Commentary

Can genetic engineering prevent food-poisoning?

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The largest outbreak of food-borne illness in a decade sickened over 1400 people in various parts of the United States in 2008. Originally thought to be caused by tomatoes contaminated with *Salmonella saintpaul*, an investigation by federal agencies found that Mexican jalapeno peppers and possibly serrano peppers were the culprits.

These sorts of outbreaks are not at all rare: A search for 'food poisoning' on the website of the US Centers for Disease Control and Prevention (CDC) (on 10 November 2008) yielded more than 5300 hits, and the CDC estimates that each year 76 million cases of food-borne illness occur and more than 300 000 persons are hospitalised and 5000 die. This raises various questions of importance to consumers. Who or what is responsible for the problem? How does such contamination occur, and what can be done to prevent recurrences?

Unfortunately, growers of fresh produce cannot protect us 100 per cent of the time. Modern farming operations – especially the larger ones – already employ strict standards and safeguards designed to keep food free of pathogens. And most often they're highly effective: Americans' food is not only the least expensive but also the safest, in the history of humankind.

The vast majority of food poisoning results from consumers' improper handling of food – in particular, from inadequately cooking chicken or permitting the juices from raw poultry to contaminate other foods.

Because agriculture is an outdoor activity and subject to myriad unpredictable challenges, there are limits to how safe we can make it. If the goal is to make a cultivated field completely safe from microbial contamination, the only definitive solution is to pave it over and build a parking lot on it. But we'd only be trading very rare agricultural mishaps for fender-benders.

Nor can we rely on processors to remove the pathogens from food in every case. The 2006 spinach-based outbreak of illness served as a reminder that our faith in processor labels such as 'triple washed' and 'ready to eat' must be tempered with at least a little scepticism. Processors were quick to proclaim the cleanliness of their own operations and deflect blame toward growers. But all of those in the food chain share responsibility for food safety and quality.

In fairness to processors, there is ample evidence to suggest that no amount of washing will rid produce entirely of all pathogens. The reason is that the contamination may occur not on the plant, but *in* it. Exposure to *Salmonella*, *E. coli* or other microorganisms at key stages of the growing process may allow them to be introduced into the plant's vascular system.

In the longer term, technology has an important role – or more accurately, it would have if only the organic food advocates and other activists would permit it. The Food and Drug Administration recently added fresh spinach and iceberg lettuce to the short list of foods that companies can irradiate to kill off many dangerous pathogens. (Regulators had already approved irradiation of meat, poultry, spices, oysters, clams and mussels.) Food irradiation is an important,

safe and effective tool that has been vastly under-used, largely due to opposition from the organic food lobby. Their resistance is scandalous – and murderous: 'If even 50% of meat and poultry consumed in the United States were irradiated, the potential impact of food borne disease would be a reduction [of] 900,000 cases and 300 deaths', according to Michael Osterholm, Director of the Center for Infectious Disease Research at the University of Minnesota.

But irradiation is not a panacea. Although it quite effectively kills the bacteria, it does not inactivate the potent toxins secreted by certain bacteria such as *Staphylococcus aureus* and *Clostridium botulinum*, and the approved doses are too low to kill most viruses. The toxins can cause serious illness or death even in the absence of live bacteria themselves.

There is technology available today that can both inhibit microorganisms' ability to grow within plant cells and block the effects of the biochemical and structural features that enable bacteria to cause disease. This same technology can be employed to produce antibodies that can be administered to infected patients to neutralise toxins and other harmful molecules and can even be used to produce therapeutic proteins (such as lactoferrin and lysozyme) that are safe and effective treatments for diarrhoea, the primary symptom of food poisoning.

But organic producers won't embrace this triple-threat technology, even if it would keep their customers from food-borne illness. The technology in question is recombinant DNA technology, or gene-splicing (also known as 'genetic modification', or GM) – an advance the organic lobby has repeatedly vilified and rejected.

For organic marketers and food activists, the irony is more bitter than fresh-picked radicchio. The technology that offers a potent new weapon to assure the safety of foods is the one they've fought hardest to forestall and confound.

In view of the huge burden of illnesses and deaths caused by bacteria and viruses in food, will the organic lobby rethink their opposition to biotechnology? Will they begin to appreciate the ways in which this technology can save lives and advance their industry? Will they permit science, common sense and decency to trump ideology? When figs can fly.

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