areas

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## Good Hygiene Practices

- Employees should come to work having showered and put on clean clothing
- Hair nets or ball caps
- Clean aprons
- Employees should refrain from wearing jewelry aside from a plain wedding band

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## Worker Illness

- Sick farm workers increase the risk of contaminating produce on the farm
  - Employees exhibiting symptoms of diarrheal disease or other food borne illness should be prohibited from working with produce
- Workers may come to work sick due to lack of sick pay, sick leave, lack of health insurance, etc.
  - It is important to understand the circumstances of farm workers

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## Worker Illness Continued

- Farm workers' health should be checked daily and employee illness recorded
  - Policies should be in place to encourage workers to report illness

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## Signs of Sudden Illness

- Changes in consciousness
- Nausea or vomiting
- Difficulty speaking or slurred speech
- Numbness or weakness
- Loss of vision or blurred vision
- Changes in breathing
- Changes in skin color
- Sweating
- Persistent pressure or pain
- Diarrhea
- Seizures
- Paralysis or inability to move
- Severe headache

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## Accidents and Injuries

- Accidents and injuries can increase risk of contamination from one person to another and from humans to produce
- Can also cause loss in productivity due to down time or lost days of work
- Establish health and safety policies to protect workers and produce

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## Treatment of Injuries

- Employees should seek prompt treatment with first aid supplies if they suffer injuries
- Wounds should be cleaned and treated to prevent infection and covered with a bandage and a glove if necessary before returning to work
- A fully stocked first aid kit should be kept in an area that is quickly and easily accessible by employees
  - Check American Red Cross recommendations about what should be kept in first aid kits

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## Produce in Contact with Bodily Fluids

- In the case of illness or injury, blood or other bodily fluids may contact produce or produce contact surfaces
- Policies should be in place to describe proper disposal or cleaning and sanitation of area

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## Employee Breaks

- Employee break areas should be separate from crop production areas and clearly designated
- Potable water should be provided for employees at all times
- Employees should not eat, drink, smoke, or chew tobacco in the field or when handling produce

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### Application of Pesticides or Chemicals

- Policies should be in place describing the use of pesticides and chemicals
- In order to protect employees' health, only trained or licensed individuals should apply pesticides or chemicals

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### Health and Hygiene Policies

- Growers should create health and hygiene policies and procedures addressing personal hygiene and hand washing, glove use if applicable, illness, accidents and injuries, produce in contact with bodily fluids, employee breaks/eating/drinking/smoking, and application of pesticides or chemicals
- Once these policies are established, employees should be trained on proper procedures

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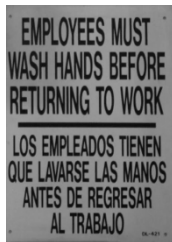
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### Health and Hygiene Policies Continued

- Signage in the appropriate languages should be placed around the property to remind employees of health and hygiene procedures
  - Hand washing signs are required



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## Training Employees

- Educate employees about:
  - Importance of good hygiene and hand washing
  - Proper hand washing technique
  - When to wash hands
  - First aid procedures
  - Proper use of restroom facilities
  - Illness/injury procedures
  - Policy on taking breaks and eating
  - Application of pesticides or chemicals

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## Training Methods

- Training can be in the form of
  - Formal presentations
  - Videos
  - Demonstrations
  - One-on-one instruction
- Training should be documented and kept on record
  - Can be useful to require employees to take a test to demonstrate their knowledge of the training. The tests may also serve as a record of training.

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## Visitors

- Any visitors to the farm that come into contact with produce must follow the same policies as employees
- Utilize signage, brochures, and short training sessions to ensure visitors are following policies and procedures

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## Recordkeeping

- Written health and hygiene policies addressing personal hygiene and hand washing, glove use if applicable, illness, accidents and injuries, produce in contact with bodily fluids, and employee breaks/eating/drinking/smoking
- Logs of employee illness and injury
- Log indicated first aid kits are checked and stocked on a scheduled basis
- Records of bodily fluid in contact with produce
- Records of employee training
- Records of visitors to farm

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## References

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# Restroom and Sewage



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## Learning Objectives

- Understand rules and regulations pertaining to restrooms and sewage facilities
- Recognize importance of keeping restroom facilities clean and properly stocked



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## Topics

- Restrooms and hand washing facilities
- Rules and regulations
- Cleaning and stocking
- Restroom etiquette
- Portable facilities and sewage disposal
- Recordkeeping



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### Restroom and Hand Washing Facilities

- Restrooms and hand washing stations must be provided for employees
- Employees should be able to use the restroom at any time, not just during a break
- Farm managers should communicate to farm workers the dangers surrounding urination or defecation in the woods near production fields

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### N.C. Department of Labor Laws and Regulations Governing Toilet Facilities

- Adequate number
- Accessible
- Ventilated
- Separate from sleeping areas
- Separated by sex and properly marked
- Well-lighted
- Adequately supplied
- Sanitary



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### OSHA Regulations

- According to OSHA regulations, one toilet facility and one hand washing facility shall be provided for each 20 employees
- Facilities shall be located within a one-quarter-mile walk of each hand laborer's place of work

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## Cleaning and Stocking

- Restroom facilities and hand washing stations must be cleaned or serviced on a scheduled basis
- Must be properly stocked at all times with toilet paper, hand soap, single-use towels, and potable water for hand washing
- Records should be kept indicating these activities

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## Restroom Etiquette

- Employees should be trained on proper restroom etiquette



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## Restroom Etiquette Cont.

- In some Latin American countries, it is not possible to flush toilet paper because it would clog the toilet. As a result, people put soiled toilet paper in the trashcan.
  - Remove trash cans from stall areas and only place them in hand washing areas
  - Use educational posters to reinforce flushing paper
  - Supervisors check to ensure workers are following proper procedures

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## Sewage Disposal

- Improper disposal of human waste from toilets could lead to contamination of water, soil, animals, crops, workers, or produce
- Sewage and waste water from hand washing stations should be contained and not allowed to run into production areas

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## Portable Restroom Facilities



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## Portable Restroom Facilities

- Portable restroom units should be located in an area that will minimize the risk of contamination
  - Response plan in case of major spill or leak
- Sanitation companies should be able to easily access and service units without having to go through production areas

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## Sewage Treatment Systems

- Farm sewage treatment/septic system should be functioning properly and not leaking



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## Recordkeeping

- Policies and procedures involving restrooms and sewage including schedule for cleaning and stocking of restroom and hand washing facilities and response plan in case of spill or leak of portable restrooms or toilet facilities
- Log of cleaning and stocking of restroom



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**Water**



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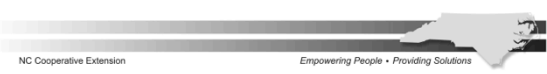
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**Learning Objectives**

- Recognize that water used in the production of fresh fruits and vegetables can be a source of pathogen contamination and dissemination
- Evaluate the risk levels associated with different water sources and irrigation systems
- Understand the importance of water testing



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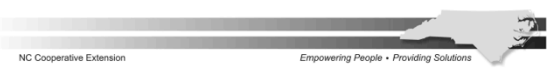
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**Topics**

- Water as a source of contamination
- Water on the farm
- Water testing
- Recordkeeping



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### **Water as a Source of Contamination**

- Water quality is the number one factor in the contamination of fresh produce
- Water may be a source of and vehicle for microbial pathogens
- Water can reach produce through a variety of means including water and wind flow, workers, vehicles or equipment, as well as through irrigation practices and pesticide or chemical applications

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### **Water Sources**

- Usually, water for agricultural use comes from
  - Surface sources such as ponds, rivers, streams, irrigation ditches, and canals
  - Wells (open or capped)
  - Municipal water systems

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### **Risk Levels Associated with Water Sources**

- Surface water is considered to be the most risky water source
  - Subject to various uncontrollable influences and should be considered non-potable
  - Grower has responsibility for testing
- Well water is less risky than surface water
  - May or may not be potable
  - Grower has responsibility for testing

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**Risk Levels Associated with Water Sources Continued**

- Municipal water is considered to be the least risky source
  - Regulated and required to be potable
  - Municipality has responsibility for testing

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**Ensuring the Safety of Water Sources**

- Surface water
  - Exclude animals from water source as well as from areas that drain into water source
  - Use physical barriers such as diversion berms or ditches to prevent runoff from potential sources of contamination
- Well water
  - Regularly check well casing and head
- Municipal Water
  - Obtain testing results from local authorities

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**Water Uses on the Farm**

- Irrigation (overhead and drip)
- Application of agricultural chemicals (pesticides or nutrient sprays)
- Frost protection
- Post-harvest handling processes
- Water for drinking and hand washing

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## Water Best Practices

- Prepare a water system description
- Test water sources prior to use of water in agricultural operations
- Use irrigation water in harvest operations that is of appropriate microbial quality for its intended use
- Test water as close to the point of use as practical
- Retain documentation of test results

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## Pesticide or Chemical Application

- Crops can become directly contaminated with pathogens if water used to mix pesticides is contaminated
  - Pesticides will not remove contaminants from water
  - Use potable water to mix pesticides
- Follow directions on pesticide label when applying pesticides to crops

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## Microbiological Testing Considerations for Agricultural Water

- Microbiological testing is used to track safety, not for daily monitoring activities
- Records become very important in the event of a microbiological outbreak investigation
- Document the frequency and results of each water test for comparison purposes
  - Changes may help identify problems

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## Water Testing

- Water should be tested for generic *E. coli*
- Test results should be quantitative (not positive/negative or present/absent)
- Recommended test is Colilert® method
  - Tests for generic *E. coli* and coliforms

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## Frequency of Water Testing

Water Source	Risk	Frequency of Testing
Municipal water	Low	Request testing results from local authorities
Well water	Medium	Annual test at the beginning of the season
Surface water	High	Water should be tested at minimum 3 times during the season (beginning, peak, and end)

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## Water Quality Considerations for Pre-harvest Irrigation

- Where edible portions of the crop ARE NOT contacted by water
  - Generic *E. coli* sample parameter
    - Acceptance criteria: Less than or equal to 126 MPN/100 mL (geometric mean of 5 samples)
    - Acceptance criteria: Less than or equal to 576 MPN/100 mL (for any single sample)

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**Water Quality Considerations for Pre-harvest Irrigation**

- Where edible portions of the crop ARE contacted by water
  - Generic *E. coli* sample parameter
    - Acceptance criteria: Less than or equal to 126 MPN/100 mL (geometric mean of 5 samples)
    - Acceptance criteria: Less than or equal to 235 MPN/100 mL (for any single sample)

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**Water Quality Considerations for Post-harvest Operations**

- Water in direct contact with produce should meet EPA MCLG (maximum contaminant level goal) microbial drinking water quality standards
  - Generic *E. coli* negative test or below detection limits
- Water that does not meet these standards should be disinfected
  - Chlorine most commonly used

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**How to Take a Water Sample**

- Contact your selected laboratory prior to collecting the sample to confirm
  - Sample delivery times
  - Collecting instructions
  - Pricing per sample
  - Testing methods available
- Collect samples in sterile containers provided by testing laboratory
- Do not rinse sample bottles prior to taking samples

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### Water Sampling Procedures

- Irrigation water samples
  - Run irrigation system for amount of time to flush "hold up" volume of the system plus additional 5-10 minutes
  - Collect samples from the sprinkler/drip system (not intake area)
- Post-harvest water
  - When collecting samples from the distribution system tap make sure to remove any attachments, such as aerators
  - Open tap fully and allow system to run for at least 10 minutes (or enough to flush "hold up" volume) before sample is taken
  - Slowly fill container to line as indicated and tightly cap container



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### Transporting Samples

- Sample should be delivered to laboratory as soon as possible
  - No longer than 24 hours after collection
  - Samples should be placed in cooler with ice or gel packs during transportation
- Check with specific lab for any additional procedures



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### Water Does Not Meet Acceptable Criteria

- If water exceeds EPA standards for contamination, do not use water from that water system, in a manner that directly contacts edible portions of the crop, until the water meets acceptable criteria
  - Switch to another source of water if possible, if no other source available, utilize root zone (drip) irrigation instead of overhead



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## Water Does Not Meet Acceptable Criteria Cont.

- Conduct an environmental survey to determine the cause of contamination
  - Check for cracks in well casing, faulty well seal, contaminated runoff, wildlife contamination, or some other impact
  - Take steps to mitigate these risks
  - If cause of contamination is not readily apparent, implement a more aggressive sampling program (i.e. weekly instead of monthly sampling)
- Retest the water as close to the source as possible and at the same sampling point as original sample

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## Improving Water Quality

- You can take specific mitigation steps to improve your water to meet water quality parameters
  - Filtration or use of disinfection practices
  - Sand filter will not remove bacterial contamination
- If water disinfection is necessary, contact local irrigation dealer for specific setup and costs
  - Most common method is chlorine disinfection based on time-released calcium hypochlorite tablets

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## Recordkeeping

- Written policies describing source of irrigation water and how crops are irrigated, frequency of water testing, and steps taken to protect water sources
- Results of all water tests performed on the farm
  - Irrigation water
  - Water for pesticides and/or chemicals
  - Water for drinking and hand washing
  - Post-harvest water

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**Animals**



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**Learning Objectives**

- Recognize animals in production areas as a potential source of contamination
- Identify methods for excluding animals from production areas



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**Topics**

- Animals as source of contamination
- Excluding animals from production areas
- Monitoring practices
- Recordkeeping



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## Animal Hazards

- Animal feces are a main source for pathogenic organisms
- Since animals are in contact with soil, manure, and water, they can easily pick up contaminants from these sources
- Wild animals in production fields can cause crop yield losses due to consumption and quality issues

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## Animals of Concern

- Wild animals
  - Deer, rabbits, birds, etc.
- Livestock
  - Cattle, horses, sheep, etc.
- Pets or working animals
  - Dogs, cats, etc.



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## Wild Animals

- Presence of wild animals in production areas must be monitored daily
- Potential management measures include
  - Fencing
  - Fish emulsion
  - Scare tactics such as noise cannons
  - Reflective tape
  - Modification of surrounding environment

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## Livestock



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## Livestock

- Prevent livestock, manure, and contaminated runoff from coming in contact with produce or irrigation water
  - Protect water with fencing, diversion ditches, and/or vegetative buffer if necessary
- A number of variables affect needed distance between animals and crop or water source
  - Safe distance varies due to farm topography, type of crop, etc.

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## Pets and Working Animals

- Keep pets out of field during growing season, using barriers as necessary
- Pets can bring not only their own waste, but pathogens from other sources they have contacted such as manure, water, and soil
- If working animals are used in production areas, must have a policy in place to deal with urine and feces



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## Evidence of Animals in Field



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## Evidence of Animals in Field

- If presence of animals is discovered in field (feces, tracks, consumption, etc.)
  - Animals should be removed from field
  - Areas of potential contamination should be sectioned off and should not be harvested
  - Animal exclusion practices should be evaluated and modified if necessary
- Produce with bird or other animal feces should not be harvested

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## Recordkeeping

- Written policies describing procedures for animal exclusion and dealing with animal presence in fields
- Daily log checking for animal presence in production areas

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**Manure**



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**Learning Objectives**

- Consider differing requirements for raw or composted manure
- Recognize proper storage, treatment, and application procedures



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**Topics**

- Hazards associated with manure use
- Storage
- Raw manure
- Composted manure
- Recordkeeping



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## Manure

- Valuable source of nutrients but potential source of pathogens
  - *Salmonella* and *E. coli* O157:H7
- Take measures to reduce risk when using manure

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## Best Management Practices

- Proper storage
- Thorough incorporation into the soil
- Maximize time between application and harvest
- Follow proper composting practices
- Keep record of application of material

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## Storage

- Store manure in an area where it or its runoff will not contaminate crops, irrigation water, finished compost, or other materials that are ready to go into the field
- Keep in mind manure can move by water or wind
  - Cover manure with shelter or tarp to prevent movement

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## Raw Manure

- Apply early, keeping nutrient concerns in mind
- Do not apply manure or manure-containing litter while edible part of plant is present

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## Raw Manure Application

- Incorporate into soil at least 2 weeks prior to planting OR a minimum of 120 days prior to harvest
  - Incorporation may reduce chance of contamination by soil splash and runoff into water sources
- Records of raw manure application should include dates of application and planting/harvesting dates of crops grown in that production area

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## Composted Manure

- Aged or composted manure is preferable to fresh manure as these processes can reduce pathogen numbers
- Manure treatment methods include
  - Aging (passive)
  - Composting (active)
  - Other active treatments such as pasteurization, heat drying, aerobic and anaerobic digestions, and alkali stabilization

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### **Manure Composting Methods: Passive (Aging)**

- To reduce pathogens, passive methods rely on
  - Time
    - Length of time varies based on regional and seasonal climate factors and type/source of manure
  - Natural temperature
  - Moisture fluctuations
  - Ultraviolet (UV) irradiation from the sun

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### **Manure Composting Methods Active**

- To reduce pathogens, active methods involve
  - Microbial action (aerobic and anaerobic) to digest organic material
  - High temperatures that kill off pathogens in days
  - Regular turning of compost pile to eliminate cold spots where pathogens can take refuge

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### **Composted Manure Guidelines**

- Composting guidelines often based on federal biosolids law (40CFR503)
  - At or above 131° F for at least 3 (within-vessel or static aerated pile) or 15 (windrow) days
  - Turned at least 5 times (windrow) only

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**Purchasing Composted Manure**

- If compost is purchased, obtain certificate of analysis showing
  - Results of heavy metals test
  - Less than 1000 MPN/g fecal coliform
  
- Ask for documentation that compost producer has quality control procedures

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**Composted Manure Application**

- Must be properly composted to reduce level of pathogens
  
- Maintain records of composting methods
  - Time charts for passive methods
  - Temperature charts for active methods
  - Analysis report if compost purchased

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**Manure and Compost Teas**

- No manure teas
  
- Compost tea safety dependent on compost used and protection from contamination

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## Recordkeeping

- Written policies describing manure use on the farm, manure storage, and composting methods if necessary
- Records of composting methods or analysis reports if compost is purchased
- Records of manure application including dates of application and planting/harvesting dates of crops grown in that production area

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- N.C. MarketReady. 2009. Fresh Produce Safety Field to Family Good Agricultural Practices (GAPs) Training Initiative V.2. <http://ncfreshproducesafety.ncsu.edu/agent-resources/good-agricultural-practices-gaps-training-curriculum/gaps-training-curriculum-tier-1-version-2>
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- U.S. Food and Drug Administration. 1998. Guidance for Industry: Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. <http://www.fda.gov/food/guidancecomplianceregulatoryinformation/guidancedocuments/produceandplantproducts/ucm064458.htm>.

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# Harvesting and Packing Equipment and Containers



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## Learning Objectives

- Understand proper cleaning and sanitation procedures for food contact surfaces, harvesting tools, and equipment
- Distinguish between cleaning and sanitizing
- Recognize good harvesting and transportation practices



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## Topics

- Pre-harvest assessment
- Food contact surfaces, equipment, and containers
- Cleaning vs. sanitizing
- Harvesting practices, storage, and transportation
- Recordkeeping



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## Pre-Harvest Assessment

- Before harvesting, an assessment is made of crop production areas noting risk and possible sources of contamination
  - Presence of wildlife
  - Flooding or other unusual events

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## Food Contact Surface

- A food contact surface is a surface that directly touches food and those surfaces from which drainage onto the food or onto surfaces that contact food ordinarily occurs during the normal course of operations
- Different types of food contact surfaces
  - Woods (porous materials)
  - Steel
  - Plastics

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## Equipment and Containers

- Equipment and containers are a food contact surface and can be a source of contamination for produce
- Policies should be in place to describe cleaning and sanitizing procedures

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## Equipment and Containers Best Practices

- Keep all equipment and harvesting containers that come into contact with produce as clean as possible
- Spoilage bacteria and pathogens can survive on surfaces that remain wet or where nutrients are readily available
- Plant material on surfaces will support growth of bacteria

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## Cleaning vs. Sanitizing

- Cleaning and sanitizing are not interchangeable terms
- Cleaning and sanitizing must occur on a regular basis and before food contact
- Cleaning must be performed before sanitizing for sanitizing to be effective
- Only potable water may be used for cleaning and sanitation

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## Cleaning

- Cleaning food contact surfaces means removing soil and residues
- Cleaning is a 3 step process
  1. Rinse away surface debris
  2. Wash and scrub with soap or detergent
  3. Rinse with clean potable water

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## Sanitizing

- Sanitizing is the process of treating a surface with a solution that will kill most microorganisms or reduce them to a non-harmful level
- For sanitizers to be effective, surfaces must first be cleaned
  - Soil and soap residues can make sanitizing solution less effective
- Follow label directions for proper use of sanitizer on defined food contact surfaces

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## Looking for Log Reduction

A log reduction is when the population of bacteria is reduced by 90%. If you have 1,000,000 bacteria and this is reduced to 100,000, then you have a 1.0 log unit reduction.

Number	Total Log Reduction	Percent Reduction
1,000,000	--	--
100,000	1	90%
10,000	2	99%
1,000	3	99.9%
100	4	99.99%
10	5	99.999%

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## Chemicals Used for Sanitizing

- Chlorine, as HOCl (most common, least expensive)
- Chlorine dioxide (e.g. Sanova, Oxine, Selectocide, etc.)
- Quaternary ammonia compounds (quat)
- Hydrogen peroxide
- Peroxyacetic acid (e.g. Tsunami)
- Ozone (not common, expensive)

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## Factors Affecting Sanitizer Effectiveness

- Water pH
- Sanitizer concentration
- Contact time
- Organic matter
- Water temperature
- Type of pathogen
- Type of food contact surface

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## Harvesting Tools

- Tools used for harvesting produce such as knives, scissors, pruning shears, etc. should be cleaned and sanitized after each use
  - Policy on cleaning and sanitation procedures
  - Make sure employees are trained
- Protect light bulbs or glass on equipment to prevent contamination in case of breakage
  - If breakage does occur, a policy should be in place describing how to deal with contamination

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## Harvesting Containers

- New or sanitized containers should be used for packing product
  - Clean and sanitize after each use
- Only reuse containers that are easily cleaned and sanitized such as reusable plastic containers (RPCs)
  - Do not attempt to wash and reuse cardboard/wax boxes



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**Harvesting Containers Continued**

- Make sure containers are in good repair
  - Broken containers can harbor pathogens, injure workers, or damage produce
- If harvesting containers are to be used for other purposes (e.g. trash) make sure they are properly marked as not used for harvesting

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**Harvesting Practices**

- Avoid contact between produce/harvesting containers and soil
  - Remove excess soil from produce/bins
- Avoid bruises or cuts to fruits or vegetables that may allow internal contamination
- Do not use surface water for field washing

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**Harvesting Practices Continued**

- Clean and sanitize equipment and containers after each use
- For mechanically harvested product, measures are taken to inspect for foreign object contamination



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## Storage

- When not in use, equipment and containers should be stored in an area protected from contamination
  - Containers should be stored inverted and covered with tarp or other material
  - Should not contact floor - use pallet or shelf
  - Do not store near hazardous chemicals

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## Transportation



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## Transportation

- Transportation equipment used to move produce from field should be clean and in good repair
  - Free from debris and washed on a regular basis
  - No oil or other leaks
- Harvested product must be covered during transportation to prevent contamination
  - Enclosed transportation vehicle or cover with tarp

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## Recordkeeping

- Policies describing cleaning and sanitation and storage of equipment, containers, and transportation vehicles
- Policies describing procedures for harvesting and transporting produce from field
- Policies on dealing with product contamination by physical or chemical contaminants
- Records of cleaning and sanitization frequency

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## References

- N.C. MarketReady. 2009. Fresh Produce Safety Field to Family Good Agricultural Practices (GAPs) Training Initiative V.2. <http://ncfreshproducesafety.ncsu.edu/agent-resources/good-agricultural-practices-gaps-training-curriculum/gaps-training-curriculum-tier-1-version-2>
- U.S. Food and Drug Administration. 2012b. USDA Good Agricultural Practices Good Handling Practices Audit Verification Checklist. <http://www.ams.usda.gov/AMSv1.0/getfile?DocName=STELPRDC3591326>
- U.S. Food and Drug Administration. 1998. Guidance for Industry: Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. <http://www.fda.gov/food/guidancecomplianceregulatoryinformation/guidancedocuments/produceandplantproducts/ucm064458.htm>.

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**Traceability**



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**Learning Objectives**

- Recognize the need for traceability on the farm
- Formulate a traceability program for the farm
- Understand procedures to conduct rapid and effective removal of foods from the marketplace (recall)



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**Topics**

- Traceability
- Creating lot numbers
- Recall
- Mock Recall
- Recordkeeping



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**What is Traceability?**

- Traceability is the ability to trace a product one step back (field) and one step forward (buyer)
  - Bioterrorism Act (2002) instructs FDA to require one-step-back and one-step-forward documentation
- Allows for product to be quickly identified and removed from distribution if implicated in event of microbiological, chemical, or physical contamination

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**Traceability on the Farm**

- Growers should be able to trace product back to the field from which it originated as well as to whom it was sold
- Important that each box of product identifies
  - Grower
  - Lot number (attached to harvest field)
  - Harvest/pack date

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**Lot Numbers**

- Lot numbers or lot codes are tied to production areas where the product is harvested and uniquely identifies crops as they move out of the field
- Growers may create their own system of lot numbering
  - May be a simple handwritten code or can involve sophisticated barcodes

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## Sample Lot Number

- STEP 1: Either put name on boxes or establish a two-digit code to identify the grower. These numbers remain the same from year to year.
  - For example: LT = Lester Tomatoes  
12 = A&B Packinghouse
- STEP 2: Establish a system to identify specific fields. The system the Farm Service Agency uses can be applicable here, specifying the farm and tract number.
  - For example: 4172T2

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## Sample Lot Number Continued

- STEP 3: Establish a system to identify each worker. This system could also be tied to the fiscal management of workers.
  - For example: 23 = harvester Mark Jones
- STEP 4: Establish a calendar for the year for the harvest pack date.
  - For example: June 2 = 0602

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## Sample Lot Number Continued

- STEP 5: This code should appear on every package containing produce from this shipment or batch.
  - Thus LT4172T223 0602 would mean
    - First set of digits: LT = grower
    - Second set of digits: 4172T2 = specific farm and field
    - Third set of digits: 23 = worker number
    - Last set of digits: 0602 = date of harvest

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## What is a Recall?

- Recalls are the procedures conducted to identify and recover potentially adulterated, misbranded, and/or hazardous foods from trade or consumer channels
- Voluntary actions by manufacturers
- FDA does have the authority to seize adulterated products or to acquire an injunction against distribution or may initiate recall process by informing firm that an adulterated product in commerce has been identified

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## Situations Prompting Recalls

- Allergens
- Bacterial/chemical contamination
- Communicable disease
- Company-generated information
- Foreign objects
- Illnesses identified by State Health Dept. or CDC
- In-house sabotage

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## Situations Prompting Recalls Continued

- Misbranding
- Packaging defects
- Real or fraudulent consumer claims
- Scientific reports
- Suppliers' notification
- Tampering and tampering threats
- Undeclared ingredients

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## Reasons for having a Recall Plan

- An effective recall plan will protect company employees and brand names from adverse legal, regulatory, and publicity actions
  - “Natural” occurrences of food contamination have been documented
    - Prevention is far from 100% achievable
- Preventing purposeful contamination
- Part of an effective traceability program



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## Recall Plan

- Steps for creating a recall plan:
  1. Create a customer/buyer contact list. Be sure to update names, phone numbers, and emails annually or as needed.
    - Growers selling directly to consumers through CSA programs, roadside stands, U-Pick operations, and farmers' markets can collect buyer information through email sign-up sheets, website notifications, and signs at stands/markets



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## Recall Plan Continued

2. Create a recall contact list
  - Names and numbers of media representatives, proper authorities (FDA, NCDA&CS, etc.), insurance company, and legal counsel
3. Identify the problem and assess health risks
  - Chemical, physical, or microbial risks
4. Determine products and lot numbers involved
5. Determine quantities involved
6. Determine current inventory on the premises



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## Recall Plan Continued

7. Determine amount of product in the marketplace
8. Identify customers/buyers who have received the product
9. Collect pertinent documentation regarding affected product
  - Records of flooding, wildlife activity, sick employees, etc.

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## Recall Plan Continued

10. Determine the following:
  - Total amount of suspect product shipped/delivered
  - Total amount of suspect product still in buyer's possession
  - Total amount of suspect product buyer has shipped
  - Total amount of suspect product that has been discarded

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## Mock Recall

- A mock recall is an exercise to determine the effectiveness of your recall plan
  - Should be conducted annually
  - If recall plan is effective, all suspect product should be accounted for within 2 hours

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## Mock Recall Procedure

- Create a scenario for your mock recall
  - For example: foreign object contamination
- Identify one of your products (by lot number) delivered to a customer on a specific date
- With lot number and shipping information in hand, call the customer and inquire if they still have the product or where the product went
  - Make sure to inform your customer that this is a mock recall

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## Mock Recall Procedure Continued

- Have the customer send you written documentation to verify their distribution of the product
- Record the date and results of the mock recall including the documentation from the customer

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## Recordkeeping

- Policies describing traceability program and recall plan
- Records demonstrating recall and mock recall effectiveness

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## References

- N.C. MarketReady. 2009. Fresh Produce Safety Field to Family Good Agricultural Practices (GAPs) Training Initiative V.2. <http://ncfreshproducesafety.ncsu.edu/agent-resources/good-agricultural-practices-gaps-training-curriculum/gaps-training-curriculum-tier-1-version-2>
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# Part 2: Navigating the USDA GAP Audit


Presentation material for Navigating the USDA GAP Audit was developed from:

*Good Agricultural Practices for Small Diversified Farms: Tips and Strategies to Reduce Risk and Pass an Audit by Benjamin Chapman, Ph.D, Audrey Kreske, Ph.D., and Roland McReynolds, Esq.*


This publication was developed by North Carolina State University and the Carolina Farm Stewardship Association and funded by a Specialty Crops Block grant awarded by the U.S. Department of Agriculture and the North Carolina Department of Agriculture and Consumer Services.





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## Navigating the USDA GAP Audit



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*Funded by the RAFI-Tobacco Communities Reinvestment Fund & NC Specialty Crop Block Grant*

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### What you've heard ...

1. This is mandatory
2. There are several parts to complete
3. So many options
4. Biased against Organic
5. Crop by Crop Audit
6. Diversification on farms is an issue
7. Agritourism/U-pick not allowed
8. Costs are too high (for actual audit and to prepare for audit)
9. Don't need it if I only sell directly to the consumer
10. Time consuming



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### Farm to School Program

- Member of the Goodness grows in NC program
  - Free to join

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NC**  **GOODNESS GROWS IN NC,  
SAVOR NC ON THE MENU AND  
AGRICULTURE GOT TO BE NC**

The Goodness Grows in North Carolina program is the official marketing program for the NC Department of Agriculture and Consumer Services. The primary goal of the program is to assist in the promotion of North Carolina Agriculture as a whole and increasing the visibility of NC products by working with growers and companies that produce NC agricultural products. Through retail and foodservice marketing assistance, as well as, event marketing, special promotions and advertising campaigns focusing on awareness, Goodness Grows can assist companies in their pursuit of reaching the consumer.

<http://www.gottobenc.com/become-a-member/membership-criteria/>



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## NC Farm to School Cooperative

- Membership fee
  - \$100 entry fee
- Must be approved by the Cooperative Board of Directors
  - Elected by Cooperative members
- Good Agricultural Practices certification
  - 3<sup>rd</sup> party
- Liability insurance
  - \$2 Million dollars

For more information contact Tommy Fleetwood [tommy.fleetwood@ncagr.gov](mailto:tommy.fleetwood@ncagr.gov)

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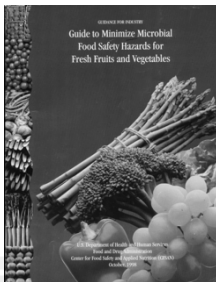
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## USDA GAP & GHP Audit Verification Checklist



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## Other Private Companies

- Primus labs
  - <http://www.primuslabs.com/Services/StandardGAP.aspxGlobalGAP>
- NSF agriculture services
  - [http://www.nsf.org/business/nsf\\_agriculture/index.asp?program=NSFAgr](http://www.nsf.org/business/nsf_agriculture/index.asp?program=NSFAgr)
- SCS global services
  - <http://www.scsglobalservices.com/food-safety>

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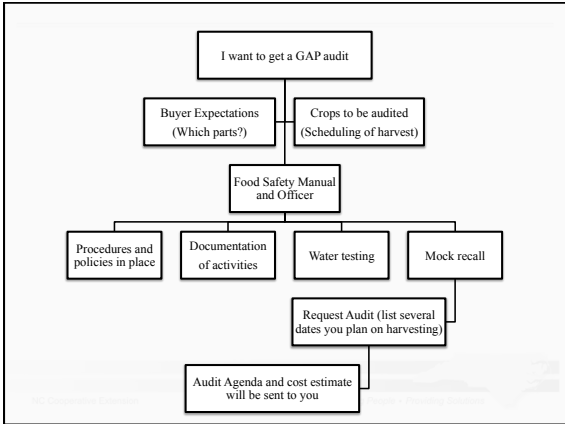
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## Buyer Expectations

- Understand your potential buyer's needs
  - What third party audit do they want you to have?
  - What sections/parts do they want you to pass?
  - What crops will you be selling to this buyer?

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## Crops to be audited

- The certificate only has room for eight categories
  - Prepare a chart listing all crops
  - Acreage associated with each category
- If you are completing the audit for a specific crop, such as sweet potatoes, make sure it is identified as one of the categories.

Crops	Acreage
Herbs	0.02
Vegetables	3.0
Root Vegetables	1.5
Sweet Potatoes	1.0
Leafy Greens	1.0
<b>Total Acres</b>	<b>6.52</b>

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### Food Safety Manual

- Written document that covers all aspects of growing and handling process, and identifies potential sources of risks
- Describes what steps and procedures are taken to reduce the risks of contamination by chemical, physical and microbial hazards
- Required to schedule and pass a GAP audit

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### Food Safety Manual Templates

- NC Fresh Produce Safety website <http://ncfreshproducesafety.ncsu.edu/>
- On-farm Food Safety Project <http://onfarmfoodsafety.org/>
- NC State Opening Markets Project <http://gapsmallfarmsnc.wordpress.com/>

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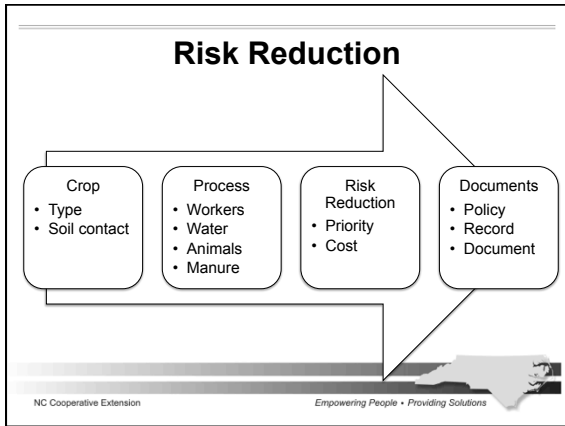
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## Identifying Risks

**Fresh Produce Hazard Assessment**

Use this hazard assessment to evaluate risks on your farm. For each question indicate if your risk is low, medium, or high. Add each question you answer as high risk to the action checklist at the end of the assessment. These will be the areas you will need to address first.

	Low Risk	Medium Risk	High Risk	My Risk
<b>Land</b>				
<b>History of land use</b>	Land is used only for growing crops and pasture.	Land is used for other purposes, such as growing crops, pasture, or other uses.	Land has been used for other purposes in the last 10 years.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Water used</b>	Farm is irrigated from surface water.	Farm is irrigated from surface water with managed fertilizer and only approved fertilizing.	Farm is irrigated from surface water with fertilizer and manure is not managed.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Worker Health and Hygiene</b>				
<b>Handwashing facilities</b>	Handwashing facilities are available for employees and visitors.	Handwashing facilities are available for employees and visitors.	Handwashing facilities are not available for employees or visitors.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Signage</b>	Produce safety signage is posted in the appropriate language or languages for workers to read and understand.	Produce safety signage is posted in the appropriate language or languages for workers to read and understand.	No signage is used.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

Adapted from: [www.freshproduce.com](http://www.freshproduce.com) (2010) and [www.freshproduce.com](http://www.freshproduce.com) (2011)

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- ## Compliance
- Important to read each question
  - Do I understand the risks and have they been mitigated?
  - Is there a portion of my food safety manual that directly addresses this question?
  - Practices reflect your food safety manual
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## Scoring

- 'Doc' column
  - R = Record
  - P = Policy
  - D = Document
  - Blank = Observation

Questions	Points	Yes	NO	N/A	Doc
G-3 Potable water is available to all workers.	10				R
G-4 All employees and all visitors to the location are required to follow proper sanitation and hygiene practices.	10				P
G-5 Training on proper sanitation and hygiene practices is provided to all staff.	15				D

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## Scoring

	Description	Example
<b>Policy</b>	Written statement in the food safety plan that is followed on the farm	Employee policy of not working with produce while sick with foodborne illness
<b>Record</b>	Written log required to be kept showing an action	Pre harvest checklist, logging of activities – washing equipment and containers
<b>Document</b>	May be a combination of a policy and a record	Signed sheet (record) of all employees trained on health and hygiene practices and a policy listing all health and hygiene practices followed on the farm
<b>Observation</b>	Observe and interview	Observing the cleanliness of the restroom facility and the proximity of livestock to crop production areas

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## Audit Cost

- The costs cover time on site conducting the audit, travel to and from your farm, and paperwork before and after the audit
  - Distance traveled
  - Amount of time depends on sections to be completed
- Charges per hour = \$92
- Administrative fee = \$50
- Cost share through NCDA or CFSA
  - First Come First Serve

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### Farm Completing Parts One and Two

Admin fee \$50

1 hour Prep time	3 hours Travel to your farm	2.5 hours Audit day	3 hours Travel from your farm	1 hour Paperwork
~\$92	~\$276	~\$230	~\$276	~\$92

Total = \$1,016

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### Farm Completing Parts One, Two, Three, and Four

Admin fee \$50

1 hour Prep time	2 hours Travel to your farm	4.5 hours Audit day	2 hours Travel from your farm	1 hour Paperwork
~\$92	~\$184	~\$414	~\$184	~\$92

Total = \$1,016

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## Scheduling an Audit

- Farm contact information and commodities/acres
- Include up to six days you are scheduled to harvest
  - Time of harvest
- Type of audit
- Submit request 2-3 weeks in advance of your first desired inspection date

Type of Audit(s) Requested (Choose at least one)	Scope(s) of GAP/GHP Audit Requested
<input type="checkbox"/> Good Agricultural Practices & Good Handling Practices (GAP/GHP) - Select Audit Scopes	<input type="checkbox"/> Part 1 - Farm Review
<input type="checkbox"/> Harmonized Food Safety Standard	<input type="checkbox"/> Part 2 - Field Harvesting & Field Packing Activities
<input type="checkbox"/> Tomato Audit Protocol (T-GAP)	<input type="checkbox"/> Part 3 - House Packing Facility
<input type="checkbox"/> Leafy Greens Audit (L-GMA)	<input type="checkbox"/> Part 4 - Storage & Transportation
<input type="checkbox"/> Identify Preservation Audit (IP)	<input type="checkbox"/> Part 6 - Wholesale Distribution Center/Terminal Warehouse
	<input type="checkbox"/> Part 7 - Food Defense

**DATE(S) preferred to have the audit:**  
 Once the request form has been received we will fax you an agenda outlining the objectives, audit criteria, personnel required, affirmed date, time schedule, and estimated cost of the audit.

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## Audit day

<p><b>Opening Meeting</b></p> <ul style="list-style-type: none"> <li>• The auditor will discuss agenda</li> <li>• Confirm sections to be completed</li> <li>• May ask for copies of documentation</li> </ul>	<p><b>Audit</b></p> <ul style="list-style-type: none"> <li>• Review documents and records</li> <li>• Observe processes</li> <li>• Interview workers</li> </ul>
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## Audit day

<p><b>Onsite documentation</b></p> <ul style="list-style-type: none"> <li>• The auditor will take time to look over their findings</li> <li>• Make comments on the audit sheet for any questions answered No or N/A</li> <li>• Finalize the audit calculations and write up</li> </ul>	<p><b>Closing Meeting</b></p> <ul style="list-style-type: none"> <li>• Review the findings of the audit</li> <li>• Questions answer session</li> <li>• Discuss any observations</li> </ul> <p><b>Verification Visit</b></p> <ul style="list-style-type: none"> <li>• Verifies consistent conformance</li> </ul>
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## Passing the USDA Audit

- Certification good for 1 year
- <http://www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateN&page=GAPGHPAuditVerificationProgram>

**List of Participating Companies with Acceptable Audits arranged:**

- By Location
- By Commodity
- By Company Name
- By Audit Type, Commodity, Location, and Company Name

Notice to our customers – we have recently upgraded our web reports to an interactive site, where you can search by company, commodity, location, and audit type. For instructions on how to use the new site, click here. (PDF)

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## Review

- Questions?

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## GENERAL SECTION

Mandatory  
 Total points 180  
 Includes the food safety plan, traceability, worker health and hygiene and pesticide/chemical use

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## Audit Section

General Section		*Mandatory
Rank	Category	Points
1	Worker Health & Hygiene	75
2	Restroom & Hand washing	35
3	Traceability	25
4	Product Handling	15
5	Facilities/Storage	10
6	Animal/Pests	10
7	Water	10
Total		180

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## Requirements

- Food safety manual required for scheduling an audit
  - Contains policies, procedures, and records
- Designate a person in charge of food safety

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

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## Traceability

- Trace your product one step forward (where it is going) and one step back (where did it come from)
  - Tied to specific grower
  - Specific field
  - Workers
  - Harvest or pack dates
- Sample lot code system:
  - LT 4172T2 23 0602
  - LT = Lester Tomatoes (grower)
  - 4172T2 = specific farm and field
  - 23 = Harvester number (Mark Jones)
  - 0602 = date of harvest (June 2)

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## Traceability

- A traceability program allows farms to easily identify implicated lot based on the
  - Lot number, field location, date of harvest, pesticide and manure application, employee health/hygiene records, and unusual events such as flooding or wildlife intrusion
- Uniquely identifies product moving out of the field

Questions		Points	Yes	NO	N/A	Doc
G-1	A documented traceability program has been established.	15				D

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## Mock Recall

- Mock Recall
  - Practice for a recall situation
  - Completed within 2 hours
  - Record date, time, and results
- Not required for first GAP audit

Questions		Points	Yes	NO	N/A	Doc
G-2	The operation has performed a "mock recall" that was proven to be effective.	10				R

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## Mock Recall

- Create a recall scenario
- Choose a lot number to be "recalled"
- Contact buyer
- Determine location of product
  - Amount shipped, still in possession of buyer, discarded, etc.
- Have buyer send documentation to verify distribution/possession of product
- Record date, time, and result

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## Mock Recall Log

### Mock Recall Log

Date:			Buyer name:			Buyer contact info:		
Product	ID #	Harvest Date	Ship Date	Amount Shipped	Date & Time Buyer Contacted	Amount of Product Remaining in Buyer Possession	Amount of Product Sold by Buyer	Initials

Comments:

\*Attach confirmation of successful mock recall.

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## Water

- Water testing results need to be available in the food safety manual for water used for drinking and hand washing
- Need to meet the US EPA drinking water standard
  - <http://water.epa.gov/drink/contaminants/index.cfm>



Questions	Points	Yes	NO	N/A	Doc
G-3 Potable water is available to all workers.	10				R

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## Worker Health & Hygiene

- Hands can be a major source of human pathogens
- Visitors
  - Auditor, U-pick operation
- The auditor may discuss hygiene policies and trainings with employees

Questions	Points	Yes	NO	N/A	Doc
G-4 All employees and all visitors to the location are required to follow proper sanitation and hygiene practices.	10				P
G-5 Training on proper sanitation and hygiene practices is provided to all staff.	15				D

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## Worker Health & Hygiene

- Proper hand washing, proper hygiene, first aid procedures, restroom use, illness/injury procedures, and smoking and eating areas
- How and when do you wash your hands?
  - Before beginning work, after visiting the bathroom, before/after eating, smoking and other breaks, after other activities not including produce handling, and anytime hands become dirty

Questions	Points	Yes	NO	N/A	Doc
G-6 Employees and visitors are following good hygiene/sanitation practices.	15				
G-7 Employees who handle or package produce are washing their hands before beginning or returning to work.	15				

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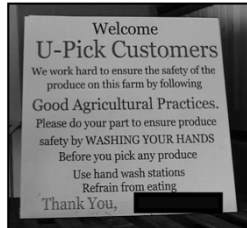
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## Signage




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## Hand Washing

- Hand washing signs
- Language appropriate
- Do I need a hand washing sign in my house bathroom?



Questions		Points	Yes	NO	N/A	Doc
G-8	Readily understandable signs are posted to instruct employees to wash their hands before beginning or returning to work.	10				

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## Restrooms

- Restroom facilities should be as clean as possible
  - Stocked with single use towels, toilet paper, and hand soap
- Supplies stocked on the property



Questions		Points	Yes	NO	N/A	Doc
G-9	All toilet/restroom/field sanitation facilities are clean. They are properly supplied with single use towels, toilet paper, hand soap or anti-bacterial soap, and potable water for hand washing.	15				

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## Restrooms

- Restroom facilities should be as clean as possible
  - Keep records of cleaning
- Portable restrooms
  - Keep records from the company regarding the frequency of servicing and cleaning



Questions		Points	Yes	NO	N/A	Doc
G-10	All toilet/restroom/field sanitation facilities are serviced and cleaned on a scheduled basis.	10				R

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## Worker Health & Hygiene

- An area away from where produce is handled or equipment/containers are washed
  - Separate picnic bench, the house kitchen, or tables in front yard area
- In the field
  - Edges of the field in driveways



Questions		Points	Yes	NO	N/A	Doc
G-11	Smoking and eating are confined to designated areas separate from where product is handled.	10				P

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## Worker Health & Hygiene

- Food safety training
  - Contract workers
- How do you know if someone is sick?
  - If symptoms are evident or an employee tells you
- Auditor may ask
  - About FB symptoms to see if owners know them
  - What happens when an employee is sick?



Questions		Points	Yes	NO	N/A	Doc
G-12	Workers with diarrheal disease or symptoms of other infectious diseases are prohibited from handling fresh produce.	15				P

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## Worker Health & Hygiene

- Bodily fluids can contain infectious organisms
- How is it disposed of and how are equipment/containers cleaned/sanitized?

Questions		Points	Yes	NO	N/A	Doc
G-13	There is a policy describing procedures which specify handling/disposition of produce or food contact surfaces that have come into contact with blood or other bodily fluids.	15				P

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## Worker Health & Hygiene

- What happens when someone get hurt?
- First aid kit needs to be stocked and made available to workers
- See American Red Cross for supplies
  - <http://www.redcross.org/prepare/location/home-family/get-kit/anatomy>

	Questions	Points	Yes	NO	N/A	Doc
G-14	Workers are instructed to seek prompt treatment with clean first aid supplies for cuts, abrasions and other injuries.	5				P

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## Pesticides

- For regulated materials, you will need copies of the appropriate licenses in your food safety manual
- For non-regulated materials, you will need documentation of conducting a training on proper pesticide use and application in your food safety manual

	Questions	Points	Yes	NO	N/A	Doc
G-15	Company personnel or contracted personnel that apply regulated pre-harvest and/or post harvest materials are licensed. Company personnel or contracted personnel applying non-regulated materials have been trained on its proper use.	10				R

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## Example

- Happy Harvest Farm
  - Traceability program in place
  - No mock recall completed (1<sup>st</sup> time for audit)
  - Water test results
  - Policy on worker/visitor health and hygiene and training completed
  - Policy on smoking/eating area and hand washing sign
  - House restroom is clean
  - Policy for workers with FB illness
  - Policy on how to deal with product/food contact surfaces that comes in contact with blood
  - Policy on what workers do when they get hurt
  - Company personnel applying pre-/postharvest materials are licensed or trained on proper use

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## General Section Scoring

Farm	Total points	Subtract N/A	Adjusted Total points	Passing Score	Calculated points	Pass /Fail
Happy Harvest Farm	180 points	G-2, 10 points, G-10, 10 points	$180 - 20 = 160$	$160 \times 0.8$ (80%) = 128	$160 - 0 = 160$	
Total	180	20	160	128	160	Pass

- G-2, 10 points, No mock recall
- G-10, 10 points, No cleaning schedule required for house bathroom

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## Review

- Questions?

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## PART ONE FARM REVIEW

Total Points 190  
Includes water usage, the presence of animals, the use of manure,  
and land history

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## Audit Section

### Part One

Rank	Category	Points
1	Water	45
2	Animal/Pest	45
3	Manure (A, B, or C)	45
4	Sewage/Waste	25
5	Land History	20
6	Traceability	10
Total		190

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## Irrigation Water



- What is the source of irrigation water ? (1-1, no points)
- How are crops irrigated? (1-2, no points)

Questions	Points	Yes	NO	N/A	Doc
1-3 A water quality assessment has been performed to determine the quality of water used for irrigation purpose on the crop(s) being applied.	15				D
1-4 A water quality assessment has been performed to determine the quality of water use for chemical application or fertigation method.	15				D

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## Water Testing

Source	Risk	Testing
Surface waters (pond, creek)	High	At the minimum should be tested 3X during the season
Well water	Medium	Annual test at the beginning of the season
Municipal water	Low	Request testing results from local authorities

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## Water Testing

- Includes pesticide and fertilizer application
- Generic *E. coli*
- Several tests available – recommend Colilert method, quantitative (numbers)
  - Not presence/absence
- EPA recreational water quality standards

Irrigation water contact with the edible portion of a plant	Highest single sample (MPN/100mL)	Average (MPN/100mL)
Direct contact	below 235	below 126
No direct contact	below 576	below 126

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## Water Test Results

- If water test results exceed EPA standards:
  - Stop using – switch to another source if possible
    - If no other source available, utilize drip irrigation
  - Retest
  - Conduct environmental survey – look for obvious signs of contamination
  - If necessary, implement a more aggressive sampling program

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## Agricultural Water

- Prevent contamination with berms, diversions, and fences
- Regularly check the integrity of the well casing and head
- Keep livestock out of water sources

Questions		Points	Yes	NO	N/A	Doc
1-5	If necessary, steps are taken to protect irrigation water from potential direct and non-point source contamination.	15				

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## Sewage

- Location of sewage treatment on the property
- Observation of adjacent property

Questions		Points	Yes	NO	N/A	Doc
1-6	The farm sewage treatment system/septic system is functioning properly and there is no evidence of leaking or runoff.	15				
1-7	There is no municipal/commercial sewage treatment facility or waste material landfill adjacent to the farm.	10				

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## Animals

- If livestock is near crop production areas there should be a distance of approximately one mile or a natural barrier
  - Small forest area or cover crop
  - Topography of the land
  - Diversion or berms

Questions		Points	Yes	NO	N/A	Doc
1-8	Crop production areas are not located near or adjacent to dairy, livestock, or fowl production facilities unless adequate barriers exist.	15				

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## Livestock and Manure

- Observation of adjacent property
- Manure lagoon
  - Maintain integrity and ensure no leaching
  - 300 feet from any well
  - Prevent runoff with diversions or other barriers
  - Check lining materials

Questions		Points	Yes	NO	N/A	Doc
1-9	Manure lagoons located near or adjacent to crop production areas are maintained to prevent leaking/overflowing, or measures have been taken to stop runoff from contaminating the crop production areas.	10				

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## Livestock and Manure

- Storage of manure piles
  - Down hill from crop production areas
  - Covered with a shelter or tarp
- If livestock is present, they need to be kept away from irrigation sources with fencing, distance and topography

Questions		Points	Yes	NO	N/A	Doc
1-10	Manure stored near or adjacent to crop production areas is contained to prevent contamination of crops.	10				
1-11	Measures are taken to restrict access of livestock to the source or delivery system of crop irrigation water.	10				

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## Wild & Domestic Animals

- Report animal tracks
- Report crop destruction
- Report feces from animals in production areas



Questions		Points	Yes	NO	N/A	Doc
1-12	Crop production areas are monitored for the presence or signs of wild or domestic animals the entering the land.	5				R

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## Wild & Domestic Animals

- Positive deterrence
  - Fences, noise cannons, scare balloons, reflective tape and fish emulsion



Questions		Points	Yes	NO	N/A	Doc
1-13	Measures are taken to reduce the opportunity for wild and/or domestic animals from entering crop production areas.	5				R

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## Manure & Composting

- It is recommended to increase the amount of time between application of manure and harvest of produce
- Pathogens of concern are *Salmonella* and *E. coli* O157:H7
- Best management practices to reduce contamination
  - Proper storage, incorporation into soil, proper and thorough composting, and application records



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## Manure & Composting

### Manure and Municipal Biosolids

Please choose one of the following options as it relates to the farm operations:

- \_\_\_\_\_ Option A. Raw manure or a combination of raw and composed manure is used as a soil amendment.
- \_\_\_\_\_ Option B. Only composted manure/treated municipal biosolids are used as soil amendments.
- \_\_\_\_\_ Option C. No manure or municipal biosolids of any kind are used as soil amendments.

**Only answer the following manure questions (questions 1-14 to 1-22) that are assigned to the Option chosen above. DO NOT answer the questions from the other two options. The points from the manure and municipal biosolids are worth 35 of a total 190 points, and answering questions from the other two options will cause the points to calculate incorrectly.**

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## Option C No Manure Used

- No manure or compost used
- Lowest risk



Option C: No Manure/Biosolids Used		Points	Yes	NO	N/A	Doc
1-22	No animal manure or municipal biosolids are used.	35				P

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## Land Use & Soil

- Land use for the previous 5 years
- Soil tests: not only pathogens
  - Levels of heavy metals, chemicals, pesticides, other contaminants

Questions	Points	Yes	NO	N/A	Doc
1-23 A previous land use risk assessment has been performed.	5				R
1-24 When previous land use history indicates a possibility of contamination, preventative measures have been taken to mitigate the known risks and soils have been tested for contaminants and the land use is commensurate with test results.	10				R

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## Sample Record

Land Use History and Preventative Measures	
Property Description (location and acreage):	
Date of site evaluation:	
Evaluation done by:	
1. Agricultural activities conducted on this site for last 5 years:	Check applicable, indicate years
<input type="checkbox"/>	Crop production only
<input type="checkbox"/>	Both crops and animal production
<input type="checkbox"/>	Permanent or temporary living facilities
<input type="checkbox"/>	Fallow
2. Crops grown on this site previously:	Specify crops
3. Adjacent properties	Check all that apply and proximity (feet) to land
<input type="checkbox"/>	Crop production
<input type="checkbox"/>	Dairy/livestock/poultry operation
<input type="checkbox"/>	Watershed (indicate river, stream, pond, lake, municipality, well, other)
<input type="checkbox"/>	Organic/Synthetic Fertilizer/Manure - dumping, storage, or handling
<input type="checkbox"/>	Municipal or private dumping site
<input type="checkbox"/>	Residential with septic systems
<input type="checkbox"/>	Commercial or industrial development
<input type="checkbox"/>	Golf course
<input type="checkbox"/>	Other operations that might present a risk(specific)

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## Flooding

- Flooding is the flowing or overflowing of a field with water outside a grower's control.
- Pooled water (e.g., after rainfall) that is not reasonably likely to cause contamination of the edible portions of fresh produce is not considered flooding

Questions	Points	Yes	NO	N/A	Doc
1-25 Crop production areas that have been subjected to flooding are tested for potential microbial hazards.	5				R

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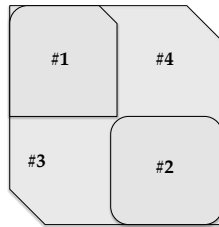
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## Traceability

- A traceability program allows farms to easily identify the implicated lot
- Each production area/field uniquely identified



Questions	Points	Yes	NO	N/A	Doc
1-26 Each production area is identified or coded to enable traceability in the event of a recall.	10				R

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## Review

- Questions?

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## PART TWO FIELD HARVEST AND PACKING ACTIVITIES

Total Points 185

Includes the pre-harvest assessment, bathroom facilities, harvesting containers and equipment, transportation and clean up procedures

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## Audit Section

Part Two		
Rank	Category	Points
1	Equipment/Containers	80
2	Restroom and Hand washing	40
3	Product Handling	25
4	Water	15
5	Land history	15
6	Traceability	10
Total		185

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## Part Two

- Commodities need to be actively harvested
- The auditor does not need to observe every crop listed on the audit
- Food safety plan needs to address different risk associated with different harvesting methods
  - Hand, knife, shears, or mechanically harvested

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## Crop Production Areas

- This assessment can include categories such as
  - Worker health and hygiene
  - Sanitation of equipment and tools
  - Properly stocked and functional restrooms
  - Available drinking water
  - Stocked first aid kit
  - Inspect water sources and production areas for signs of animals

Questions	Points	Yes	NO	N/A	Doc
2-1 A documented pre-harvest assessment is made on the crop production areas. Risks and possible sources of crop contamination are noted and assessed.	15				D

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## Example Pre-Harvest Assessment

Weather: Dry Rain Humid _____	Date	Initial	Date	Initial
Crops harvested: _____				
Worker health & hygiene?	Y/N		Y/N	
Harvest tools & containers clean?	Y/N		Y/N	
Handwashing station & restrooms stocked?	Y/N		Y/N	
Inspection of water source?	Y/N		Y/N	
Signs of animals in field?	Y/N		Y/N	
Van/truck bed clean?	Y/N		Y/N	
First aid kit stocked?	Y/N		Y/N	

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## Restrooms

- Occupational Safety and Health Administration (OSHA) requires one bathroom and one hand washing facility for every 20 employees within ¼ mile walk of each hand laborer's place of work.

Questions	Points	Yes	NO	N/A	Doc
2-2 The number, condition, and placement of field sanitation units comply with applicable state and/or federal regulations.	10				
2-3 When question 2-2 is answered "N/A" (sanitation units are not required), a toilet facility is readily available for all workers.	10				

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## Restrooms

- Portable units located outside of the field
- A response plan needs to describe what will be done to contain the spill, prevent additional contamination, to clean it up, and dispose of contaminated product

Questions		Points	Yes	NO	N/A	Doc
2-4	Field sanitation units are located in a location that minimizes the potential risk for product contamination and are directly accessible for servicing.	10				
2-5	A response plan is in place for the event of a major spill or leak of field sanitation units or toilet facilities.	10				P

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## Containers



- Harvesting container material
  - Able to be cleaned and sanitized
- Should be cleaned/sanitized on a daily basis
  - Remove any leftover plant debris to prevent the growth of bacteria
- Transportation vehicle
  - Cleaned on a regular basis

Questions		Points	Yes	NO	N/A	Doc
2-6	All harvesting containers and bulk hauling vehicles that come in direct contact with product are cleaned and/or sanitized on a scheduled basis and kept as clean as practicable.	10				D

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## Equipment

- Equipment used for harvesting produce such as knives, scissors, pruning shears
- Cleaned/sanitized on a daily basis
- Storage
- Harvest by hand = N/A



Questions		Points	Yes	NO	N/A	Doc
2-7	All hand harvesting equipment and implements (knives, pruners machetes, etc.) are kept as clean as practical and are disinfected on a scheduled basis.	10				D

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## Product Handling

1. Mark the area with flags and do not harvest any materials from the area.
2. Remove the contaminated crop and soil and dispose of it in the dumping area.
3. The soil will be treated based on recommendations of the state environmental agencies

Questions		Points	Yes	NO	N/A	Doc
2-12	There is a standard operating procedure or instructions on what measures should be taken in the case of product contamination by chemicals, petroleum, pesticides or other contaminating factors.	5				P

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## Product Handling

- When crops are harvested by hand, this is considered 100% inspection for foreign materials.

Questions		Points	Yes	NO	N/A	Doc
2-13	For mechanically harvested product, measures are taken during harvest to inspect for and remove foreign objects such as glass, metal, rocks, or other dangerous/toxic items.	5				

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## Containers

- Properly labeled



Questions		Points	Yes	NO	N/A	Doc
2-14	Harvesting containers, totes, etc. are not used for carrying or storing non- produce items during the harvest season, and farm workers are instructed in this policy.	5				P

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## Water

- Water testing results for wash water (post harvest water) need to be in the food safety manual
- Need to meet the US EPA drinking water standard
  - Post harvest water that does not meet this standard = automatic unsatisfactory

Questions		Points	Yes	NO	N/A	Doc
2-15	Water applied to harvested product is microbially safe.	15				R

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## Product Handling

- Remove dirt/mud from containers
  - Hand and mechanical harvesting

Questions		Points	Yes	NO	N/A	Doc
2-16	Efforts have been made to remove excessive dirt and mud from product and/or containers during harvest.	5				

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## Transportation

- Transportation equipment used to move produce items from field to other areas should be clean and in good repair.



Questions		Points	Yes	NO	N/A	Doc
2-17	Transportation equipment used to move product from field to storage areas or storage areas to processing plant which comes into contact with product is clean and in good repair.	10				

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## Transportation

- This can be accomplished with plastic tarp, clean sheet, box cover (completely enclosed)



Questions		Points	Yes	NO	N/A	Doc
2-18	There is a policy in place and has been implemented that harvested product being moved from field to storage areas or processing plants are covered during transportation.	5				P

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## Containers

- Do not pack on ground
- Storage
  - Off ground
  - Protected from contamination with a tarp or something similar

Questions		Points	Yes	NO	N/A	Doc
2-19	In ranch or field pack operations, only new or sanitized containers are used for packing the product.	10				D
2-20	Packing materials used in ranch or field pack operations are properly stored and protected from contamination.	10				

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## Traceability

- The ability to track a product one step forward and one step back
- Uniquely identified product moving out of the field

Questions		Points	Yes	NO	N/A	Doc
2-21	Product moving out of the field is uniquely identified to enable traceability in the event of a recall.	10				D

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## Example

- Bunny Lou Farm
  - Portable restroom on leased land
  - Water test results
  - Harvest containers 5 gallon buckets – some are broken
  - Harvest by hand and knife
  - Pick up truck bed for transporting produce – not covered
  - No field packing
  - Lot codes for product moving out of field

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## Part 2 Scoring

Farm	Total points	Subtract N/A	Adjusted Total points	Passing Score	Subtract Lost Points	Calculated points	Pass/Fail
Bunny Lou Farm	185 points	2-3, 10 points, 2-10, 15 points 2-19, 20 points	185 - 45 = 140	140 x 0.8 (80%) = 112	2-8, 5 points 2-18, 5 points	140 - 10 = 130	
Total	185	45	140	112	10	130	Pass

- 2-3, 10 points, portable restroom
- 2-10, 13, 15 points, no mechanical harvesting
- 2-19, 20 points, no field packing
- 2-8, 5 points, broken containers
- 2-18, 5 points, produce not covered during transportation

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## Review

- Questions?

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# Part 3:

## Food Safety Program and Plan Development and Additional Resources

The resources in this section are adapted from:

*Good Agricultural Practices Fresh Produce Safety Plan for Field Practices.* NCSU Publication No. AG-718W. North Carolina Cooperative Extension. College of Agriculture and Life Sciences. NC State University, 2009 by Ducharme, D. T., John Rushing, and Chris Gunter.

Opening Markets: Exploring and Communicating Food Safety Barriers. *You want me to call my buyer and say what? Mock Recall.* August 19, 2011 by Kreske, Audrey. <http://gapsmallfarmsnc.wordpress.com/?s=recall>

*Fresh Produce Safety Analysis Checklist* by Baros, Katie; Kreske, Audrey; and Ducharme, Diane.





## Fresh Produce Safety Analysis Checklist

*Use this checklist to ensure you have answered each audit question when creating your food safety plan. In the page # column, include the page number where the answer to the question can be found in your manual.*

### **Land**

#	Section, Number	Question	Doc	Points	Page #
1	General, #P-1	A documented food safety program that incorporates GAP and/or GHP has been implemented.		-	
2	General, #P-2	The operation has designated someone to implement and oversee an established food safety program. Name:		-	
3	Part One, #23	Record of previous land use	Record	5	
4	Part One, #24	When previous land use indicates a possibility of contamination, preventative measures have been taken to mitigate the known risks and soils have been tested	Record	10	
5	Part One, #25	Crop production areas that have been subjected to flooding are testing for potential microbial hazards	Record	5	
6	Part One, #7	No sewage treatment facility or landfill adjacent to farm	Observe	10	
7	Part One, #9	Manure lagoons adjacent to crop production areas are maintained to prevent leakage or measures taken to prevent runoff	Observe	10	

### **Worker Health and Hygiene**

#	Section, Number	Question	Doc	Points	Page #
8	General, #4	All employees and visitors are required to follow proper sanitation and hygiene practices.	Policy	10	
9	General, #5	Training on proper sanitation and hygiene practices is provided to all staff.	Document	15	
10	General, #6	Employees and visitors are following good sanitation/hygiene practices	Observe	15	
11	General, #7	Employees who handle/pack produce are washing their hands before beginning or returning to work	Observe	15	
12	General, #8	Readily understandable signs are posted to instruct employees to wash their hands before beginning or returning to work	Observe	10	
13	General, #11	Smoking and eating are separate from where product is handled (outside of field, away from processing/handling product)	Policy	10	
14	General, #12	Workers sick with foodborne illness are prohibited from handling fresh produce	Policy	15	
15	General, #13	Policy describing procedures on how to deal with product/food contact surfaces that come into contact with blood or other bodily fluids	Policy	15	

16	General, #14	Workers are instructed to seek prompt treatment with clean first aid supplies for cuts, abrasions, and other injuries	Policy	5	
17	General, #15	Company personnel applying regulated and non-regulated pre-/postharvest materials are licensed or trained on proper usage	Record	10	

### ***Restroom and Sewage***

#	Section, Number	Question	Doc	Points	Page #
18	General, #9	Bathrooms are clean and properly stocked with single-use towels, toilet paper, hand soap, and potable water for hand washing	Observe	15	
19	General, #10	Bathroom facilities cleaned on a scheduled basis	Record	10	
20	Part Two, #2	Field sanitation units (#s, condition, and placement) comply with state/federal regulations	Observe	10	
21	Part Two, #3	When sanitation units are not required, a toilet facility is available for all workers	Observe	10	
22	Part Two, #4	Sanitation units are located in an area that minimizes potential risk for product contamination and can be reached for service	Observe	10	
23	Part Two, #5	A response plan is in place for the event of a major spill or leak of field sanitation units or toilet facilities	Policy	10	
24	Part One, #6	Septic system is maintained and functioning properly, no evidence of leakage or runoff	Observe	15	

### ***Water***

#	Section, Number	Question	Doc	Points	Page #
25	General, #3	Potable water is available to all workers. Drinking water testing results	Record	10	
26	Part One, #1	What is the source of irrigation water (location on field)	Policy	No points	
27	Part One, #2	How are crops irrigated (location on field)	Policy	No points	
28	Part One, #3	Water quality assessment has been performed to determine the quality of water used for irrigation purpose on the crop(s) being applied	Document	15	
29	Part One, #4	Water quality assessment has been performed to determine the quality of water use for chemical application or fertigation method	Document	15	
30	Part One, #5	Steps are taken to protect irrigation water from potential direct and non-point source contamination	Observe	15	
31	Part Two, #15	Water applied to harvested product is microbially safe	Record	10	

### Animals

#	Section, Number	Question	Doc	Points	Page #
32	Part One, #8	Crop production areas are not located adjacent to livestock production unless adequate barriers exist (erosion ditches with tall grass, 1 mile away, etc)	Observe	15	
33	Part One, #11	Measures are taken to restrict access of livestock to the source or delivery system of irrigation water	Observe	10	
34	Part One, #12	Crop production areas are monitored for the presence or signs of wild or domestic animals entering land	Record	5	
35	Part One, #13	Measures are taken to reduce the opportunity for wild and/or domestic animals from entering crop production areas	Record	5	

### Manure

#	Section, Number	Question <i>Choose A, B, or C</i>	Doc	Points	Page #
36	Part One, #10	Manure stored adjacent to crop production areas is contained to prevent contamination of crops	Observe	10	
	Option A	Raw Manure			
37	Part One, #14	When manure applied, it is incorporated at least 2 weeks prior to planting and a min of 120 prior to harvest	Record	10	
38	Part One, #15	Raw manure is not used on commodities harvested within 120 days of planting	Record	10	
39	Part One, #16	If both raw and composted manure used, composted manure is properly treated to reduce levels of pathogens	Record	10	
40	Part One, #17	Manure is properly stored prior to use	Observe	5	
	Option B	Composted Manure			
41	Part One, #18	Only composted manure used as a soil amendment	Record	10	
42	Part One, #19	Composted manure is properly treated to reduce pathogens	Document	10	
43	Part One, #20	Composted manure is properly stored and is protected to minimize recontamination	Observe	10	
44	Part One, #21	Reports are available on purchased composted manure	Record	5	
	Option C	No Manure Use			
45	Part One, #22	No animal manure is used	Policy	35	

**Equipment and Containers**

#	Section, Number	Question	Doc	Points	Page #
46	Part Two, #1	A documented pre-harvest assessment is made on crop production areas. Noting risk and possible sources of contamination	Document	15	
47	Part Two, #6	All harvesting containers and bulk hauling vehicles that come in direct contact with product are cleaned and/or sanitized on a scheduled basis and kept as clean as practical	Document	10	
48	Part Two, #7	All hand harvesting equipment are kept as clean as practical and are disinfected on a scheduled basis	Document	10	
49	Part Two, #8	Damaged harvesting containers are properly repaired or disposed of	Observe	5	
50	Part Two, #9	Harvesting equipment/machinery that comes in contact with product is in good repair	Observe	10	
51	Part Two, #10	Light bulbs/glass on harvesting equipment are properly protected so as to not contaminate produce	Observe	10	
52	Part Two, #11	Instructions on what measures should be taken in case of glass, plastic breakage and possible contamination during harvesting operations	Policy	5	
53	Part Two, #12	Instructions on what measures should be taken in the case of product contamination by chemicals, petroleum, pesticides, etc	Policy	5	
54	Part Two, #13	For mechanically harvested product, measures taken to inspect product for foreign objects (hand harvest 100% inspection)	Observe	5	
55	Part Two, #14	Harvesting containers are not used for carrying/storing non-produce items during the harvest season	Policy	5	
56	Part Two, #16	Efforts are made to remove excess dirt and mud from product or harvesting containers	Observe	5	
57	Part Two, #17	Transportation equipment used to move product is clean and in good repair	Observe	10	
58	Part Two, #18	Policy that harvested product needs to be covered when moved from field to storage area	Policy	5	
59	Part Two, #19	In field pack operations, only new or sanitized containers are used for packing the product	Document	10	
60	Part Two, #20	Packing materials used in field pack are properly stored and protected from contamination	Observe	10	



**Traceability**

#	Section, Number	Question	Doc	Points	Page #
61	General, #1	A documented traceability program has been established	Document	15	
62	General, #2	The operation has performed a 'mock recall' that was proven to be effective	Record	10	
63	Part One, #26	Each production area is identified to enable traceability in the event of a recall	Record	10	
64	Part Two, #21	Product moving out of the field is uniquely identified to enable traceability in the event of a recall	Document	10	



## Land Use History and Preventative Measures

Property Description (location and acreage):

Date of site evaluation:

Evaluation done by:

<b>1. Agricultural activities conducted on this site for last 5 years:</b>		<b>Check applicable, indicate years</b>
	<input type="checkbox"/>	Crop production only
	<input type="checkbox"/>	Both crops and animal production
	<input type="checkbox"/>	Permanent or temporary living facilities
	<input type="checkbox"/>	Fallow
<b>2. Crops grown on this site previously:</b>		<b>Specify crops</b>
<b>3. Adjacent properties</b>		<b>Check all that apply and proximity (feet) to land</b>
	<input type="checkbox"/>	Crop production
	<input type="checkbox"/>	Dairy/livestock/poultry operation
	<input type="checkbox"/>	Watershed (indicate river, stream, pond, lake, municipality, well, other)
	<input type="checkbox"/>	Organic/Synthetic Fertilizer/Manure - dumping, storage, or handling
	<input type="checkbox"/>	Municipal or private dumping site
	<input type="checkbox"/>	Residential with septic systems
	<input type="checkbox"/>	Commercial or industrial development
	<input type="checkbox"/>	Golf course
	<input type="checkbox"/>	Other operations that might present a risk(specify)
<b>4. Has land been flooded in the past 60 days?</b>		
	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
<b>5. Application of manure/biosolids?</b>		<b>Indicate date</b>
	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
<b>6. Evidence of animal risks?</b>		<b>Please indicate</b>
	<input type="checkbox"/>	Downed fencing, tracks, feeding?
	<input type="checkbox"/>	Other

**7. Upon visual inspection of site, are there any potential food safety concerns? (for instance, recent dumping, evidence of old septic systems, upstream activities)**

**8. If any of the above creates a risk, are there pre-existing mitigation factors that should be considered? Examples include: topographical change/slopes, buffers, barriers, ditches, fences, distances to septic fields, inspection for leaks of septic system. (Please explain.)**

**9. Please explain any steps you will be taking to mitigate the risks addressed above. For instance, if fences need mending, or if flooding occurred within the last 60 days, indicate pathogen testing and documentation.**

**10. If applicable, try to obtain property owner's signature attesting to above evaluation.**

**Property Owners Signature:** \_\_\_\_\_

**Date**

**Site Evaluator Signature:** \_\_\_\_\_

**Date**



# Farm Name

## Food Safety Procedures for Farm Workers and Visitors

This brochure recaps some important points from your orientation. Please take the time to look over it and become more familiar with its points. Do what you can to prevent contamination of produce, soil, and equipment. If you see something that needs attention, let your supervisor know.

### Employee Hygiene

We are in the fresh produce business, and many of our products are going to be consumed without cooking. All employees are expected to practice personal cleanliness. There are many opportunities for food to become contaminated as it is produced and prepared. One of the major sources of food-borne pathogen contamination is worker's hands.

**The single most effective method of preventing produce contamination with these organisms is proper hand washing.**

We must all do our part to prevent food-borne illnesses to our customers!

### Hand-washing

Hand washing is the most effective way to prevent the spread of germs. Wash your hands after coughing and sneezing, using the restroom, smoking, or taking breaks, before entering the work area, and after using the telephone.

### Drinking Water, Breaks, and Comfort Areas

- Water in the coolers is from safe drinking water sources and is available to you at all times. Please place cups in the receptacles provided and notify your field supervisor when the cooler needs to be refilled.
- Smoking and eating are allowed only in designated areas. Smoking and the use of tobacco and chewing gum are prohibited outside the break areas.
- Toilets are provided and are clean and properly supplied. Please notify the field supervisor if these need attention. Toilet paper is to be placed directly in the toilet bowl.

### Illness

If you have an intestinal illness or symptoms of another infectious disease, you are prohibited from handling produce. Notify your supervisor and you will be assigned other responsibilities.

### If You are Injured or Have an Emergency

You are required to seek prompt treatment for cuts, abrasions and other injuries. First aid kits are located at the comfort station. Notify your field supervisor.

### **Handling and Disposition of Produce or Surfaces That Have Come into Contact with Blood or Body Fluids**

In the event of such contamination, notify your field supervisor immediately. The contaminated area should be isolated immediately. It will be the responsibility of the field supervisor to make sure contaminated produce is sealed in plastic bags and removed from the field. Equipment should be decontaminated according to procedures in the food safety plan.

### **Be Vigilant**

Food safety depends on the attention of all employees, workers and supervisors. Be on the lookout for potential sources of contamination such as signs of animal activity and feces. Let supervisors know if there are unauthorized persons or suspicious activities in the field. Be watchful. Report failures in the food safety plan. Our customers are counting on you.

### **Food safety is the responsibility of every employee!**

#### **FARM NAME**



Street Address  
Address 2  
City, ST ZIP Code  
Phone:  
Fax:  
E-mail address

**Servicing and Cleaning Log for Sanitation Facilities**

**Location of operation**

**Please see the food safety plan for overall field sanitation unit service procedures.**

Sanitation Unit #	Date of Cleaning	Cleaned By (name)	Date of Servicing	Serviced By (name)	Supplies Stocked**

\* See field map for locations of each unit in fields.

\*\* Sanitation supplies are single-use towels, toilet paper, hand- or anti-bacterial soap, potable water for hand washing

If contracted with sanitation company, attach service/cleaning receipt.

**Reviewed by:**

**Title:**

**Date:**







# Nash County Health Department

Environmental Health

Nash County Administration Building  
120 West Washington Street - Suite 2127  
Nashville, N.C. 27856  
(252) 459-9829

**Bad Example**

NAME: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
LOCATION: Nashville, NC \_\_\_\_\_  
PHONE: \_\_\_\_\_ WELL ORDINANCE \_\_\_\_\_ OTHER X

## WELL HEAD EVALUATION

Appears to be properly protected: Yes X No \_\_\_\_\_

If the well appears not to be protected, a bacterial water sample cannot be taken. A well that is not properly protected is not considered to be a safe water supply, regardless of any water analysis. If the well was found not to be properly protected, please refer to the recommended corrective measures noted below.

\_\_\_\_\_ PROPERLY INSTALL WELL SEAL \_\_\_\_\_ REPAIR WELL CASING  
\_\_\_\_\_ REPAIR OR INSTALL REQUIRED GROUT \_\_\_\_\_ OTHER \_\_\_\_\_

## WATER SUPPLY ANALYSIS

The results of the drinking water coliform analysis for your water supply are as follows:

- I.  Coliform bacteria were not found (absent)  
 Coliform bacteria were found (present)
- II.  Fecal coliform bacteria were not found (absent)  
 Fecal coliform bacteria were found (present)
- Other \_\_\_\_\_

COLLECTED BY: \_\_\_\_\_ Date: 3-10-10 Time: 12:40 am

Sample Number 8845 Received in Lab: Date: 3-10-10 Time: 1:30 pm

Date Reported 3-11-10 Technician Johnson

## RECOMMENDATIONS

X NONE INDICATED  
\_\_\_\_\_ DISINFECT WATER SUPPLY

OTHER COMMENTS \_\_\_\_\_

### North Carolina Laboratories Offering Generic E. coli Testing

Cert #	Method Certified	Lab Number	Lab Name	Lab Contact	Lab Address	Lab City	State	Zip	Telephone	E-mail Address	Generic E. Coli Test	Focal E. Coli Test	Website	Notes
57	922D-Membrane Filter (CFU)		Environmental, Inc	Anthony Triona	PO Box 954	Cullowhee	NC	28723	828-293-9396	<a href="mailto:environmental@ncol.com">environmental@ncol.com</a>	Membrane Filter (CFU) \$35.00 a sample	Membrane Filter (CFU) \$35.00 a sample		
	923B-Colliert (MPN) & Membrane Filter (CFU) & Multiple Fermentation Method (MPN)	37711	Water Tech Labs, Inc	Tony Gragg	PO Box 1056	Granite Falls	NC	28630	828-396-4444	<a href="mailto:water@watter.net">water@watter.net</a>	Colliert (MPN) & Membrane Filter (CFU) & Multiple Fermentation Method (MPN) \$30.00 a sample	Colliert (MPN) & Membrane Filter (CFU) & Multiple Fermentation Method (MPN) \$30.00 a sample		
352	922D-Membrane Filter (CFU)		Earth Environmental Services	Michael Laid	75 Bison Lane	Murphy	NC	28906	828-360-6401 or 828-360-6407	<a href="mailto:earthuser@webwork.com">earthuser@webwork.com</a>	Membrane Filter (CFU) \$50.00	Membrane Filter (CFU) \$50.00		*Driven per farmers request, very willing to work with farmers and is already catering to some local area farmers
27	923B-Membrane Filter (CFU)		Regers & Colliert Engineers, Inc.	Melisa Ramey	PO Box 5655	Greenville	SC	29606	864-232-1556	<a href="mailto:melisa.ramey@regersandcolliert.com">melisa.ramey@regersandcolliert.com</a>	Membrane Filter (CFU) \$35.00 a sample	Membrane Filter (CFU) \$35.00 a sample	<a href="http://www.pegfab.com">www.pegfab.com</a>	
20	922D-Membrane Filter (CFU)		PAR Laboratories, Inc.	Russell Everett	PO Box 411483	Charlotte	NC	28273	704-588-8333	<a href="mailto:russ.everett@ncsu.edu">russ.everett@ncsu.edu</a>	Membrane Filter (CFU) \$35.00 a sample	Membrane Filter (CFU) \$35.00 a sample	<a href="http://www.parlabs.com">www.parlabs.com</a>	
440	922D-Membrane Filter (CFU)	37755	Statesville Analytical Laboratory Services	Dena Myers	PO Box 228	Statesville	NC	28687	704-872-4697	<a href="mailto:dena.myers@statesvillanet.net">dena.myers@statesvillanet.net</a>	Membrane Filter (CFU) \$20.00 a sample	Membrane Filter (CFU) \$20.00 a sample	<a href="http://www.sa-ls.com">www.sa-ls.com</a>	
192	923B-Colliert (MPN)		CMU-Environmental Laboratory Services	Emily Rhineback	4232 Westmont Drive	Charlotte	NC	28217	704-336-2854	<a href="mailto:grhineback@lcharlotte.nc.us">grhineback@lcharlotte.nc.us</a>	Colliert (MPN) \$25.00 a sample	Colliert (MPN) \$25.00 a sample		
34	922F-Multiple Fermentation Method (MPN)	37701	Research & Analytical Laboratories	Sid Champion	PO Box 473	Kernersville	NC	27884	336-996-2841	<a href="mailto:ralc2@hadr.com">ralc2@hadr.com</a>	Multiple Fermentation Method (MPN) \$50.00 a sample	Multiple Fermentation Method (MPN) \$50.00 a sample		
1	9223B-Colliert (MPN) & Membrane Filter (CFU)	37718	Beacham Laboratory	Rod Reeves	1820 Wilmington Highway	Jacksonville	NC	28540	910-347-5843	<a href="mailto:beachamrod@live.com">beachamrod@live.com</a>	Colliert (MPN) \$30.00 a sample	Colliert (MPN) \$20.00 a sample		* Farmers would have to ask for quantitative results for generic e.coli, otherwise they would strictly presence/absence. Have to have sample within six hours of being taken and on ice.
75	Ideox Colliert (MPN)	37721	Tritest-Wilmington	Felicia Justice	6624 Gordon Rd Suite G	Wilmington	NC	28411	910-763-9793	<a href="mailto:justice@tritest.com">justice@tritest.com</a>	Colliert (MPN) \$35.00 a sample	Colliert (MPN) \$35.00 a sample	<a href="http://www.tritest.com">www.tritest.com</a>	
94	9223B-Membrane Filter (CFU)	37729	Environmental Chemists, Inc. (Envirochem)	Greg Porter	6602 Windmill Way	Wilmington	NC	28405	910-392-0223	<a href="mailto:gport@environmentalchemists.com">gport@environmentalchemists.com</a>	Membrane Filter (CFU) \$30.00 a sample	Membrane Filter (CFU) \$30.00 a sample	<a href="http://www.bermyenvironmental.com">www.bermyenvironmental.com</a>	* Currently work with multiple blueberry farmers, very familiar with quantifiable e.coli testing for ag. Purpose. Have to have sample within 8 hours of collection.
10	Membrane Filter (CFU)	37715	Environment 1, Inc.	John Melvin	PO Box 7085	Greenville	NC	27835	252-756-6208	<a href="mailto:jmelvin@earthlink.net">jmelvin@earthlink.net</a>	Colliert (MPN) \$50.00 a sample	Colliert (MPN) \$50.00 a sample	<a href="http://environment1inc.com/">http://environment1inc.com/</a>	* Have to receive the sample within 6 hours of it being drawn. Lab doesn't do these very often, would be willing to do so if there was enough interest to make it worth their while. A farmer can request a sample pick up.
11	Colliert (MPN)	37714	Microbac Laboratories, Inc	Ron Sanders	2592 Hope Mills Rd	Fayetteville	NC	28306	910-864-1920	<a href="mailto:rsanders@microbac.com">rsanders@microbac.com</a>	Colliert (MPN) \$50.00 a sample	Colliert (MPN) \$50.00 a sample	<a href="http://www.microbac.com">www.microbac.com</a>	Several other microbac labs in NC, however all of the rest produce qualitative Generic E. coli results. Fayetteville is the only one with quantifiable results
67	Ideox Colliert (MPN) & 922D-Membrane Filter (CFU)	37731	Tritest Raleigh, Inc.	William Sherman	PO Box 3380, 6701 Conference Drive	Raleigh	NC	27636	919-834-4984	<a href="mailto:wsherman@tritest.com">wsherman@tritest.com</a>	Colliert (MPN) \$50.00 a sample	Colliert (MPN) & Membrane Filter (CFU) \$50.00 a sample	<a href="http://www.tritest.com">www.tritest.com</a>	Perform Colliert (MPN) for their Generic E.coli count and for total fecal they can run both the Colliert and the membrane filter method (CFU)
633	9223B-Colliert (MPN) & Membrane Filter (CFU)	37738	Pace Analytical Services, Inc	Terri Page	370 West Meadow Road	Eden	NC	27288	336-623-8921	<a href="mailto:TerriPage@paceabts.com">TerriPage@paceabts.com</a>	Membrane Filter (CFU) \$50.00 a sample	Membrane Filter (CFU) \$50.00 a sample	<a href="http://www.paceabts.com/">http://www.paceabts.com/</a>	
313	9223B-Colliert (MPN)		Wake County Human Services Laboratory	Christine Glover	PO Box 14049	Raleigh	NC	27620	919-250-4437	<a href="mailto:cglover@co.wake.nc.us">cglover@co.wake.nc.us</a>	Colliert (MPN) \$25.00 a sample	Colliert (MPN) \$25.00 a sample		



# FDA Guidance for Industry Evaluating the Safety of Flood- affected Food Crops for Human Consumption

Providing guidance to growers on how to evaluate the safety of flood-affected food crops for human consumption.

## Flooding

Flooding is the flowing or overflowing of a field with water outside a grower's control.

## Rain Water Ponding

Pooled water (e.g., after rainfall) that is not reasonably likely to cause contamination of the edible portions of fresh produce is not considered flooding.

### IMPORTANT

If the edible portion of a crop is exposed to flood waters, it is considered adulterated under section 402(a)(4) [21 U.S.C. 342(a)(4)] of the Federal Food, Drug, and Cosmetic Act and should not enter human food channels.

## Safety of food crops when flood waters did NOT contact edible portion of crops

For crops in or near flooded areas, but flooded waters did NOT contact edible portions of the crops, the growers should on a case-by-case basis evaluate for possible contamination

### Factors to consider in terms of evaluation may include:

- Assessment of flood waters
- Type of crop and stage of growth
- Likelihood for crops to absorb or internalize potential contaminants
- Degree and duration of crop exposure to flood waters and related conditions



# FDA Guidance for Industry Evaluating the Safety of Flood- affected Food Crops for Human Consumption

## Controls to Avoid Cross Contamination After Flooding



Segregate flood affected crops from crops not affected.

Prevent cross contamination.

A 30-foot buffer zone is generally recommended.

Check your well head to see if it is under flood water.

Even if the crop is not completely submerged, there may still be microbial contamination of the edible portion of the crop. There is also the potential for plants to take up chemical contaminants. In addition to the direct presence of contaminants noted above, mold and toxins may develop in the crops as a result of exposure to the water.

## Additional Guidance Offered:

- Testing
- Assessment of Flood-affected Fields before Replanting
- Additional Controls to Avoid Cross-contamination after Flooding





Field Supervisors Daily Checklist for **Farm name.**

Field Location:

Date:

√/Date	Item	Comments / Corrections
	All new workers complete orientation, get brochure, and sign roster	
	Water containers are filled from potable drinking water.	
	All employees are clean. Sick or injured employees asked to report to supervisor. Sick workers reassigned.	
	Employees wash hands before starting work, after breaks.	
	Break areas designated. Restrooms are clean and fully supplied. No leaks.	
	First-aid kits available. Supplies for cleanup of contamination and body fluid spills available.	
	Visual inspection of water sources and sewage system does not indicate areas at risk for contamination.	
	Areas with evidence of animal activity, flooding, or other contamination have been documented with Notice of Unusual Events/Problems and Corrective Measures	
	Harvesting tools and containers are properly stored and clean and in good repair.	
	Harvesting machinery is clean and free from excessive dirt and mud, dripping lubricants, or fuel. Light bulbs, glass, and plastic are protected to avoid contaminating produce in case of breakage.	
	Pesticide spray equipment visually checked for damage.	

Signed \_\_\_\_\_ Date \_\_\_\_\_

List the items needing follow up on the **Notice of Unusual Events/Problems and Corrective Measures** and attach to this document.







## Chlorine Solutions in ppm

### Chlorine Injection systems

Equation below can be used to determine the injection rate (gph) of a 5.25% available chlorine liquid with ppm referring to the desired chlorine concentration.

$$\text{gph} = \frac{(\text{ppm})(\text{irrigation flow rate, gpm})}{\text{Concentration of chlorine injection ( 5.25, 10 . 15, etc)}}$$

5.25% = 971  
10% = 1870

An example is provided where a stock solution concentration of 5.25% available chlorine was used with a 500 gpm irrigation system. The goal was to have an 8 ppm active chlorine concentration in the irrigation system:

$$\frac{(8 \text{ ppm})(500 \text{ gpm})}{971} = 4.1 \text{ gph}$$

The same information can be determined using Table 1. For example, a treatment level of 8 ppm with a 10% available chlorine concentration corresponds to an injection rate of 0.43 gph. Note that this is the required injection rate for each 100 gpm. Thus, for 500 gpm, the injection rate would be five times as large, or 2.2 gph.

### Refer to paper: *Treating Irrigation systems with Chlorine – IFAS CIR1039*

To prepare a specific free chlorine solution (ppm) using sodium hypochlorite (NaOCl), use the following formula.

- 1) **Determine amount of sodium hypochlorite (NaOCl) concentrate to be added to the total volume of water** (units for NaOCl concentrate to add and total volume must be the same):

$$\text{Volume of NaOCl to add} = \frac{\text{Desired ppm of free chlorine} \times \text{total volume in tank}}{(\% \text{ NaOCl in concentrate}) \times 10,000}$$

- 2) **Add calculated amount of NaOCl concentrate to tank and bring up to final volume with water.**

#### Example

To achieve a 150 ppm free chlorine concentration in a 1,000 gallon dump tank using a 12.75% sodium hypochlorite solution.

- 1) NaOCl concentrate to add (gallons) =  $\frac{150 \text{ ppm} \times 1,000 \text{ gallons}}{(12.75 \times 10,000) \text{ ppm}} = 1.18 \text{ gallons.}$
- 2) Add 1.18 gallons of 12.75% sodium hypochlorite to 998.82 gallons of water. Adjust pH to between 6.5 & 7.5.

**Table 1.** Liquid chlorine (sodium hypochlorite) injection rates.

Treatment Level (ppm)	Concentration of available chlorine in stock solution (percent)						
	1	2	3	4	5.25*	10*	15*
(gph of injection per 100 gpm of irrigation flow rate)							
1	0.54	0.27	0.18	0.14	0.10	0.054	0.036
2	1.1	0.54	0.36	0.27	0.21	0.14	0.072
3	1.6	0.81	0.54	0.41	0.31	0.16	0.11
4	2.2	1.1	0.72	0.54	0.41	0.22	0.14
5	2.7	1.4	0.90	0.7	0.51	0.27	0.18
6	3.3	1.7	1.1	0.8	0.62	0.32	0.22
8	4.4	2.2	1.5	1.1	0.82	0.43	0.29
10	5.5	2.8	1.8	1.4	1.0	0.54	0.36
15	8.3	4.1	2.8	2.1	1.5	0.81	0.54
20	11.0	5.5	3.7	2.8	2.1	1.1	0.72
25	13.8	6.9	4.6	3.4	2.6	1.4	0.90
30	16.5	8.3	5.5	4.1	3.1	1.6	1.1
40	---	11.0	7.3	5.5	4.1	2.2	1.5
50	---	13.8	9.2	6.9	5.2	2.8	1.8
75	---	---	13.8	10.3	7.7	4.1	2.8
100	---	---	---	13.8	10.3	5.5	3.7

\*These are commercially available concentrations. Other concentrations are obtained by diluting with water.

Migliaccio K.W., Boman B., Clark G A. 2009. *Treating Irrigation Systems with Chlorine*. University of Florida. IFAS Extension. CIR1039.

## Traceback

Tracing your product one step forward (Where is it going) and one step back (Where did it come from) is really what traceability is about.

- the specific grower
- to the specific orchard or field.
- To workers
- harvest dates and or a packing date.

Here is an example for a traceback system:

STEP 1: Either put name on boxes or establish a two-digit code to identify the grower . These numbers remain the same from year to year.

For example:   LT       Lester Tomatoes  
                  12       A&B Packinghouse

STEP 2: Establish a system to identify the specific fields. The system that the Farm Service Agency uses can be applicable here, specifying the farm and track number.

For example:   4172T2 = Lester Farms, track 2

STEP 3: Establish a system to indentify each worker. This system could be tied to the fiscal management of workers also.

For example:   23 = Harvester Mark Jones

STEP 4: Establish a calendar for the year.

For example:               June 2 = 0602

STEP 5: This code should appear on every package containing produce from this shipment or batch.

Thus LT4172T223 0602 would mean:

First two digits = LT = grower.

Second set of digits = 4172T2 = specific farm     and field.

Third set of digits = 23 = worker number.

Last four digits = 0602 = indicate the date of harvest

## Recall

Here is a checklist for your recall plan:

1. Create a Customer/Buyer Contact list. Be sure to update names, phone numbers, and emails annually or as needed.
  - Restaurants or CSA company: Two contacts in purchasing/shipping department
  - Your own CSA: All members by email or website
  - Farmer's Market/Roadside stand: Website for customers to look for information, email sign up sheet, signs posted at the market or roadside stand
  -
2. Create a Recall Contact list. This list should include names and phone numbers of media representatives, proper authorities (FDA, NCDA, etc.), your insurance company and your legal council.
3. Identify the problem (chemical, physical or microbial risks) and assess the health risks.
4. Determine the products and lot numbers involved. (Only strawberries, or one day all vegetables, etc.)
5. Determine quantities involved. (cases, boxes, etc.)
6. Determine current inventory on the premises.
7. Determine the amount of product in the marketplace.
8. Identify the customers/buyers who have received the product.
9. Collect pertinent documentation regarding the affected product.
  - Inputs and outputs of affected field associated with the lot number such as notes on flooding, wildlife activity, ill employee, manure application, etc.
10. You will need to determine:
  - the total amount of suspect product shipped/delivered
  - the total amount of suspect product in the buyer's possession still
  - the total amount the suspect product the buyer has shipped
  - any product discarded
11. Upon completion of the mock recall, outline any issues in the recall plan and how you should change the recall plan to make it better.
  - For example, taking longer than 2 hours and not being able to account for 100% of the product.

For example, you call Pack It Daily, you delivered to them 5 boxes of turnips on May 6. This delivery was lot # 5052012. They received 4 boxes because one of the boxes fell on the floor and was discarded. The contents of the four boxes were sent to customers on 5/7/2012. Pack It Daily will send you an invoice (or this information on their letterhead) stating the amount shipped and the day they received your delivery with a note about the discarded box of turnips. This invoice (or letter) should be in your food safety manual along with your mock recall log.





## Guidance

# The Use of Chlorine Materials in Organic Production and Handling

### 1. Purpose

This guidance provides clarification regarding the use of chlorine materials in organic production and handling.

### 2. Scope

This guidance provides information to National Organic Program (NOP) certifying agents and to certified and exempt organic operations.

### 3. Background

The NOP is providing this guidance to clarify and ensure consistency in the use of chlorine products under the NOP regulations and in response to recommendations from the National Organic Standards Board (NOSB). The annotations limiting the use of chlorine in 7 CFR § 205.601(a)(2), § 205.603(a)(7), and § 205.605(b) of the National List of Allowed and Prohibited Substances (National List), do not align with a November 1995 NOSB recommendation on chlorine materials. This recommendation stated that chlorine materials should be allowed for use in organic crop production, organic food processing, and organic livestock production with the following annotation:

“Allowed for disinfecting and sanitizing food contact surfaces. Residual chlorine levels for wash water in direct crop or food contact and in flush water from cleaning irrigation systems that is applied to crops or fields cannot exceed the maximum residual disinfectant limit under the Safe Drinking Water Act (currently 4mg/L expressed as Cl<sub>2</sub>).”

This annotation was originally crafted to acknowledge that levels of chlorine permitted in municipal drinking water were considered acceptable for organic food production and handling. The language used in the proposed NOP rule published in March 2000 did not include the terms “in direct crop or food contact” and “in flush water ... that is applied to crops or fields.” The language used under § 205.605 (handling uses) only mentions use in disinfecting food contact surfaces, leading some handlers to question whether chlorine could be used in direct food contact. The NOP responded in the preamble of the final rule (65 FR 80548, 80616, December 21, 2000) which stated that the use of the term “residual chlorine” referred to the chlorine that was present in water when it exited the facility as effluent.

The NOSB revisited the issue through a May 2003 recommendation. The NOSB noted that “residual chlorine” is a scientific term used when measuring chlorine. Residual chlorine (also called free or available chlorine) is the chlorine that remains available in solution after the disinfection step is complete, when the initial added chlorine material has been reduced by reaction, bound to the organic matter, or evaporated. The residual chlorine is what is still available to oxidize other substances. Residual chlorine is the fraction of available chlorine in solution derived from the disinfectant source.



When calcium hypochlorite or sodium hypochlorite is used, the proper measure for residual chlorine is the sum of the concentrations of hypochlorous acid (HOCl) and hypochlorite ion (OCl<sup>-</sup>). For chlorine dioxide (ClO<sub>2</sub>), all unreacted chlorine is considered to be free chlorine. Another frequently used term is total chlorine, which is a measurement of the free plus inactive forms.

In 2003, the NOSB stated: “The Organic Foods Production Act is not designed to function as a waste water regulation. Instead, it is a regulation designed to protect organic integrity. As such, processing operations must demonstrate compliance with the chlorine annotation by monitoring the chlorine content of the water which is in direct contact with organic products, not the wash water which is discharged from the facility.” This statement represents NOP’s current thinking on this topic.

#### 4. Policy

As per the annotations in the National List shown below, residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act (SDWA). To demonstrate compliance with the NOP regulations regarding chlorine, certified operators should monitor the chlorine level at the point where the water last contacts the organic product in direct applications. A description of the operation’s monitoring procedure should be contained in the operation’s Organic System Plan. Certifying agents should review and verify records used by certified operations to demonstrate compliance during the operation’s annual inspection.

##### 4.1 Crop operations:

1. Residual chlorine levels in the water in direct crop contact (when used pre-harvest) or as water from cleaning irrigation systems applied to soil should not exceed the maximum residual disinfectant limit under the SDWA.
2. Chlorine products may be used up to maximum labeled rates for disinfecting and sanitizing equipment or tools. No intervening event is necessary before equipment is used in contact with organic crops.

##### 4.2 Livestock operations:

1. Residual chlorine levels in the water in direct food or animal contact (for example, drinking water) should not exceed the maximum residual disinfectant limit under the SDWA.
2. Chlorine products may be used up to maximum labeled rates for sanitizing equipment or tools (including dairy pipelines and tanks). Label instructions should be followed regarding requirements for rinsing or not rinsing prior to the equipment’s next use.

##### 4.3 Handling operations (includes on-farm post-harvest handling):

1. For food handling facilities and equipment, chlorine materials may be used up to maximum-labeled rates for disinfecting and sanitizing food contact surfaces. Rinsing is not required unless mandated by the label use directions.



2. Water used in direct post-harvest crop or food contact (including flume water to transport fruits or vegetables, wash water in produce lines, egg or carcass washing) is permitted to contain chlorine materials at levels approved by the Food and Drug Administration or the Environmental Protection Agency for such purpose.
  - a. Rinsing with potable water that does not exceed the maximum residual disinfectant limit for the chlorine material under the SDWA must immediately follow this permitted use.
  - b. Certified operators should monitor the chlorine level of the final rinse water, the point at which the water last contacts the organic product. The level of chlorine in the final rinse water must meet limits as set forth by the SDWA.
  - c. Water used as an ingredient in organic food handling should not exceed the maximum residual disinfectant limit for the chlorine material under the SDWA, as required by the Organic Food Production Act (7 U.S.C. 6510(a)(7)).

## 5. References

### Other Definitions

“Maximum residual disinfectant level” is a term defined by the Environmental Protection Agency (EPA) at 40 CFR §§ 141.2, 141.65 as the highest level of a disinfectant allowed in drinking water. This level is currently established by EPA at 4 mg/L for chlorine (as Cl<sub>2</sub>) and 0.8 mg/L for chlorine dioxide.

### Organic Foods Productions Act (1990 as amended)

7 U.S.C. 6510, Handling.

(a) In General.—For a handling operation to be certified under this title, each person on such handling operation shall not, with respect to any agricultural product covered by this title...

(7) use in such product water that does not meet all Safe Drinking Water Act requirements.

### NOP Regulations (as amended to date)

7 CFR § 205.601 Synthetic substances allowed for use in organic crop production.

(a) As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems.

(2) Chlorine materials—Except, That, residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act.

(i) Calcium hypochlorite

(ii) Chlorine dioxide

(iii) Sodium hypochlorite

7 CFR § 205.603 Synthetic substances allowed for use in organic livestock production.

(a) As disinfectants, sanitizer, and medical treatments as applicable

(7) Chlorine materials—disinfecting and sanitizing facilities and equipment. Residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act.

(i) Calcium hypochlorite.

(ii) Chlorine dioxide.

(iii) Sodium hypochlorite.



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7 CFR § 205.605 Nonagricultural (nonorganic) substances allowed as ingredients in or on processed products labeled as “organic” or “made with organic (specified ingredients or food group(s)).”

(b) Synthetics allowed:

Chlorine materials— disinfecting and sanitizing food contact surfaces, Except, That, residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act (Calcium hypochlorite; Chlorine dioxide; and Sodium hypochlorite).

### **NOSB Recommendations**

2003, NOSB. Measuring Effluent: Clarification of Chlorine Contact with Organic Food, NOSB Processing Committee April 30, 2003.

<http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELDEV3104548>

1995, NOSB. Final Minutes of the National Organic Standards Board Full Board Meeting Austin, Texas October 31-November 4, 1995.

<http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5057496>

### **Other Laws and Regulations**

Safe Drinking Water Act, 1974 as amended 1986, 1996; included in 42 U.S.C. Chapter 6A – Public Health Service, Section 300f, authorizes National Primary Drinking Water Regulations, 40 CFR Part 142. <http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm>

Approved on July 22, 2011



Good Agricultural Practices (GAPs) can improve produce quality and safety and protect your business. Producers also use standard cleaning and sanitizing practices to reduce sources of microbial contamination on their products.

This publication focuses on the best cleaning and sanitizing practices for food products and food contact surfaces. It includes a resource list plus a sample form for monitoring sanitizer effectiveness and a sample cleaning schedule.

Washing, rinsing, and sanitizing may appear to increase costs, but they enhance product quality and offer these benefits:

- Soil and particles that can cause decay or spoilage are removed.
- Microorganisms that cause foodborne illness can be eliminated or reduced to a safe level.
- Clean produce is more visually appealing to customers.
- Product shelf life increases when spoilage organisms are removed.

# On-farm Food Safety: Cleaning and Sanitizing Guide

Using good sanitation practices during production, harvesting, and packaging can help reduce the risk of microbial contamination of fresh produce. Soil, fertilizers, harvesting equipment, water, workers, or animals such as livestock, pets, and pests can be sources of harmful microorganisms that cause foodborne illness. Surfaces that come in contact with produce must be washed, rinsed, and sanitized regularly. Employees need to understand and use appropriate food handling practices.

## Food Contact Surfaces

Any surface that comes in contact with food, either directly or indirectly, is a food contact surface. Examples include preparation tables, spinners, food bags, and cartons for transporting produce. Food contact surfaces should be smooth and nonporous to allow for easy and effective cleaning. Rough surfaces, such as wood, can harbor dirt and microorganisms. Stainless steel tables and counters are commonly used in foodservice and processing facilities due to durability and ease of cleaning.

Other surfaces that can come into contact with product include containers for harvesting and transportation, tables in packing areas, bags and other packaging materials, conveyors, processing equipment, employee aprons, outerwear, and gloves. Hands also may come into contact with the food. For more information about food handling practices, see “On-farm Food Safety: Food Handling Guide” (PM 1974b).

## Cleaning

Cleaning means removing soil and residues. For product (fruits and vegetables) the cleaning steps vary with how dirty the product is, and the tenderness and perishable nature of the food. For example, root vegetables often require initial rinsing, scrubbing, followed by one or two additional rinses to remove soil residue, while only rinsing can be safely used on leafy green vegetables. Fruits and vegetables that grow well above the ground may be brushed or wiped when

soil and other residue are minimal. Other tender or highly perishable products such as strawberries or raspberries should not be washed with water until just prior to use, as should all fruits and vegetables. When water is used for cleaning, it should be potable (safe to drink). New research shows that for certain vegetables, such as tomatoes, bacteria can be pulled into openings if the wash water temperature is colder than that of the produce item.

Cleaning of food contact surfaces means removing soil and residues. This involves a three-step process of rinsing away surface debris, washing and scrubbing with soap or detergent, followed by rinsing with clean potable water. Rinsing surfaces thoroughly is important so that any detergent residue is removed.

Under certain conditions, microorganisms (bacteria, yeasts, and molds) can form invisible films (biofilms) on surfaces. Biofilms can be difficult to remove and usually require cleaners (for physical removal) as well as sanitizers (for killing of biofilm microbes.)

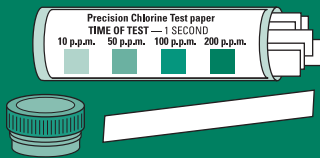
## Sanitizing

Sanitizing is the process of treating a food contact surface with a sanitizing solution that will kill most microorganisms or reduce them to a non-harmful level. For sanitizers to be effective, surfaces must first be cleaned, because soil and soap residues can make the sanitizing solution less effective.

- **Sanitizing** is a process that reduces the contamination level of a product or food contact surface by 99.999 (5-log reduction) percent in 30 seconds.

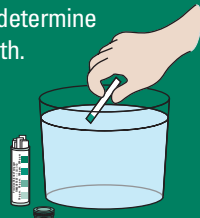
- **Sanitizer** is a chemical compound designed to kill microorganisms. Chlorine bleach (sodium hypochlorite concentrations 5.25 to 6.5 % in liquid form) and quaternary ammonium compounds (quats) are commonly used sanitizers for food contact surfaces. Chlorine and hydrogen peroxide, at proper concentrations, can be used for food products.

## Chlorine Test Kit



### How to use test strips

- Make sure the test strip is appropriate for the type of sanitizer.
- Prepare the sanitizing solution.
- Dip a strip into the solution.
- Compare the color the strip changed to with the guide on the outside of the package to determine the solution strength.
- Record sanitizer concentration.



### Cleaning tips

- Have tools, supplies, and waste receptacles easily available for employee use.
- Make sure waste receptacles are regularly emptied and cleaned.
- Have a place to properly store all equipment at the end of the day.
- Encourage employees to share ideas related to cleaning and sanitizing.
- Look for potential problems when walking through your operation.
- Evaluate all cleaning and processing equipment and utensils daily.
- Conduct a visual inspection to make sure surfaces are in good condition and cleaned and sanitized regularly.
- Establish a cleaning and sanitizing schedule for equipment and food contact surfaces.

However, excessive concentrations may damage product tissues and/or lead to toxic levels. Producers should check with regulators in their areas regarding approved agents. It is recommended only registered formulas be used.

- **Sanitizing solution** is the mixture of a specific amount of a sanitizer with potable water, according to the directions given by the manufacturer to create the proper concentration.

Sanitizing solutions gradually lose effectiveness over time. As the solution is continually exposed to air or organic materials, reactions cause some of the chemical to dissipate. The best way to check whether a sanitizing solution is effective is to use a test strip. Sanitizing solutions should be made and checked at least daily. They also should be recorded. (See sidebar to left for an example of chlorine test strips).

## Choosing a Sanitizer

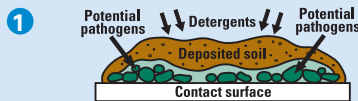
Producers should select a sanitizer based on these characteristics: safety for workers and the environment, stability, water quality and pH, and non-corrosiveness. Several types of sanitizers are available for products and/or food contact surfaces: chlorine (50 – 200 parts per million or ppm), quaternary ammonium or quats (see label for recommended concentrations), hydrogen peroxide, and new generation food-grade vegetable washes. (See sidebar on page 3).

New generation food-grade vegetable washes, such as PRO-SAN<sup>®</sup>LC, sanitize fresh produce and produce contact surfaces and are biodegradable. Chlorine and hydrogen peroxide are commonly used for products because they are readily available and cost effective. For a complete list of approved sanitizers for products and food contact surfaces, check with state and federal regulatory agencies.

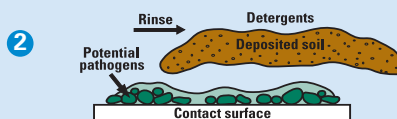
Sanitizers may have multiple uses. For example, chlorine can be used on fresh produce or on food contact surfaces, depending on the concentration. Room temperature water should be used to minimize chlorine loss in the solution. The proportion of sanitizer to water must be accurate to make sure the solution will be effective and avoid damage to products and consumers. A common recipe for a chlorine based sanitizing solution is 1 tablespoon household bleach (**non-scented**) per 1 gallon room temperature water. This will result in a solution of 100 ppm. A range of 50 – 100 ppm is recommended for food contact surfaces. This solution is applied as a fine spray in the final step of the cleaning process and should not be wiped or rinsed off. Surfaces should be allowed to air dry. We recommend 100 – 200 ppm chlorine solution for products. Mixing up to 2 tablespoons per gallon of water (200 ppm solution) can be used because organic materials, like soil, will break down effectiveness of the chlorine quickly. Removing as much soil as possible from the product prior to washing, and changing chlorinated wash water frequently is recommended. A final rinse with potable water can be used on the produce but is not necessary.

Chlorine bleach can be purchased in several concentrations of the active ingredient, sodium hypochlorite. A typical

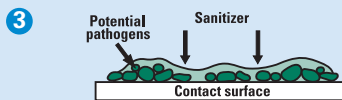
### How the cleaning and sanitizing process works



**Washing** helps loosen soils and other organic material from the surface. **Detergent and scrubbing** also helps break the adhesion of microorganisms to the surface.



**Rinsing** removes loosened soil and detergent from the surface. This step is important because organic material and detergent can bind up sanitizer making it less effective.



Applying the **sanitizer** to clean surfaces actually provides a “kill” step for reducing the number of microorganisms. The surface is not completely free of microorganisms, but the number is greatly reduced, and if done correctly, will result in a safer product without quality damage.

concentration is 6%. (Check the label because super concentrations of bleach are being introduced in the market). Keep in mind that water quality (such as pH and amount of minerals) can significantly impact the effectiveness of both detergents and sanitizers. Chlorine is most effective in killing microorganisms at pH between 6.0 and 7.5. Check pH and concentrations with test strips regularly and record on a monitoring form (see example).

Hydrogen peroxide is another common sanitizer for products. This may be purchased in a shelf-stable form at appropriate concentrations (e.g., Tsunami®), which lessens the risk of an on farm accident when mixing solutions. Or, producers can prepare solutions themselves using 1% to 5% of hydrogen peroxide; generally a 3% solution is used. Caution should be taken during this process to protect worker from harm.

Use a test strip to achieve the recommended concentration for the specific product. (The concentration for hydrogen peroxide is usually listed in percents while other sanitizer concentrations are shown by ppm). Research has shown that adding ½ cup acid such as acetic, citric, or lactic acid to 1 gallon of hydrogen peroxide solution can significantly improve the effectiveness of the solution. Tsunami® contains acetic acid.

### New Generation Washes

New generation food-grade fruit and vegetable washes, such as PRO-SAN® LC (Liquid Concentrate) and FreshRinse® sanitize fresh produce and produce contact surfaces. These new, acid-based washes minimize overall microbial numbers and inactivate common bacterial pathogens such as *Salmonella spp.* Most consist of only biodegradable components so washes are environmentally friendly. Unlike chlorine, hydrogen peroxide, ozone, and peroxyacetic acid, these new generation washes are non-oxidizing and are less reactive with the fresh produce.

Several sanitizers are approved by the USDA National Organic Program: chlorine, ozone (which requires ozone generating equipment), and peroxyacetic acid (Tsunami®); acetic acid (although the vinegar must be from an organic source); and hydrogen peroxide. These New Generation washes are Generally Recognized as Safe (GRAS).

### Sample Chemical Sanitizer Monitoring Form

Date	Initials	Test Strip Result	Use
8/15/10	DH	Chlorine 50 ppm—OK	Surfaces
8/15/10	DH	Chlorine 200 ppm—OK	Product

**Directions:**  
 1. Complete this form daily.  
 2. Record date, your initials, and test strip result.  
 3. Indicate whether the test strip turned the appropriate color to meet the sanitizer concentration standard. The result is either "OK" or "CHANGED." If the solution is changed, indicate corrective action on the form.  
 4. If the sanitizer solution is redone, log the new concentration on the form.

### Set up Cleaning and Sanitizing Schedule

The key to effective cleaning and sanitizing is making these practices part of normal operations. Equipment should be cleaned from top to bottom to avoid re-soiling already cleaned surfaces. In general, four questions need to be answered.

1. **What** should be cleaned?
2. **How** should each piece of equipment or food contact surface be cleaned and sanitized?
3. **When** should equipment be cleaned? Daily, weekly, as needed?
4. **Who** is responsible? Is a specific person or a position responsible for each cleaning task? Who will check to make sure the list is done according to schedule?

Many steps can be easily overlooked during cleaning. Action items in the schedule should be incorporated into regular duties of workers. Workers should initial the form to document that the task is completed. Regular cleaning reduces the build-up of microorganisms.

### Sample Cleaning Schedule

Area	Cleaning Frequency	Cleaning and Sanitizing Method	Person Responsible
1. Preparation table in packaging area	Beginning of the day and between packaging different products	1-Remove debris accumulation using clean cloth and soapy water. 2-Rinse table top with clean water. 3-Sanitize with clean cloth and chlorine sanitizer solution of 50 ppm.	Bill / 1-5-11
2.			
3.			
4.			
5.			

Visit [www.iowahaccp.iastate.edu](http://www.iowahaccp.iastate.edu) for sample cleaning procedures, schedules, and monitoring forms



## Summary

Cleaning and sanitizing are part of an overall food safety plan to provide the safest and best quality fresh fruits, vegetables, greens, and herbs to customers. Checklists, standard procedures, and schedules are typically the best ways to communicate information to employees and document that proper cleaning and sanitizing practices are followed.

## References and Resources

More information about general produce food safety, GAPs, and food safety plans is available at the following websites.

### **Local Foods: From Farm to Foodservice, Hotel, Restaurant, and Institution Management Extension, Iowa State University**

<http://www.iastatelocalfoods.org>

### **Environmental Protection Agency**

<http://www.epa.gov>

### **Good Agricultural Practices Project, Cornell University**

<http://www.gaps.cornell.edu>

### **Good Agricultural Practices, New England Extension Food Safety Consortium**

<http://www.hort.uconn.edu/IPM/foodsafety/index.htm>

### **Guidelines for the use of chlorine bleach as a sanitizer in food processing operations, (Publication FAPC#116), W. McGlynn, Oklahoma State University Cooperative Extension**

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-963/FAPC-116web.pdf>

### **Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables, Center for Food Safety and Applied Nutrition (CFSAN), U.S. Food and Drug Administration**

<http://www.fda.gov/downloads/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/UCM169112.pdf>

### **HACCP: Hazard Analysis Critical Control Point Information Center, Iowa State University Extension**

<http://www.iowahaccp.iastate.edu/>

### **Postharvest handling of fruits and vegetables**

2000. Janet Bachmann and Richard Earles. National Sustainable Agriculture Information Service - ATTRA. Available at [www.attra.ncat.org/attra-pub/postharvest.html](http://www.attra.ncat.org/attra-pub/postharvest.html)

### **Vegetable Research and Information Center, University of California**

#### **Cooperative Extension**

<http://vric.ucdavis.edu>

### **Organic Materials Review Institute**

Founded in 1997, the Organic Materials Review Institute (OMRI) provides organic certifiers, growers, manufacturers, and suppliers an independent review of products intended for use in certified organic production, handling, and processing.

<http://www.omri.org/>

### **National Good Agricultural Practices Network**

The National Good Agricultural Practices Network is based at Cornell University. <http://www.gaps.cornell.edu/index.html>

### **USDA BioPreferred Catalog may be found at the following website:**

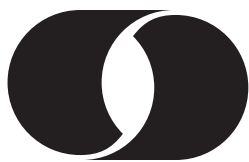
<http://www.biopreferred.gov/bioPreferredCatalog/faces/jsp/catalogLanding.jsp>

This electronic catalog may be used to find and compare information on BioPreferred products and companies that supply them.

#### **...and justice for all**

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LEOPOLD CENTER

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Institution Management; and Aubrey Mendonca, Food Science and Human Nutrition. Revised by Lester Wilson, Food Science and Human Nutrition; Catherine Strohbehn, Hotel, Restaurant and Institution Management; Paul Domoto, Horticulture; Margaret Smith, Value Added Agriculture; Byron Brehm-Stecher and Aubrey Mendonca, Food Science and Human Nutrition. Reviewed by Angela Shaw, Food Science and Human Nutrition.



**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," and generally recognized good agricultural practices.**

**Firm Name:** \_\_\_\_\_

**Contact Person:** \_\_\_\_\_

**Audit Site Address:** \_\_\_\_\_

**City:** \_\_\_\_\_ **State:** \_\_\_\_\_ **Zip:** \_\_\_\_\_

**Mailing Address:** \_\_\_\_\_

**City:** \_\_\_\_\_ **State:** \_\_\_\_\_ **Zip:** \_\_\_\_\_

**Telephone No:** \_\_\_\_\_ **Fax:** \_\_\_\_\_

**E-mail:** \_\_\_\_\_

**Auditor(s)** (list all auditors with the lead listed first):  
\_\_\_\_\_

**USDA or Fed-State Office performing audit:** \_\_\_\_\_

**Arrival Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_

**Departure Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_

**Travel Time (hours)** \_\_\_\_\_

**Person(s)  
Interviewed:**  
\_\_\_\_\_

Did the auditee participate in GAP & GHP training?

Yes  No

Is there a map that accurately represents the farm operations?

Yes  No  N/A

Legal Description/GPS/Lat.&Long. of Location: \_\_\_\_\_

Are all crop production areas located on this audit site?

Yes  No  N/A

Total acres farmed (Owned, leased/rented, contracted, consigned): \_\_\_\_\_

Does the company have more than one packing facility?

Yes  No  N/A

Is there a floor plan of the packing house facility(s) indicating flow of product, storage areas, cull areas, employee break rooms, restrooms, offices?

Yes  No  N/A

Is any product commingled prior to packing?

Yes  No

**Audit Scope: (Please check all scopes audited)**

**General Questions (All audits must begin with and pass this portion)**

Part 1 – Farm Review.....

Part 2 - Field Harvest and Field Packing Activities.....

Part 3 - House Packing Facility.....

Part 4 – Storage and Transportation.....

Part 5 – (Not Used)

Part 6 – Wholesale Distribution Center/Terminal Warehouse.....

Part 7 – Preventive Food Defense Procedures.....

**Commodities:**

## **Conditions Under Which an Automatic "Unsatisfactory" Will be Assessed**

- **An immediate food safety risk is present when produce is grown, processed, packed or held under conditions that promote or cause the produce to become contaminated.**
- **The presence or evidence of rodents, an excessive amount of insects or other pests in the produce during packing, processing or storage.**
- **Observation of employee practices (personal or hygienic) that have jeopardized or may jeopardize the safety of the produce.**
- **Falsification of records.**
- **Answering of Questions P1 or P2 as "NO".**

## **Auditor Completion Instructions**

- **For clarification and guidance in answering these questions, please refer to the Good Agricultural Practices & Good Handling Practices Audit Verification Program Policy and Instruction Guide.**
- **Place the point value for each question in the proper column (Yes, No, or N/A).**
- **Gray boxes in the "N/A" column indicate that question cannot be answered "N/A".**
- **Any "N/A" or "No" designation must be explained in the comments section.**
- **The "Doc" column:**
  - **A "D" indicates that a document(s) is required to show conformance to the question. A document may be a combination of standard operating procedures outlining company policy as well as a record indicating that a particular action was taken.**
  - **A "R" indicates that a record is required to be kept showing an action was taken.**
  - **A "P" indicates that a policy/standard operating procedure (SOP) must be documented in the food safety plan in order to show conformance to the question.**

## General Questions

### Implementation of a Food Safety Program

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

### Traceability

Questions		Points	Yes	NO	N/A	Doc
G-1	A documented traceability program has been established.	15				D
G-2	The operation has performed a "mock recall" that was proven to be effective.	10				R

### Worker Health & Hygiene

Questions		Points	Yes	NO	N/A	Doc
G-3	Potable water is available to all workers.	10				R
G-4	All employees and all visitors to the location are required to follow proper sanitation and hygiene practices.	10				P
G-5	Training on proper sanitation and hygiene practices is provided to all staff.	15				D
G-6	Employees and visitors are following good hygiene/sanitation practices.	15				
G-7	Employees who handle or package produce are washing their hands before beginning or returning to work.	15				
G-8	Readily understandable signs are posted to instruct employees to wash their hands before beginning or returning to work.	10				
G-9	All toilet/restroom/field sanitation facilities are clean. They are properly supplied with single use towels, toilet paper, 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				R

USDA Good Agricultural Practices and Good Handling Practices  
 Audit Verification Checklist

Questions		Points	Yes	NO	N/A	Doc
G-11	Smoking and eating are confined to designated areas separate from where product is handled.	10				P
G-12	Workers with diarrheal disease or symptoms of other infectious diseases are prohibited from handling fresh produce.	15				P
G-13	There is a policy describing procedures which specify handling/disposition of produce or food contact surfaces that have come into contact with blood or other bodily fluids.	15				P
G-14	Workers are instructed to seek prompt treatment with clean first aid supplies for cuts, abrasions and other injuries.	5				P
G-15	Company personnel or contracted personnel that apply regulated pre-harvest and/or post harvest materials are licensed. Company personnel or contracted personnel applying non-regulated materials have been trained on its proper use.	10				R

COMMENTS:						


**Total Points earned for General Questions =**

**Total Possible** = 180      *The total number of points possible for this section.*

**Subtract "N/A"** = \_\_\_\_\_      *Enter the additive number of N/A points (+points) here.*

**Adjusted Total** = \_\_\_\_\_      *Subtract the N/A points from the Total possible points*

**X .8 (80%)**      *Multiply the Adjusted Total by .8 and show it as the Passing Score*

**Passing Score** = \_\_\_\_\_

**Pass**       **Fail**      **(please mark one)**

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," and generally recognized good agricultural practices.

**For further information regarding the USDA GAP & GHP Audit Program, please contact:**

**USDA Fruit and Vegetable Program, Specialty Crops Inspection Division, Audit Services Branch at 202-720-5021, or FVAudits@ams.usda.gov**



## Part 1 - Farm Review

### Water Usage

(1-1) What is the source of irrigation water? (Pond, Stream, Well, Municipal, Other)  
 Please specify:

---

(1-2) How are crops irrigated? (Flood, Drip, Sprinkler, Other) Please specify:

---

Questions		Points	Yes	NO	N/A	Doc
1-3	A water quality assessment has been performed to determine the quality of water used for irrigation purpose on the crop(s) being applied.	15				D
1-4	A water quality assessment has been performed to determine the quality of water use for chemical application or fertigation method.	15				D
1-5	If necessary, steps are taken to protect irrigation water from potential direct and non-point source contamination.	15				

### Sewage Treatment

Questions		Points	Yes	NO	N/A	Doc
1-6	The farm sewage treatment system/septic system is functioning properly and there is no evidence of leaking or runoff.	15				
1-7	There is no municipal/commercial sewage treatment facility or waste material landfill adjacent to the farm.	10				

### Animals/Wildlife/Livestock

Questions		Points	Yes	NO	N/A	Doc
1-8	Crop production areas are not located near or adjacent to dairy, livestock, or fowl production facilities unless adequate barriers exist.	15				
1-9	Manure lagoons located near or adjacent to crop production areas are maintained to prevent leaking/overflowing, or measures have been taken to stop runoff from contaminating the crop production areas.	10				

Questions		Points	Yes	NO	N/A	Doc
1-10	Manure stored near or adjacent to crop production areas is contained to prevent contamination of crops.	10				
1-11	Measures are taken to restrict access of livestock to the source or delivery system of crop irrigation water.	10				
1-12	Crop production areas are monitored for the presence or signs of wild or domestic animals the entering the land.	5				R
1-13	Measures are taken to reduce the opportunity for wild and/or domestic animals from entering crop production areas.	5				R

### Manure and Municipal Biosolids

Please choose one of the following options as it relates to the farm operations:

\_\_\_\_\_ Option A. Raw manure or a combination of raw and composed manure is used as a soil amendment.

\_\_\_\_\_ Option B. Only composted manure/treated municipal biosolids are used as soil amendments.

\_\_\_\_\_ Option C. No manure or municipal biosolids of any kind are used as soil amendments.

Only answer the following manure questions (questions 1-14 to 1-22) that are assigned to the Option chosen above. DO NOT answer the questions from the other two options. The points from the manure and municipal biosolids are worth 35 of a total 190 points, and answering questions from the other two options will cause the points to calculate incorrectly.

Option A: Raw Manure		Points	Yes	NO	N/A	Doc
1-14	When raw manure is applied, it is incorporated at least 2 weeks prior to planting or a minimum of 120 days prior to harvest.	10				R
1-15	Raw manure is not used on commodities that are harvested within 120 days of planting.	10				R
1-16	If both raw and treated manure are used, the treated manure is properly treated, composted or exposed to reduce the expected levels of pathogens.	10				R
1-17	Manure is properly stored prior to use.	5				



<b>Option B: Composted Manure</b>		Points	Yes	NO	N/A	Doc
1-18	Only composted manure and/or treated biosolids are used as a soil amendment.	10				R
1-19	Composted manure and/or treated biosolids are properly treated, composted, or exposed to environmental conditions that would lower the expected level of pathogens.	10				D
1-20	Composted manure and/or treated biosolids are properly stored and are protected to minimize recontamination.	10				
1-21	Analysis reports are available for composted manure/treated biosolids.	5				R
<b>Option C: No Manure/Biosolids Used</b>		Points	Yes	NO	N/A	Doc
1-22	No animal manure or municipal biosolids are used.	35				P

**Soils**

<b>Questions</b>		Points	Yes	NO	N/A	Doc
1-23	A previous land use risk assessment has been performed.	5				R
1-24	When previous land use history indicates a possibility of contamination, preventative measures have been taken to mitigate the known risks and soils have been tested for contaminants and the land use is commensurate with test results.	10				R
1-25	Crop production areas that have been subjected to flooding are tested for potential microbial hazards.	5				R

**Traceability**

<b>Questions</b>		Points	Yes	NO	N/A	Doc
1-26	Each production area is identified or coded to enable traceability in the event of a recall.	10				R

<b>COMMENTS:</b>						

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 Audit Verification Checklist


**Total Points earned for Farm Review =** \_\_\_\_\_

**Total Possible = 190** *The total number of points possible for this section.*

**Subtract "N/A" = \_\_\_\_\_** *Enter the additive number of N/A points (+points) here.*

**Adjusted Total = \_\_\_\_\_** *Subtract the N/A points from the Total possible points*

**X .8 (80%)** *Multiply the Adjusted Total by .8 and show it as the Passing Score*

**Passing Score = \_\_\_\_\_**

**Pass**                       **Fail**                      **(please mark one)**

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," and generally recognized good agricultural practices.

## Part 2 - Field Harvest and Field Packing Activities

### Field Sanitation and Hygiene

Questions		Points	Yes	NO	N/A	Doc
2-1	A documented pre-harvest assessment is made on the crop production areas. Risks and possible sources of crop contamination are noted and assessed.	15				D
2-2	The number, condition, and placement of field sanitation units comply with applicable state and/or federal regulations.	10				
2-3	When question 2-2 is answered "N/A" (sanitation units are not required), a toilet facility is readily available for all workers.	10				
2-4	Field sanitation units are located in a location that minimizes the potential risk for product contamination and are directly accessible for servicing.	10				
2-5	A response plan is in place for the event of a major spill or leak of field sanitation units or toilet facilities.	10				P

### Field Harvesting and Transportation

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

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Questions		Points	Yes	NO	N/A	Doc
2-11	There is a standard operating procedure or instructions on what measures should be taken in the case of glass/plastic breakage and possible contamination during harvesting operations.	5				P
2-12	There is a standard operating procedure or instructions on what measures should be taken in the case of product contamination by chemicals, petroleum, pesticides or other contaminating factors.	5				P
2-13	For mechanically harvested product, measures are taken during harvest to inspect for and remove foreign objects such as glass, metal, rocks, or other dangerous/toxic items.	5				
2-14	Harvesting containers, totes, etc. are not used for carrying or storing non- produce items during the harvest season, and farm workers are instructed in this policy.	5				P
2-15	Water applied to harvested product is microbially safe.	15				R
2-16	Efforts have been made to remove excessive dirt and mud from product and/or containers during harvest.	5				
2-17	Transportation equipment used to move product from field to storage areas or storage areas to processing plant which comes into contact with product is clean and in good repair.	10				
2-18	There is a policy in place and has been implemented that harvested product being moved from field to storage areas or processing plants are covered during transportation.	5				P
2-19	In ranch or field pack operations, only new or sanitized containers are used for packing the product.	10				D
2-20	Packing materials used in ranch or field pack operations are properly stored and protected from contamination.	10				
2-21	Product moving out of the field is uniquely identified to enable traceability in the event of a recall.	10				D



## Part 3 - HOUSE PACKING FACILITY

### Receiving

Questions		Points	Yes	NO	N/A	Doc
3-1	Product delivered from the field which is held in a staging area prior to packing or processing is protected from possible contamination.	5				
3-2	Prior to packing, product is properly stored and/or handled in order to reduce possible contamination.	5				

### Washing/Packing Line

Questions		Points	Yes	NO	N/A	Doc
3-3	Source water used in the packing operation is potable.	15				R
3-4	If applicable, the temperature of processing water used in dump tanks, flumes, etc., is monitored and is kept at temperatures appropriate for the commodity.	10				D
3-5	Processing water is sufficiently treated to reduce microbial contamination.	10				D
3-6	Water-contact surfaces, such as dump tanks, flumes, wash tanks and hydro coolers, are cleaned and/or sanitized on a scheduled basis.	10				D
3-7	Water treatment (strength levels and pH) and exposure time is monitored and the facility has demonstrated it is appropriate for the product.	10				D
3-8	Food contact surfaces are in good condition; cleaned and/or sanitized prior to use and cleaning logs are maintained.	15				D
3-9	Product flow zones are protected from sources of contamination.	10				
3-10	The water used for cooling and/or making ice is potable.	15				R
3-11	Any ice used for cooling produce is manufactured, transported and stored under sanitary conditions.	10				R

### Packing House Worker Health & Hygiene

Questions	Points	Yes	NO	N/A	Doc
3-12 Employee facilities (locker rooms, lunch and break areas, etc.) are clean and located away from packing area.	10				
3-13 When there is a written policy regarding the use of hair nets/beard nets in the production area, it is being followed by all employees and visitors.	5				P
3-14 When there is a written policy regarding the wearing of jewelry in the production area, it is being followed by all employees and visitors.	5				P

### Packing House General Housekeeping

Questions	Points	Yes	NO	N/A	Doc
3-15 Only food grade approved and labeled lubricants are used in the packing equipment/machinery.	10				R
3-16 Chemicals not approved for use on product are stored and segregated away from packing area.	10				
3-17 The plant grounds are reasonably free of litter and debris.	5				
3-18 The plant grounds are reasonably free of standing water.	5				
3-19 Outside garbage receptacles/dumpsters are closed or are located away from packing facility entrances and the area around such sites is reasonably clean.	5				
3-20 Packing facilities are enclosed.	5				
3-21 The packing facility interior is clean and maintained in an orderly manner.	5				
3-22 Floor drains appear to be free of obstructions.	5				
3-23 Pipes, ducts, fans and ceilings which are over food handling operations, are clean.	5				
3-24 Glass materials above product flow zones are contained in case of breakage.	10				
3-25 Possible wastewater spillage is prevented from contaminating any food handling area by barriers, drains, or a sufficient distance.	10				
3-26 There is a policy describing procedures which specify handling/disposition of finished product that is opened, spilled, or comes into contact with the floor.	15				P

Questions		Points	Yes	NO	N/A	Doc
3-27	Only new or sanitized containers are used for packing the product.	10				D
3-28	Pallets and containers are clean and in good condition.	5				
3-29	Packing containers are properly stored and protected from contamination (birds, rodents, and other pests).	10				

### Pest Control

Questions		Points	Yes	NO	N/A	Doc
3-30	Measures are taken to exclude animals or pests from packing and storage facilities.	10				D
3-31	There is an established pest control program for the facility.	10				D
3-32	Service reports for the pest control program are available for review.	5				R
3-33	Interior walls, floors and ceilings are well maintained and are free of major cracks and crevices.	5				

### Traceability

Questions		Points	Yes	NO	N/A	Doc
3-34	Records are kept recording the source of incoming product and the destination of outgoing product which is uniquely identified to enable traceability.	10				D

COMMENTS:



USDA Good Agricultural Practices Good Handling Practices  
 Audit Verification Checklist


**Total Points earned for House Packing Facility =** \_\_\_\_\_

**Total Possible = 290**     *The total number of points possible for this section.*

**Subtract "N/A" =** \_\_\_\_\_     *Enter the additive number of N/A points (+points) here.*

**Adjusted Total =** \_\_\_\_\_     *Subtract the N/A points from the Total possible points*

**X .8 (80%)**     *Multiply the Adjusted Total by .8 and show it as the Passing Score*

**Passing Score =** \_\_\_\_\_

**Pass**                       **Fail**                      **(please mark one)**

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," and generally recognized good agricultural practices.

## Part 4 - STORAGE AND TRANSPORTATION

### Product, Containers & Pallets

Questions		Points	Yes	NO	N/A	Doc
4-1	The storage facility is cleaned and maintained in an orderly manner.	5				
4-2	Bulk storage facilities are inspected for foreign material prior to use and records are maintained.	5				R
4-3	Storage rooms, buildings, and/or facilities are maintained and sufficiently sealed or isolated and are protected from external contamination.	10				
4-4	Storage grounds are reasonably free of litter and debris.	5				
4-5	Floors in storage areas are reasonably free of standing water.	5				
4-6	Possible wastewater spillage is prevented from contaminating any food handling area by barriers, drains, or sufficient distance.	10				
4-7	There is a policy describing procedures which specify handling/disposition of finished product which is opened, spilled, or comes into contact with the floor.	15				P
4-8	Packing containers are properly stored and sufficiently sealed, to be protected from contamination (birds, rodents, pests, and other contaminants).	10				
4-9	Pallets, pallet boxes, tote bags, and portable bins, etc. are clean, in good condition and do not contribute foreign material to the product.	5				
4-10	Product stored outside in totes, trucks, bins, other containers or on the ground in bulk is covered and protected from contamination.	10				
4-11	Non-food grade substances such as paints, lubricants, pesticides, etc., are not stored in close proximity to the product.	10				
4-12	Mechanical equipment used during the storage process is clean and maintained to prevent contamination of the product.	5				D

### Pest Control

Questions		Points	Yes	NO	N/A	Doc
4-13	Measures are taken to exclude animals or pests from storage facilities.	10				D
4-14	There is an established pest control program for the facility.	10				D
4-15	Service reports for the pest control program are available for review.	5				R
4-16	Interior walls, floors, and ceilings are well-maintained and are free of major cracks and crevices.	5				

### Ice & Refrigeration

Questions		Points	Yes	NO	N/A	Doc
4-17	The water used for cooling and/or making ice is potable.	15				R
4-18	Manufacturing, storage, and transportation facilities used in making and delivering ice used for cooling the product have been sanitized.	10				R
4-19	Climate-controlled rooms are monitored for temperature and logs are maintained.	5				D
4-20	Thermometer(s) are checked for accuracy and records are available for review.	5				D
4-21	Refrigeration system condensation does not come in contact with produce.	10				
4-22	Refrigeration equipment (condensers, fans, etc.) is cleaned on a scheduled basis.	10				D
4-23	Iced product does not drip on pallets of produce stored below.	10				

### Transportation

Questions		Points	Yes	NO	N/A	Doc
4-24	Prior to the loading process, conveyances are required to be clean, in good physical condition, free from disagreeable odors, and from obvious dirt/debris.	10				P
4-25	Produce items are not loaded with potentially contaminating products.	10				P
4-26	Company has a written policy for transporters and conveyances to maintain a specified temperature(s) during transit.	10				P
4-27	Conveyances are loaded to minimize damage to product.	5				P

### Worker Health and Personal Hygiene

Questions		Points	Yes	NO	N/A	Doc
4-28	Employee facilities (locker rooms, lunch and break areas, etc.) are clean and located away from storage, shipping, and receiving areas.	10				
4-29	When there is a written policy regarding the use of hair/beard nets in the storage and transportation areas, it is being followed by all affected employees and visitors.	5				P
4-30	When there is a written policy restricting the wearing of jewelry in the storage and transportation areas, it is being followed by all affected employees and visitors.	5				P

### Traceability

Questions		Points	Yes	NO	N/A	Doc
4-31	Records are kept regarding the source of incoming product and the destination of outgoing product which is uniquely identified to enable traceability.	10				D

COMMENTS:


**Total Points earned for Storage & Transportation =** \_\_\_\_\_

**Total Possible = 255**      *The total number of points possible for this section.*

**Subtract "N/A" =** \_\_\_\_\_      *Enter the additive number of N/A points (+points) here.*

**Adjusted Total =** \_\_\_\_\_      *Subtract the N/A points from the Total possible points*

**X .8 (80%)**      *Multiply the Adjusted Total by .8 and show it as the Passing Score*

**Passing Score =** \_\_\_\_\_

**Pass**                       **Fail**                      **(please mark one)**

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," and generally recognized good agricultural practices.

## Part 6-Wholesale Distribution Center/Terminal Warehouses

### Receiving

Questions		Points	Yes	NO	N/A	Doc
6-1	All companies that supply fresh produce are required to have passed a third party audit verification of GAP and/or GHP.	15				D
6-2	Upon receiving, conveyances are required to be clean, in good physical condition and free from obvious objectionable odors, dirt and/or debris at time of unloading.	10				P
6-3	Company does not accept produce items that are loaded with or are not protected from potentially contaminating products.	10				P
6-4	Refrigerated commodities are monitored for temperatures at the time of receiving.	5				R
6-5	The company has a written policy regarding the disposition of product when temperatures are not within the company's guidelines at the time of receiving.	5				P

### Storage Facility/Temperature Control

Questions		Points	Yes	NO	N/A	Doc
6-6	The facility is clean and maintained in an orderly manner.	5				
6-7	Refrigerated rooms are monitored for temperature and logs are maintained.	5				D
6-8	Thermometer(s) are checked for accuracy and records are available for review.	5				D
6-9	Refrigeration system condensation does not come into contact with produce.	10				
6-10	Refrigeration equipment (condensers, fans, etc.) is cleaned on a scheduled basis.	10				D
6-11	Iced product does not drip on pallets of produce stored below.	10				
6-12	The water used for cooling/ice is potable.	10				R
6-13	Manufacturing, storage, and transportation facilities used in making and delivering ice used for cooling the product are sanitized on a scheduled basis.	10				D
6-14	There is a policy describing procedures which specify handling/disposition of finished product which is opened, spilled, or comes into contact with the floor.	15				P

Questions		Points	Yes	NO	N/A	Doc
6-15	Product flow zones are protected from sources of contamination.	10				
6-16	Glass materials above product flow zones are contained in case of breakage.	10				
6-17	The grounds are reasonably free of litter and debris.	5				
6-18	The grounds are reasonably free of standing water.	5				
6-19	Outside garbage receptacles/dumpsters are closed or are located away from facility entrances and the area around such sites is reasonably clean.	5				
6-20	The facility is enclosed.	5				
6-21	Floor drains appear to be free of obstructions.	5				
6-22	Pipes, ducts, fans, and ceilings in the facility are reasonably clean.	5				
6-23	Possible wastewater spillage is prevented from contaminating any food storage or handling area by barriers, drains, or a sufficient distance.	10				
6-24	Non-food grade substances such as paints, lubricants, pesticides, etc., are not stored in close proximity to the product.	10				

### Pest Control

Questions		Points	Yes	NO	N/A	Doc
6-25	Measures are taken to exclude animals or pests from the facility.	10				D
6-26	There is an established pest control program for the facility.	10				D
6-27	Service reports for the pest control program are available for review.	5				R
6-28	Interior walls, floors and ceilings are well-maintained and free of major cracks and crevices.	5				

### Repacking/Reconditioning

(6-29) Does the facility repack and/or recondition product?

YES                       NO                      (please mark one)

If the answer to question 6-29 is YES, answer questions 6-30 through 6-41. If the answer for question 6-29 is NO, then questions 6-30 through 6-41 are answered N/A.

Questions		Points	Yes	NO	N/A	Doc
6-30	Repacking/reconditioning processes are confined to an established location in the facility.	5				P
6-31	Food contact surfaces are in good condition; cleaned and/or sanitized prior to use and cleaning logs are maintained.	15				D
6-32	Source water used in the repacking operation is potable.	15				R
6-33	Processing water is sufficiently treated to reduce microbial contamination.	10				D
6-34	Water treatment (strength levels and pH) and exposure time is monitored and is appropriate for product.	10				D
6-35	If applicable, the temperature of processing water used in dump tanks, flumes, etc., is monitored and is kept at temperatures appropriate for the commodity.	10				D
6-36	Any ice used for cooling produce is manufactured, transported and stored under sanitary conditions.	10				R
6-37	Water used for chilling and/or to make ice is potable.	15				R
6-38	Only food grade approved and labeled lubricants are used in the repacking equipment/machinery.	10				D
6-39	Only new or sanitized containers are used for product repacking.	10				P
6-40	Pallets and other containers are clean and in good condition.	5				
6-41	Packing containers are properly stored and protected from contamination (birds, rodents, and other pests, etc.).	10				

### Worker Health and Personal Hygiene

Questions		Points	Yes	NO	N/A	Doc
6-42	Employee facilities (locker rooms, lunch and break areas, etc.) are clean and located away from repack and storage area.	10				
6-43	When there is a written policy regarding the use of hair nets/beard nets in the facility, it is being followed by all affected employees and visitors.	5				P





USDA Good Agricultural Practices and Good Handling Practices  
 Audit Verification Checklist


**Total Points earned for Wholesale Distribution  
 Center/Terminal Warehouse =** \_\_\_\_\_

**Total Possible = 410**      *The total number of points possible for this section.*

**Subtract "N/A" =** \_\_\_\_\_      *Enter the additive number of N/A points (+points) here.*

**Adjusted Total =** \_\_\_\_\_      *Subtract the N/A points from the Total possible points*

**X .8 (80%)**      *Multiply the Adjusted Total by .8 and show it as the  
 Passing Score*

**Passing Score =** \_\_\_\_\_

**Pass**                       **Fail**      **(please mark one)**

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," and generally recognized good agricultural practices.

## Part 7 - Preventive Food Defense Procedures

Based on the U.S. Food and Drug Administration's Food Producers, Processors, and Transporters:  
 Food Security Preventive Measure Guidance for Industry.

### Secure Employee/Visitor Procedures

Questions		Points	Yes	NO	N/A	Doc
7-1	The company has a documented food defense plan and a person has been designated to oversee it. Name: _____	5				D
7-2	Food defense training has been provided to all employees.	5				D
7-3	Employees are aware of whom in management they should contact about potential security problems/issues. Name of management representative: _____	5				
7-4	Visitors are required to check in (showing proof of identity) and out, when entering/leaving the facility.	5				D
7-5	The purpose of visitation to site is verified before admittance to the facility.	5				D
7-6	Visitors are prohibited from the packing/storage areas unless accompanied by an employee.	5				D
7-7	Incoming and outgoing employee and visitor vehicles to and from the site are subject to inspection.	5				D
7-8	Parked vehicles belonging to employees and visitors display a decal or placard issued by the facility.	5				
7-9	Staff is prohibited from bringing personal items into the handling or storage areas.	5				D
7-10	Staff access in the facility is limited to the area of their job function and unrestricted areas.	5				D
7-11	Management is aware of which employee should be on the premises, and the area they are assigned to.	5				D
7-12	A system of positive identification of employees has been established and is enforced.	5				

### Secure Facility Procedures

Questions		Points	Yes	NO	N/A	Doc
7-13	Uniforms, name tags, or identification badges are collected from employees prior to the termination of employment.	5				D
7-14	The mailroom is located away from the packing/storage facilities.	5				
7-15	Computer access is restricted to specific personnel.	5				D
7-16	A system of traceability of computer transactions has been established.	5				
7-17	A minimum level of background checks has been established for all employees.	5				D
7-18	Routine security checks of the premises are performed for signs of tampering, criminal or terrorist activity.	5				D
7-19	Perimeter of facility is secured by fencing or other deterrent.	5				
7-20	Checklists are used to verify the security of doors, windows, and other points of entry.	5				D
7-21	All keys to the establishment are accounted for.	5				D
7-22	The facility has an emergency lighting system.	5				
7-23	The facility is enclosed.	5				
7-24	Storage or vehicles/containers/trailers/railcars that are not being used are kept locked.	5				
7-25	Delivery schedules have been established.	5				
7-26	The off-loading of incoming materials is supervised.	5				
7-27	The organization has an established policy for rejecting deliveries.	5				D
7-28	Unauthorized deliveries are not accepted.	5				D
7-29	The company does not accept returned (empty) containers for packing of product unless they are sanitized containers intended for reuse.	5				D
7-30	The facility has a program in place to inspect product returned to the facility for tampering.	5				D
7-31	The company has identified the individual(s), with at least one backup, who are responsible for recalling the product.	5				D
7-32	The company has performed a successful mock recall of product to the facility.	5				D



**Total Points earned for Preventative Food Defense  
Procedures =** \_\_\_\_\_

**Total Possible = 180**      *The total number of points possible for this section.*

**Subtract "N/A" =** \_\_\_\_\_      *Enter the additive number of N/A points (+points) here.*

**Adjusted Total =** \_\_\_\_\_      *Subtract the N/A points from the Total possible points*

**X .8 (80%)**      *Multiply the Adjusted Total by .8 and show it as the  
Passing Score*

**Passing Score =** \_\_\_\_\_

**Pass**                       **Fail**                      **(please mark one)**

**Good Agricultural Practices & Good Handling Practices  
 Audit Verification Program Scoresheet**



Facility Name (Print) as it should appear on Certificate:			
Street Address (Print):		City (Print):	State (Print):
e-mail Address (Print):		fax number:	Zip (Print):
Date Audit Began:		Date Audit Completed:	Date Audit Requested:
Time Audit Began:		Time Audit Completed:	Date of Previous Audit :
USDA Commodity Procurement Audit?			Check One Yes <input type="checkbox"/> No <input type="checkbox"/>

**EVALUATION ELEMENTS**

Scopes Requested	Element	Possible Points	Less N/A Points	Adjusted Points	Passing Score*	Facility Score	Pass Fail	Date Passed	General Questions	Reviewing Official	Unannounced
X	General Questions	180									
	Part 1 – Farm Review	190									
	Part 2 – Field Harvesting & Field Packing Activities	185									
	Part 3 – House Packing Facility	290									
	Part 4 – Storage and Transportation	255									
	Part 6 – Wholesale Distribution Center/ Warehouses	410									
	Part 7 – Preventative Food Defense Procedures	180									

\*A Passing Score is 80% of the Possible Points, or the Adjusted Points if adjustments are necessary, with no "automatic unsatisfactory" conditions.

Commodities:		
Send completed GAP&GHP Certificate to: (choose one)	Inspection office: (list office)	Directly to auditee above:

Lead Auditor Name (Print): \_\_\_\_\_ Signature & Date: \_\_\_\_\_

Duty Station: \_\_\_\_\_ All Scopes Completed: \_\_\_\_\_

*For USDA HQ use:*

Reviewing Official Name (Print): \_\_\_\_\_

Signature & Date: \_\_\_\_\_

To verify a company's continued good standing in the USDA GAP&GHP Program please visit <http://www.ams.usda.gov/gapgph>





# Pathogens on Produce

These pathogens can be spread via water, workers, wildlife, manure, equipment and containers, if previously contaminated.

## Bacteria

<b>C.botulinum (Botulism)</b>	<ul style="list-style-type: none"> <li>Toxin produced by bacteria causes nausea, vomiting, fatigue, dizziness, muscle paralysis, difficulty swallowing, double or blurred vision, and breathing difficulties</li> </ul>	<ul style="list-style-type: none"> <li>Soil, water, decaying vegetation, reptiles.</li> </ul>
<b>Escherichia coli O157:H7</b>	<ul style="list-style-type: none"> <li>Bloody diarrhea, abdominal pain. Can lead to kidney failure especially in children and the elderly</li> </ul>	<ul style="list-style-type: none"> <li>Animal feces, especially ruminants - cattle, deer, goats, and sheep. Human feces.</li> </ul>
<b>Salmonella spp.</b>	<ul style="list-style-type: none"> <li>Abdominal pain, diarrhea, chills, fever, nausea, vomiting</li> </ul>	<ul style="list-style-type: none"> <li>Animal feces, especially reptiles, and birds/poultry. Also in livestock, pet, human feces. Pond sediment.</li> </ul>
<b>Shigella spp.</b>	<ul style="list-style-type: none"> <li>Abdominal pain, diarrhea, fever, vomiting</li> </ul>	<ul style="list-style-type: none"> <li>Human feces.</li> </ul>
<b>Listeria monocytogenes</b>	<ul style="list-style-type: none"> <li>Diarrhea, vomiting, and fever in healthy adults; may lead to spontaneous abortion or stillbirth in pregnant women; severe infections in babies and immune compromised adults.</li> </ul>	<ul style="list-style-type: none"> <li>Soil, food handling and storage areas. Likes moist areas.</li> </ul>

## Parasites

<b>Cryptosporidium spp.</b>	<ul style="list-style-type: none"> <li>Profuse watery diarrhea, abdominal pain, anorexia, vomiting</li> </ul>	<ul style="list-style-type: none"> <li>Animal and human feces, water.</li> </ul>
<b>Cyclospora spp.</b>	<ul style="list-style-type: none"> <li>Watery diarrhea, nausea, anorexia, abdominal cramps (duration 7 to 40 d)</li> </ul>	<ul style="list-style-type: none"> <li>Animal and human feces, water.</li> </ul>

## Viruses

<b>Hepatitis A.</b>	<ul style="list-style-type: none"> <li>Hepatitis A Fever, malaise, anorexia, nausea, abdominal pain, jaundice, dark urine</li> </ul>	<ul style="list-style-type: none"> <li>Animal and human feces, water.</li> </ul>
<b>Norwalk/Norwalk-like virus</b>	<ul style="list-style-type: none"> <li>Vomiting diarrhea, malaise, fever, nausea, abdominal cramps</li> </ul>	<ul style="list-style-type: none"> <li>Human feces and vomit. Potentially in animals- cattle, swine, mice.</li> </ul>





# FOODBORNE ILLNESSES & SYMPTOMS

ORGANISM	SYMPTOMS	DURATION
<b>Campylobacter</b>	Diarrhea, cramps, fever and vomiting; diarrhea may be bloody	2-10 days
<b>Clostridium Botulism</b>	Vomiting, diarrhea, blurred vision, double vision, difficulty in swallowing, muscle weakness. Can result in respiratory failure.	Variable
<b>Cryptosporidium</b>	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever	Maybe remitting and relapsing over weeks to months
<b>Cyclospora</b>	Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue	Maybe remitting and relapsing over weeks to months
<b>E.coli</b>	Watery diarrhea, abdominal cramps and some vomiting	3-7 or more days
<b>Hepatitis A</b>	Diarrhea, dark urine, jaundice, flu-like symptoms, i.e., fever, headache, nausea, and abdominal pain	Variable, 2 weeks- 3 months
<b>Listeria</b>	Fever, muscle aches, and nausea or diarrhea	Variable
<b>Norovirus</b>	Nausea, vomiting, abdominal cramping, diarrhea, fever, headache. Diarrhea is more prevalent in adults, vomiting more common in children.	12-60 hours
<b>Salmonella</b>	Diarrhea, fever, abdominal cramps, vomiting.	4-7 days
<b>Shigella</b>	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus.	24-48 hours

# **Audit Requests and Cost Share**

Resources in this section reflect currently available resource for GAPs certification to include cost-shares and USDA GAPs auditing requests.





## Good Agriculture Practices (GAPs) One-on-One Consultation Application

As part of our Local Produce Safety Initiative, we offer one-on-one site training and consultations for North Carolina farmers seeking GAP certification. Our services include: 1.) Initial Risk Assessments; 2.) Mock Audit; 3.) Food Safety Plan Review; and 4.) On-Site training.

We encourage producers to attend a GAP workshop

We will provide consulting services to include a mock audit or food safety plan review in order to identify potential risks and provide an assessment of your practices in relation to the GAPs certification matrix.

If you are interested in participating, complete this application and send it to:  
[james@carolinafarmstewards.org](mailto:james@carolinafarmstewards.org).

OR

Carolina Farm Stewardship Association, ATTN: James Cooper  
P.O. Box 448, Pittsboro, NC 27312

**If you have questions, please feel free to contact James Cooper directly at 918-688-0594.**

Farm Name			
Contact Person			
Mailing address			
City	State	Zip	County
Email		Phone	
Crops (Harvest Technique's):			
Preferred Audit Period (2-week window):			
<p><i>It is recommended that you choose a period when you are able to demonstrate various harvest techniques on a variety of crops. The processes and procedures on your farm are what is being audited, not specific crops.</i></p>			

carolina farm   
stewardship association

Please answer the following questions so that we can better determine how your one-on-one training/consultation time will be allocated.

1. How many acres do you currently have in vegetable production? \_\_\_\_\_
2. How long has your farm been in operation? \_\_\_\_\_
3. Have you attended a Good Agricultural Practices (G.A.P.s) training/workshop? Yes / No  
If yes, provide location and year: \_\_\_\_\_
4. Do you currently have a completed Food Safety Plan for your farm? Yes / No
5. Do you need assistance writing your food safety plan? Yes / No
6. Do you have access to a food safety plan template that you can utilize to draft your plan? Yes / No
7. As part of this training, time may be spent performing a Mock Audit to ensure that you are prepared for the USDA G.A.P. Audit. Do you need a Mock Audit? Yes / No
8. Do you feel you need a CFSA food safety representative present during your GAP audit? Yes / No
9. Do you currently have a buyer that has notified you of GAP certification requirements? Yes / No  
If so, what is your deadline for compliance? \_\_\_\_\_
10. Do you have buyer that has committed to purchase produce from you if you obtain GAP certification? Yes / No
11. Are you currently, or do you intend to, sell to a NC Food Hub? Yes / No
12. Describe how you feel this one-on-one training will best benefit you by describing you current needs (be specific listing desired services).  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**North Carolina Department of Agriculture & Consumer Services  
Cooperative Grading Service  
P.O. Box 588 Williamston, NC 27892**

[www.ncgradingservice.org](http://www.ncgradingservice.org)

(252) 792-1672 phone

(252)792-4784 fax

**REQUEST FOR AUDIT SERVICES**

AUDITEE INFORMATION		FARM/FACILITY INFORMATION	
Company Name:		COMMODITIES:	# of ACRES:
Address:			
City, State & Zip:			
GPS Coordinates:			
Billing Address:			
City, State & Zip:			
Phone#:			
Fax #:			
Email Address:		ARE YOU A NC FARM TO SCHOOL SUPPLIER?	
Contact Person:		[ ] YES [ ] NO	

For a copy of the USDA GAP/GHP Audit Checklist, visit the USDA website [www.ams.gov/gapghp](http://www.ams.gov/gapghp)

Type of Audit(s) Requested (Choose at least one)	Scope(s) of GAP/GHP Audit Requested:
<input type="checkbox"/> Good Agricultural Practices & Good Handling Practices (GAP/GHP-Select Audit Scopes----->	<input type="checkbox"/> Part 1 - Farm Review
<input type="checkbox"/> Harmonized Food Safety Standard	<input type="checkbox"/> Part 2 - Field Harvesting/Field Packing Activities
<input type="checkbox"/> Tomato Audit Protocol (T-GAP)	<input type="checkbox"/> Part 3 - House Packing Facility
<input type="checkbox"/> Leafy Greens Audit (LGMA)	<input type="checkbox"/> Part 4 - Storage & Transportation
<input type="checkbox"/> Identity Preservation Audit (IP)	<input type="checkbox"/> Part 6 - Wholesale Distribution Center/Terminal Warehouse
	<input type="checkbox"/> Part 7 - Food Defense
<b>DATE(S) preferred to have the audit:</b>	

Once the request form has been received we will fax you an agenda outlining the objectives, audit, criteria, personnel required, affirmed date, time schedule, and estimated cost of the audit.

If the date on the agenda needs to be changed, we will need to be informed as soon as possible.

We charge the USDA rate of \$92.00 per hour which includes travel, time on site, and audit preparatory time.

As per USDA requirements, we charge an additional \$50.00 fee for website maintenance and certification.

There is a \$150.00 USDA fee for all Harmonized Food Safety Audits and requires signature of a Subway Audit Release Form.

Before performing the audit, we must have a Participation Agreement on file that is signed by a company official. The agreement allows the auditor to view your records, access the facility, and allows for an unannounced visit to your facility if in operation > 30 days.

We would like to have this request no later than 2 weeks prior to the end of your season.

The commodity has to be in harvest before we can perform Pt. 2. In Part 2 or 3, employees must be working in the field or packing facility in order to verify that policies and procedures are being followed.

**Signature** \_\_\_\_\_ **DATE** \_\_\_\_\_

Ronald D. Wynn Jr.  
252-792-1672  
[Ronnie.Wynn@ncagr.gov](mailto:Ronnie.Wynn@ncagr.gov)

Vincent Wyche  
252-217-0649  
[Vincent.Wyche@ncagr.gov](mailto:Vincent.Wyche@ncagr.gov)

Michael Carr  
828-253-1691 ext. 2  
[Michael.Carr@ncagr.gov](mailto:Michael.Carr@ncagr.gov)







**Steve Troxler**  
Commissioner

North Carolina Department of Agriculture  
and Consumer Services  
*Division of Marketing*

**Tom Slade**  
Director

March 6, 2015

**N. C. Good Agricultural Practices Certification Assistance Program**

The North Carolina Department of Agriculture & Consumer Services has developed the Good Agricultural Practices (GAP) Certification Assistance Program. This program will help North Carolina growers with financial support in obtaining a third party audit to verify they are following effective food safety practices.

Food safety has become an important marketing and health issue for the produce industry. Buyers are demanding assurances from growers that their produce is safe. It will become more difficult for growers to market their fruits and vegetables if they don't have a GAP program in place. The goal of this program is to increase the number of N.C. farmers following Good Agricultural Practices (GAP)/Good Handling Practices (GHP) and using third party audits to verify their food safety program.

This is a cost share program designed to assist fruit and vegetable growers with the cost of a GAP/GHP audit. For farms that are being audited for the first time the NCDA&CS will pay up to \$900 of the cost of having a third party audit to verify a farm's food safety program. A farm that has been audited in previous years will receive a total of \$300. The total amount a farm can receive will be \$900 per year for first time audits or \$300 per year for subsequent audits. Funds will be paid to the auditor conducting the GAP/GHP audit to reduce the cost to the farmer up to \$900. Participating farmers will be responsible for paying the auditor for any balance due above the reimbursement threshold. Funding for this program comes from a USDA grant to the NCDA&CS. Funds are available on a first come first served basis until the funds are depleted.

**To be eligible for assistance**, North Carolina fruit and vegetable growers must meet the following requirements:

- Growers must have a third party audit from an approved government agency or company that verifies Good Agricultural Practices (GAP)/Good Handling Practices (GHP).
- GAP/GHP audits can be for Farm Review, Field Harvest and Field Packing, Packing House Facility and also Storage and Transportation.
- The GAP/GHP audit must be conducted in 2015.
- Submit an application form for approval to participate in this program to the NCDA&CS prior to receiving the GAP/GHP audit.

For additional information or to request an application for this program, contact Shirley Nicholson at (919) 707-3136 or email [Shirley.Nicholson@ncagr.gov](mailto:Shirley.Nicholson@ncagr.gov).



**N.C. Good Agricultural Practices Certification Assistance Program  
North Carolina Dept. of Agriculture and Consumer Services (NCDA&CS)**

**Application Form**

This is a cost share program designed to assist fruit and vegetable growers with the cost of a GAP/GHP audit. The NCDA&CS will pay up to \$900 of the cost of having a third party audit to verify a farm's food safety program for first time users; \$300 for those who have previously participated in the program. Funds will be paid to the auditor conducting the GAP/GHP audit to reduce the cost to the farmer by up to \$900/\$300. Participating farmers will be responsible for paying the auditor for any balance due above \$900/\$300. Funds are available on a first come first served basis until the funds are depleted. Applications must be submitted for approval to participate in this program to the NCDA&CS prior to receiving the GAP/GHP audit. Payments are limited up to \$900 per farm or company for audits conducted in 2015.

Date: \_\_\_\_\_

Name of applicant: \_\_\_\_\_

Farm Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ County: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

Name and address of certifying agency or company that will perform your GAP/GHP audit:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone: \_\_\_\_\_

My third party GAP/GHP audit will be conducted for the following areas:

Farm Review \_\_\_\_\_ Field Harvest and Field Packing \_\_\_\_\_

Packing House Facility \_\_\_\_\_ Storage and Transportation \_\_\_\_\_

Estimated Date third party GAP/GHP audit will be conducted: \_\_\_\_\_

Crop(s) to be included in the GAP/GHP audit: \_\_\_\_\_

I am a North Carolina fruit and/or vegetable grower/packer. I plan to have my farm/packing house audited for GAP/GHP. I understand that the auditor that performs my GAP/GHP audit will be paid up to \$900 of the cost of the audit by NCDA&CS and I am responsible for any balance due above \$900/\$300.

Signature of Applicant: \_\_\_\_\_

Mail or fax to: NCDA&CS - GAP Certification Assistance Program

Shirley Nicholson

1020 Mail Service Center

Raleigh, NC 27699-1020

FAX: 919-715-0155



# Homework

The resources in this section are adapted from or created by:

*Farm Map* adapted from Small Farm Food Safety, Fresh Produce (<http://edis.ifas.ufl.edu/pdffiles/FY/FY96900.pdf>) by Baros, Katie; Kreske, Audrey; and Ducharme, Diane.

*Fresh Produce Hazard Assessment* created by Baros, Katie; Kreske, Audrey; and Ducharme, Diane.

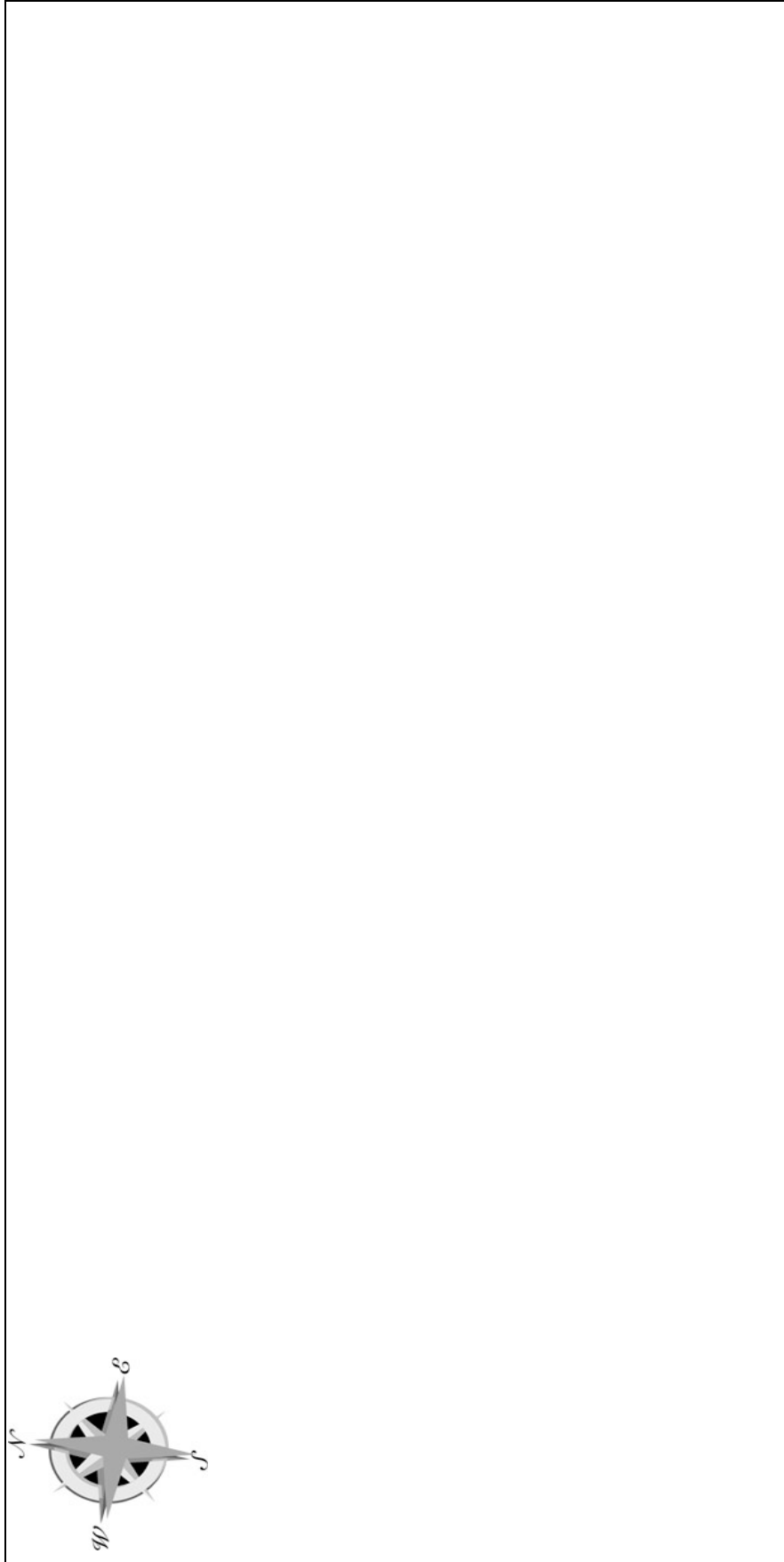
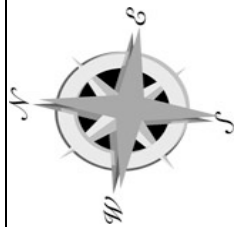
Stup, Richard. 2001. Standard Operating Procedures: A Writing Guide. The Pennsylvania State University, University Park, PA. Retrieved from: <http://extension.psu.edu/animals/dairy/hr/tools-for-dairy-employee-supervisors/ud011>.



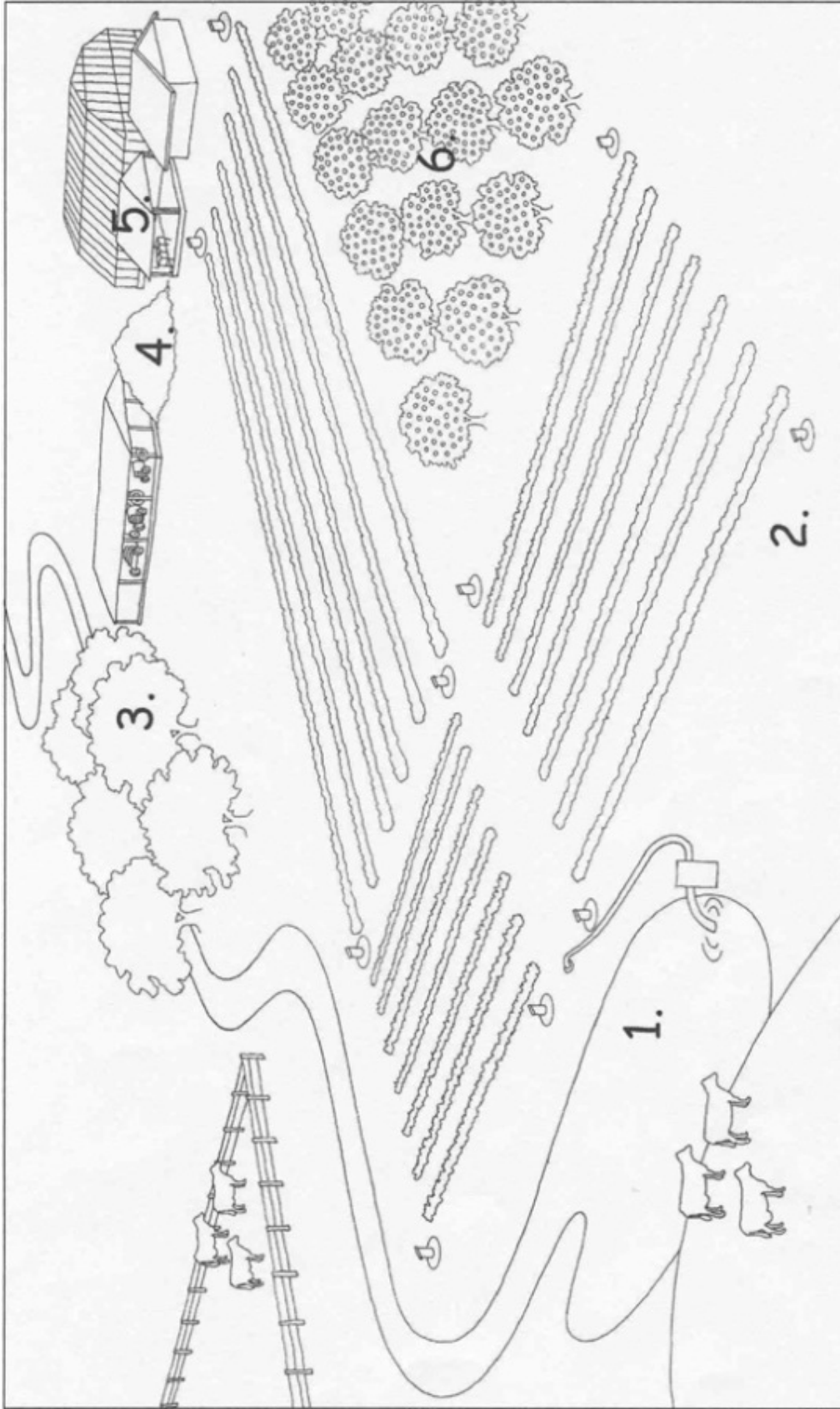


[HTTP://NCFRESHPRODUCE SAFETY.NCSU.EDU](http://ncfreshproducesafety.ncsu.edu)

### Your Own Farm Map



Adopted from Small Farm Food Safety, Fresh Produce:  
<http://edis.ifas.ufl.edu/pdf/FILES/FY/FY96900.pdf>



- 1. Surface Water Source for Irrigation
- 2. Overhead Irrigation Piping
- 3. Unmanaged Forest
- 4. Compost Heap
- 5. Vegetable Wash Station
- 6. Citrus Grove



Name:

Date:

## Fresh Produce Hazard Assessment

*Use this hazard assessment to evaluate risks on your farm. For each question indicate if your risk is low, medium, or high. Add each question you answer as high risk to the action checklist at the end of the assessment. These will be the areas you will need to address first.*

### Land

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>History of land use</b>	Land is fallow, fenced and has not been grazed	Land is a former farm with no history of animal production <b>OR</b> my land was used for animal production more than 5 years ago	Land has been used for animal production in the last 5 years	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Watershed</b>	Farm is upstream from any sources of contamination	Farm is downstream from a well-managed feedlot and only received runoff during flooding	Farm is downstream from at least one feedlot and runoff is commonly received	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

### Worker Health and Hygiene

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Handwashing facilities</b>	Clean handwashing facilities are provided for everyone who handles fruits and vegetables <b>AND</b> they are monitored daily to ensure cleanliness and ample stock of soap, water, and paper towels	Clean handwashing facilities are provided <b>BUT</b> are not monitored daily	Handwashing facilities are not provided at any location on the farm	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Signage</b>	Personal hygiene signage is provided in the appropriate language or via diagrams for workers to read and understand	Personal hygiene signage is provided in a language not well understood by workers	No signage is used	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

<b>Worker training</b>	All workers attend regular training program focused on good personal hygiene <b>AND</b> handwashing is emphasized daily <b>AND</b> language and training materials are appropriate for workers	All workers attend one training focused on hygiene provided in their language, but the importance is not reinforced <b>OR</b> training is provided sporadically or in a language not well understood by workers	No training on handwashing or personal hygiene for food safety is provided to workers	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Worker illness and injury</b>	Workers are required to report illness and injury <b>AND</b> if ill, are given non-food contact jobs <b>AND</b> supervisors have permission to reassign workers who appear to be ill	No accommodations are made for sick workers, but very sick workers are eventually sent home	Worker illness is not monitored <b>AND</b> there is no standard procedure for workers reporting illness or injury	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Pesticide application</b>	Any person who handles and applies pesticides is certified through a state regulatory agency	The operator or manager is certified for pesticide applications through a state regulatory agency, but other people who handle pesticides are not certified	Neither the pesticide applicator or supervisor is certified to apply pesticides through a state regulatory agency.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

### **Restroom and Sewage**

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Toilet facilities</b>	Clean toilet facilities with handwashing stations are provided for everyone who handles fruits and vegetables <b>AND</b> they are monitored daily to endure cleanliness and ample stock of soap, water, and paper towels, and toilet paper	Clean toilet facilities are provided <b>BUT</b> are not monitored daily	Toilet facilities are not provided at any location on the farm	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Location of field toilets</b>	Readily available for use (within ¼ mile walk) <b>AND</b> portable toilets are located out of the produce crop field in an area that is physically isolated from all produce production or handling areas	Field toilets are not within a ¼ mile walk or conveniently located <b>OR</b> portable toilets are located in the field with less than 20 feet between the unit and production fields.	There are no field or conveniently located toilets <b>OR</b> portable toilets are pulled into the produce crop fields	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

## Water

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Source of irrigation water</b>	Irrigation water is from a municipal, treated water source or from ground water obtained from a properly constructed, capped well, in good condition, that could be readily treated if indicator organisms were detected in annual water tests	Irrigation water is sourced from an uncapped well <b>OR</b> irrigation water is drawn from a regularly tested surface water source	Irrigation water is drawn from a surface water source with no knowledge of its microbial quality <b>OR</b> irrigation water is sourced from a pond or other water source that has daily visits by livestock or wild animals	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Irrigation method</b>	Drip irrigation is used on produce crops <b>OR</b> furrow irrigation is used with no plant wetting	Overhead or flood irrigation with ground water that is known to be free from pathogens is used	Overhead or flood irrigation water is sourced from surface water that has not been tested for indicator organisms	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Water testing</b>	All water sources are tested for indicator organisms <b>AND</b> these records are kept on file	Water sources are tested but records are not maintained	No water tests are conducted and no attempt is made to get water test results from municipalities	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

## Animals

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Animal exclusion</b>	Animals are excluded (as much as possible) using fencing and other active deterrents. Animal attractants are minimized by discarding old equipment and containers, removing excess water, and keeping weeds and brush mowed	Animals are excluded from some areas but not others. Some fencing or active deterrents used intermittently.	No animal exclusion efforts have been made for produce fields or irrigation ponds	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Location of livestock</b>	No livestock in area	No livestock on property; neighbor's livestock confined away from crops <b>OR</b> livestock on property are confined away from fenced crops	Livestock, ruminants, and poultry have free access to production fields	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

## Manure

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Timing of manure application</b>	When raw manure is applied, it is incorporated into the soil at least 2 weeks prior to planting and a minimum of 120 days prior to harvest	Manure is applied and incorporated into the soil at least 60 days prior to harvest of produce crop.	Raw manure is applied less than 120 days prior to harvest.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Manure storage</b>	Manure is stored in an area that is physically isolated from produce fields and produce handling facilities, with barriers to reduce risk of leaching, run-off, or wind-spread.	Manure is stored in an area that is physically isolated from produce fields and produce handling facilities <b>BUT</b> is not covered or quarantined by a barrier to reduce risk of leaching, run-off, or wind-spread.	Manure is stored next to a produce field or produce handling facility and no barriers to reduce risk of leaching, run-off, or wind-spread are present.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Composted manure</b>	Compost producer keeps and provides records on feedstocks and handling practices that insure complete aerobic composting such as temperature, aeration and moisture management, equipment sanitation, and isolation and protection of curing piles <b>OR</b> reports are available on purchased composted manure	Compost producer follows appropriate composting protocols but does not keep records to verify practices.	Little or nothing is known about compost source, material used, or management strategies.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

## Equipment and Containers

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Pre-Harvest Assessment</b>	A pre-harvest assessment is conducted on crop production areas noting risk and possible sources of contamination. Results are documented.	A pre-harvest assessment is conducted on crop production areas but results are not documented	No pre-harvest assessment is conducted	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Cleanliness of field packing equipment and machinery</b>	All field packing equipment and machinery is cleaned and sanitized at the start of each work session and after breaks or as needed	All field packing equipment and machinery is cleaned and sanitized daily	All field packing equipment and machinery are cleaned and sanitized only at the beginning of the season <b>OR</b> equipment and machinery is not routinely cleaned and sanitized	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Cleanliness of harvest aids (e.g. knives, aprons, containers)</b>	All harvesting aids are cleaned and sanitized at the start of each work session and after breaks or as needed	All harvesting aids are cleaned and sanitized daily	Harvest aids are cleaned and sanitized only at the beginning of the season <b>OR</b> harvest aids are not cleaned and sanitized	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Soil removal</b>	As much soil as possible is removed from produce and bins while in the field to prevent contamination of wash water or other loads of produce	Soil may be removed from produce and bins, but there is no policy in place that requires it	Produce and bins are commonly moved from the field without inspecting for dirt	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Breakage/contamination</b>	Preventative measures and a corrective action policy are in place to prevent or contain physical or chemical contaminants.	Some preventative measures taken but no corrective action policy in place	No preventative measures or a corrective action policy	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High

## Traceability

	<b>Low Risk</b>	<b>Medium Risk</b>	<b>High Risk</b>	<b>My Risk</b>
<b>Product identification</b>	Each piece or container of produce shipped from the farm is coded to allow the farm management to trace it from the field of origin to the distributor	Coding of produce and record keeping in completed for only certain commodities shipped from the farm. Not all lots can be traced back to field of origin.	There is no method in place to identify lots or to trace them back to the field of origin.	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High
<b>Mock recall</b>	A mock recall has been conducted on the farm to test the recall strategy and verify traceback procedures	A recall plan has been discussed, but no mock or testing program of the plan has been implemented	There has been no discussion of a recall response plan among farm management	<input type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High







# Dairy Farm

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## **STANDARD OPERATING PROCEDURES: A Writing Guide**

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# Business

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PENNSTATE



COLLEGE OF AGRICULTURAL SCIENCES  
AGRICULTURAL RESEARCH AND  
COOPERATIVE EXTENSION

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## INTRODUCTION: DRIVING TOWARD THE SAME GOALS

A successful dairy farm business needs committed workers who complete work procedures consistently and accurately. It also requires all involved to contribute their experience, knowledge, and ideas to constant improvement for the future. This publication describes how dairy businesses can use standard operating procedures to get everyone driving toward outstanding performance and success.

Most people naturally want to do a good job. Successful managers recognize this fact and seek to channel workers' efforts in ways that will benefit the business. Well-written standard operating procedures (SOPs) provide direction, improve communication, reduce training time, and improve work consistency. The SOP development process is an excellent way for managers, workers, and technical advisers to cooperate for everyone's benefit. A very positive sense of teamwork arises when these parties work together toward common goals.

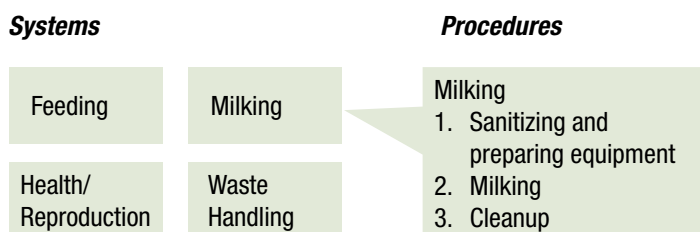
Standard operating procedures used in combination with planned training and regular performance feedback lead to an effective and motivated workforce. Dairy managers and advisers benefit from consistent work performance and predictable results. Workers benefit from increased confidence and a clear sense of achievement.

## DEFINING SYSTEMS, PROCEDURES, AND STEPS

Producing a high-quality product at a profit depends on the consistent operation of all systems within the dairy. The basic **systems** shared by all dairy farm businesses are a milk harvesting system, an animal feeding system, and a waste management system (see Figure 1). Dairy farm success depends on how well these systems work together to produce large volumes of high-quality milk to sell.

Management systems are made up of work **procedures**. For example, on most farms, milking consists of more than just cleaning and stimulating cows and attaching milking units to them. Before milking can begin, someone must prepare the milking equipment system, usually by sanitizing and changing the configuration from wash mode to milking mode. After all cows are milked, someone must change the equipment back to wash mode and clean the system. Each of these three activities—sanitizing and preparing to milk, milking, and cleanup—are examples of procedures that when put together make up the milking management system.

**FIGURE 1. SYSTEMS AND PROCEDURES.**



Finally, **steps** are the smaller actions that when put together form a procedure. Figure 2 is a basic standard operating procedure for prepping cows, attaching milking units, and post-dipping in a double-12 parlor. Notice that the procedure is made up of a series of small steps. The small steps are where variation among different workers takes place if procedures are not standardized. Managers can use standard operating procedures to help ensure everyone performs each procedure the same way every time.

## FORMATS FOR STANDARD OPERATING PROCEDURES

When writing standard operating procedures, managers can choose a number of different ways to organize and format them. Your goal is to create a document that is easy for the reader to understand and helpful for the work at hand.

Two factors determine what type of SOP to use (Figure 3). First, how many decisions will the user need to make during the procedure? Second, how many steps and substeps are in the procedure? Routine procedures that are short and require few decisions can be written using the **simple steps** format. Long procedures consisting of more than ten steps, with few decisions, should be written in **hierarchical steps** format or in a **graphic format**. Procedures that require many decisions should be written in the form of a **flowchart**.

**FIGURE 2. SAMPLE “SIMPLE STEPS” OPERATING PROCEDURE FORMAT.**

*Clarity Farms Parlor SOP #1, Basic Milking Procedure*  
*Effective Date: Oct. 1, 1999*  
*Developed by Parlor Staff*

1. Dry-wipe dirt and debris from the first cow’s udder.
2. Predip all four teats with the green dip cup.
3. Strip two squirts of milk from each teat and observe for abnormal milk. If any abnormal milk is found, refer to Parlor SOP #2, “Dealing With Cows Showing Abnormal Milk.”
4. Repeat steps 1, 2, and 3 with the second and third cows on the same side.
5. Return to the first cow and thoroughly wipe with a clean towel.
6. Attach unit to first cow and adjust.
7. Repeat steps 5 and 6 with the second and third cows in the side.
8. Begin at step 1 with the fourth cow on the side and repeat procedure with each group of 3 cows until all 12 units are attached.
9. When all units have detached, postdip all cows and release.

### Simple Steps

Generally, a milking procedure is very repetitive and requires few decisions. In this case, a simple set of steps like those in Figure 2 is sufficient. The SOP in Figure 2 does not contain much detail. A thorough training program would be necessary to make sure that new milkers understand how to perform each step in the procedure. Unfortunately, this low level of detail still leaves a lot of room for milkers to interpret the procedure. This SOP could work in a situation where only a few people milk.

### Hierarchical Steps

A dairy striving for very consistent work should use a more detailed and precise format for most SOPs. The hierarchical steps format (see Figure 4) allows the use of easy-to-read steps for experienced users while including more detailed substeps as well. Experienced users may only refer to the substeps when they need to, while beginners will use the detailed substeps to help them learn the procedure.

### Graphic Procedures

When writing procedures for very long activities, managers should consider using a graphic format. The graphic format breaks long processes into shorter subprocesses that consist of only a few steps. Workers can learn several short subprocesses more easily than one long procedure. Figure 5 illustrates the graphic procedure format.

Another possibility for the graphic format is to use photographs and diagrams to illustrate the procedure. Many producers and most of their advisers have access to computers with powerful graphic capabilities. Digital cameras are now relatively inexpensive and simple to operate. Use these tools to design creative SOPs that combine helpful pictures with explanatory text. Pictures truly are worth a thousand words, and they are helpful regardless of the literacy level or native language of a worker.

**FIGURE 3. STANDARD OPERATING PROCEDURE FORMAT CHOICES AND CRITERIA.**

<i>Many decisions?</i>	<i>More than 10 steps?</i>	<i>Best SOP format</i>
No	No	Simple Steps
No	Yes	Hierarchical or Graphic
Yes	No	Flowchart
Yes	Yes	Flowchart

**FIGURE 4. SAMPLE “HIERARCHICAL STEPS” OPERATING PROCEDURE FORMAT.**

**Clarity Farms Parlor SOP #1, Basic Milking Procedure**

**Effective Date: Feb. 1, 2000**

**Developed by Parlor Staff**

1. Wipe dirt and debris from the first cow’s udder.
  - a. Use your gloved hand to remove dry dirt and bedding.
  - b. Use a clean paper towel to dry the teats and udder if they are wet.
2. Predip all four teats with the green dip cup.
  - a. Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full.
3. Strip two squirts of milk from each teat and observe for abnormal milk.
  - a. Squirt milk onto black surface of strip cup.
  - b. Abnormal milk may appear watery, bloody, or have clots or flakes.
  - c. If any abnormal milk is found, refer to Parlor SOP #2, “Dealing With Cows Showing Abnormal Milk.”
4. Repeat steps 1, 2, and 3 with the second and third cows on the same side.
5. Return to the first cow and thoroughly wipe with a clean towel.
  - a. Completely clean teats from base of udder to end of teat.
  - b. Pay special attention to the tip of the teat where the opening is located.
  - c. Use more than one towel if necessary.
6. Attach unit to first cow and adjust.
  - a. Press green button on control panel to activate milking unit.
  - b. Attach teat cups while allowing as little air as possible to escape.
  - c. Adjust automatic take-off arm and hoses so milking unit hangs level from front to back.
7. Repeat steps 5 and 6 with the second and third cows in the side.
8. Begin at step 1 with the fourth cow on the side and repeat procedure with each group of three cows until all 12 units are attached.
9. When all units have detached, postdip all cows with the blue dip cup and release.
  - a. Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full.

**FIGURE 5. SAMPLE GRAPHIC OPERATING PROCEDURE FORMAT.**

**Clarity Farms Feeding SOP #1, Feeding the Lactating Cows**

**Effective Date: October 7, 2000**

**Developed by Feeding Crew**

**Prepare Feedbunk**

1. Sweep feed refusals to end of feed bunk.
2. Scoop feed refusals into TMR mixer.
3. Record weight of feed refusals in feeder notebook.
4. Distribute feed refusals in bunk at steer pen.

**Load Mixer**

1. Check feeder notebook for amount of ingredients to mix.
2. Add protein concentrate from bin #1. Record lbs added in feeder notebook.
3. Add ground corn from bin #2. Record lbs added in feeder notebook.
4. Add corn silage from bunker #1. Record lbs added in feeder notebook.
5. Add haylage from bunker #2. Record lbs added in feeder notebook.

**Mix Feed**

1. Mix feed for exactly five minutes.
2. Do not move tractor while mixer is running.
3. Record total amount of feed in mixer in feeder notebook.

**Distribute Feed**

1. Distribute feed evenly along entire length of feedbunk.
2. Record time in feeder notebook.
3. Return tractor and mixer to equipment shed.

## Flowcharts

Notice that Step 3 in Figure 4 refers to another SOP, called “Cows With Abnormal Milk.” This SOP is likely to require many decisions to determine what is wrong with the milk, if a sample should be taken, whether the cow should be treated, etc. Procedures that require many decisions should be presented as a flowchart.

Flowcharts are simply a graphic way to present the logical steps in a decision-making process. While normal milking procedures are quite straightforward and repetitive, deciding what to do about a cow with abnormal milk certainly is not. Many different factors such as mastitis or an injury may cause the abnormal milk. The appropriate response to each situation may be dramatically different. A flowchart provides an easy-to-follow mechanism for walking a worker through a series of logical decisions and the steps that should be taken as a result.

Figure 6 is a flowchart depicting how milkers should deal with cows showing abnormal milk. Note that the procedure begins in the top left-hand corner and proceeds generally to the right and downward, depending on which decisions are made. You should use the generally accepted symbols for flowcharts, which are as follows:

**START/END** A flattened oval represents a starting or ending point.

**ACTION** A rectangle indicates the worker should perform an action of some sort.

Unlabeled arrows between other symbols indicate the direction of flow.

**DECISION** Diamonds are the accepted symbol for a decision point. They must have two or more arrows leading away from them toward alternatives.

**YES** Decision arrows lead away from a diamond and toward an appropriate action or

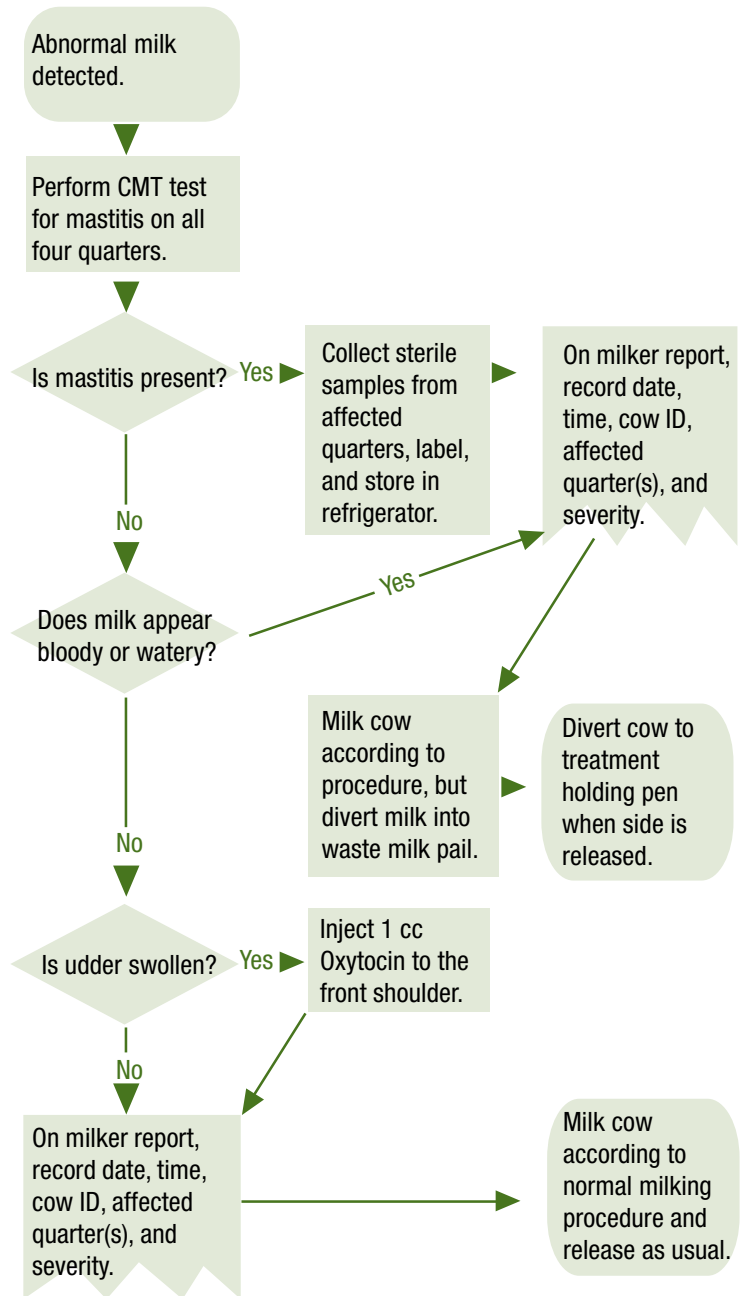
**> 103°** follow-up decision. At least two alternatives must lead from each decision diamond. Many times they will be yes and no, but they also could involve three or more choices. For example, after taking a temperature, you might have several options to follow, depending on the results.

**RECORD** A rectangle with a ragged bottom edge indicates that a record or notation should be written down. You might use this in an SOP to record how much cows were fed, or to note when a job is completed.

Regardless of the SOP format that you choose to use, there are a few elements of information that should be included

## FIGURE 6. SAMPLE FLOW CHART OPERATING PROCEDURE FORMAT.

*Clarity Farms Parlor SOP #5, Cows With Abnormal Milk*  
*Effective Date: February 27, 2001*  
*Developed by Parlor Staff*



with every SOP. These include a clear and descriptive title; the name of the author or person responsible for the SOP; and the date on which the SOP or revision becomes effective. Businesses that use many SOPs should adopt a logical numbering scheme for filing and to keep track of revisions. In addition, some SOPs should include lists of materials or tools needed to complete the job. All SOPs that involve hazardous working conditions should include a list of safety precautions.

## **DEVELOPING AND IMPLEMENTING THE SOP: PEOPLE SUPPORT WHAT THEY HELP CREATE**

The SOP development process is critical to successful implementation of SOPs. It should be an inclusive process that considers the input of everyone with an interest in the procedure's success. Managers who write procedures without input from workers or technical advisers run the risk of upsetting workers and producing a poorly written SOP. Managers who enlist the talents of workers and technical advisers will increase buy-in and produce better SOPs. Most importantly, they will take advantage of an important opportunity to foster teamwork among workers, managers, and advisers. Human nature dictates that people support what they help create.

The following seven steps describe a method that will produce excellent procedures and generate maximum buy-in from the workforce. All of the steps are important.

### **1. Plan for Results**

Plan with the business goal in mind. The goal of a milking SOP is not to ensure that everyone milks the same way. The goal is to quickly and efficiently harvest high-quality milk and eliminate the spread of mastitis organisms. Standard operating procedures work best when they are designed to achieve specific results.

Decide what business goals will be achieved through better management with SOPs and how those goals will be measured. For example, in the parlor, you might measure the pounds of milk harvested per milker per hour and the rate of new mastitis infections per month. These measures would indicate how efficiently cows are milked and how effective the procedures are at preventing the spread of mastitis. You then can use this information to adjust procedures and provide feedback to workers about their performance.

Many benchmarks exist in the industry to help measure quality and efficiency in specific areas. Ask your advisers for help identifying benchmarks that will help you improve your business. In some cases, you might need to come up with measures on your own that will help track progress over time.

### **2. First Draft**

Select a format for the procedure. If you choose to use simple steps, hierarchical steps, or the graphic format, first make a detailed list of the steps in the order that they are done. A simple way to get started is to observe someone performing the process as it now exists and write down everything that they do. This list is now a draft of the procedure.

If the procedure needs to appear as a flowchart, start with the most reasonable beginning point. Draw the decisions that a worker will need to make and the actions that follow each decision. Don't try to be perfect with the first draft, because it is very likely that you will need to make many revisions.

### **3. Internal Review**

Provide each worker who performs the procedure with a copy of the draft SOP. Ask them to review and suggest changes that are easier to understand, more accurate, or will improve performance. Assure the workers that their input is important and will be used.

People are much more likely to accept and use the SOP if they feel a sense of ownership in it. Workers will feel ownership and commitment to an SOP if they believe that management used, or at least fairly considered, their ideas during development. The chance of success is reduced when workers feel that management is imposing SOPs without regard to worker input.

Another excellent reason to involve the workers is that they are likely to have good ideas. Highly successful managers actively engage their work teams in a continual quest to become more efficient, increase cost effectiveness, and improve quality.

### **4. External Review**

Dairy managers increasingly rely on the advice of trusted advisers outside their own organization. The SOP writing process is an excellent way to tap the expertise of your technical advisers such as the veterinarian, nutritionist, or extension agent. They can give you advice that draws on their scientific knowledge and broad experience with other dairy businesses.

Provide your advisers with a copy of the SOP draft. Ask them to suggest any changes that will make it clearer and more effective. Dairy managers often see dramatic performance improvements after their technical advisers help them with SOPs. In many cases, the procedure writing process takes communication with advisers to much more productive levels than ever before. Revise the procedure as necessary to incorporate input from your technical advisers.

### **5. Testing**

For procedures to be effective, they must perform in the workplace. There is only one way to be absolutely certain that a procedure is well written and performs as expected. Have someone test the procedure by performing each step exactly as it is described while the procedure writer watches. Have a person not familiar with the work follow the procedure. Any steps that cause confusion or hesitation for the test worker should be revised.

### **6. Post**

Make a final draft of the procedure and post it in the appropriate locations. The workplace is one essential location. A master SOP file should be kept in a central location so workers can review little-used SOPs when necessary. Another possibility is to include SOPs with employee handbook materials. In each case, it is essential to keep SOPs up to date.

Preferably, the workplace copy of the procedure should be printed in text large enough for workers to review while completing their work. Many copy centers have

the ability to make enlargements. In addition, it may be helpful to laminate the workplace copy so that it will hold up under difficult conditions.

## 7. Train

The last step in the SOP writing process is often the most neglected. Train or retrain everyone as necessary to follow the procedure exactly. Even with very detailed steps, it is necessary to train all workers. Otherwise, individuals will interpret the meaning of procedures in different ways, leading to inconsistency in work routines and performance.

When training workers, share the reasons *why* procedures must be performed correctly—not just what to do or how to do it. People are much more likely to follow procedures exactly when they understand why they are important. In addition, sharing “why” demonstrates that you care about the worker and his or her success. It also helps develop the worker’s job knowledge and enhances his or her ability to contribute to future procedure improvements.

An effective SOP training program first will make the worker aware of what training activities will take place and what the trainer will be able to do when training is complete. The trainer will explain and demonstrate both why and how each step in the SOP is performed and then give the learner a chance to practice. The trainer will provide positive feedback as the learner masters parts of the procedure and patiently revisits those parts that need improvement.

## EFFECTIVE WRITING

Standard Operating Procedures are instructions that should be understandable to everyone who uses them. Writers should always try to write procedures as simply as possible while communicating well. A complete discussion of grammar and writing is beyond the scope of this paper. For more information, refer to the book *Procedure Writing: Principles and Practices* by Douglas Wieringa (see “References”).

Write steps as short sentences. Long sentences are harder to understand and tend to include more than one step. Several short sentences usually are easier to understand. Note the following examples:

- Long:** Use your gloved hand to wipe dry dirt and debris from the first cow’s udder, or dry with a clean paper towel if the udder is wet.
- Short:** Wipe dirt and debris from the first cow’s udder.
- Use your gloved hand to remove dry dirt and bedding.
  - Use a clean paper towel to dry the teats and udder if they are wet.

Note that the short sentences in the example above are organized in the hierarchical format. Both examples convey the same meaning, but the long sentence is much

more difficult to understand. In this example, we have one step to complete, but two different ways of completing it, depending on the condition of the cow’s udder. It is very awkward to convey all this information in one sentence.

Write steps in SOPs as imperative sentences. Imperative sentences are in the form of a command and are easy to understand. They usually begin with an action verb. Consider the following examples from an SOP for feeding cows:

- Unclear:** The weight of feed refusals should be recorded in the feeder notebook.
- Clear:** Record the weight of feed refusals in the feeder notebook.

In this example, the manager wants to know how much feed the cows refuse to eat so she can accurately determine dry matter intake. The clear example directs the person doing the feeding to record this information. The unclear example is subject to interpretation—does it mean that the feeder should record this information, or just that someone should?

Communicate well in as few words as possible. Mark Twain once said he didn’t have time to write a short story, so he wrote a long one instead. Writers tend to use long sentences and paragraphs because it is easier than thinking of the exact, most meaningful words. Procedure writers must use short, direct sentences so readers can quickly understand and memorize the steps in the procedure. Consider the following examples from an SOP for feeding calves:

- Rambling:** Make sure that you clean out all of the old grain from the calf pails before you put new grain in them.
- Concise:** Empty all old grain from calf pails before feeding new grain.

The two sentences communicate the same idea, but the concise sentence is more direct and easier to understand. The reward for clear and concise writing is better understanding by readers.

Use acronyms and abbreviations sparingly. For example, “The cow developed an LDA after exhibiting reduced DMI brought on by BVD or IBR. She had not yet received supplemental bST.” Many people involved in dairy management will recognize all of the acronyms in these sentences, but many others will not. Use acronyms only when they are commonly understood, not just to shorten your writing. For example, most people understand the meaning of the abbreviation “BVD” more quickly than if they read “bovine viral diarrhea.” On the other hand, most will stumble on the acronym DMI, but even those with only a passing interest in nutrition will recognize the words “dry matter intake.”

- Example:** Adjust ATO arm and hoses so that milking unit hangs level from front to back.

In this example, “ATO” stands for automatic take-off. There is no advantage to using “ATO” in place of the actual words. The writer would help most milkers to understand by avoiding this uncommon acronym.

## LEVEL OF DETAIL

The level of detail to include in standard operating procedures is one of the most difficult decisions to make. Procedures definitely should include all steps that are essential and that should be performed the same way by all workers. Omitting any of these essential steps may lead to confusion for the reader or performance variation among different workers. On the other hand, procedures should not be so detailed that they are cumbersome and impractical for everyday use.

Highly detailed procedures cannot take the place of training. Recognizing this, procedure writers should not attempt to answer all possible questions that a worker might have. SOPs should complement and serve as a basis for introductory training. Excessive detail also is likely to cause resentment from experienced workers. They might feel that management is using the SOP to micromanage every aspect of their work performance.

Procedure writers must ensure that they include enough detail to eliminate significant variation among workers. In Figure 2, Step 2 says to "Predip all four teats with the green dip cup." Experience shows that dipping means different things to different people. Some workers will start with a minimal amount of dip in the cup so that only the tip of the teat is covered. Others will first fill the cup full so a great deal of dip is wasted when the cow is dipped. In Figure 4, a substep, "Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full" follows the main predip step. This additional level of detail helps ensure that each teat is sufficiently covered while minimizing dip wastage.

Be aware that a weakness of the flowchart format is that the level of detail must be low. Attempting to use an excessive number of detailed steps leads to a very long, messy, and hard-to-follow flowchart. Flowcharts are best used to provide an overview of a procedure, while paying special attention to logical decisions. Actions within a

flowchart that require detailed steps should refer to another SOP. For example, in Figure 6, an action block calls for the worker to take a sterile sample of milk. The steps needed to complete this action should be covered in another SOP and through training. Some writers overcome this weakness of flowcharts by using a hybrid of simple steps in combination with the flowchart. In the hybrid, several steps may be included inside or next to the appropriate flowchart shape.

## CONCLUSION

Standard operating procedures are powerful tools for seizing control of work procedures. They define the subtle details that make the difference between success and failure in today's dairy economy. In addition, well-written SOPs act as effective communication tools that contribute to worker understanding and job satisfaction.

The SOP development process, while demanding, can provide significant performance improvements. When properly and fully carried out, the development process brings workers, managers, and advisers together in a collaborative way. As a result, everyone focuses their abilities on doing the best job possible with the farm's resources.

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