



carolina farm
stewardship association

Good Agricultural Practices for Diversified Farms

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Funded by the North Carolina Specialty Crop Block Grant

Foodborne Illness

- Caused by eating contaminated foods or beverages
- Each year there are:
 - 48 million cases of foodborne illness
 - 128,000 hospitalizations
 - 3,000 deaths



Farmers' Market Outbreaks



In 2000, *Escherichia coli* O157:H7 linked to produce samples offered at a farmers' market in Fort Collins, CO

- 14 illnesses



In 2010, *Salmonella* Newport linked to guacamole, salsa and uncooked tamales at a farmers' market in east-central Iowa

- 44 illnesses and five hospitalized



In 2011, *Escherichia coli* O157:H7 linked to strawberries sold at multiple farm stands and farmers' markets in Oregon

- One death, 16 illnesses, and four hospitalizations

What Causes Foodborne Illness?

- ① Food from unsafe source
 - ② Inadequate cooking
 - ③ Improper holding temperature
 - ④ Contaminated equipment
 - ⑤ Poor personal hygiene
- Who is at risk?
 - Infants
 - Toddlers
 - Elderly
 - Pregnant women
 - Immunocompromised
 - Taking specific medications

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Opening Markets

- Identifying barriers and developing guidance for GAP certification
- Case study
 - 12 NC farms (< 30 acres)
 - One hour visits
 - Onsite evaluation
 - Risk score survey
- A Farmer participating in the project said,

“We don’t have an unsafe food supply... but we have gone overboard with this food safety business... we become preoccupied with things that don’t generate any product, takes people’s time, ...money, ...energy and it saps their enthusiasm.... so I am very frustrated in that sense.”

<http://gapsmallfarmsnc.wordpress.com/>

Participating Farms

Farm	Organic certification	House bathroom	Dog on property	Livestock on property	Employees	Well water	No fencing	Raw Manure	Reuse wax boxes
A	•		•	•	•		•	•	•
B		•	•	•	•	•		•	•
C	•	•	•	•	•			•	•
D	•	•	•			•			
E	•	•	•					•	
F	•	•	•		•				
G	•			•	•	•	•	•	
H					•			•	•
I		•	•	•	•	•	•	•	•
J	•		•	•	•				•
K				•	•			•	
L					•				
Total	7	6	7	6	9	4	3	7	6

Checklist

- Iowa State University
- Five major areas
- Voluntary
- Initiates conversation

Checklist for Retail Purchasing of Local Produce

Name of Producer: _____ Farm: _____
 Address: _____ Phone: _____
 Retailer Name: _____ Retailer's phone number: _____
 Date of this inspection: _____
 Date of last inspection: _____
 Name of Retailer: _____
 Name of Retailer's Manager: _____
 Name of Retailer's Employee: _____

Production Practices

	Yes	No	NA	NAK
1. Do you have a written food safety plan?				
2. Do you have a written food safety plan that covers all aspects of your growing and handling process, and identifies the potential sources of risks?				
3. Do you have a written food safety plan that is updated annually or more frequently?				
4. Do you have a written food safety plan that is approved by a third party?				
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10. Do you have a written food safety plan that is approved by a third party?				

Product Handling

	Yes	No	NA	NAK
1. Do you have a written food safety plan that covers all aspects of your growing and handling process, and identifies the potential sources of risks?				
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Transportation

	Yes	No	NA	NAK
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 Extension Services

General Questions

1. A documented food safety program that incorporates GAP and/or GHP has been implemented
 - o Written document that covers all aspects of your growing and handling process, and identifies the potential sources of risks
 - o <http://ncfreshproducesafety.ncsu.edu/good-agricultural-practices/audits-plans/food-safety-plans>
 - o <http://onfarmfoodsafety.org/>
 - o <http://extension.umass.edu/nutrition/index.php/programs/food-safety/programs/good-agricultural-practices/gap-manual>
2. The operation has designated someone to implement and oversee a food safety program

*If the answer is "No" to the above questions
 You don't have a program*

Production Practices

- If irrigation is used, what is its source?
 - o Well
 - o Stream, pond, etc.
 - o Municipal
 - o Other
- Is it protected from contamination?



Production Practices

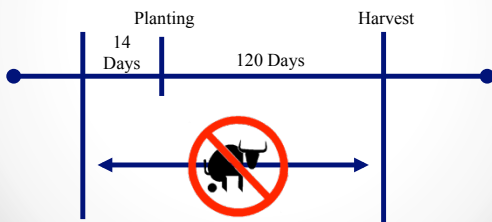
- What types of manures are used?
 - Raw
 - Composted (active)
 - Aged (passive)
 - No manure is used



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Production Practices

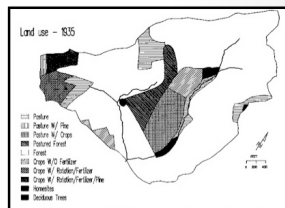
- Is raw manure incorporated into the soil at least 2 weeks prior to planting and 120 days prior to harvest?



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Production Practices

- You will need to know the land use history for a minimum of the previous 5 years.
 - What remains in the soil and water ways?
 - Perform a site evaluation
 - Runoff from upstream
 - Flooding
 - Chemical spills



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Production Practices

- Is the field exposed to runoff from animal confinement or grazing areas?



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Production Practices



- Floodwaters are likely to contain contaminants
 - Raw manure or feces, agricultural chemicals, fuel, Microbial pathogens (bacteria, viruses, and parasites), heavy metals or other chemical contaminants
- FDA considers crops adulterated if the edible portion has come in contact with floodwaters
 - Not to be sold for human consumption
 - Both above ground and root crops

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Production Practices

- Are farm livestock and wild or domestic animals restricted from growing areas?
- Positive deterrence
 - Fences, use noise cannons or scare balloons and fish emulsion
 - The average cost of fencing for farms participating in the research project was \$4.83 per foot.



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Working Animals

- If you use livestock to reduce pests or weeds in crop production areas, it is important to increase the time between manure application and harvest of crops.
 - Using chickens in a movable tractor to clear out pests/weeds after harvest has completed.
 - Animal urine and feces will accumulate in the crop production area
- It is important to document this raw manure application and make sure no crops will be planted for 2 weeks or harvested within 120 days.

Example

Date	Activity	Documentation
Sept 2	Animals allowed to graze on harvested crop production area	Record raw manure application from May 2-10
Sept 10	Animals removed from harvested crop production areas	Record raw manure application from May 2-10
Sept 24-26	Till the remaining plants and soil, if planting immediately must wait 2 weeks after tilling	Record tilling of land after raw manure application
A best practice would be to use this area for cover crop, to increase time between raw manure application and planting/harvest of crops		Record when crops are planted and expected to be harvested

Traffic Flow

- Walking through a chicken house/pen and then walking through a field of greens with the same boots can lead to cross-contamination.
- When employees move from livestock areas to crop production areas anything they have come in contact with will be on their shoes, clothes and/or hands.



Production Practices

- Are portable toilets used in a way that prevents field contamination from waste water?
 - Leased land



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Product Handling

- Are storage and packaging facilities located away from growing areas?



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Product Handling

- Are harvesting baskets, totes, or other containers kept covered and cleaned/sanitized before use?
- Are product and non-product containers available and clearly marked?



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Product Handling

- Is harvesting equipment that comes into contact with the products kept as clean as possible?



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Sanitation

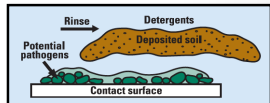
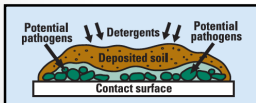


- Cleaning is the process of removing food and other soils
- Sanitizing is the process of reducing the number of microorganisms that are on a properly cleaned surface to a safe level
- *Sanitizing agents only work on properly cleaned and rinsed surfaces*

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How this process works

- ① Washing helps loosen soils and other organic matter from the surface
- ② Detergent and scrubbing also helps break the adhesion of microorganisms to the surface



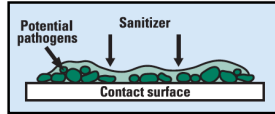
- ③ Rinsing removes loosened soil and detergent from the surface
 - ✦ This step is important because organic material and detergent can bind up sanitizer making it less effective

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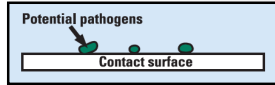
Iowa State University Extension, June 2011

How this process works

- ④ Applying the sanitizer to clean surfaces actually provides a 'kill' step for reducing the number of microorganisms



- ⑤ The surface is not completely free of microorganisms, but the number is greatly reduced



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Iowa State University Extension, June 2011

Transportation

- Is transport vehicle well maintained and clean?



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Transportation

- Are products kept cool during transit?



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Facilities

- Is potable water/well tested at least once per year and results kept on file?
- Need to meet the US EPA drinking water standard
 - Post harvest water that does not meet this standard = automatic unsatisfactory



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Facilities

- Is product protected as it travels from field to packing facility?
 - This can be accomplished with plastic tarp, clean sheet, box cover (completely enclosed)



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Facilities

- Is a product packing area in use with space for culling and storage?
- Are packing areas kept enclosed?



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Facilities

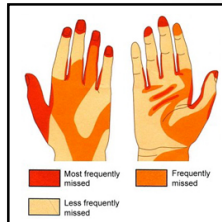
- Are food contact surfaces regularly washed and rinsed with potable water and then sanitized?



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Facilities

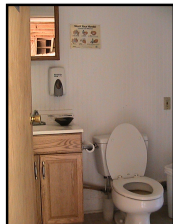
- Do workers have access to toilets and hand washing stations with proper supplies?



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Facilities

- Are toilets and hand washing stations clean and regularly serviced?



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Facilities

- Is a pest control program in place?



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Worker Health & Hygiene

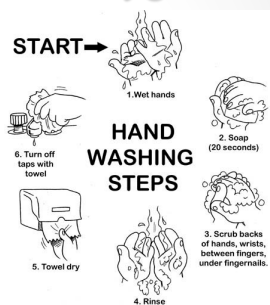
- Is a worker food safety training program in place?



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Worker Health & Hygiene

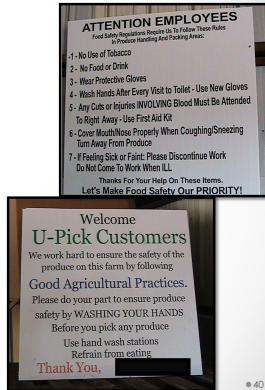
- Are workers trained about hygiene practices and sanitation with signs posted to reinforce messages?



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Worker Health & Hygiene

- Are workers and visitors following good hygiene and sanitation practices?
- Proper handwashing, proper hygiene, first aid procedures, properly using the restroom facilities, illness/injury procedures, jewelry policy, and policy on taking breaks
- Auditor = visitor
- U-pick operation



Worker Health & Hygiene

- Are workers instructed not to work if they exhibit signs of infection (e.g., fever, diarrhea, etc.)?
- Small to no staff – FB illness - no harvesting can occur
- Auditor may ask
 - About FB symptoms to see if owners know them
 - What happens when an employee is sick



Worker Health & Hygiene

- Do workers practice good hygiene by:
 - wearing clean clothing and shoes?
 - keeping hair covered or restrained?
 - washing hands as required?
 - covering open wounds with clean bandages?



Conclusion

- Outbreaks have shown that microorganisms can survive and cause infection
- Ultimate goal is reducing the risks on the farm
- GAP's & GHP's help farmers provide safer food
- Food safety audits may be required or voluntary depending on the buyer

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Thank You

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<http://gapsmallfarmsnc.wordpress.com/>

<http://ncgoodfarmersmarketpractices.com/>

<http://chapmanfoodsafety.wordpress.com/trainings/gardens/>

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