FORUM

Making Sure Leafy Greens and Other Produce Stay Safe

The United States has one of the safest food supplies in the world, especially when it comes to leafy greens and other fresh produce, like tomatoes and green onions. Millions of people eat tons of fresh greens, such as spinach and lettuce, each year in perfect safety.

But between 1996 and 2006, there were 24 reported incidents of foodborne illness caused by contaminated fresh-cut produce in the United States. Even the rare incident, such as the *E. coli* O157:H7 contamination of spinach in the fall of 2006, is one too many.

There is, of course, our expectation that people won't become ill from their food. But beyond that, any incident of contamination in the food chain seriously affects the public's confidence in our food supply and can change people's eating habits. And with today's extended national media and global marketplace, even a small, localized incident is known across the country.

At the same time, the current *Dietary Guidelines for Americans* urge Americans to eat five to nine servings of fruits and vegetables every day. Ready-to-eat, fresh and/or minimally processed fruits and vegetables are ideal for helping a health-conscious, fast-paced society meet this goal.

To meet consumer demand, the fresh-cut-produce industry has undergone double-digit growth for the past several years, reaching an estimated $12 billion in annual sales in the United States, of which $5 billion are attributed to cut, packed salad and vegetables. This only increases the pressure to ensure the safety and wholesomeness of leafy greens and other fresh produce.

We need to understand how and why recent outbreaks occurred with *E. coli* O157:H7 in fresh lettuce and spinach, *Salmonella* in tomatoes, and viruses in green onions. Preventing their recurrence is of paramount importance to the health and well-being of the general public and to the economic security of the U.S. produce industry. The cost of the 2006 spinach outbreak, exclusive of litigation, has exceeded $100 million, with sales declining more than 30 percent.

For scientific research to continue to improve the safety of leafy greens and other fresh produce, we must take a holistic approach, looking at the entire farm-to-fork continuum. We also need to observe the process from a distance, seeing all the steps of production and processing as integrated and related. We need to be looking at safety on a regional basis, not just one farm at a time.

Preventing microbial contamination is always preferable to testing and treatment after contamination has occurred. Removing or killing microbial pathogens is very difficult and will only add to production costs, which then increases prices for consumers.

Developing new ways to prevent contamination will take innovative research to provide good manufacturing practices.

A wide variety of issues relate to food safety and to production, processing, and distribution of fresh and fresh-cut produce. Anything that comes into contact with fresh produce has the potential to contaminate it. A major source of microbial contamination of fresh produce is indirect or direct contact with feces. Potential sources of fecal contamination include animals, untreated manure used as a soil amendment, water, infected workers, or conditions in the field or packing facility, such as unclean containers and tools used in harvesting and packing.

One of the factors complicating on-farm contamination prevention is that increasingly scarce land and water resources are pushing multiple farming activities into closer proximity, making it harder to keep livestock and produce separate. Livestock and wildlife are likely to be drinking from the same creek that irrigates a crop field. Wildlife is suffering habitat contraction, increasing the chances that production fields may double as their living space.

Transport also presents opportunities for contamination, such as unclean floors and walls of the vehicles or unclean containers.

Processing fresh produce into fresh-cut products further increases the risk of contamination by breaking the natural exterior barrier of the produce. The release of plant cellular components when produce is shredded or chopped provides a nutritive medium in which pathogens—if present—can grow and contamination can spread.

Improper sanitation during processing is another major potential point of contamination by pathogens. Further, the degree of handling and product mixing common to many fresh-cut processing operations can provide more opportunities for contamination to occur and to spread through a large volume of product.

The potential for pathogens to survive or grow is increased by the high nutrient and moisture content of produce; the absence of a lethal process—for example, a heat step—during production to eliminate pathogens; and the potential for temperature change during processing, storage, transport, and retail display.

ARS is working on many approaches for increasing food safety in all these areas, including better epidemiological tools to improve tracking of outbreaks back to the source, new production techniques, and improved postharvest practices, including barriers and produce treatments.

Research will certainly find new ways to prevent or remove contamination, and producers will put them into practice. But consumers should not let fears and concerns provoked by rare outbreaks rob them of the health benefits of a diet rich in fresh vegetables and fruits.

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