Food for thought

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Food safety is a personal and public health concern for infectious disease specialists and microbiologists. Repeated stories of food illness in the popular press and reports of foodborne outbreaks in our professional journals continually confront us. Food production practices, surveillance activity and the expanding knowledge of infecting agents combine to evolve and produce both real and perceived increases in infections acquired from food. The article by Allard (pages 185-190) in the present issue of *The Canadian Journal of Infectious Diseases* presents a Canadian perspective of current food safety concerns and a framework within which foodborne diseases may be minimized.

Changes in taste, trade and production have a role in the problem of foodborne diseases. There is increasing importation of fresh produce from developing countries, where standards for sanitation and water safety are less rigorous than those in Canada, and food contaminated with imported pathogens may be sold here. The best example was, perhaps, the repeated outbreaks of *Cyclospora cayentanensis* in Canada and the United States in 1996 and 1997, which were traced to Guatemalan raspberries (1). Outbreaks of this protozoan parasite occurred in a second year, despite efforts to implement control interventions at the producer level. Among many other examples are hepatitis A from green onions (2), and salmonellosis found in fresh cilantro and cantaloupe (3) from Mexico. The increased centralization of food production, with subsequent widespread product distribution, increases the range and size of foodborne outbreaks. Widespread exposure to an infectious agent in food may occur before any disease is recognized. A large *Escherichia coli* 0157:H7 outbreak across the western United States and British Columbia was traced to apple juice from a single production facility (4). Food handling processes at the plant were adequate, but apples were assumed to have been contaminated on the ground before collection and shipping. Over 200,000 cases of *Salmonella typhimurium* were attributed to pasteurized milk from a single dairy plant in Illinois (5). In Canada, over 800 cases of *Salmonella enterica* country-wide were traced to contaminated prepackaged pasteurized processed cheese from a single producer (6). A

high profile example is the outbreak of variant Creutzfeldt-Jakob disease (vCJD) in the United Kingdom, where the long incubation meant that human exposure to potentially contaminated meat was widespread before any risk was appreciated (7). And there are continuing surprises as our tastes evolve. Who could have known that alfalfa sprouts, an early icon of healthy eating, could be such an efficient incubator for *Salmonella* species and *E coli* 0157:H7? Is there any end to the viruses, bacteria and protozoa that are acquired from raw oysters? Our helminths may come from Japanese sushi, or from Manitoba pickerel that are (under)cooked over an open fire by an idyllic northern lake. Consumers, producers and clinicians are rightly concerned about food safety.

Allard does not discuss food as a form of bioterrorism. Potential infectious agents are readily available and easily propagated. Before the recent anthrax experiences, the only known successful bioterrorism event in North America was an episode of deliberate contamination of food with salmonella at fast food outlets, with over 200 cases of disease (8). Foodborne dissemination may be less likely to cause mortality than agents that are spread by aerosolization, but it remains attractive for bioterrorism because deliberate contamination of fresh or processed foods may cause widespread illness and societal disruption. Perhaps the positive viewpoint is that a food bioterrorism event is unlikely to have any greater impact than some of the large foodborne outbreaks that have already been experienced in North America. The public health response to these outbreaks has allowed considerable practical experience that would also be relevant in managing a food bioterrorism event.

Clearly, food safety requires attention. Allard describes current and proposed strategies to promote food safety in Canada, and highlights the challenges of developing a comprehensive food safety approach. A complex network of regulations that are relevant to food safety originates from several different ministries, and requires coordination. Federal, provincial and municipal regulators must interact effectively. Disease surveillance is essential and needs to meet the criteria of timely case identification and capacity

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for rapid determination of similarity of isolates, even if a first case is in Nova Scotia and a second on Vancouver Island. The safety of imported food is an issue for both public health and trade. The boundaries of responsibility and authority to intervene if problems with imported food are suspected must be clear. When can importation be restricted because of food safety concerns, given current global trade regulations? In the past few years, beef from Argentina has been banned, with only a slim theoretical risk of foodborne risk, while raspberries from Guatemala continue to be imported, despite known risk. Safety decisions surrounding food importation must be explicit and transparent, and must ensure that public health considerations have priority.

The food and agricultural industries argue that current centralized, high volume production practices have increased output and lowered prices, making more food available at lower costs. Feed lots, centralized slaughter facilities and antimicrobial growth promoters are some of the practices they see as necessary to maintain current levels of efficiency and productivity. These arguments may be correct, but the downside of current production practices, such as the vCJD outbreak in the United Kingdom and the increasing antimicrobial resistance in human pathogens, cannot be denied. In fact, past and current changes in food production practices are uncontrolled experiments that take place on a wide scale, with potential adverse impacts that cannot be fully predicted. The public's unease with this situation spills into concerns with the implementation of other proposed practices, such as genetically modified foods and irradiation. Available but limited experience suggests that these practices are not harmful, but long term effects are unknown, and there are theoretical concerns.

As Allard notes, food producers have a responsibility to provide information to the public, and the public has a responsibility to follow personal practices to ensure food safety. Risk assessment belongs, however, not only to the

food industry and public health, but also to the individual at the personal level. If the consumer is to make informed choices, timely, relevant information must be available, with options for choice. Simple measures such as labelling the origin of all fresh produce should be implemented, and any potential information relevant to infection risks must be displayed clearly. Guatemalan raspberries should have been labelled as associated with a parasitic foodborne outbreak when imported the second year. Ideally, consumers should also be able to choose between 'organically' or industrially produced foods, and foods that have or have not been irradiated. Obviously, this will require agreement on the definition of terms and consumer access to criteria that are used in labelling. In this era of electronic communication and technology, the practical impediments to providing timely and relevant information should be easily overcome. The trade-off of price and perception of safety for food, if there is one, is made by the individual consumer, and should be based on information that is as complete as possible. Involving consumers in these decisions is consistent with the current principles of health promotion and individual choice. Consumer decisions will also clearly assist producers in deciding which practices may be profitable.

We are fortunate in Canada to have a sufficient quantity of food, of wide variety, that is generally safe and of high quality. Food importing and production practices, however, continue to evolve, and changes in these practices carry a potential risk for increased foodborne infection that may not be appreciated when changes are made. The continuing risks of food infection, and our inability to consistently predict adverse outcomes, certainly mandate a continuing effective national surveillance program for foodborne illness. This must be comprehensive and function in real time. Consumers also have an individual responsibility in ensuring personal food safety. Complete and accurate information must be generally available, however, to support informed choices by the individual.

REFERENCES

1. Herwaldt BL, Beach MJ, Cyclospora Working Group. The return of cyclospora in 1997: Another outbreak of cyclosporiasis in North America associated with imported raspberries. *Ann Intern Med* 1999;130:210-20.
2. Dentinger CM, Bower WA, Nainan OV, et al. An outbreak of hepatitis A associated with green onions. *J Infect Dis* 2001;183:1273-6.
3. Campbell JV, Mobil-Boetani J, Reporter R, et al. An outbreak of Salmonella serotype thompson associated with fresh cilantro. *J Infect Dis* 2001;183:984-7.
4. Cody SH, Glynn MK, Farran JA, et al. An outbreak of *Escherichia coli* 0157:H7 infection from unpasteurized commercial apple juice. *Ann Intern Med* 1999;130:202-9.
5. Ryan CA, Nickels MK, Hargrett-Bean NT, et al. Massive outbreak of antimicrobial-resistant salmonella traced to pasteurized milk. *JAMA* 1987;258:3269-74.
6. Ahmed R, Soule G, Demczuk WH, et al. Epidemiology typing of *Salmonella enterica* serotype enteritidis in a Canada-wide outbreak of gastroenteritis due to contaminated cheese. *J Clin Microbiol* 2000;38:2403-6.
7. Valleron AJ, Boelle PY, Will R, Cesbron JY. Estimation of epidemic size and incubation time based on age characteristics of vCJD in the United Kingdom. *Science* 2001;294:1726-8.
8. Torok TJ, Tauxe RV, Wise RP, et al. A large community outbreak of salmonellosis caused by intentional contamination of restaurant salad bars. *JAMA* 1997;278:389-95.