

Hello and welcome to Food Safety for Wash/Pack Facilities, a training series brought to you by the CCE Cornell Vegetable Program. Implementing food safety practices in wash/pack facilities is critical for ensuring that foodborne pathogens are not introduced or spread as produce is sorted, graded, washed, and packed.

This series will walk you through principles of food safety, the ideal wash/pack facility layout, post-harvest water management, cleaning and sanitizing, and tips for cleaning larger washing equipment. Because food safety is a company-wide responsibility, we invite all farm employees to participate in this training.

Food Safety for Wash/Pack Facilities, Part 1: Principles of Food Safety

Objectives for Part 1 include:

- Identify the three types of pathogens that can contaminate produce
- Identify sources and routes of contamination from field to wash/pack line
- Highlight everyday health and hygiene practices that can reduce food safety risks
- Review the process of proper handwashing
- Review signs and symptoms of illness
- Outline proper procedure for handling injuries

Food Safety practices are critical for ensuring that produce is safe for consumers, but it can be challenging to implement. Why is that?

For starters, fresh fruits and vegetables are often eaten raw. That means there is no kill step, such as cooking or canning, or other processing that would otherwise kill foodborne pathogens.

Contamination is also hard to remove once present. Many fruits and vegetables naturally have rough surfaces, crinkled leaves, stem scars, fruit scars, netted skins, or other natural openings. These small spaces can easily harbor pathogens.

Certain pathogens can multiply rapidly on produce surfaces if conditions are right. Bacteria, for example, require a food source, moisture, and appropriate temperature to multiply. If those conditions are present, bacteria can multiply once every 20 minutes.

Contamination is usually random in occurrence and in number. This is due in part because there are many possible routes of contamination on the farm, including workers, water, soil amendments, animals, tools, buildings, or other surfaces.

Because of this farms should have food safety policies in place throughout the farm –especially in wash/pack areas. The wash/pack facility is a bottleneck. All produce on the farm may need to go through the facility to be sorted, graded, washed, or packed. Even the smallest amount of contamination could explode into a much bigger contamination event under the right conditions. For example, sanitizers aren't used in the water, workers aren't washing their hands, birds or rodents are getting into the facility, etc.

How can people get sick from eating produce?

Most foodborne illness are caused by three types of germs, or pathogens, that can be spread by feces, saliva, or mucous. The three pathogens are called: bacteria, viruses, and parasites.

Let's review each contaminant:

- 1) **Bacteria** – most foodborne illnesses are caused by bacteria! They can cause vomiting, diarrhea, cramps, fever, nausea, etc. They are often spread by poor hygiene like lack of handwashing, or coughing and sneezing. Some bacteria that cause people to get sick include Shigella, E. coli O157:H7, Salmonella, and Listeria. Listeria can be especially harmful to pregnant people. The disease called Listeriosis can cause pregnant people to miscarry, deliver their babies early, or have low birth weight.
- 2) **Viruses** – Viruses can cause projectile vomiting, diarrhea, cramps, muscle aches and so on. Foodborne viruses cannot live on plants or food. They can only live within a host – like a human or animal. Good health and hygiene practices can help prevent the spread of viruses. Norovirus and Hepatitis A are some of the most common viruses that cause foodborne illness.
- 3) **Parasites** – Parasites like *Toxoplasma gondii* or *Giardia lamblia* can cause diarrhea, cramping, muscle pain, weight loss, malnutrition. Parasites can be spread by contaminated water, soil, or person to person contact. Additionally, contaminated animal or human feces can spread parasites. Poor health and hygiene can also cause food to become contaminated with parasites.

Now that we know how people get sick from eating produce, let's talk about the 5 ways in which produce can become contaminated.

The 5 routes of contamination are:

- 1) People
- 2) Animals
- 3) Water
- 4) Soil Amendments
- 5) Equipment, tools, surfaces, buildings

How can people contaminate produce?

- If you do not properly wash your hands after eating, drinking, smoking, using the restroom, or after working with animals or soil amendments
- If you have been injured and blood or other bodily fluids gets onto the produce
- if you work while you are sick.
- If you wear dirty clothes or boots to the farm, or if your boots or clothes get contaminated with manure while working on the farm.
- If you do not properly use the restroom by throwing away toilet paper into the toilet or if you do not wash your hands with soap and water.
- If you harvest produce with contaminated tools.

How can animals contaminate produce?

Domesticated animals like cats, dogs, livestock, or other pets can contaminate produce if they are allowed in areas where crops are grown, harvested, washed, packed, or stored. In Wash/Pack facilities, we are especially concerned about birds, mice, rats, cats, or dogs.

Wild animals can also contaminate produce – and they are much harder to control! It is important to remember that ALL animals are capable of spreading pathogens in their feces, mucous, or saliva.

If animals poop in fields, eat crops, root, or trample on crops they can spread contamination. If these crops are harvested they can introduce contamination into the wash/pack line.

Animals, both domesticated and wild, can contaminate the water sources that may be used to irrigate crops.

If manure is not properly stored, it can run-off into the field during rain events or flooding. OR animals can get into the manure and spread it across the farm.

How can water contaminate produce?

Water can easily carry and spread food borne pathogens.

Water can become contaminated from animals – if they get into creeks, ponds, streams, rivers, etc. that are used for irrigation OR if there is frequent flooding from those water sources. Small animals can contaminate irrigation hoses if they are able to get into them during the off-season when they are stored.

If there are heavy rains or flooding, contamination can be spread easily to a large area.

Water that is used for washing vegetables can easily spread or introduce contamination, especially if the source of the water is not adequate for use on fruits and vegetables, if sanitizers are not used to kill pathogens, or if variables that impact sanitizer efficacy are not frequently monitored.

How can soil amendments contaminate produce?

- All manures can carry foodborne germs.
- If you apply manure too close to harvest, crops can be contaminated.
- If the manure is not completely treated – there is a chance it might have foodborne germs in it.
- If manure is improperly stored, animals can get into it, or it can spread from water run-off then it could also cause contamination of crops.
- If manure is spread on a windy day, there is a chance particles can blow onto areas of the field or garden that you did not intend.
- Cross contamination can happen if you use tools or equipment to handle manure or soil amendments and they are not cleaned and sanitized before using for produce.

How can equipment, tools, surfaces, or buildings contaminate produce?

If equipment, tools, surfaces, and buildings are not regularly cleaned and sanitized and they are used for crop production, they can harbor foodborne germs.

Anything can be a food contact surface if it comes into contact with food. This includes vehicles that are used for transporting produce, harvest tools, washing and packing equipment, and any and all harvest bins. Food contact surfaces should be cleaned and sanitized.

Tall grass outside of buildings can attract small animals like rodents.

Birds and rodents can also enter into packing areas.

Puddles of water in buildings and packing areas can harbor foodborne germs as well.

And lastly, trash and/or cull bins that are not routinely emptied can attract rodents, insects, and other animals.

Everyday health and hygiene practices that can help to prevent or reduce contamination

In general, everyone on the farm should be expected to:

- Follow standards of personal health and hygiene, including wearing clean clothing and footwear
- Follow farm policies for jewelry and or glove-wearing
- Follow proper handwashing procedures, including knowing when to wash hands
- Notify their supervisor if they are ill
- Refrain from eating, chewing gum, or using tobacco products while working with produce.
- Minimize contact with animals (other than working animals)

Guidelines for clothing and footwear

- Employees should wear clean clothes to work each day.
- Employees should wear clean shoes or boots.
- If you work with animals *and* produce, consider having separate sets of footwear and clothing. This can help to prevent cross contamination.
- If you are required to wear gloves, change them when they become torn or contaminated.
- If you wear reusable gloves, they should be cleaned often.
- Aprons, gloves, and other personal protective equipment (such as goggles, facemasks, respirators, etc.) should always be removed before using the toilet. They should store in a clean, designated area when they are not being used.

Guidelines on jewelry

Many people wear watches, their wedding rings, bracelets, or earrings. In many work environments these are not a concern, but on the farm, jewelry can easily trap soils as well as contaminants in the tiniest of spaces. Not only can jewelry innocently spread foodborne pathogens, but they can also be physical contaminants. For example, if the back of an earring were to fall off into a bag of lettuce.

Jewelry can also pose a hazard to workers. Loose jewelry can get caught on machinery. If possible, you should avoid wearing unnecessary jewelry to the farm. If you must wear jewelry, such as your wedding ring, it should be covered with a glove when you are handling produce. Be aware, that if you wear jewelry on your hands, it can cause tears in gloves or other garments. If jewelry is worn uncovered, employees should take extra care in washing around and underneath the jewelry.

Guidelines on Glove Use

Always follow your farm's policy on glove-wearing. Some farms may require their workers to wear gloves, where others may not. If you do wear gloves, inspect them prior to use, to make sure they do not have holes, tears, or cracks in them. Furthermore, gloves should be clean before you use them to handle produce.

Gloves should be stored in a designated clean, dry environment when not in use.

Single use gloves should not be reused.

And remember to always remove your gloves before taking breaks, using the restroom, or handling trash. You should always wash your hands prior to wearing your gloves.

Proper handwashing

Proper handwashing is very important. It can prevent you from catching or spreading foodborne pathogens, as well as other germs like the flu, or COVID19. Handwashing is also effective at removing harmful pesticide residues. Let's review the proper way to wash hands.

Step 1. Wet hands with water. The water can be hot or cold.

Step 2. Apply soap and lather. Wash the front and backs of hands, in between your fingers, and underneath nails. Rub hands together for AT LEAST 20 seconds.

Step 3. Rinse hands thoroughly with clean water

Step 4. Dry with a paper towel

Step 5. Turn off faucet with used towel

Step 6. Throw the paper towel in a trash can

What about hand sanitizers?

- Hand sanitizers are absolutely ***not*** a substitute for hand washing! Why is that?
- Hand sanitizers do ***not*** get rid of 100% of germs
- Your hands need to be cleaned with soap and water before the sanitizer can work. If your hands are dirty or greasy the hand sanitizer may not be effective.
- Hand sanitizers might not remove pesticides or other harmful chemical.

When should hands be washed?

- Before starting or returning to work
- Before putting on gloves
- Before and after eating and smoking.
- After using the toilet
- After touching animals or animal waste
- Any other time hands may become dirty or contaminated. For example, when you are taking out the trash, emptying cull bins, before and after you treat a cut or a wound, after blowing your nose, coughing or sneezing.

Proper use of toilets

It is very important that all urination and defecation happens in the toilet, not in the field. One toilet and one hand washing facility are required for every twenty workers. The toilet and handwashing facility must be located in close proximity to each other and within ¼ mile. Toilet paper should always be thrown away in the toilet and not in the trash can or on the floor. And remember always wash your hands after using the toilet.

What should you do when you are ill?

You should absolutely NOT work with produce if you are sick. You can contaminate produce through coughing, sneezing, or not washing your hands after using the restroom. Symptoms of illness can include:

- Nausea
- Vomiting
- Diarrhea
- Fever
- Jaundice
- Abdominal cramps

- Sore throat

It is important that employees be aware of how they are feeling. If you suspect you have a foodborne illness, ask your supervisor if there is another task you can work on that does not involve contact with produce.

What should you do if you are injured?

- Follow your farm's standard operating procedure for injuries.
- If the injury is severe, call 911 or have someone else call 911. IF the injury is minor, locate your farm's First Aid Kit.
- For minor injuries, clean and bandage all wounds. If the wound is on the hand, a glove should be worn. This will help prevent blood, bodily fluids, or the bandage from contaminating produce while you continue working. This will also help protect you! An open wound is more exposed to harsh chemicals like sanitizers, fertilizers, or pesticides. Your wound will be protected if it is bandaged and gloved.
- Throw away produce that may be contaminated from blood or bodily fluids.
- Clean and sanitize any items that came in contact with blood or bodily fluids.
- And finally, report all injuries to supervisor and record in the injury log. It is important to have this record in case produce *was* contaminated and a produce recall needs to happen.

What about drinking water and break areas?

- You should only drink potable water from the designated water source. Only use single cups, do **NOT** share cups with other people.
- Do not bring glass containers to drink from, use plastic or metal containers. Glass containers can break and shatter and contaminate produce or cause physical harm.
- Only refill water containers from a designated water source.
- Do not eat, chew gum, or use tobacco products in while harvesting, washing, sorting, or packing produce. These activities should only happen in your farm's designated break area.

In summary...

- Bacteria, viruses, and parasites can cause foodborne illnesses
- Workers, animals, water, soil amendments, tools, surface, and equipment can all serve as sources of contamination
- Worker health and hygiene is critical for ensuring food safety on the farm.
- Farms should have policies on clothing, footwear, jewelry, glove-wearing, illness, injuries, etc.
- Handwashing can go a long way to stop the contamination spread
- Workers who are ill or injured can also spread contamination

For more information

If you have any questions or would like clarification or help identifying resources, do not hesitate to reach out. You can reach Extension Specialist Robert Hadad via email at rgh26@cornell.edu or by phone at 585-739-4065.

You can reach Program Assistant, Caitlin Tucker, at cv275@cornell.edu or by phone at 573-544-4783.

If you would like to learn more about the Cornell Vegetable Program visit cvp.cce.cornell.edu.

Up Next: Part 2 – The Ideal Wash/Pack Facility Layout