



Keeping Food Safe in the Market

Food safety risks and responsibilities: Farmers markets are a great way for consumers to get fresh produce, to support the local economy, and for vendors to increase profits. Farmers markets are becoming more popular, but the safety of products sold is essential for their continued growth. Understanding the causes of foodborne illness and the proper procedures to decrease the risk of contamination of the food products is the responsibility of both the managers and the vendors. The safety of food products begins on the farm, but safe food handling strategies must be used at all times to ensure that a safe, high quality product gets to the consumer.

Understanding the causes of foodborne illness

The Centers for Disease Control and Prevention estimate that one out of every six Americans per year contract foodborne illnesses. Sometimes this simply means a stomach ache, but more serious cases can lead to hospitalization and even death.

Microorganisms like viruses, bacteria and parasites can all cause illness if they contaminate produce and are ingested. These microorganisms are referred to as pathogens. Many of these pathogens are spread from human > food > human or from animals > food > humans. Some potential human pathogens associated with fresh produce are shown in **Table 1**.

Guidelines to reduce the risk of disease transmission

Microorganisms can come into contact with the food at any point from seed to sales. Currently there is no way to eliminate 100% of the food risks associated with uncooked produce, so preventing contamination is the best way to ensure safety. Here are some guidelines to reduce the risk of illnesses from products sold in the market:

1. Vendor/food handler health

- Any persons experiencing vomiting, nausea, diarrhea or jaundice must be excluded from handling food or materials that come in contact with food for at least 24 hours after symptoms have gone away. If jaundice has occurred, a signed release form from a doctor should be required.
- Any persons experiencing a sore throat with a fever should be assigned duties that do not involve working with or around food.
- Persons with cuts, burns, skin infections or sores should have them bandaged and protected with gloves or other barriers sufficient to prevent contamination of food or surfaces that contact food.

Manager's Responsibility: identify vendors or market workers who present a risk of transmitting foodborne pathogens. If symptoms are gastrointestinal, then exclude them from the facility until symptom-free for 24 hours or they have a signed medical release form. If they have had jaundice, a medical release form should be required. If symptoms are coughing, sneezing, bandaged area, sore throat with fever, etc., then assign them to jobs without contact with food or food containers as appropriate.

2. Hygiene

Handwashing is one of the most effective ways to prevent food contamination.

Make sure vendors and market workers know the six steps of proper handwashing:

- Rinse hands with clean, warm, running water (at least 100°F).
- Apply soap.

- Rub hands together for at least 20 seconds.
- Pay special attention to cleaning under and around nails.
- Rinse hands under warm, running water.
- Dry hands with clean paper towels or a hot air dryer.
- Vendors must wash hands before handling food products; after eating, smoking, or using the restroom; after touching nose, face, hair or any other possible contaminant.
- Hand sanitizer should be used in addition to handwashing but not as a substitute.
- Don't have a sink? See **Figure 1** to learn how to build a portable system.

Manager's responsibility: Handwashing facilities should be easily accessible and stocked with proper supplies. Also, maintain a supply of hand sanitizers for vendor and consumer use. Post signs to encourage customers to help keep produce safe by washing hands before handling produce.



▲ Pets can be a source of contamination. Establish a “no pets allowed” policy for your market.

3. Proper food display

- Make sure vendors regularly clean and sanitize their display surfaces.
- Do not allow animals in the marketplace as they could contaminate the food.
- Keep food items and containers off the ground to prevent dirt, dust or splashing water from contaminating food.
- Cover or package foods like breads, cakes, cookies, etc. to prevent contamination.
- Separate high-risk foods like raw meat products from ready-to-eat foods like fresh produce.
- Proper storage temperatures will help maintain freshness and quality. Cooling produce will help to preserve quality and prevent growth of bacteria. Most fruits and vegetables can be stored at 41°F. However, some produce may be susceptible to chilling injury. For a detailed list of storage conditions for specific whole fruits and vegetables, visit http://www.caes.uga.edu/applications/publications/files/pdf/FS%20100_2.PDF. Cut fruits and vegetables must be kept at 41°F or colder to be safe. Keeping produce like shelled peas, greens, etc. on ice or at 41°F or colder will help maintain quality and safety.
- Plastic containers or other non-porous materials are best for food display because they are easier to clean and sanitize and are less likely to transmit pathogens.
- If vendors prefer wooden trays, straw baskets or other display materials that are harder to clean and sanitize, then these should be lined with foil or paper towels that can be discarded or clean cloth dishtowels or fabrics that can be washed between uses to prevent possible spread of contamination from one batch to another.



Manager's responsibility: Talk to vendors about how to safely display products in the market. Instruct vendors on clean and sanitary practices for handling foods in the market.

▲ If baskets are used, line them with paper towels or with fabric or dishtowels that can be laundered between uses.

4. Proper food sampling

In general, produce is considered a low risk food, but the risk of contamination is greatly increased when the food is processed. The term "processed" applies to foods that have undergone procedures to alter their original state like cooking, chopping, mixing, grinding, drying, smoking, packing, etc.

Food sampling procedures:

- Produce must be rinsed with water that is suitable for drinking.
- Scrubbing firm produce with a clean vegetable brush can remove dirt, insects, some pathogens and some pesticide residues that could contaminate the produce once it is cut.

- Use clean equipment.

- Any dish, countertop, utensil or item that comes in contact with food must be clean, free of dirt, and then sanitized. Sanitizing further reduces the levels of microorganisms that may remain after cleaning.

- Mixing 1 tablespoon of chlorine bleach per gallon of

water can make a good and inexpensive sanitizing solution that can be used in 3 ways:

- 1) It can be placed in spray bottles. Spray the solution onto surfaces and allow them to air-dry. If used in spray bottles, the solution must be made fresh daily to prevent a loss of strength due to evaporation of the chlorine.
- 2) It can be used as a soak. After washing and rinsing to remove soap, place items to be sanitized in the chlorine solution and allow them to sit for at least one minute. Allow items to air-dry.
- 3) It can be applied to surfaces using paper towels or clean cloth towels. Allow solution to air-dry or wait at least one minute and dry surface with clean paper towels.

- Minimize bare hand contact with ready-to-eat food.

- Vendors should use single service gloves when prepping and serving ready-to-eat foods.

- Design a safe sampling setup with single service items like toothpicks.

- Samples should be kept covered. This can provide protection from flies, dust and other possible air contaminants.

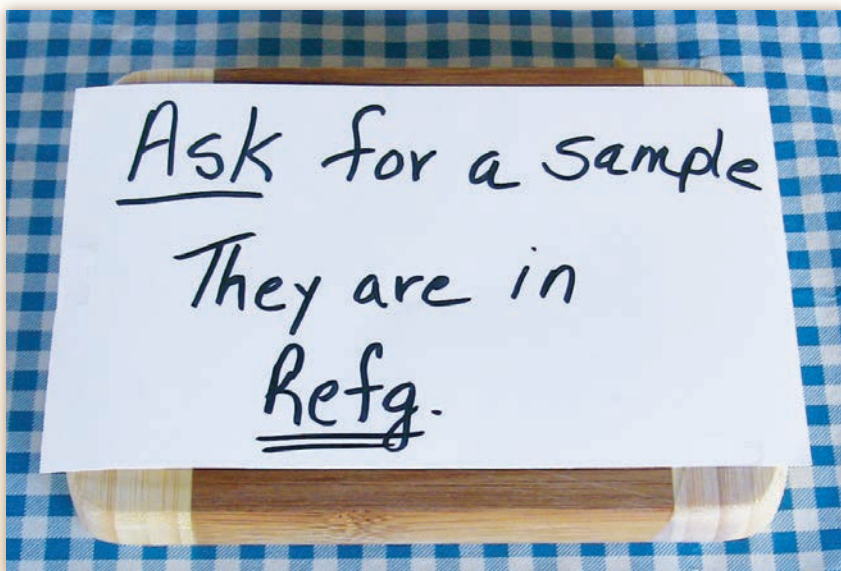
- Hold foods to be sampled at recommended temperatures to prevent microbial growth.



Courtesy of Wayne Morris, Virginia Tech

▲ **Figure 1.** A portable handwashing station can be built by setting a water container on stacked pallets or a table. A funnel collects the wash water into a bucket underneath. A bottle of soap with a pump dispenser is provided. Paper towels are stored in a covered plastic container.

Courtesy of Dr. Ben Chapman and Allison Smathers, North Carolina Cooperative Extension



- Thoroughly cook hot samples to approved temperatures, and hold them above 135°F when serving.

- Cut produce samples should be held either at 41°F or colder, or on ice. Alternatively, they can be labeled with the time they were prepared and disposed of after two hours, or one hour if the surrounding temperature exceeds 90°F.

Manager's responsibility: Check to see that safe food handling procedures are being followed and that foods prepared for sampling are being kept safe.

- ▲ One option for keeping samples safe is to keep them refrigerated or on ice until requested.

Table 1. Microorganisms that cause foodborne illness.

Most likely source of contamination	Pathogen	Type	Likely Produce Sources	Symptoms	Duration	Potential Impact	Documented Produce Outbreaks	
Soil	<i>Clostridium botulinum</i>	Bacteria	Improperly canned low acid foods like vegetables or mixtures of acid and low acid ingredients	Double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth and muscle weakness.	12-72 hours	If untreated, can lead to muscle paralysis and even death.	Cabbage salad, chopped garlic in oil	
	<i>Listeria monocytogenes</i>		Bean sprouts, Cabbage, Cantaloupe, Cucumber, Potatoes, Radish, Tomato	Fever, muscle aches, and sometimes GI symptoms	9-48 hours for GI symptoms, 2-6 weeks for invasive disease	Pregnant women and those with compromised immune systems are most susceptible. Illness may lead to death	Cantaloupe, celery, coleslaw mix, lettuce, tomato	
Fecal matter from: improperly composted manure, contaminated water (irrigation or post-harvest), food handlers	<i>Salmonella spp.</i>		Artichokes, Bean sprouts, Beet leaves, Cabbage, Cantaloupe, Cauliflower, Chilies, Eggplant, Endive, Fennel, Lettuce, Mungbean, Parsley, Pepper, Spinach, Tomato, Watermelon	Diarrhea, fever, abdominal cramps, vomiting	6-48 hrs	Usually infections resolve within 5-7 days, but those with severe diarrhea may require rehydration with fluids intravenously.	Cantaloupe, lettuce, sprouts, tomatoes, unpasteurized juice, watermelon	
	<i>Shigella spp.</i>		Green onion, Parsley, Lettuce	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus	4-7 days	2% develop post-infectious arthritis	Green onions, Lettuce, Watermelon	
	<i>E. coli</i> O157:H7		Most fruits and vegetables	Severe diarrhea (often bloody), abdominal cramps and vomiting.	1-8 days	Children under 5 are at a greater risk of acute kidney failure.	Cantaloupe, Coleslaw, Fruit salad, Lettuce, Sprouts, Unpasteurized juice	
	<i>Cryptosporidium</i>		Parasite	Raw produce contaminated by water or an ill food handler	Dehydration, weight loss, stomach cramps or pain, fever, nausea, vomiting and respiratory symptoms.	2-10 days but may last 1-2 weeks	Immune deficient infected individuals may experience secondary infection leading to more serious illness.	Green onions, Unpasteurized juice
				<i>Cyclospora</i>	Berries, Lettuce, Basil	Diarrhea, stomach cramps, upset stomach, slight fever	1-14 days	If symptoms persist, antibiotics may be required.
	Hepatitis A Virus		Virus	Raw produce or contamination by food handler	Diarrhea, dark urine, jaundice, vomiting and flu-like symptoms	15-50 days, avg 28 days	Dehydration may occur as a result of vomiting.	Diced tomatoes, Lettuce, Orange juice, Raspberries, Strawberries, Watercress
Norovirus		Raw produce or contamination by food handler		Nausea, vomiting, abdominal cramping, diarrhea, fever, headache. Diarrhea is more common in adults, vomiting is more common in children.	12-48 hours	It is highly contagious and dehydration can become a problem, especially in the very young and older adults.	Coleslaw, Fresh cut fruit, Melon, Tossed salad	

This project was supported all, or in part, by a grant from the National Institute of Food and Agriculture, United States Department of Agriculture (Award Number 2009-51110-20161).

Publication #FDNS-E-168-13. L. Carrella, J.A. Harrison, M.A. Harrison, J. Cannon, J.W. Gaskin, R. Boyer and G. Zehnder.

February 2012

The University of Georgia and Ft. Valley State University, the U.S. Department of Agriculture and counties of the state cooperating. Cooperative Extension, the University of Georgia Colleges of Agricultural and Environmental Sciences and Family and Consumer Sciences, offers educational programs, assistance and materials to all people without regard to race, color, national origin, age, gender or disability. An Equal Opportunity Employer/Affirmative Action Organization, Committed to a Diverse Work Force.