

FOOD SAFETY CONSIDERATIONS IN VERMONT APPLE ORCHARDS

Food safety considerations have increasingly become important to all farming operations, and apple orchards are not immune from the potential for contamination of their crop from harmful agents. One definition of food safety, from the University of Rhode Island Cooperative Extension Food Safety Education Program is "protecting the food supply from microbial, chemical (i.e. rancidity, browning) and physical (i.e. drying out, infestation) hazards or contamination that may occur during all stages of food production and handling—growing, harvesting, processing, transporting, preparing, distributing and storing. The goal of food safety monitoring is to keep food wholesome." Apple products have been the focus of a number of food safety-related issues, including chemical contamination by pesticides, and microbial infection in cider. While the potential contamination profile may be very different from crops such as leafy greens or meat and milk, orchardists must consider food safety implications of their growing and handling practices on their final product.

Recently much focus on food safety issues has been raised for apple growers by produce buyers, many of which are requiring GAP or other certified production systems in order to maintain accounts. GAP, or Good Agricultural and Handling Practices, is a formal audit program authorized by USDA and administered by third-party inspectors in each state. Alternative food safety programs exist and may be acceptable for certain crop buyers. Food safety programs do not apply only to wholesale growers, however, all growers should consider food safety practices and develop a written plan for their operation.

[Cornell University's Food Safety Begins on the Farm](#)

[MDA - Good Manufacturing Practices \(GMPs\) for Michigan Apple Cider](#)

Generally speaking, food safety plans focus on minimizing microbial or other contamination to the product, and traceability programs to ensure that contaminated products can be easily recalled. Basic, common-sense steps to consider in your orchard operation include (excerpted from [Food Safety Checklist for Vermont Apple Orchards](#)):

Manure/Feces

Note: Manure should not be used in Vermont orchards.

- Do you clean equipment (including tires) used to handle manure (perhaps used in other areas of your operation) before use in orchards or processing areas?
- Do you exclude livestock from orchards during the growing season?
- Do you take steps to keep wildlife from entering orchards?
- Is your orchard or packing area located away from fields or pastures where manure is spread or a facility where livestock is housed?

Feces from domestic animals and wildlife are a source of pathogens, bacteria and other disease-causing microorganisms. Feces may contaminate fruit if (i) animals directly deposit it, (ii) fruit touches the ground or unclean containers (iii) fruit is handled by people who do not wash their hands after touching ladder rungs or other surfaces, and (iv) spray water or drift carry pathogens in feces. The key is to minimize opportunities that feces can directly or indirectly come in contact with apples.

Efforts to exclude livestock and wildlife can reduce contamination risks in the orchard, and processing and storage areas. Fencing can exclude domestic and wild animals. You may have success discouraging deer with repellants, and birds with noise cannons and scare balloons. Runoff and drift may carry microorganisms that live in manure. These risks can be reduced by improved management of manure in livestock yard (e.g. routine scraping) and spread in fields (e.g. incorporation of manure).

Sources of Water

- If you use well water for spray irrigation, mixing pesticides, cooling fruit, or washing fruit, is your well at least 100 feet from a manure storage facility, livestock area, septic system drainage field, or discharge area for milkhouse water?
- Do you test your well water sources for fecal coliform microbes at least once per year?
- Have you installed a backflow prevention device or other system to prevent contamination of clean water supplies by potentially contaminated water?

Sources of Water Actions

Apple growers use water in different aspects of their operation, and should take steps to insure the quality of the water they use. If you use water from a water utility or other supplier, you have assurance about your water's quality. If you rely on well water, you are responsible for protecting your water supply from contamination.

On-farm threats to wells include livestock operations and septic tanks. Water can carry microorganisms such as *Escherichia coli* (*E. coli*), *Salmonella* spp., *Cryptosporidium parvum*, *Giardia lamblia*, and the Norwalk and hepatitis A viruses that may contaminate fruits and vegetables. Even in small amounts, these microorganisms can cause food-borne illness. You can protect your well by moving pollution sources. Milkhouse wastewater can be channeled into a manure storage facility. It may not be feasible to move a septic system or structure that is too close to a well, so make sure these are properly managed to prevent problems.

Septic tanks should be regularly pumped. Diverting clean water from entering the facility can reduce runoff from livestock yards. While you should test your well water annually, pay special attention to tests if you have pollution sources near your well. Annual testing of private water sources may be requirement if you are processing foods, e.g. cider, sauces and jam. Simple actions such as installing a backflow prevention device enable you to avoid risks before they become contamination problems.

Harvest Practices

- Do you properly collect and handle dropped apples that are to be used for pasteurized or cooked products?
- Do you avoid cross-contamination by requiring use of separate containers to collect dropped apples, and washing hands after contact with dropped apples?
- Do you properly cull and dispose of decayed, damaged or wormy fruit?
- Are totes, bins and other storage containers cleaned before use in the field?
- When you stack containers, are apples in the lower container free from contact with the bottom of the upper container?
- Do you inspect and fix or discard containers that are damaged?
- Are workers instructed to wash their hands before starting work, after handling dropped apples, and after using the bathroom, or at other times they become contaminated?
- Do you avoid resting or storing unused ladders on the ground?
- When climbing ladders, do individuals place their hands on the side rails where possible and safe?
- Do workers and others who pick apples have convenient access to properly equipped hand washing stations and clean restrooms in the field and near the processing area?
- Do you provide workers training about basic sanitation and good hygiene?
- Do you exclude workers who have symptoms of infectious diseases: coughing, diarrhea?
- Do you require workers to cover infectious wounds with waterproof bandages to prevent food contamination?

Harvest Practice Actions

During harvest, apples may become contaminated with microbes from contact with the ground, packing boxes, and workers with poor hygiene or infectious diseases. Your goal is to reduce the chances that apples will come in contact with sources of contamination. Dropped apples, which should not be used in cider making, may pick up microbes from feces and other sources of contamination. Damaged or decayed fruit can support the growth and reproduction of dangerous microbes. The surfaces of storage containers can also harbor microbes. Unused containers should be stored to prevent access by rodents, birds and other wildlife. Your best protection is to wash containers thoroughly. You will undermine your efforts to keep containers clean if workers stand in bins during harvest. Stacking open or damaged containers may allow contamination to pass from apples in one container to apples in another, particularly if apples touch the bottom of the container above them.

Good handling practices for equipment includes ladders. They should be placed upright against walls or buildings when not in use. In regular use, footwear soils the rungs of a ladder. By not placing hands on the rungs, workers avoid a source of potential contamination of fruit. Workers who handle fruit can transmit diseases such as hepatitis A. Precautions start with clean hands. Supply soap, fresh water and single-use disposal towels for hand washing. Appropriate restroom facilities can prevent the spread of diseases. Without training, workers cannot be expected to take advantage of well-maintained facilities. Appropriate facilities and instructions on the importance of hand washing are of particular value if you run a pick your own operation. You should follow procedures to prevent the spread of disease by excluding sick workers and covering wounds.

Processing

- Do you follow measures to prevent people who work in the field from carrying potential contaminants into the processing area?
- Before washing, are apples inspected, and is damaged or decaying fruit discarded?
- Are brushes cleaned and sanitized periodically?
- Do you use chlorine or other sanitizing chemicals in your wash water?
- Is wash water monitored using test strips or other method to maintain an adequate level of sanitizing chemicals?
- Do apples in a box touch the bottom of a box stacked above?
- After each day's use, do you wash and sanitize lines, belts and other equipment that comes in contact with fruit
- Do you have a pest control system to minimize rodents, insects and other unwanted pests in the processing area?
- Are pets, livestock or wildlife kept at least 25 feet away from areas where apples are processed or stored?
- Do you maintain the processing area and surrounding grounds free from waste, improperly stored garbage, and other conditions attractive to pests?

Processing Actions

Sanitation and cleanliness carry over from the field to the processing area or packing house. You should make sure that people who process apples after picking them, change footwear and clothing, and wash their hands. You can avoid problems by using a separate crew to process apples, if possible.

Like those who work in the orchard, people who process apples need access to restroom and hand washing facilities, and should be required to use them. They need to understand the importance of personal cleanliness and clean equipment.

No worker should be permitted to handle fruit if they have uncovered wounds or infectious diseases. Brushes and any other equipment that touch apples should be regularly cleaned and sanitized to avoid the spread of contamination.

While wash water is an important step in preventing contamination, it can become a source of contamination if not properly managed. The level of sanitizing chemicals should be checked to insure that it is adequate to kill germs. Check with state regulators for more information on your options. Changing wash water daily can reduce risks, and is particularly important if you are not taking adequate steps to sanitize your wash water.

Regular maintenance is important to sanitation. Every day you should wash and sanitize lines, belts and other equipment that comes in contact with fruit. As part of your standard sanitation routine, you should take steps to prevent animals or pests entering the processing area. If you spray pesticides, make sure they are suitable for the task, and wash equipment after spraying.

Cider Pressing

- Before pressing, do you re-inspect apples, and discard damaged or decayed apples?
- Do you use only filter cloths specifically designed for cider pressing and replace them as needed?
- Do you use only press racks made of food-grade plastic or wood properly protected by a food-approved coating
- Is the press rack and other equipment kept off the floor at all times?
- Between runs, do you place filter clothes over a clean line or in a clean container?
- Do you use pumps and tubing that are approved for food use?
- Do you use as much continuous tubing and limit couplings to as few as possible?
- After each day's use, do you adequately clean all equipment to remove fruit particles and film and then sanitize
- After each day's use, do you clean and sanitize press filter cloths, press rack and tubing?
Do you test sanitizing solution to ensure proper concentrations?
- Do you use new containers to package your cider?
- If you do not pasteurize your cider, does label information contain an FDA required warning?
- Do you keep records for each container that enable you identify the date the cider was pressed, the apples used in making the cider and where the container was marketed?
- Do you have system to insure that the oldest cider is sold first?
- Do you enforce sanitation rules such as hand washing and hair nets or caps for workers?
- Do you clean and sanitize surfaces that come in contact with food after pesticide spraying and before food processing?

- Do you follow precautions and restrictions when using pesticides in your processing area to prevent the contamination of food or packaging materials?
- Is wastewater drained properly into the sewer or a septic system separate from the toilet system?
- Do you promptly remove and properly dispose of pressed pomace?

Cider Processing Actions

Pressing cider like making apple butter or even caramelizing apples are forms of processing that raise food safety concerns distinct from production, washing and packing of raw fruit. Microorganisms (bacteria, yeast, and mold) that contaminate freshly packaged cider may come from (1) fresh fruit, especially if it is picked from the ground or its surface is rotted, slightly decayed, or damaged, (2) the facility, equipment, and water, or (3) people involved in making cider. As a general rule, requirements for processing facilities build on the basic concepts for washing and packing: maintaining clean and sanitary conditions, insuring worker hygiene, and reducing opportunities for contamination from contact with the ground, pests or animals. Additional requirements include higher standards for facility design and construction to protect against contamination. Standards for workers may be detailed. For example, hair nets or caps may be required. Proper storage of processed foods may be required to prevent spoilage. Labeling also represents a difference between raw and processed foods.

Packaged foods must have a label that lists:

- Product name
- Ingredients
- Net quantity
- The name, address, and zip code of the manufacturer, packer, or distributor
- Pack, open, pull, freshness, or expiration dates
- FDA warning label for cider that is not pasteurized or otherwise treated to kill 99.999% of pathogens such as E. coli

Besides the basics, labels may include handling instructions ("keep refrigerated") and required nutritional information. Record keeping should be part of processing so you can document what goes into each container and where each container goes. To trace the origin of cider, processors often use lot or date coding. For an extra margin of safety, you may wish to use a qualified laboratory test for E. coli bacteria in two or more of samples from each orchard supplying freshly harvested apples. Pressing apples results in by-products that must be properly disposed of. You should consult local or state health department about proper disposal of pomace or wastewater.

UVM Fruit Program | 63 Carrigan Drive | Burlington, VT 05405

802-656-0972 | terence.bradshaw@uvm.edu

uvm.edu/extension/commercial



CULTIVATING HEALTHY COMMUNITIES

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. University of Vermont Extension, Burlington, Vermont. University of Vermont Extension, and U.S. Department of Agriculture, cooperating, offer education and employment to everyone without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or familial status. Any reference to commercial products, trade names, or brand names is for information only, and no endorsement or approval is intended.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES