Module 6: Postharvest Handling & Sanitation encompasses practices in the field during harvest, as well as during postharvest handling, packing, and holding activities.
Thinking of fresh produce as a ready to eat food may be a new idea, but it helps to highlight the importance of sanitation. Fruits and vegetables that are eaten raw are not cooked or otherwise processed to kill micro-organisms that may be present, so produce must be protected from contamination.

The first part to any sanitation program is to keep things clean.

FSMA Produce Safety Rule—Subpart K (§ 112.111–§ 112.116) includes standards for growing, harvesting, packing, and holding activities; Subpart L (§ 112.121–§ 112.140) includes standards for equipment, tools, buildings, and sanitation. Both of these areas are discussed throughout this module.
5

- Basic housekeeping is the first step. Organize the farm so that produce handling areas are separate from tractor repair, animal care, or other farm tasks that could introduce food safety risks.

- Some basic practices are required in the FSMA Produce Safety Rule and they are covered in detail later in the module, including disposing of trash and eliminating pests.

- In practical terms, this could mean sweeping, emptying trash and cull piles/containers daily, cleaning up spills, and developing pest control programs.

- Once basic practices are in place, implement the four steps to cleaning and sanitizing. Cleaning and sanitizing surfaces are required in some cases, such as for food contact surfaces. It is not possible to sanitize every surface, but when possible, the four steps should be completed to keep reusable harvest containers, tools, grading tables, and packing equipment clean and to reduce the presence of microorganisms. The full four steps to cleaning and sanitizing are reviewed later in this module.

6

- Workers are key to ensuring harvest and postharvest activities are done properly, so they must be trained. Worker training was covered in Module 2: Worker Health, Hygiene, and Training but here are some specific requirements that might be valuable to cover again.
§ 112.112 requires immediately prior to and during harvest activities, those subject to the rule must take all measures reasonably necessary to identify, and not harvest, covered produce that is reasonably likely to be contaminated with a known or reasonably foreseeable hazard, including steps to identify and not harvest covered produce that is visibly contaminated with animal excreta. At a minimum, identifying and not harvesting covered produce that is reasonably likely to be contaminated with animal excreta or that is visibly contaminated with animal excreta requires a visual assessment of the growing area and all covered produce to be harvested, regardless of the harvest method used.

§ 112.113 requires that workers must also harvest covered produce in a manner that protects against contamination.

According to § 112.114, covered produce that drops to the ground before or during harvest cannot be distributed (also called dropped covered produce in the glossary). Crops that grow underground (such as carrots), crops that grow on the ground (such as cantaloupe), or crops that are intentionally dropped to the ground as part of harvesting (such as almonds) are not included in this dropped covered produce requirement.

§ 112.22(b) requires that persons who conduct harvest activities for covered produce must also receive training that includes all of the following: (1) Recognizing covered produce that must not be harvested, including covered produce that may be contaminated with known or reasonably foreseeable hazards; (2) Inspecting harvest containers and equipment to ensure that they are functioning properly, clean, and maintained so as not to become a source of contamination of covered produce with known or reasonably foreseeable hazards; and (3) Correcting problems with harvest containers or equipment, or reporting such problems to the supervisor (or other responsible party), as appropriate to the person’s job responsibilities.

§ 112.22(a)(1) requires that worker training include principles of food hygiene and food safety.

Worker clothing and equipment are important and there are requirements for hygienic practices (§ 112.32). Dirty clothes, shoes, and gloves can lead to cross-contamination of produce.
Not all packing operations are designed or used the same way. Some packing areas are closed to the outside environment, much like a food production facility. Others are open to the outside making them more susceptible to contamination.

When thinking about how to manage food safety risks during postharvest handling, take into consideration the level of control that is possible in the packing environment.

- If using an open packing area (such as ‘four sticks and a lid’, tent or pavilion)—prevent pests such as roosting birds and keep the area as clean as possible to discourage other pests.
- Environmental contaminants such as blowing dirt and field runoff may also be a potential source of contamination if the packing shed is open.
- Closed packing areas have a greater level of control, simply because they have walls, windows, and doors. Keeping pests out and keeping the area clean still takes effort, so be sure door seals are in place and windows are screened to reduce pest entry. A pest control and monitoring program must be in place and those regulatory requirements are covered later in this module.
- Regardless of the type of packing area, it is a requirement to clean and, when necessary and appropriate, sanitize food contact surfaces.

§ 112.122(a) states that both fully and partially enclosed buildings used for covered activities, including those that have a roof but no walls are subject to Subpart L of the rule.

§ 112.126(a) requires that buildings must be suitable size, construction, and design to facilitate maintenance and sanitary operations. This includes providing adequate space for equipment and storage, keeping floors, walls, ceilings, fixtures, ducts, and pipes clean and in good repair, and taking precautions to separate produce and food contact surfaces from potential contamination.
There are ways to reduce food safety risks in all situations regardless of the type of packing operation. This is not an exhaustive list of all the practices that can be used on farms and in packinghouses, these are just a few examples. Encourage participants to share other ideas.

- **Keep it clean**: Sweep, pick up trash, remove cull piles—good housekeeping goes a long way!
- **Separate produce handling areas** from other farm activities such as vehicle repair, spray mixing, and storage.
- **Provide proper hygiene facilities** for workers. Toilets, handwashing facilities, and separate eating and break areas are key for making sure workers do not contaminate fresh produce.
- **Avoid standing water and condensate**: Whether in a closed operation or open packing area, take effort to reduce standing water in equipment and on the floor (or ground). Standing water can support the growth and persistence of pathogens such as *Listeria monocytogenes* and splash onto fruits, vegetables, and equipment, in turn spreading contamination throughout the packing area.
- **Pest management**: All packing areas should have a pest management program. Closed operations have more ability to exclude rodents and other pests, but pests can still be managed in open operations.
- **Separate covered produce** from produce not covered by the FSMA Produce Safety Rule.
- **Keep it organized**: Having a cleaning process and place for tools and equipment can help ensure that they are in good working condition and clean for the next use. Some growers will use color labeling (such as ‘green is clean’) or designate areas for dirty and clean equipment to be placed when returning from the field. Having a system can minimize confusion, increase efficiency, and help reduce risks by ensuring important cleaning and sanitation steps are done properly each day.
This slide does not contain specific references to the FSMA Subpart requirements. Many of the FSMA requirements outlined in Subpart K and L are fairly general and broad in scope to facilitate scalability and flexibility in reducing food safety risks on a variety of farms and packinghouses. It is suggested that growers review the requirements in Subpart K and L to develop practices for their farm to satisfy these requirements.

### Assessing Risks in Packing Areas

- Map the flow of produce from the field through the packing area into storage and out to transportation
- Identify areas where produce may directly contact surfaces and equipment (Zone 1)
- Identify other areas that may introduce food safety risks such as equipment surfaces adjacent to food contact surfaces, floor drains, or adjacent land uses (Zones 2, 3, and 4)

As in the field, consider the risks from workers, water, soil, animals, adjacent equipment surfaces (such as spray bars), floor drains, and any adjacent land uses that can introduce contamination into packing and storage areas.

A good way to begin risk assessment in the packing area is to map the flow of produce from the field through the packing area, including storage and loading onto transportation vehicles.

Identify all surfaces that contact the produce as well as where incoming produce from the field and washed/packed produce might cross paths in the packing area or cooler.

Food contact surfaces are considered Zone 1. The other zones (2, 3, and 4) correspond to areas beyond the direct food contact surfaces. These zones will be reviewed in the next few slides.

Make a list of produce safety risks that are identified during the survey of harvesting, packing, storage, and transportation practices, so they can be addressed during implementation of the food safety plan.

### Additional Resource:

By defining zones in the packinghouse, growers can target cleaning and sanitation efforts in different areas that may affect fresh produce.

- Zone 1 is any surface that DIRECTLY contacts fresh produce.
- Zone 2 is the area immediately adjacent to Zone 1.
- Zone 3 is the area adjacent to Zone 2.
- Zone 4 is any area that could impact the safety of produce, but may be outside the packing or produce handling environment.

Each zone is described in the following slides and can help growers prioritize food safety risks and cleaning schedules for their packing area.

Zone 1 surfaces are DIRECT food contact surfaces—e.g., any surface that the produce may contact such as belts, rollers, brushes, sorting tables, workers’ hands, bins, or sinks.

Remember to assess sanitary design before buying new equipment. Equipment that is easy to clean is much more likely to be maintained and cleaned in the production environment.

§ 112.123(d)(1) requires all food contact surfaces of equipment and tools used in covered activities be inspected, maintained, and cleaned and, when necessary and appropriate, sanitized to protect against contamination of covered produce.

Cleaning and sanitizing practices in Zone 1 should come first to reduce food safety risks.
- § 112.123(d)(2) requires that growers also maintain and clean non-food contact surfaces, tools, and equipment when necessary to prevent contamination of produce. Areas described in this module as Zones 2, 3, and 4 are likely to be in this category.

- § 112.111 requires that those subject to the rule who grow, harvest, pack or hold produce that is not covered in this part (i.e., excluded produce in accordance with § 112.2) and also conduct such activities on covered produce, and the excluded produce is not grown, harvested, packed or held in accordance with this part, they must take measures during these covered activities, as applicable, to: (a) Keep covered produce separate from excluded produce (except when covered produce and excluded produce are placed in the same container for distribution); and (b) Adequately clean and sanitize, as necessary, any food contact surfaces that contact excluded produce before using such food contact surfaces for covered activities on covered produce.

- For farm management purposes, it may be easier to handle both covered and excluded produce in ways that meet regulatory expectations so that there are only one set of practices on the farm. Each farm should evaluate the best way to meet regulatory requirements, buyer requirements, and farm needs.

**Additional Information**

- This slide is optional.

- If the growers are only field packing or do not have packinghouses or sheds, this information may not be useful.

- The slides that follow provide more detailed information on these packing area zones, if this topic is relevant to the group being trained.

**The Other Zones: 2, 3, & 4**

- These areas are important because they may contribute to contamination of Zone 1
- These areas are best managed by established cleaning schedules to make sure areas adjacent to or outside of Zone 1 do not introduce contamination

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13 Additional Information

- This slide is optional.

- Zone 2 includes surfaces which are not in direct contact with produce, but are in close proximity to the produce. While these areas pose an indirect food safety risk, they still may contribute to contamination. This may include spray nozzles, equipment housing, sidewalls, and other nearby surfaces.

- Most commonly, these areas are overlooked because they are not often visible or easily accessible. For example, the interior walls of washing equipment may not be easily accessed, leading to rust or a buildup of microorganisms (i.e., biofilms). This buildup could slough off and contaminate other areas of the equipment or the produce directly.

14 Additional Information

- This slide is optional.

- Zone 3 includes areas inside the packinghouse such as floors, trash cans, and storage areas.

- If cull piles, dirt, or standing water are not removed on a regular basis, they could act as an attractant to pests or a reservoir for pathogens to multiply and persist.

- Restrooms, storage areas, drains, and catwalks, especially if they are above packing or washing equipment, can contribute to contaminating produce.
Additional Information

- This slide is optional.
- Zone 4 includes areas beyond the packing area. Exterior environmental factors such as manure or compost piles, domesticated animals, traffic from loading docks, and even adjacent land uses can all present opportunities for contamination to enter the packing area.

- Things that can reduce risks include removing soil from the bottom of harvest bins before they enter the packing area, designing patterns of movement around the farm to eliminate unnecessary traffic into the packing area, installing foot baths at entry doors to the packing area, and other practices that reduce movement of contamination from outside into the packing area.

Once a map of the flow of produce through the packing areas has been developed and growers have identified the biggest risks, they should develop a plan to implement practices that reduce those risks.

- If the risks involve concerns about the cleanliness of worker hands as they pack produce, growers may need to perform additional training or improve worker training programs.

- Here are a few sanitation practices to evaluate and consider implementing:
  - Are the belts and brushes that move produce dirty and/or damaged? Growers may need to establish a cleaning and sanitizing program and SOPs.
  - Are birds roosting in the rafters? Putting up netting or closing open doors to prevent entry may be practices that are needed for pest management.

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• Are harvest containers easily cleaned or designed for single use? Consider replacing broken or old harvest containers with ones that can be cleaned and sanitized more easily. See the slide Best Case Is Not Always Possible for information regarding use of wooden bins or wooden harvest containers.

• Does the cooler fan drip? Adding a drip pan to prevent water from dripping on packed and cleaned produce will help reduce risks.

• Finally, how is the produce leaving the farm and getting to customers? Are the transportation vehicles clean? Food safety risks can be reduced by cleaning the vehicles or requiring the trucking company to clean the vehicles prior to loading produce.

17

- A dirty surface cannot be sanitized! Not all surfaces can be sanitized, but all surfaces can be cleaned! This may include sweeping, wiping off tables, or brushing/rinsing off dirt from harvest totes. Cleaning must be done before sanitizing.

- Surfaces may also be cleaned with a detergent and then sanitized with an antimicrobial pesticide or another treatment to reduce or eliminate pathogens and spoilage microorganisms.

- In the FSMA Produce Safety Rule (§ 112.3), sanitize means to adequately treat cleaned surfaces by a process that is effective in destroying vegetative cells of microorganisms of public health significance, and in substantially reducing numbers of other undesirable microorganisms, but without adversely affecting the product or its safety for the consumer.

Additional Resource:

Cleaning vs. Sanitizing
What is the difference and why does it matter?

- Cleaning: Physical removal of dirt (soil) from surfaces which can include the use of clean water and detergent
- Sanitizing: Treatment of a cleaned surface to reduce or eliminate microorganisms

Important point: You cannot sanitize a dirty surface. Cleaning always comes first!
There are four steps to cleaning and sanitizing as outlined in the next few slides.

Always use clean water that is free from generic *E. coli* for all sanitation steps.

§ 112.44(a)(3) requires no detectable generic *E. coli*/100 mL in water used to contact food contact surfaces.

First, remove any obvious dirt and debris from the food contact surface. This can be done using a brush to sweep, air to blow off, or water to rinse off debris.

Avoid cleaning with high pressure washers or air compressors, as this could spread pathogens and other debris over a large area.

Be sure to use an appropriate detergent for the type of soil that needs to be removed. Some detergents are designed to remove fats (e.g., from animal slaughter) while others may be more effective at removing carbohydrates (e.g., sugars from fruit), or proteins, so select the detergent that removes the type of soil that is present.

*Detergents* should be appropriate for use on food contact surfaces.

Apply the detergent at the level recommended on the label and physically scrub the surface to remove any soil.

Removing the soil and other organic build-up can help minimize the formation of biofilms.
Additional Resources:


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- Rinse the surface with clean water that is free of any detectable generic *E. coli*. Make sure all of the detergent and soil is removed.

- As mentioned in an earlier slide, § 112.44(a)(3) requires no detectable generic *E. coli* /100 mL in water that contacts food contact surfaces.

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- **Sanitizers**: A substance that reduces the amount of microorganisms to acceptable levels, typically for use on food contact surfaces. Sanitizers are generally considered to be part of a broader group of substances called antimicrobial pesticides. The antimicrobial product label will describe approved uses, such as for water or for food contact surfaces, as well as approved concentrations or dosages.

- Apply a sanitizer approved for use on food contact surfaces. Ensure that the product is the proper concentration per the label instructions.
§ 112.123(d)(1) requires that those subject to the rule must inspect, maintain, and clean and, when necessary and appropriate, sanitize all food contact surfaces of equipment and tools used in covered activities as frequently as reasonably necessary to protect against contamination of covered produce.

- Apply and use sanitizers according to label instructions. There may be a 5th step if the sanitizer requires a final rinse, so be sure to read and follow the label.
- Allow the surface to air dry.
- Document this as a **clean break** if the farm separates lots using this process.
- In organic operations, the application of a sanitizer may need to be followed by a potable water rinse. Follow the certifier’s requirements for application and residue management on food contact surfaces.

### Clean Breaks

- Establishing a ‘clean break’ after taking these steps to clean and sanitize food contact surfaces can help limit the amount of product subject to a recall or withdrawal. Many produce packers establish lots to trace their products and to limit risk to their business if a food safety contamination event occurs. Whether a packer determines a lot by date, grower, field, buyer, or some other means, a sanitation ‘clean break’ is needed before and after the production of that lot to consider it separate from other production lots. In a number of recent produce-related food safety events, the lack of a defined clean break resulted in a **recall** that covered the entire production season (Chapman and Danyluk, 2013).

- Documentation is key to establishing a clean break. Be sure to keep records of when, how, and what was cleaned in the packinghouse as well as any monitoring steps and who did the cleaning. These records will help establish distinct lots.

### Reference:

The art and science of developing materials and building equipment that can be easily cleaned and sanitized is called **sanitary design**. If growers plan to build a new packinghouse or buy new equipment or harvest containers, it is important to select materials that are easy to clean and sanitize.

Requirements associated with equipment, buildings, and tools can be found within Subpart L.

Specifically, §112.123(a) requires those subject to the rule to use equipment and tools that are of adequate design, construction, and workmanship to enable them to be adequately cleaned and properly maintained.

Effective sanitary design will also reduce the time and money needed to properly clean and sanitize surfaces, so it is not just important to produce safety but will help save money.

**Additional Resource:**


Some things in the packing and storage area are constructed of materials that may be difficult to clean and sanitize. Wooden bins, because they are a porous surface, are one example.

Just because the equipment and containers used on the farm are difficult to maintain and clean does not mean that good practices cannot be implemented. Remember, this is about risk reduction, not risk elimination.

Because the equipment and buildings are designed to be easily cleaned and sanitized.

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- Keep equipment clean. Establish cleaning schedules that ensure equipment is not left to sit with plant (vegetative) debris on it overnight. This gives microorganisms a chance to establish themselves and form biofilms which are difficult to remove. If there are plans to buy new equipment or build a new packinghouse or storage area, look for equipment that is easy to clean and sanitize, and was built with principles of sanitary design in mind. Growers can consult local university or extension specialists, State Department of Agriculture or Public Health personnel, or county sanitarians for a second opinion if they are unsure what to buy or how to retrofit equipment safely.

- Assess equipment and tools, those that are not in good repair and cannot be maintained (cleaned and/or sanitized) may need to be discarded.

- § 112.123(b)(1) requires tools and equipment be installed and maintained to facilitate proper cleaning of the equipment and adjacent spaces.

- § 112.123(d)(1) requires those subject to the rule to inspect, maintain, and clean and, when necessary and appropriate, sanitize all food contact surfaces of equipment and tools used in covered activities as frequently as reasonably necessary to protect against contamination of covered produce.

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- Many farms have limited resources. Retrofitting and repurposing equipment is one way to cut costs and utilize already available tools and equipment on the farm. Unfortunately, retrofitting equipment and using it in ways for which it was not originally designed can introduce risks. For example, post-manufacturing welds can provide niches for pathogens to hide.

- Review modifications and changes to determine if niches where pathogens can grow or opportunities for biofilm formation have occurred.

- § 112.123(c) requires seams on food contact surfaces of equipment and tools must be either smoothly bonded, or maintained to minimize accumulation of dirt, filth, food particles, and organic material and thus minimize the opportunity for harborage or growth of microorganisms.

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• Avoid materials that may be difficult to sanitize such as carpeting on packing lines or other materials that do not dry and could spread contamination as they contact produce.

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- To keep packing areas clean, it is best to prevent dirt and debris from entering.
- Keep packing and storage areas clean by removing dirt and debris from the outside of the bins before they enter.
- Stacking harvest containers can introduce contamination to produce below if the bottom of the container is not clean.
- Sanitizers may be less effective if there is a large organic load (from dirt or leaves on/in bins) in the wash water. By keeping bins clean, sanitizers are less likely to be impacted and water will need to be changed less often.

26

- Routine cleaning and maintenance is essential because dirty equipment can lead to cross-contamination of fresh produce.
- Cracked hoses can harbor pathogens and torn door seals can allow pests to enter the packing area.
- Standing water can harbor pathogens and give them a place to multiply in the packing area.
- Condensation in packing, cooling, and storage areas should be eliminated or minimized because water can support microbial growth and contamination can easily be transferred to produce (e.g., by splash or from equipment).
§ 112.126(b) requires measures be implemented to prevent contamination of covered produce and food contact surfaces in buildings, as appropriate, considering the potential for such contamination through (1) Floors, walls, ceilings, fixtures, ducts, or pipes; and (2) Drip or condensate.

Workers must be trained to correct problems with harvest containers or equipment, or report such problems to the supervisor (§ 112.22(b)(3)). These problems may include old or broken harvest containers or equipment that might need to be replaced.

27

- Packing containers and produce packaging can be a source of contamination if the containers are not clean.
- Keep packing materials, cases, bags, or boxes in a clean, dry area that is covered and off the ground so that it does not become contaminated by pest droppings or other environmental factors such as windblown dirt or dirt from catwalks above storage areas.
- Single-use, food grade plastic liners can be used inside packing containers to provide a clean surface.
- § 112.116 requires that food-packing material (including packaging materials) be adequate for their intended use, which includes being cleanable or designed for single-use, and unlikely to support growth or transfer of bacteria. If food-packing materials are reused, steps must be taken to ensure that food-contact surfaces are clean, such as by cleaning food-packing containers or using a clean liner.
- § 112.115 requires covered produce to be packaged in a manner that prevents the formation of Clostridium botulinum toxin, if such toxin is a known or reasonably foreseeable hazard (such as for mushrooms).

Additional Resource:
Pests such as birds and rodents can carry human pathogens in their feces. They can also be an issue to the quality and integrity of the produce.

§ 112.128 requires that pest control programs in buildings must:

- Take measures to protect covered produce, food contact surfaces, and food-packing materials from contamination by pests, including routine monitoring for pests as necessary and appropriate.

- For fully-enclosed buildings, there must be measures in place to exclude pests.

- For partially-enclosed buildings, growers must take measures to prevent pests from becoming established or remove them, when present.

A pest management plan should be developed for excluding or eliminating pests from the packing and storage areas.

- In closed operations, inspect walls, windows, and door seals to keep pests out. Mice can fit in a pencil-sized hole and rats through a hole the size of a quarter.

- Deter birds from roosting by using netting or rafter spikes.

- Keep areas outside the packing area clear and free of debris and tall grass, which may provide places for pests to live and hide.

- Remove trash and culls every day and as needed throughout the day, so they do not become an attractant to pests.

- Keep produce covered to protect it from bird droppings or pest activity.
This slide provides more specifics about setting up a pest management program.

- Unbaited traps can be used to monitor and eliminate pests. Baited traps might actually draw pests to the area. If monitoring identifies a problem, growers should take action. Remember, § 112.128 includes routine monitoring for pests.

- Identify all traps on a packing area map and monitor on a regular basis for activity. Growers may need to hire an outside pest control company to help them deal with a problem.

- Keep pallets and produce boxes away from walls and off of floors to help monitor pest activity. Rodents find comfort in keeping to side walls where they can escape and hide easily.

- Workers should be trained to notify the grower or farm manager if they find evidence of a pest problem such as droppings, damaged product, or traps that are continually having to be emptied.

- Records should be kept of all pest management practices. If hiring a pest control company, growers should have them fill out a log sheet. Growers can review log sheets to verify that the program is working and to make sure there are no other pest problems they need to address.
Cold storage areas should also have a pest management and sanitation plan established since produce may be stored for a period of time.

Ensure cooling units are functioning properly by inspecting them on a regular schedule and documenting temperatures and cleanliness. Cooling units should be monitored to make sure they are not dripping or forming condensation within the cooler.

Condensate pans should be sloped and drained out of the room or directly to a drain, not onto the floor.

Take cooler temperatures at the beginning of each day to be sure they are functioning properly.

§ 112.126(b)(2) requires those subject to the rule must take measures to prevent contamination of covered produce and food contact surfaces in their buildings from drip or condensate.

§ 112.124 requires that instruments (such as thermometers) used to measure, record, and regulate temperature or other conditions in order to prevent the growth of microorganisms must be kept (a) accurate and precise, (b) adequately maintained, and (c) adequate in number for their designated uses.

Cooling is not required for the FSMA Produce Safety Rule, but if coolers are used, proper steps should be taken to ensure they are maintained and monitored to prevent produce safety risks.
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- If using ice that directly contacts produce, such as for cooling, the ice must be made from water that is free of detectable generic E. coli/100 mL water (§ 112.44(a)(2)).
- Ice should be stored in clean containers in a clean area. A schedule should be set to clean and sanitize ice machines and ice storage areas.
- If stacking boxes containing ice or produce that has been hydro-cooled, understand that water is likely to drip onto boxes and areas below, so take into account any risks that might need to be minimized, such as standing water.

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- Ideally, the vehicle that transports produce should only be used to transport produce, but this is not always possible, especially on small farms.
- § 112.125 requires that equipment used to transport covered produce (a) be adequately cleaned prior to transporting produce and (b) adequate for use in transporting covered produce.
- § 112.123(e) requires if those subject to the rule use equipment such as pallets, forklifts, tractors, and vehicles such that they are intended to, or likely to, contact covered produce, they must do so in a manner that minimizes the potential for contamination of covered produce or food contact surfaces with known or reasonably foreseeable hazards.
- If the vehicle is used for transporting anything besides produce, such as carrying live animals or compost, it should be cleaned and sanitized before being used to haul produce.
For more information on sanitary transportation, see the FSMA Final Rule on Sanitary Transportation of Human and Animal Food.

Additional Resource:

Check for physical hazards in the vehicle prior to loading, such as splinters, nuts and bolts, or any other small objects. Pay attention to corners where trash and dirt can become lodged.

Odors may signify what the vehicle has transported in the past or that rotting organic residues were not properly cleaned out. Other odors (e.g., coffee, air fresheners) can be used to cover up other unwanted odors. If growers are unsure if the vehicle is clean, they should not load produce until it is clean.

If hiring transportation, require the company to clean and sanitize trucks (if necessary) before they arrive to haul produce. Also stipulate the recordkeeping logs they need to fill out and maintain in the contract.

If the vehicle is to be used to keep produce cool, ensure that the cooling unit is functioning properly before loading and that all door seals, air chutes, and side walls are in good condition.
34

- SOPs outline what tasks need to be done and how to perform them, especially in the packing area.
- A list of some possible SOPs growers might want to consider including in their food safety plan are listed on this slide.
- Be sure to write clear and concise SOPs that anyone could follow. To test an SOP’s effectiveness, growers should give it to someone else to read. Ideally, growers should watch someone carry out the task to see if it is clear what needs to be done. If it works, great. If not, it should be revised as necessary.

Additional Resource:

35

- This curriculum and FSMA Produce Safety Rule are focused primarily on reducing microbial food safety risks; however, there are two other types of food safety risks that exist—chemical and physical risks.
- These two risks are briefly discussed here since some of them may be more common in the packing and storage areas where produce is close to chemical storage (e.g., detergents, sanitizers) and physical hazards in the packing area (e.g., glass from lights and metal parts of equipment).
- Other chemical risks worth mentioning are allergens. They are not discussed in any detail in this curriculum but are covered in the FSMA Preventive Controls for Human Foods Rule and the Food Safety Preventive Controls Alliance curriculum.

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Recordkeeping is just as critical for monitoring that chemical and physical food safety hazards are being controlled.

Chemical food safety risks can come from the improper application of pesticides or other chemicals such as detergents and sanitizers that are used on or near produce.

Be sure to keep chemicals and cleaning supplies in a location away from fresh produce handling areas such as in a locked storage cabinet or separate shed.

Be sure workers are trained to follow SOPs that clearly define when and how much of the chemicals need to be used to complete the task properly.

Safety Data Sheets (SDS) should be on site or easily accessible in case of a medical emergency.

Oils and lubricants for equipment should be food grade if they are used anywhere near fresh produce. Always follow the label instructions for application and proper use.

When using new food contact equipment on the farm, be sure the material is not reactive with any of the sanitizers or chemicals used for cleaning and sanitizing. Heavy metals can leach under certain conditions and end up contaminating produce.

Chemical Food Safety Risks

- Chemical hazards include pesticides, detergents, sanitizers, and other chemicals used on the farm
- To reduce chemical food safety risks:
  - Keep chemicals locked and stored in an area away from produce packing and storage areas
  - Train workers and develop detailed SOPs for them to follow
  - Keep SDS on site in case of an emergency
  - Use only food grade lubricants, oils, and chemicals according to their labeled use
  - Use non-reactive materials that will not leach into produce
Physical food safety risks can be present if any foreign material comes in contact with produce or produce handling equipment.

Broken glass from light fixtures is a physical hazard, especially in the packing and storage areas. Sleeves and light guards should be used to keep glass light bulbs from shattering onto produce or into packing and storage areas.

Metal from equipment (e.g., nuts, bolts) can present additional physical risks. Some farms may want to install metal detectors to make sure metal does not end up in the finished product. If the product is going to a food processing facility, such as apples to a baby food manufacturer, the processor may also require metal detectors.

Wood splinters are also a risk and may be common when using wood pallets or bins.

Set a schedule to inspect equipment and packing areas to reduce the risks of physical hazards contaminating produce and produce handling, storage, and transportation areas.

A corrective action should be taken and documented if food safety risks are identified in the packing, washing, storage, or transportation of produce.

Think about both short term and long term solutions. How can the situation be fixed immediately? How can the event be prevented from occurring again in the future?

Corrective actions can help fix a problem, determine its cause, and modify practices to make sure it does not happen in the future.
There are many things that could trigger a corrective action in packing and storage areas or transportation vehicles.

Here are some examples of immediate food safety risks. Consider engaging participants by asking what they would do if one of these things happened on their farm or in their packing area.

Corrective Action Scenarios:

- **Pest infestations**: Remove and manage pest infestations. This could be done by hiring an outside pest control company or by setting traps, putting up bird netting, or other actions. Inspect any stored produce and make sure it has not been contaminated by the pests. Review § 112.128(a).

- **Ill or injured worker in packing area**: Workers should first seek medical attention. First aid kits should be provided and workers should be trained on how to use the kits properly. Surfaces that may have come in contact with bodily fluids, such as vomit, blood or fluid from an open lesion, should be cleaned and sanitized. Any produce that has come in contact with vomit, blood, or other bodily fluids should be disposed of properly. If there is concern that a large volume of produce is reasonably likely to be contaminated, the lot may need to be discarded. Notify the owner/manager about injuries and contamination issues. All actions should be documented. Review Subpart D: Health and Hygiene for requirements.

- **Drain backup**: This situation should be evaluated as to whether it may have affected the produce storage or packing areas, the shoes of workers who may have come into contact with it, and any produce that may be contaminated. If the sewage/contaminated water was tracked through the packinghouse (by workers or equipment), cleaning and sanitizing of the area should be done. In addition, the proximity of the produce and produce packing lines or contact surfaces should be evaluated to make sure they have not become contaminated. Sewage and waste water lines should not run over packing lines, but if they do, they need to be monitored to make sure they do not leak onto produce or food contact surfaces. Review §§ 112.126(a)(2), 112.129, 112.131 and 112.133.
Recordkeeping can be facilitated in the packing area by attaching recordkeeping logs to clipboards hung in convenient locations or inserted into plastic sleeves taped to the walls where the activity is happening.

There are many cleaning and sanitation practices that need to be done on the farm. This may mean delegating some of the tasks to others. Be sure all workers know what their responsibilities are and what records they need to fill out.

§ 112.140(b)(2) requires that growers subject to the rule must establish and keep documentation of the date and method of cleaning and sanitizing of equipment to this part used in covered harvesting, packing, or holding activities.

Template logs and SOPs related to sanitation can be found on the GAPS website.

Summary

- All packing areas, regardless of age or design, must have sanitation practices that minimize contamination risks
- Identify all of the food contact surfaces as produce moves through the packing and storage areas—focus on keeping these surfaces clean as a first priority
- Cleaning and sanitizing are not the same thing
- You cannot sanitize a dirty surface
- Food safety practices such as cleaning, general maintenance and housekeeping, and pest control need to be in place to reduce risks

Notes:

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