Module 1: Introduction to Produce Safety

Copyright © Cornell University, 2017

Cornell University permits these materials to be downloaded, printed, and distributed for educational purposes and to meet requirements of the Produce Safety Alliance Grower Training Course. It may not be altered or published electronically without expressed permission of Cornell University (Produce Safety Alliance, 630 West North Street, Jordan Hall, Geneva, NY 14456, USA). It may not be printed, published electronically, and sold in whole or in part by a third party or company for profit.

Electronic Public Release Version
To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links
Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
3

Learning Objectives

- Develop a better understanding of produce safety on your fresh fruit and vegetable farm
- Identify types of human pathogens that can contaminate fresh produce
- Understand common ways that produce might become contaminated on the farm
- Describe strategies to prevent and reduce risks of contamination by human pathogens
- Understand the value of commitment to implementing food safety practices

4

Produce safety affects every fruit and vegetable grower. Some growers may be subject to the new FSMA Produce Safety Rule, while other growers are receiving food safety pressure from buyers. Even if there is no regulatory or market pressure, produce safety is critical to every grower because they produce food that consumers will eat.

It is important to know that growers are the key to produce safety on the farm, and making the decision to do something on the farm is up to them.

- All farms, regardless of size, location, or commodities grown, can reduce food safety risks.
- Growers know their farm best—their production practices, who works on the farm, and all of the other details that go into running a successful business.
- Those who make major decisions for the farm and know the day-to-day farm activities need to be involved in assessing food safety risks and developing the farm’s food safety plan.
- Actions to reduce food safety risks not only impact the financial viability of farms, but also the health and safety of those who consume the produce grown.

Relevance to the Farm

- You can prevent and reduce risks on the farm
- You know your farm and practices better than anyone, but you may not know the consequences of your current practices on food safety risks
- Your actions directly impact food safety and the financial viability of your farm

Notes:

Electronic Public Release Version

To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links

Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
The Food Safety Modernization Act (FSMA) was signed into law on January 4, 2011 by President Obama. It is the most sweeping reform of the United States’ food safety laws in over 70 years. The overall objective of FSMA is to focus on prevention of food safety issues.

There are seven primary rules included within FSMA:

1. Produce Safety Rule which includes Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption
2. Preventive Controls for Human Food
3. Preventive Controls for Animal Food
4. Foreign Supplier Verification Programs
5. Accreditation of Third-Party Auditors/Certification Bodies
6. Sanitary Transportation of Human and Animal Food
7. Prevention of Intentional Contamination/Adulteration

Additional Resource:
- FDA Factsheet. Background on the Food Safety Modernization Act.

Notes:

Electronic Public Release Version
To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links
Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
This curriculum covers the FSMA Produce Safety Rule requirements as well as Good Agricultural Practices (GAPs) for on-farm food safety. This training is one way to meet § 112.22(c) which requires that at least one supervisor or responsible party from a farm subject to the FSMA Produce Safety Rule must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.

The final FSMA Produce Safety Rule was published in the Federal Register on November 27, 2015.

The ‘Section’ symbol (§) is displayed on slides where there are specific FSMA Produce Safety Rule requirements either mentioned on the slide or referenced in the slide notes. These numbers refer to specific sections of the regulation.

While the slides and/or notes may not reflect the regulatory language exactly in all cases, a FSMA Regulatory Reference Table has been provided so specific language can be reviewed and regulatory standards can be aligned with the slides in the curriculum.

Every grower should know how to find the specific regulatory requirements to be sure they are fully complying with all the details included in the particular requirement. Many of the requirements have been abbreviated to fit on the slides.

As an exercise, ask participants to locate § 112.2. Can they name one produce item that is NOT covered by the regulation?

- Answer: § 112.2 lists produce that is not covered by the FSMA Produce Safety Rule. For example, asparagus which is considered to be ‘rarely consumed raw’ can be found on this list. There are other types of produce also not covered by the regulation, such as produce grown only for personal consumption or consumption on the farm that produced it.

Additionally, some terms are in bold. These terms have been defined either by the FDA in the Produce Safety Rule, the Food, Drug and Cosmetic Act or provided by the PSA for further clarification in the glossary of this training manual.
The FSMA Produce Safety Rule is the first mandatory federal standard for the production of fruits and vegetables in the United States. Prior to FSMA, growers, packers, and the produce industry were encouraged to follow voluntary guidance such as FDAs 1998 “Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables”.

Resource documents are available to help growers and packers determine whether they will be covered or exempt from these regulations. These documents are available on the PSA website and the FDA’s website.

Produce not covered by the FSMA Produce Safety Rule (§ 112.2(a)) includes:

1. Produce commodities that FDA has identified as rarely consumed raw: asparagus; black beans, great Northern beans, kidney beans, lima beans, navy beans, and pinto beans; garden beets (roots and tops) and sugar beets; cashews; sour cherries; chickpeas; cocoa beans; coffee beans; collards; sweet corn; cranberries; dates; dill (seeds and weed); eggplants; figs; ginger; hazelnuts; horseradish; lentils; okra; peanuts; pecans; peppermint; potatoes; pumpkins; winter squash; sweet potatoes; and water chestnuts
2. Produce that is used for personal or on-farm consumption
3. Produce that is not a raw agricultural commodity (A raw agricultural commodity is any food in its raw or natural state)

The definition of produce (§ 112.3) does not include food grains, including barley, dent- or flint-corn, sorghum, oats, rice, rye, wheat, amaranth, quinoa, buckwheat, and oilseeds (e.g., cotton seed, flaxseed, rapeseed, soybean and sunflower seed).

The rule provides eligibility for an exemption for produce that receives commercial processing that adequately reduces the presence of microorganisms of public health significance, under certain conditions and with certain documentation requirements (§ 112.2(b)).

- Documentation requirements include disclosure statements accompanying produce for further processing and annual written assurances from customers (§§ 112.2(b)(2) and (b)(3)).
- Farms that have an average annual value of produce sold during the previous three-year period of $25,000 (adjusted for inflation) or less would not be covered by the regulation (§ 112.4).
Farms may be eligible for a qualified exemption and associated modified requirements (§ 112.5, § 112.6). To be eligible for a qualified exemption, the farm must meet two requirements:

1. The farm must have food sales averaging less than $500,000 per year adjusted for inflation during the previous three years; AND
2. The farm’s direct sales to qualified end-users must exceed sales to all buyers combined during the previous three years. A qualified end-user is either (a) the consumer of the food (in any location) or (b) a restaurant or retail food establishment that is located in the same state or the same Indian reservation as the farm or not more than 275 miles away. Restaurants and retail establishments located in another state or country may be qualified end users if they are within 275 miles of the farm.

A farm with the qualified exemption must still meet certain modified requirements, including prominently and conspicuously displaying the name and the complete business address of the farm where the produce was grown either on the label of the produce or at the point of purchase. These farms are also required to establish and keep certain documentation.

While some growers may be exempt or not covered by the Produce Safety Rule, all growers should be prepared to implement food safety practices because they grow food people eat. Growers may also sell to buyers that require the implementation of food safety practices, including those required in the regulation.

Additional Resource:
• Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables

Growers and packers will have several years to comply with the Produce Safety Rule, unless excluded or exempt.

The final rule was published on November 27, 2015. The regulation became effective 60 days after the publishing date (January 26, 2016).

<table>
<thead>
<tr>
<th>Business Size</th>
<th>Years to Comply After Effective Date (1-26-16)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other businesses (&gt;500K)</td>
<td>2</td>
</tr>
<tr>
<td>Small businesses (&gt;250K-500K)</td>
<td>3</td>
</tr>
<tr>
<td>Very small businesses (&gt;25K-250K)</td>
<td>4</td>
</tr>
</tbody>
</table>

*Compliance dates for certain aspects of the agricultural water requirements allow an additional two years beyond each of these compliance dates.
Compliance dates, for all covered produce except sprouts, by business size:

- All other businesses, defined as greater than $500,000 in average annual (previous three year period) produce sales, will need to comply with the regulation within two years of the effective date.
- Small businesses, defined as greater than $250,000 but less than $500,000 in average annual (previous three year period) produce sales, will need to comply with the regulation within three years.
- Very small businesses, defined as greater than $25,000 but less than $250,000 in average annual (previous three year period) produce sales, will need to comply with the regulation within four years.
- The compliance dates for certain aspects of the agricultural water requirements allow an additional two years beyond each of these compliance dates.

Compliance dates for farms eligible for qualified exemptions are:

- Labeling requirements (if applicable): January 1, 2020
- Retention of records supporting eligibility for a qualified exemption: Effective date of final rule (January 26, 2016)
- For all other modified requirements for farms growing covered produce other than sprouts:
  Very small businesses—4 years, Small businesses—3 years

Although this provides sufficient time for growers and packers to understand and comply with the regulations, growers should familiarize themselves with the requirements as soon as possible to determine if they are subject to the rule. As mentioned previously, buyer requirements for food safety practices will likely continue to increase, so all growers need to be aware of the regulation and how it might impact their farm.

The following slides in this module will describe why produce safety is important and provide a basic overview of strategies that can be taken to reduce risk. Each area will be covered in greater detail in subsequent modules.
9

- This graph highlights the diversity of produce items that have been implicated in food-borne illness outbreaks where the source of the outbreak likely occurred prior to retail or consumer preparation.

- Ultimately, contamination can happen to any produce commodity; therefore, preventing contamination is critical for all fruit and vegetable growers.

- For this reason, the FSMA Produce Safety Rule does not target specific commodities, but instead, focuses on the practices which reduce risks. Read more about the FDA’s approach to produce regulation in the “Additional Resource” section below.

Pie chart notes:

* One outbreak of Cyclospora associated with raspberries in 1997 accounts for 1,012 illnesses, with no information on hospitalizations and deaths.

** Two outbreaks in 2004 were associated with mesclun lettuce and/or basil.

*** “Other” includes one outbreak associated with each of the following commodities: celery, hazelnuts, hot peppers, pine nuts, pistachios, snow peas, and squash. The single Salmonella Saintpaul outbreak associated with hot peppers accounts for 1,535 illnesses, 308 hospitalizations, and 2 deaths.

+ Five outbreaks during this time period were associated with unknown produce; while no specific produce item was identified as the vehicle for these outbreaks, various produce items were found to be epidemiologically associated with illness.

Other Notes:

- These data do not contain information on outbreaks/illnesses where the point of contamination is the retail food setting or home.

- These data do not include illnesses transmitted from person-to-person.

- Illness data represent only the number of illnesses reported to CDC, FDA, and state/local health departments in association with an outbreak. These data do not include illnesses that may have occurred but were not reported, sporadic cases of illness, and illnesses not associated with a food vehicle.
Information on outbreaks/illness reported prior to 2004 has been compiled from paper records; information on outbreaks/illnesses since 2004 has been obtained from the CFSAN Outbreak Surveillance Database.

The outbreaks tracked by FDA are a subset of all the outbreaks tracked by CDC. CDC also tracks outbreaks/illnesses where the point of contamination is the retail food setting or the home. Due to lags in reporting of illnesses, some differences in numerical tallies may exist between FDA and CDC data.

Slide Reference:

Additional Resource:
- FDA Factsheet. Why doesn’t this rule only target fruits and vegetables that are known to have caused outbreaks of foodborne illness?

To begin to understand food safety risks, growers should start with understanding what types of microorganisms can contaminate fresh produce.

The biggest food safety hazards in fresh produce are pathogens. A human pathogen is a microorganism capable of causing disease or illness in humans. There are three primary groups of pathogenic microorganisms that are of concern in fresh produce: bacteria, viruses, and parasites.

Microorganisms of Concern in Fresh Produce

- Bacteria
  - Salmonella, toxigenic E. coli, Shigella, Listeria monocytogenes
- Viruses
  - Norovirus, Hepatitis A
- Parasites
  - Giardia lamblia, Cryptosporidium parvum, Cyclospora cayetanensis, Toxoplasma gondii

10

Notes:
This slide provides a few examples of each type of microorganism plus a few names of pathogens you may recognize; however, there are many more pathogens that may cause foodborne illness outbreaks. We will cover each type in detail within the next few slides.

Chemical and physical food safety hazards are much less common and typically are responsible for fewer serious health outcomes.

- Chemical food safety risks (such as improper application of pesticides) are certainly a concern, but are much less common than microbial food safety risks. Many chemical hazards are also controlled by established programs outside of the FSMA Produce Safety Rule, for example through EPA pesticide registration and application requirements.

- Physical food safety risks may present choking hazards or cause someone to chip a tooth (such as from a pebble from the field in the product).

Additional Resource:
- FDA Bad Bug Book.

This slide summarizes important facts about how bacteria multiply and persist in farm environments. More detailed information is provided in the next two slides, but they are optional slides. Depending on the audience, the trainer may choose to present this summary only or to use the more detailed slides that follow.

Please refer to the slide notes that cover bacterial growth and optimal conditions for more information.

Information on potential sources and how pathogens are spread in the farm environment will be covered later on in this module and throughout the course.
Additional Information

- This slide is optional.
- Bacteria are single-celled microorganisms that can multiply in environments outside of a host organism as well as inside a host. Most can multiply very quickly, reaching high numbers in a short period of time if they are in the right environment.
- Examples include: *E. coli* O157:H7, *Salmonella*, *Campylobacter*, *Listeria monocytogenes*, *Shigella*, and more.
- It is unlikely that just ONE bacterial cell will be present. Where there is one, there usually are many – sometimes up into the millions!
- Some pathogens, such as *E. coli* O157:H7 can cause illness with just 10 cells ingested. Other pathogens require a much higher dose (i.e., ingesting many more cells) to cause illness.

**Example outbreaks caused by pathogenic bacteria:**
- 2006 *E. coli* O157:H7 outbreak in spinach.
- 2011 *Listeria monocytogenes* outbreak in cantaloupes.
- 2014 *Salmonella* outbreak in bean sprouts.

---

### Bacteria

<table>
<thead>
<tr>
<th>Time</th>
<th># of Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 min</td>
<td>2</td>
</tr>
<tr>
<td>40 min</td>
<td>4</td>
</tr>
<tr>
<td>1 hour</td>
<td>8</td>
</tr>
<tr>
<td>80 min</td>
<td>16</td>
</tr>
<tr>
<td>100 min</td>
<td>32</td>
</tr>
<tr>
<td>2 hours</td>
<td>64</td>
</tr>
<tr>
<td>4 hours</td>
<td>4096</td>
</tr>
<tr>
<td>6 hours</td>
<td>262,144</td>
</tr>
<tr>
<td>8 hours</td>
<td>16,777,216</td>
</tr>
</tbody>
</table>

If conditions are ideal, bacteria can multiply once every 20 minutes. It is unlikely you’ll ever start with just ONE bacterium. Some pathogens can make people sick with a dose of 10 cells or less. What conditions are optimal? - Food source - Moisture - Right temperature

---

Notes:

Electronic Public Release Version

To order printed materials visit producesafetyalliance.cornell.edu/order-materials

View producesafetyalliance.cornell.edu/mod1 for web links

Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
13 Additional Information

- This slide is optional.
- Bacteria need food, moisture, and the right range of temperatures to survive and multiply. If growers can control these factors on the farm, they can limit the ability of bacteria to multiply.
- Most pathogens are adapted to body temperature, and require the right range of temperatures to multiply; however, some pathogens (such as *Listeria monocytogenes*) can not only survive, but also multiply at refrigeration temperatures.
- Think about where bacteria might find food (e.g., sugars from broken fruit in a wash tank), water (e.g., washing water), and other ideal growing environments (e.g., hard to clean spaces where water and food collect).
- The acronym FATTOM has been traditionally used to describe ideal conditions for bacterial growth.
  - **Food:** Sufficient nutrients are needed to promote growth of bacteria; this can be controlled by proper sanitation.
  - **Acidity:** Most pathogens thrive under slightly acidic or alkaline conditions (pH 6.6–7.5), but some can grow at acidic pH values as low as 4.5.
  - **Time:** To reduce risks, use cooling and/or move produce quickly out of the field to a covered location. Clean frequently to prevent build-up of bacteria and biofilms.
  - **Temperature:** Most pathogens grow best between 41°F (5°C) and 135°F (57°C). Keeping produce cool and maintaining the cold chain will deter or slow pathogen multiplication rates. Some pathogens, such as *Listeria monocytogenes*, can multiply in cooler temperatures, so maintaining sanitation practices and keeping produce at the proper temperature will reduce risks.
  - **Oxygen:** Most pathogens are facultative anaerobes, meaning they can grow in the presence or absence of oxygen. One exception is *Clostridium botulinum* (botulism) which does not grow in the presence of oxygen and can be associated with canned foods that do not receive adequate thermal processing. Botulism results from ingesting the botulinum toxin...
produced by the growth of *C. botulinum* in the absence of oxygen in canned food products, rather than from traditional infection. Botulism can occur in canned foods but is not likely in raw agricultural commodities since they are exposed to oxygen. Produce in modified atmosphere packaging can deplete oxygen levels that may lead to accelerated decay and growth of spoilage organisms. Food safety challenges with *Clostridium botulinum* and mushrooms in modified atmosphere packages (sealed packages lacking venting) have occurred (See reference below).

**Moisture:** Water is essential for pathogen growth. Controlling standing water and making sure the packing environment, food contact surfaces, and produce going into cold storage are kept as dry as possible, will help reduce risks.

**Additional Resource:**
- Iowa State University Extension and Outreach: Lesson 4 Food Safety —FATTOM.

**Reference:**
Viruses are small particles of nucleic acid that require a host in order to reproduce themselves.

Viruses are typically spread by people such as food handlers who have not washed their hands before touching produce or food. Examples of viruses associated with fresh produce outbreaks and illnesses include Norovirus and Hepatitis A.

Only a few virus particles are needed to make someone ill and they are very easy to spread through the environment and from person to person. You may be familiar with Norovirus because of its association with cruise ship outbreaks and its ability to spread rapidly in tight quarters.

Prevention is key to reducing the spread of viruses. Basic handwashing, proper restroom use, and illness reporting can help prevent the spread of viruses.

Research on the reduction of Norovirus on food contact surfaces is currently limited, making selection of a sanitizer effective on viruses very difficult. Growers should focus on preventing contamination from occurring in the first place.

Example outbreak:

2003 Hepatitis A outbreak in green onions.

Additional Resources:

- Norovirus Collaborative for Outreach, Research, and Education (NoroCORE).
- EPA Registered Hospital Disinfectants Effective Against Norovirus.
  - Special note: The sanitizers/disinfectants listed in the above resource are not suitable for food contact surfaces, but could be used in other areas, such as restrooms.
Parasites need a host to multiply, but they can also be very stable in the environment. They can remain viable in the environment for long periods of time and are often transmitted through water contaminated with fecal material.

Examples of parasites include: Giardia, Toxoplasma gondii (often carried by cats), Cyclospora, Cryptosporidium, and Angiostrongylus catonensis (rat lungworm).

Some parasites can survive in the body for long periods of time without producing any symptoms. This makes it difficult to know when, where, and how the individual became infected. Symptoms may also come and go, making parasitic infections difficult to diagnose.

Example outbreak:

- 2004 Cyclospora in snow peas traced back to Guatemala.

Reference:

This slide is intended to highlight two key points: 1) number of outbreaks caused by each type of pathogen and 2) the significant impact they have on the health of the individuals who become ill.

From 1996 to 2014, approximately 172 produce-related reported outbreaks occurred, resulting in 17,156 outbreak-related illnesses, 2,067 hospitalizations and 68 deaths. The total number of outbreaks also includes a single outbreak attributed to Curcurbitacin toxin, a chemical hazard that was linked to the consumption of squash in 2004.

As the previous slides have illustrated, there have been a variety of pathogens which have been associated with produce outbreaks including:

- Bacterial pathogens—Escherichia coli (E. coli) O157:H7, non-O157 Shiga toxin-producing E. coli (STECs) (e.g., O145, O111, O104:H4); Salmonella spp.; Listeria monocytogenes (L. monocytogenes); Shigella sonnei.
- Viruses—Hepatitis A, Norovirus.
- Parasites—Cryptosporidium parvum; Cyclospora cayetanesis and Giardia lamblia.

Though many may experience only minor symptoms, such as diarrhea, nausea, or vomiting, others have more serious symptoms that result in hospitalization, long term health impacts, and even death.

Slide Reference and data adapted from:


Additional Resources:


Notes:


— Produce safety can be challenging for a number of reasons.

1. Many fruits and vegetables are consumed raw, so there is no cooking or “kill step” to destroy pathogens that may be on the produce.

2. Contamination events are often sporadic, affecting small portions of the crop, so knowing contamination has occurred is difficult.

3. Microorganisms, as their name suggests, are not easily seen, so contamination is difficult to detect visually.

4. Contamination is usually present at very low levels and difficult to detect through product testing.

5. Rough surfaces (e.g., cantaloupes), large folded surface areas (e.g., leafy greens), and stem scars (e.g., tomatoes) provide great places for pathogens to hide, thereby making pathogens difficult to remove by any amount of washing at the farm level or in the consumer’s home.

For these reasons, the focus of produce safety is on preventing contamination from occurring in the first place. Contamination is difficult to remove once present.
Additional Resources:


18

- On the farm, contamination can come from a number of sources.

- Do growers have these things on their farms (e.g., water, workers, soil, tools, or animals)? Of course they do—which is why every grower needs to understand food safety risks and how to reduce them on the farm.

- This course will cover each of these areas and the risks they may pose to the contamination of produce. The next five slides will introduce the risks associated with each of these areas.

Additional Resources:


Notes:
Humans can carry pathogens and spread them to produce, food contact surfaces, or other people while they work on the farm.

Pathogens are most commonly spread, directly or indirectly, by fecal material (fecal-oral route) but they can also be spread through saliva, mucous, or other bodily fluids such as blood (blood-borne pathogens).

Workers who directly contact produce through activities such as harvesting and packing have the highest potential for contaminating produce. However, others on the farm, such as visitors, office staff, and volunteers, can also contaminate produce.

More details about how to reduce food safety risks associated with workers are presented in Module 2: Worker Health, Hygiene, and Training.

Additional Resource:


Both domesticated animals (e.g., cattle, chickens, pigs, family pets) and wild animals (e.g., deer, geese, wild pigs) can carry pathogens in their feces and spread contamination by tracking feces through the field as they move.

Produce can be contaminated directly or indirectly by feces, through contamination of water, or cross-contamination from wildlife movement.

Notes:
The risks associated with animals are discussed in more detail in Module 4: Wildlife, Domesticated Animals, and Land Use.

Additional Resources:

21

- Water is used in many ways on the farm—everything from irrigating to washing produce.
- Water is also a great vehicle for carrying and spreading human pathogens if the water becomes contaminated.
- Water can become contaminated at the source as well as at any point in its distribution and use.
- Module 5: Agricultural Water, will discuss both production and postharvest water risks and how they can be minimized.

Additional Resources:

Notes:
Electronic Public Release Version
To order printed materials visit producesafetyalliance.cornell.edu/order-materials
Visit producesafetyalliance.cornell.edu/mod1 for web links
Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
22

- Raw manure represents a significant microbial risk to fresh produce since animal manures can contain human pathogens.
- Manure can be a valuable resource to farms and nutrient cycling. There are ways, such as through composting or by extending the time between application of manure and harvest, to reduce food safety risks when using raw manure as a soil amendment.
- More details about soil amendments will be covered in Module 3: Soil Amendments.

Additional resources:


23

- One way that contamination can be spread that is often overlooked is through cross-contamination from food contact surfaces, such as sorting tables, tools, and equipment.
- The best way to reduce risks is to keep all food contact surfaces clean and sanitized, when possible.
- Dedicating tools to a task will also reduce risks, such as having separate sets of tools for different jobs, such as for cleaning food contact surfaces and for cleaning bathrooms.
- Debris, trash, or standing water can pose risks to food contact surfaces.

Notes:

Electronic Public Release Version
To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links
Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
Keeping areas outside buildings cleaned-up (e.g., free of debris or unused equipment) and mowed will reduce pest harborage areas as well as their presence inside buildings.

More details about reducing risks posed by buildings, equipment, and tools will be covered in Module 6: Postharvest Handling and Sanitation.

Cleaning and sanitizing will be covered in greater detail in Module 6: Postharvest Handling and Sanitation; however, these definitions are critical to review since these terms will be mentioned throughout the following modules.

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, 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.

Important point: You cannot sanitize a dirty surface. Cleaning always comes first!

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!
25

- The importance of a grower’s commitment to produce safety cannot be overstated!
- The safety of produce depends on the grower and every person who works on the farm.
- This slide highlights why their commitment is important to produce safety.

Produce Safety Begins With Your Commitment

- Identifying produce safety risks on your farm
- Supporting the implementation of food safety policies and practices to reduce risks
- Providing equipment and facilities necessary to implement practices that reduce risks
- Supporting effective food safety training so everyone can actively be involved in reducing risks
- Setting a good and consistent example on your farm

26

- Growers need to know what risks exist on their farms before they begin. Many farms have limited resources, so identify the biggest risks and work to minimize those risks first.
- Implement practices to reduce the risks identified. Practices might include training workers or composting manure before it is applied to fields.
- Monitor implementation to make sure practices are getting done and being completed correctly.
- Implement corrective actions to fix a problem identified through monitoring and prevent it from occurring again.
- Recordkeeping is very useful in making sure tasks are being completed and to visualize trends over time. It is also required for some provisions of the FSMA Produce Safety Rule and for many third party audits.

Additional Resource:

Notes:

Electronic Public Release Version

To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links
Assessing risks requires a systematic review of the farm location, practices, conditions, and typical situations to determine where contamination could most easily occur.

Many situations and risks will be discussed during this training, but each farm has its own unique risks. Growers should focus on learning how they can assess these risks so they can evaluate their own farm.

Most farms are already implementing practices to reduce produce safety risks—so many growers are likely already doing some of these things.

Growers should prioritize those risks that they think will have the biggest impact on produce safety and address those risks first; farm resources are limited, so they should choose their investments wisely.

Some things may only require a slight modification of practices, while others may require a capital investment.

If growers are unsure about what practices may work best for their farm to reduce food safety risks, they should consider contacting their state or local GAPs or Extension educator or other educational resources listed in the PSA Training Manual. See Module 7: How to Write a Farm Food Safety Plan and the training manual for more information.

Additional Resource:
- University contacts are listed on the PSA website or on the National GAPs website

Notes:
29

- **Good Agricultural Practices (GAPs)** encompass all of the areas that have been discussed—from planting through postharvest handling. They represent best practices related to food safety on the farm and in packinghouses. These areas and more will be discussed throughout this curriculum.

- This curriculum includes regulatory requirements, but also places emphasis on providing a foundation of GAPs and other produce safety practices so growers can assess risks and implement practices to reduce risks.

- The farm environment cannot be considered zero risk; therefore, the focus is to **minimize** risks to fresh produce during production and packing.

30

- **Standard operating procedures (SOPs)** can help growers implement GAPs and ensure that practices are done properly.

- Think of an SOP as a recipe card. It provides step-by-step instructions on how to complete a task that needs to be done for produce safety. It also includes where the supplies are located to complete the task and how often the task should be done.

- Practice writing SOPs can be a great learning exercise and helps refine the instructions to get the job done properly. Have the grower write an SOP and then give it to someone who has never done the task before. Did that person complete the task correctly? Were they confused at any point about the instructions or location of supplies? If so, growers should revise the SOP to be more clear.

---

Notes:

**Electronic Public Release Version**

To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links

Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
As growers view the modules today, ask them to consider where SOPs might be useful to help implement food safety practices on their farm. Encourage them to make notes in the modules so they know where to begin when they return home.

**Additional Resource:**

### 31

**Monitoring** is very important to ensure food safety practices are done properly and at times when they have the most impact.

Monitoring appears in each module to highlight its importance and the benefit of identifying problems before they impact the safety of produce.

What activities should be monitored on the farm? What monitoring is required? Make a list and discuss with the group. As a note, required monitoring practices will be covered throughout the course, so revisiting this exercise at the end of the course will be most beneficial.

### 32

Corrective action plans can be established in advance for problems that are reasonably likely to happen, such as too little sanitizer added to wash water.

Some events cannot be predicted, so corrective actions may need to be developed after the problem has been identified. Monitoring will help identify when a corrective action is needed. These corrective actions can then be added to the overall plan. Growers can also have a plan for responding when the unexpected occurs.
• Either way, corrective action plans should be directed toward fixing the problem and helping identify the underlying issue to reduce the likelihood that the problem will occur again.

33

• Make recordkeeping easy and useful! There are many templates to use that can be tailored to each farm.

• Make sure the recordkeeping logs are located near where the tasks need to be done. If the records are in the office, which is a 5 minute walk from the packing area, the record likely will not be filled out.

• Required records must be dated and signed or initialed by the person who performed the activity (§ 112.161(a)(4)).

• Be sure to review logs on a regular basis to make sure there are no problems. Certain required records must be reviewed, then signed and dated by a supervisor or responsible party (§ 112.161(b)).

• Required records, per § 112.164, must be kept for at least two years past the date the record was created.

• Retaining records for at least this length of time is necessary to ensure that the records are available for reference during verification activities as well as during inspections or in the event something goes wrong.

• Records can be stored off-site, as long as they can be retrieved and made available and accessible to FDA within 24 hours of request by FDA for inspection and copying (§ 112.166).

• Electronic records are considered to be ‘on-site’ if they can be accessed from the farm via computer or other devices.
There are many benefits to recordkeeping.

- Be assured that the task was completed and done properly.
- See trends or outliers that may cause problems in the future, such as toilet facilities that are frequently out of stock, indicating they need to be checked and cleaned more often.
- Recordkeeping is required for third party audits and for some parts of the FSMA Produce Safety Rule, see Subpart O—Records for more information on requirements for making and keeping records.

Recordkeeping Basics

- Records can be handwritten (pen & paper) or electronic (handheld data entry or scanner)
- Invest in tools that make it work
  - Clip boards
  - Pens tied to long pieces of string attached to a clipboard with the recordkeeping logs
  - Plastic page sleeves
  - Duct tape
- Use technology to your advantage
  - Phones, apps, tablets, computer software

Recordkeeping Benefits

- You can verify practices were done
  - And done properly!
  - Assures you that everyone is sticking to the food safety policies
- Look for trends or outliers and eliminate potential problems
- May be required for certain activities
  - Regulatory (i.e., FSMA Produce Safety Rule requirements)
  - Third party audits

34

35

Duct tape, pencils, clipboards, log sheets, and plastic sleeves go a long way to facilitate recordkeeping.

Technology can be used for recordkeeping too. Phones, apps, tablets, and computers can make the transfer and saving of documents easy for food safety.

If using electronic recordkeeping, be sure that the records are authentic and cannot be changed after entries have been made.

§ 112.165 outlines acceptable record formats which include original records, true copies, and electronic records.
36

- Make recordkeeping easy for workers and the tasks they are doing.
- Workers should understand which records they are responsible for filling out as well as when and how to do it.
- Recordkeeping supplies should be available where the task is being done to make completing records easy.
- **Tip:** Use clear plastic sleeves to tape records near the site of where the task is being done. Clipboards (with pens attached) can also be nailed to the wall in a convenient location for workers to fill out.

37

- A **Farm Food Safety Plan** guides practices to ensure food safety.
- When growers return to their farms, writing a food safety plan will solidify their ideas and allow them to take action on their own farm to reduce risks.
- A Farm Food Safety Plan is not required under the FSMA Produce Safety Rule, but is generally accepted as a best practice and is needed for many third party audits.

**Recordkeeping Tips**

- Establish record keeping schedules that make sense for the record keeper and the action
  - When does it need to be recorded?
  - Who is in charge of documenting it?
  - How often does it need to be documented?
- Build recordkeeping into normal routines
  - Place recordkeeping logs in accessible areas with necessary supplies (e.g., pens, paper)

**A Farm Food Safety Plan**

- Gets you thinking about YOUR farm and practices
- Keeps you organized so you can focus your time and resources more effectively
- Gives you a plan to follow and assure everyone is involved
- Documents your progress
- Is required by third party audits and some buyers
- Is not required by the FSMA Produce Safety Rule, but is a good idea! 

Notes:

**Electronic Public Release Version**

To order printed materials visit producesafetyalliance.cornell.edu/order-materials

Visit producesafetyalliance.cornell.edu/mod1 for web links

Produce Safety Alliance Grower Training Course • Version 1.1 • © 2017
Produce safety impacts every farm. Outbreaks also impact the health of consumers and reduce confidence in produce and influence purchase/consumption decisions.

Financial viability of farms depends on safe produce because outbreaks can impact sales and the local economy.

Commitment to food safety is critical to the success of every farm food safety program.

Leadership should be provided to guide the implementation and management of produce safety practices on each farm.

Necessary resources for food safety may include training, facilities, and equipment that must be provided to workers so that they can do their jobs correctly and follow regulatory requirements (Discussed in more detail in Module 2: Worker Health, Hygiene, and Training).

Never underestimate the value of setting a good example for all of your employees to follow.

Writing a Farm Food Safety Plan is a good place to start!

**Summary**

- Produce safety impacts your farm
- Microorganisms are the primary produce safety concern
- Your commitment is critical to success
- Produce safety includes:
  - Assessing risks, implementing practices, monitoring practices, using corrective actions, and keeping records
  - Providing the necessary resources to get it done
- A written Farm Food Safety Plan guides your produce safety efforts

Notes: