

Food Safety Begins on the Farm

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A lively salad of mixed greens and crunchy alfalfa sprouts, a tall refreshing glass of cider, and sweet juicy strawberries for dessert - fresh fruits and vegetables bring variety, nutrition, excitement, and numerous health benefits to the human diet.

However, as fresh produce consumption has increased in the United States over the past 10 years, scientists at the Centers for Disease Control and Prevention have noticed a disturbing increase in the number of foodborne disease outbreaks associated with these products. Disease outbreaks are often associated with bacteria such as Salmonella and E coli 0157:H7, parasites such as Cryptosporidium, and viruses such as Hepatitis A. While some of this contamination can be traced back to poor agricultural practices, probably a large amount occurs as a result of improper postharvest handling.

The increase in the incidence of actual foodborne illness can be attributed to several factors. People who are elderly, very young, pregnant, immuno-compromised, or suffering from chronic illnesses are most susceptible to foodborne illness. As the American population ages, a larger number of people fall into this category. At the same time, this very population is becoming more aware of the health benefits of fresh and minimally processed food. The

American food system has created a situation where most food products travel a very long distance from production to consumption, greatly increasing food exposure to many different types of microbes and making the food less fresh when it arrives at the store. At the same time, new agricultural and environmental conditions, including the large scale industrialization of livestock and produce operations, along with the overuse of antibiotics and antibacterial products, have actively selected for strains of pathogens that are extremely virulent and which readily adapt to current agricultural and food handling systems. Even locally grown fresh produce may contain pathogens.

What Can Farmers Do?

There are effective and remarkably simple strategies that farmers, handlers and processors can take in order to reduce the risk of food borne disease. A team of scientists and Extension personnel at Cornell University, led by Dr. Anusuya Rangarajan, has surveyed common agricultural and food handling practices. They have developed an farmer-friendly approach that should raise awareness of the major points of pathogen contamination and stimulate a sense of responsibility to take necessary steps to reduce risk.

Sources of Potential On-Farm Contamination

Manure

The improper application of manure can increase microbial risk significantly. Because manure contains high levels of fecal coliform bacteria, including E. Coli 0157:H7, raw manure should never be applied to crops that will be eaten without cooking. Organic certification programs include strict requirements for the

handling of raw manure and for the use of composted manure, but there are few restrictions on non-organic produce farms.

Fruit and vegetable crops should not be sidedressed with fresh or slurry manure. Whenever possible, manure should be composted thoroughly, since most pathogenic bacteria will be either killed or out-competed by the composting process. Manure-based compost must be frequently turned to ensure uniform, high temperature composting. Raw manure can be applied to cover crops or thoroughly incorporated into the soil prior to planting, but there should be a minimum of 120 days between manure application and harvest.

Direct application to crops is not the only threat that manure can pose. When manure is stored or composted on the farm, it should be stored as far away as practical from areas where fresh produce will be grown or handled. Where possible, physical and wind barriers should be constructed to prevent runoff and wind drift. If at all possible, animals should not be allowed to roam in crop areas, especially close to harvest time.

Water

Water used in farming can be a particularly important source of harmful microorganisms. This includes water used for irrigation, greenhouse watering, produce cooling and washing, and processing. The Cornell team recommends that well water should be tested biannually for coliform level, and surface water should be tested 3-4 times each year, depending on climate and water quantity. If a water test indicates the presence of fecal coliforms, filtering the water, using settling ponds, or

chemical water treatments may be necessary.

Surface water is the most common source for irrigation in the United States, and yet it poses a far greater potential for microbial contamination than does municipal or ground water. Upstream neighbors who do not keep animals out of waterways or adequately prevent runoff from animal operations can contaminate ponds, lakes, and streams. It is important that produce farmers work with their neighbors and the local watershed officials to insure that irrigation water they use is clean. Drip irrigation is more effective in reducing crop contamination because the edible portions of the crops are not wetted directly. Applying overhead irrigation in the morning allows for more effective leaf drying which reduces survival of pathogens.

Unintentional runoff from neighboring animal operations can carry contaminated water directly onto a vegetable farm. Diversion ditches and sod waterways can carry runoff water away from where produce is grown. Produce farmers should regularly monitor their farm borders for signs of runoff, particularly if they are adjacent to animal operations.

If produce is washed and/or hydrocooled after harvest, it is important to get a coliform water test in order to document that the wash water does not carry harmful pathogens. Water used for washing or hydrocooling should be changed regularly when it becomes dirty. Use of chemical water treatments may be necessary to provide uncontaminated wash water, but chlorine above 200 ppm may damage certain types of produce. Organic standards also may specify acceptable rates for water treatment.

When produce is hydrocooled, it is important that the water is of an appropriate temperature for the particular type of produce. If the water is too cold and there are pathogens in the water, they could get drawn into the interior of the fruit along with the water, making it impossible to wash off the contamination. This is of particular concern with tomatoes, peppers, apples and potatoes.

Employee Health and Hygiene

Many pathogens can be transferred to fresh fruits and vegetables from the hands of farm workers who pick, package and handle the produce. The failure of people to wash their hands after using the toilet has led to numerous foodborne illness outbreaks.

Farm and packinghouse workers should be provided with clean restrooms, clean water, soap, and single-use towels, and be instructed in proper handwashing technique. Workers who are sick with contagious illnesses, such as Hepatitis A, or who have open wounds should not be permitted to handle fresh food. This should be monitored regularly as part of normal employee supervision. Providing packinghouse employees with disposable gloves will reduce the possibility of contamination.

Farms with U-Pick operations should encourage customers to practice good hygiene also. Particularly where portable toilets are provided in the field for U-Pick customers, handwashing water, soap and towels should be provided, and signs should prompt customers to wash before returning to the field.

Equipment Sanitation

Harvest equipment and containers should be thoroughly cleaned before use. Whenever feasible, this should include high- pressure washing, rinsing, and sanitizing. Workers should not be allowed to stand in bins during harvest, and large bins should be covered to keep out birds and other animals. Field soil should be removed from the bottoms of bins before moving them into packing areas.

Packing sheds should be kept clean, with the floors, tables and packing lines routinely washed at the end of each day. Birds, rodents, and domestic animals should be kept out of packing areas. Workers should be provided with a separate area for eating, toileting and smoking and be required to wash their hands before returning to work. Field boots should not be worn in the packing areas.

The growth of most pathogens is suppressed by cold temperature, while the high quality of the produce is retained, so it is important to chill most produce appropriately as soon after harvest as possible. This can be done with cold water, ice, or forced air. However, refrigeration units should not be loaded beyond their cooling capacity.

Transportation containers and vehicles should be clean before loading. Be sure that fresh fruits and vegetables are not shipped in trucks that have carried live animals or harmful substances. If such trucks must be used, the interior of the truck must be thoroughly washed and sanitized before the produce is loaded.

Implement a Traceback System

For the farmer's protection, it is important that produce can be traced to field of

origin and date of packing. This is a routine part of organic certification and therefore is common on organic farms but is far less prevalent on non-organic produce farms. Records of lot numbers on all loads leaving the farm should be maintained.

Food Safety Awareness

By developing an awareness of where there is potential for foodborne pathogen contamination, and by implementing simple management practices to address these possible points of exposure, a fresh market grower should be able to ensure that their produce does not carry a undesirable load of unintentional hitchhikers.

For more information, or for a copy of the Cornell bulletin, “Food Safety Begins on the Farm: A Growers Guide to Good Agricultural Practices for Fresh Fruits and Vegetables”, contact the Cornell Good Agricultural Practices Program at 607-254-5383.