BUY LOCAL, BUY SAFELY!

A Guide for Evaluating Food Safety Practices at Local Produce Farms

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Why buy local?

Many people are thinking about buying more fruits and vegetables from local growers. There are many good reasons to buy local: supporting the local farm economy, reducing costs and environmental impacts associated with food transportation, and getting fresher products.

But savvy customers won't overlook food safety when considering local purchases!

Just because a grower is small-scale and local doesn't guarantee that they have taken the right steps to ensure that their produce is safe to eat. All growers should consider food safety hazards and take appropriate preventive measures. After all, every grower want to be sure their customers won't contract a food-borne illness from produce.

What food safety hazards can occur in produce? The major hazards associated with produce are disease-causing bacteria such as *Escherichia coli* O157:H7 and *Salmonella*, viruses such as hepatitis A and norovirus, and parasitic protozoa such as *Cryptosporidium*. Many of these hazards have been in the news over the past few years for causing large-scale illness outbreaks.

How do food safety hazards get into produce? Microbes can be carried by livestock, wildlife, or humans, and transferred to produce by contaminated irrigation or spray water, improper manure use, runoff from neighboring farms, wildlife passing through the farm, or poor hygienic practices by farm workers. Many food safety hazards, like *E. coli* O157:H7 and *Salmonella*, are carried in the intestinal tract of animals. Others, including *Listeria monocytogenes*, can be naturally found in soil and water, or the packing shed environment – often surviving for months.

What about pesticides and chemicals? Consumers might also be worried about the potential hazards of pesticide residues or other chemical contaminants. These hazards haven't been in the news as much as microbes, but they are still important. Many customers base their purchasing decisions on how growers use agricultural chemicals, and will ask produce farmers about their use of agricultural chemicals. In this guide, though, we'll focus on the hazardous microbes.

What do food safety regulations say about produce? Wisconsin food safety regulations say little about produce sold directly to consumers. In addition, the regulations for restaurants and retail food establishments only say that produce should be obtained from an approved source. This guidance was written to help growers and their customers understand the best practices recommended for producing safe fruits and vegetables. In the future, some larger growers will be required to meet produce safety standards set by the U.S. Food and Drug Administration (FDA). These standards are not likely to be in place before 2013.

What's the most straightforward way for a grower to become an "approved source"? Up-to-date United States Department of Agriculture (USDA) certification for implementing Good Agricultural Practices (GAPs) is a straightforward indication that a grower has taken appropriate food safety measures. For more information about the USDA GAPs program, technically known as the Fresh Produce Audit Verification Program, go to the following website: http://www.ams.usda.gov/AMSv1.0/gapghp.

There are a variety of other organizations that audit produce-growing operations for good agricultural and handling practices; many of them are listed at the Cornell University National GAPs Program website (http://www.gaps.cornell.edu/weblinks.html).

What if a grower is a certified organic grower? A certified organic grower meets the standards of the National Organic Program (NOP). Some aspects of the NOP standards, such as those for use of manure as fertilizer, relate directly to food safety hazards. However, the NOP does not address most of the major steps that must be taken to prevent contamination of produce with disease-causing microbes. So, organic certification isn't a reliable indicator of how well the grower controls food safety hazards.

How can a grower adequately ensure food safety without being GAPs-certified? First, the grower should have a written food safety plan, which they can show to customers, and documentation that shows the plan is being followed. The food safety plan should address each of the questions listed in this guide. For each of the questions asked, a "Yes" answer indicates that an important step is being taken toward ensuring crop safety. At the back of this guidance is a score sheet you can use to make a more detailed evaluation of a food safety plan.

For the questions in this guide, there is a general principle to follow for minimizing food safety hazards, and suggested steps to take in following the general principle. You may notice that the suggested steps sometimes seem vague. This is because the factors affecting contamination of produce are often very complex, and make it hard to provide hard-and-fast answers on how to ensure that produce is safe to eat. For example, a well-accepted principle is "prevent exposure of

produce crops to livestock waste". But is it acceptable if there is a dairy farm on the adjoining section of land? What if the dairy farm is downhill from the produce? What if the dairy farm is uphill from the produce but there is a vegetation buffer zone between the dairy farm and the produce? What if the dairy farm is ¼ mile from the produce farm? How about ½ mile? There are no clear answers to these questions, because each situation is unique and complex. What you can set as a standard is that for each question in this guide, at least one preventive step is taken towards a "Yes" answer.

WATER

Anytime water contacts produce there is the potential for contamination. If the water contains disease-causing microbes, these microbes can be transferred to the produce. Here are some key water-related questions to answer in evaluating a farm's food safety system.

- **Is the best-quality available water used for post-harvest operations such as rinsing harvested crops?**

Guiding principles: The closer it is to harvest time, the more important it is to use high-quality water. The best-quality water should be used when working with the harvested product.

Steps to take: The water supply for post-harvest operations should be potable (suitable for drinking and from an approved source); growers may also choose to add a food-grade sanitizing agent, such as sodium hypochlorite, chlorine dioxide, or peracetic acid, to post-harvest water. These sanitizing agents can be purchased from a sanitation chemical supply company.

- **Is the water source protected from possible contamination via run-off, flooding, and animal livestock operations?**

Guiding principle: Once water becomes contaminated, it is very hard to clean up. Preventing contamination is the best strategy.

Steps to take: Wells should be properly constructed and sealed to minimize the chance of contamination. Both surface water and ground water may be influenced by point and non-point source contamination, especially during storms. Growers can protect crops from flooding or run-off by building run-off structures, waterways, diversion berms and buffer areas. Ideally wells should be upslope from animal livestock operations. Fences and gates may be useful in keeping animals away from surface water sources.

- **Is there minimal contact between irrigation water and produce?**

Guiding principle: Direct contact between irrigation water and produce should be avoided, or at least minimized.

Steps to take: Growers can use drip or furrow irrigation which is less likely to contaminate produce than overhead spray irrigation. Experts recommend growers develop a schedule of testing the irrigation water for *Escherichia coli*, a bacterium indicative of fecal contamination. Some experts recommend testing for fecal coliform bacteria or total coliform bacteria. These bacterial groups can also indicate fecal contamination. The higher the level of *E. coli* , fecal coliform, or total coliform bacteria, the greater the distance you should try to have between irrigation water and crops.

- **Is spray-water suitable to contact produce?**

Guiding principle: The water used for delivering chemicals and/or amendments to plants should be of the same quality as water used for post-harvest operations, i.e. potable (safe to drink and from an approved source).

Steps to take: Growers should review and document their water sources and usage to be sure that their best-quality water is designated for spraying and workers know and follow the correct procedure for making spray solutions. It is also important to adequately clean spray reservoirs between uses.

- **Is there any re-use of water in post-harvest operations? If so, is the re-use done counter to the process flow? Are sanitizing agents added to the water?**

Guiding principle: Every time water is re-used, the levels of microbes and organic matter in it will likely increase. If water is re-used, each successive use should be farther away from the finished product. Sanitizing agents can reduce the transfer of microbes from water to produce.

Steps to take: Growers should examine their sources of post-harvest water and determine if re-use occurs. If it does, procedures should be developed, and followed, for ensuring that the "direction" of water usage is opposite to the product flow. For example, water that is used to rinse or cool harvested crops could be re-used to irrigate crops. To prevent the potential transfer of bacteria from step to step, growers may want to add a food-grade sanitizing agent, such as sodium hypochlorite , chlorine dioxide, or peracetic acid, to post-harvest water. These sanitizing agents can be purchased from a sanitation chemical supply company.

SOIL AMENDMENTS

Growers may add various substances to the soil to provide nutrients and organic matter that support healthy produce crops. These soil amendments can be important for creating a healthy soil ecosystem that improves crop yield and improves soil aeration and drainage. However, soil amendments can also be an important source of harmful microbes. Animal manures are the most problematic soil amendments because they can contain a variety of disease-causing bacteria such as *E. coli* O157:H7 and *Salmonella*.

- **If manure is added to the soil, has the manure been properly composted to ensure that fecal bacteria have been destroyed during the composting process?**

Guiding principle: Manure should be properly composted before application, or, if not composted within recommended limits, applied well in advance of harvest time.

Steps to take: The National Organic Program (NOP) specifies time/temperature/turning requirements for composting of manure. The NOP requires that the manure have an initial carbon : nitrogen ratio between 25:1 and 40:1 and states that temperatures between 131° F and 170° F must be sustained for at least three days using an in-vessel or static aerated pile system. In a windrow composting system, temperatures must be sustained between 131° F and 170° F for at least 15 days; during the 15 days the materials must be turned a minimum of five times. If manure-composting does not achieve these time/temperature/turning requirements, the composted manure should be applied at least 120 days before harvest if the edible portion of the crop is likely to have direct or indirect contact with soil (e.g. a root crop, green beans that might

be splashed while growing). If the edible portion of the crop is not exposed to soil, there must be at least a 90-day application-to-harvest interval.

- **Are in-process and finished-product composted manure stored properly?**

Guiding principle: Manure that is in the process of being composted can be a source of contaminants. If composted manure is not stored properly, it can become re-contaminated before it is used.

Steps to take: Manure composting should be done where runoff will not contaminate produce fields. For example, the composting area should not be up-slope from the fields. Once composting is complete, care should be taken to prevent cross-contamination with manure that is not yet composted. Growers should avoid storing finished compost down-slope from the in-process composting operation.

- **If non-composted manure is used as a soil amendment, is it applied at the correct time?**

Guiding principle: If application of non-composted manure is done too close to harvest-time, disease-causing microbes in the manure are more likely to be transferred to the produce.

Steps to take: There are no requirements regarding when properly composted manure can be applied to soil. But if non-composted manure is used, the NOP standards require that it be applied at least 120 days before harvest (exposed edible portion) or at least 90 days before harvest (non-exposed edible portion).

PHYSICAL LOCATION OF FIELDS

- **Do the fields have topographical features that might prevent run-off contamination of produce?**

Guiding principle: Steep slopes can lead to contamination via runoff from adjacent fields or surface-water sources. Contamination is much less likely if the fields are up-slope from adjacent fields or surface-water sources.

Steps to take: If the ground slopes toward the crops, growers should create physical barriers such as trenches to prevent contamination. Buffer vegetation zones may also be useful as barriers. If crops are up-slope from potential contamination, physical barriers are far less necessary.

- **Do the fields have an appropriate land history?**

Guiding principle: Previous uses of fields can leave a reservoir of disease-causing microbes.

Steps to take: Growers should determine the previous history of their fields and avoid growing produce crops too soon after the fields have been used in animal agriculture. For example, land that has been used for raising cattle within the past three years may not be appropriate for growing vegetables.

- **Do adjacent fields present an insignificant risk of contamination?**

Guiding principle: Adjacent fields can be a source of disease-causing microbes.

Steps to take: Ideally, produce fields should not be near animal feedlots or other potential sources of animal waste contamination. Growers should also consider the spread of waste via run-off and wind. A grower may prevent runoff contamination by using physical barriers such as ditches or diversion berms. Buffer zones containing trees or bushes may reduce contamination carried by wind.

- **Is animal movement controlled to minimize the risk of contamination?**

Guiding principle: Wild and domestic animals can carry disease-causing microbes in their intestines. If these animals get into a produce field, their feces can contaminate produce.

Steps to take: Fences and buffer zones may reduce animal traffic through produce-growing fields. A more challenging situation occurs on farms that use livestock to pull plows or other farm implements. Short of "diapering" of horses (as is sometimes done with horse-drawn carriages in cities), there are few practical preventive steps available. At the very least, the animals should be used in the fields at least 90 or 120 days before harvest (the same standard as for applying non-composted manure).

- **Does the area have a small population of birds?**

Guiding principle: Birds are common carriers of *Salmonella* and can shed these bacteria over a large area.

Steps to take: There are no effective practical methods available to prevent bird traffic through farms. Eliminating bird habitat near the farm is often not desirable from an ecological viewpoint. To some extent, though, bird populations are related to insect populations, so an effective Integrated Pest Management system may be the best preventive step available.

PERSONNEL

- **Are employees properly trained in personal hygiene and how to prevent contamination of produce?**

Guiding principle: If employees don't have good hygiene practices, they are more likely to spread disease-causing microbes to produce during harvest, washing, and packing operations.

Steps to take: Regardless of the number of employees, growers should have a set of hygiene policies for employees to follow, and a documented system for teaching employees about these practices. It is a good idea to have introductory training for new employees and refresher training for experienced employees. Training should be clear, at a level that employees can understand, in the appropriate language, and should ideally involve demonstrations of desired practices. Records of training sessions (dates, attendees, topics) should be kept.

- **Are employees with illnesses or open wounds prohibited from handling produce?**

Guiding principle: Ill employees can contaminate produce with disease-causing microbes.

Steps to take: Plainly speaking, the grower should take steps to be sure that employees with vomiting, diarrhea, or other symptoms of gastrointestinal illness do not handle produce. Employees with these symptoms should be sent home or assigned tasks that do not involve contact with produce or any surface that contacts produce. If an employee has a skin wound, they can handle produce if the wound is completely covered with a waterproof covering. If not, they should also be sent home or re-assigned. Employees with symptoms of respiratory illness (e.g. coughing, runny nose, sneezing) should be sent home or assigned tasks that do not involve contact with produce or any surface that contacts produce. The grower should have written policies for dealing with employee illnesses and be sure that employees understand the policies.

- **Are adequate restroom facilities available to employees?**

Guiding principle: If employees relieve themselves near the growing area, disease-causing microbes can be transferred to the produce. If employees don't have the opportunity to wash their hands after using the restroom, they may spread disease-causing microbes to produce.

Steps to take: The grower should prevent this type of contamination by providing adequate restroom facilities that are convenient for employees to use. The restroom facilities may have to be portable on large farms. The facilities should always include adequate facilities for washing and drying hands. The facilities must be maintained so that they do not become a cause of produce contamination.

- **Do field workers have a separate area for breaks and meals?**

Guiding principle: Food and beverages can be spilled and spills will attract pests. Pests can transfer disease-causing microbes to produce.

Steps to take: To prevent transmission by pests attracted to spills, the grower should require that food and beverages are only consumed in a break area that is separate from the produce fields and packing areas.

FIELD SANITATION

- **Are appropriate harvest containers used?**

Guiding principle: Harvest containers can transfer disease-causing microbes to produce. This transfer is more likely if the containers are made out of porous materials like wood, burlap, or re-used corrugated fiberboard.

Steps to take: Smooth, cleanable non-absorbent container surfaces are less likely to harbor microbes and contaminate produce. Ideally, growers should use containers that are cleanable and constructed out of a food-grade plastic material.

- **Are harvest containers inspected, discarded if necessary, cleaned and sanitized regularly?**

Guiding principle: Even if harvest containers are made out of appropriate materials, they can still become a source of disease-causing microbes if they are not kept in good condition, cleaned and sanitized.

Steps to take: Ideally, growers should have a documented program for inspecting containers, discarding damaged containers, and cleaning and sanitizing the containers that are in good condition. The process of inspect-clean-sanitize should be done, and documented, regularly, with the frequency increasing when conditions such as rainy weather lead to greater amounts of soil on the containers. Remember that if containers are nested, the outside of each container should be inspected, cleaned, and sanitized, too. Drying the containers in the sunlight, before they are used, nested, or stored is recommended because the ultraviolet light in sunshine can kill microbes.

- **Is farm equipment cleaned and sanitized routinely?**

Guiding principle: Farm equipment is often overlooked as a source of produce contamination. Microbes that contaminate equipment during an earlier task can be transferred to the produce or its surrounding environment during a later task.

Steps to take: Growers should carefully clean and sanitize equipment before it is used with fresh produce, especially if the equipment has been used with debris or manure. Growers should have a schedule for equipment cleaning and sanitizing and document that it is followed.

PACKING SHED SANITATION

- **Is the building designed to prevent cross-contamination?**

Guiding principle: Cross-contamination with disease-causing microbes can occur when washed produce touches unwashed produce or equipment that also handles unwashed produce.

Steps to take: The grower should design and operate the packing shed so that the product flow is linear – unwashed produce enters the shed at one end, and washed packaged produce leaves the shed (or goes into the cooler) at the other end. The shed should be operated so that unwashed and washed produce are kept separate, never coming into contact with the same surfaces or each other. Access to the packing shed should be limited to reduce opportunities for contamination. The grower should construct the shed so that birds, rodents, and insects are kept out. If there is a maintenance area in the shed, it should be physically separated from the washing / packing area. Growers might document the layout of their packing shed by preparing a floor plan sketch or by taking digital photographs.

- **Are containers inspected, discarded if necessary, cleaned and sanitized regularly?**

Guiding principle: In the packing shed, bins and other containers may hold produce for relatively long periods of time. Alternatively, some containers get re-used many times throughout the day, making it important to minimize contamination by frequently cleaning and sanitizing them.

Steps to take: Some growers use two different colors of bins – one for unwashed produce, and one for finished produce. Ideally, growers will have a written procedure for container inspection, cleaning, and use.

- **Are personnel trained in minimizing microbial contamination?**

Guiding principle: Just like in the field, packing shed employees can contaminate produce with disease-causing microbes.

Steps to take: Growers should make sure that packing shed employees understand and follow good hygiene practices. Hand-washing stations should be convenient and accessible, and the employees should be trained when and how to properly wash their hands. Toilet facilities should be physically separate from the packing and storage areas, but within a convenient distance, and equipped with appropriate hand-washing facilities.

- **Is equipment cleanable, cleaned and sanitized as appropriate?**

Guiding principle: If equipment traps debris or isn't cleaned and sanitized properly, it can be a source of contaminants.

Steps to take: Growers should only use equipment that is designed so that it can be easily cleaned. Growers should maintain the equipment condition, and repair or replace damaged, pitted, corroded, or cracked equipment, because these defects can harbor debris and the microbes in it. Growers should design packing lines to avoid "dead ends" where produce (and microbes) can accumulate. Equipment should be positioned so that there is enough space around it to allow for adequate inspection and cleaning. The grower should have a schedule for inspection, cleaning, and sanitizing, and documentation to show that the schedule was followed**.**

- **Are packaging materials stored in a sanitary manner?**

Guiding principle: Contaminated packaging materials can transfer disease-causing microbes to produce.

Steps to take: Growers should store packaging materials in a dry, separate area where they will not become contaminated.

- **Are coolers adequately maintained?**

Guiding principle: Microbes grow more slowly when the temperature is cold. Maintaining cooler temperatures at 45°F or lower will minimize microbial growth and, for most produce, extend its shelf life.

Steps to take: Growers should have a regular schedule for monitoring, and recording, cooler temperature. Growers should remember to regularly empty, clean and sanitize the cooler so that it doesn't become a source of contaminants. Cooler floors should be kept clean and dry. Cooling unit coils and fan housings should be regularly cleaned.

- **Are trucks maintained in a sanitary condition?**

Guiding principle: Contaminants on the inside of the truck can lead to unsafe produce if they are transferred to the produce.

Steps to take: Growers should avoid using trucks that back-haul animals, raw meat, fish, or poultry, or non-food-grade materials. There should be a regular schedule for cleaning and sanitizing the truck interior, with records kept to show that the schedule was followed. Refrigerator conditions should be maintained in the truck cooler during transportation.

SUMMARY

Using this guide will help you evaluate food safety practices in produce operations, but it is just a start. You may want to periodically re-evaluate practices, especially if unusual growing conditions occur (e.g. flooding), a new food safety concern is discovered, or new preventive measures are developed.