Scientific Contributions

Safe Food-Doing the Right Things Right In Canada

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Introduction

In the aftermath of soul-searching by the Canadian Food Inspection Agency (CFIA), Health Canada (HC), the Public Health Agency of Canada (PHAC) and the Ontario Ministry of Health and Long Term Care following the Maple Leaf listeriosis outbreak last year, lessons learned reports were published that provided some insight into factors limiting performance of the food safety system in Canada. However, they provided only a partial view. Broader, but still incomplete perspectives were given by the House of Commons Standing Committee on Agriculture Sub-Committee on Food Safety and the Independent Investigation into Listeriosis by Ms Weatherill. Predictably, the reports from the latter two investigations focused on whether things had been done right. Instead, their focus should have been on whether the right things had been (and are being) done. The most glaring oversight in the Weatherill report was its acceptance of the *status quo* regarding foodborne illness surveillance.

The food safety system in Canada is highly regarded by our trading partners, yet it is in need of improvement if it is to address current and future needs to protect consumers. Issues needing attention include foodborne illness surveillance, food inspection that proactively corrects critical safety practice deficits and validates acceptable system operation (smart inspection), as well as legislative execution of the requirement for seamless interaction among the three government levels that have food safety responsibility. These issues do not diminish the need for industry and consumers to continuously fulfill their critical roles in preparing safe food for the table.

Institutional infrastructure

In Canada, as in the US and Mexico, food safety is a multi-jurisdictional (shared) responsibility, and to some extent it is uncertainty regarding responsibility during crisis events that influences the successful operation of the outbreak response system (PHAC, 2008a).

At the national level, HC and CFIA (housed within Agriculture and Agri-Food Canada, AAFC) share food safety responsibility. HC sets standards and policy for food safety, and conducts risk assessment and pre-market reviews for foods. The PHAC (housed in HC) is responsible for surveillance of enteric illnesses including those from food and water. The CFIA enforces HC standards and is responsible for industry compliance. Provinces/territories and municipal governments have a public health mandate including food safety surveillance investigations and compliance for foods produced and sold within their jurisdictions. In a manner analogous to the US situation, regional departments of health, agriculture or the environment as well as municipal health departments (for food service operations within cities) are involved. Since legislative power may not be delegated from one level of government to another,

governments must collaborate in areas of shared jurisdiction, including surveillance and inspection (FAO/WHO, 2002).

While government recognizes that the prime responsibility for safe food production rests with industry, it (in both Canada and the US) has been slow to learn that safety must be built into foods and can't be inspected into them. Thus, smarter, not more inspection will improve safety, and this will develop from better understanding of the important risks inherent in foods. Over the past few decades, Canada has used surveillance data from other countries to assess risk but it is clear that country specific differences (Greig and Ravel, 2009) and even differences among geographic areas within countries exist (CDC, 2009) that can influence the pattern of risks observed. The obstacles presented by multi-jurisdictional fragmentation of food inspection and illness surveillance can be overcome with determination and commitment, but adequate foodborne illness surveillance will require investment.

Foodborne illness surveillance

Surveillance of illnesses in humans caused by contaminated food can contribute to protecting public health in two important ways: firstly, by the early and effective removal of offending food vehicles from the marketplace, outbreaks can be contained; and secondly, by establishing reference levels of illness through surveillance performance of interventions to reduce illness can be measured, and then modified or replaced as needed (OzFoodNet, 2008; Todd et al., 1997).

While estimates of acute gastroenteritis in Canada exist (Thomas et al., 2008) significant under-reporting is evident (PHAC, 2008b). Canada is also without a national foodborne illness surveillance program. At present there are two elements which make up the country's national enteric disease reporting system: the National Notifiable Infectious Disease Reporting System (NNIDRS) which accumulates case information; and the National Enteric Surveillance Program (NESP) which records laboratory results. Inconsistent treatment of data in the different regions of the country affects the reliability of the NNIDRS data set and differences in reportable disease agents in different parts of the country reduce the value of the data further. Canada's active participation in the WHO initiative to estimate the global burden of foodborne illness (Hird et al., 2009; Senior, 2009) by 2012 may help address this deficiency in the country. In addition, the development of the C-EnterNet program at one site in Ontario (of 5 sentinel sites planned) is hoped will lead to the establishment of a national integrated enteric pathogen surveillance program much like FoodNet in the US. At present it collects data in a passive manner, but it also conducts monitoring of food, agricultural and water samples for pathogen presence. The CFIA also routinely conducts food analysis for drug and agri-chemical residues.

In order for the Canadian food safety system to be proactive and manage prioritized risks, collection of food vehicle and pathogen data is essential. The lack of such data is a handicap, particularly since others (the EU, US and Australia) have shown this is practical and valuable. Another obstacle in North American countries is the multiplicity of agencies that have food safety and public health responsibilities. Effective operation of food safety systems in these countries is, therefore, highly dependent upon timely and responsible interagency collaboration based on transparency to achieve seamless interaction. Unfortunately, the record shows in Canada that during periods of crisis, the system can falter.

Food Inspection

Canada, unlike the US, has a single national food inspection authority, the CFIA, which is responsible for administering the Consumer Packaging and Labelling Act with respect to foods. It also has *de facto* responsibility for all food inspection, but in reality it shares this responsibility with the provinces/ territories and municipal governments. Although it has arms length independence as an agency, the CFIA reports to the Minister of Agriculture and Agri-Food Canada. This is considered by some to represent a client-related conflict of interest since the AAFC mandate includes industry and trade promotion. Establishment of a national food safety authority reporting directly to the Prime Minister could overcome this objection, but in European countries where this has been done, the outcome has achieved nothing more than the insertion of another level of bureaucracy, leaving the burden of foodborne illness unchanged.

The CFIA has premier responsibility to register facilities that process foods identified in the Canadian Agricultural Products Act as well as the Meat and Fish Inspection Acts which are traded inter-provincially or exported/imported. A set of standards governing all aspects of processing/handling, including facility registration, operation and inspection is established and these requirements are consistent with those of international trading partners. However, these same products, if traded within provincial/ territorial borders require only regional approval and must comply with a second tier of often less stringent regulations, administered by provincial agriculture, environment or health departments. Foodservice organizations (restaurants, hotels, hospitals) operate within regulations established at a third tier by municipal governments (usually health departments). Provinces and local governments have their own inspection staff plus training programs, and opportunity for heterogeneity in program delivery is substantial. Internal CFIA documents suggest that roughly 60% of the Canadian food dollar is used to purchase food which is subject to inspection by the CFIA (AGC, 2000). This is not of concern if inspection priority is risk-directed, and it cannot be overlooked that food company survival is dependent upon producing safe, high quality food. Of greater concern should be the differences in standards applied by government at the three levels. Systems in use were developed in response to regional needs (growth) but their inconsistency must be resolved since Canada is a signatory to the WHO Sanitary and Phytosanitary Agreements which allow import and national distribution of foreign products that satisfy the often lower regional (provincial/territorial) standards.

These diverse inspection mandates (based on Constitutional law) prevent inter-agency delegation of responsibility during sporadic or outbreak foodborne illness investigations. This introduces further opportunity for inconsistent outbreak data recovery. In parallel with the national listeriosis outbreak investigated in 2008 by the CFIA, there were two separate outbreaks (*Salmonella* – 87 ill, 1 death; *Listeria* – 22 ill, 1 death) from cheese manufactured in different provincially inspected plants (Galanis and Shyng, 2009). These were both investigated by the Quebec provincial Department of Health and the Department of Agriculture, Fisheries and Food (MAPAQ). Seize and destroy orders by MPAQ superceded voluntary cheese recalls by the companies involved. Both the cheese and national cured meat *Listeria* outbreaks were contained within 4 months of detection. Against all reasonable odds, a fourth outbreak occurred in October which was caused by *E.coli* O157:H7 in "fast-food" from an Ontario Harvey's restaurant (50/201 illnesses confirmed linked to the

restaurant, no deaths). This investigation initially became the responsibility of an Ontario (North Bay Parry Sound) district health unit, the third tier of inspection in Canada with responsibility for foodservice facilities.

The large size of the country, regional differences in population density and availability of infrastructure complicate attempts to implement and administer both foodborne illness surveillance and uniform food inspection programs. Regions with high population density have more mature inspection and illness surveillance systems, but inadequate data capture is still apparent. A difficult question to answer would be whether all provinces protect Canadians equally. The short answer is no if you believe that regulations and inspection guarantee safe food. In reality, when industry integrity is considered, the answer is yes.

The surveillance/inspection link

Food inspection rigour and foodborne illness surveillance are linked. Without information to formulate risk-based inspection policy (key to effective risk management) inspection activity will remain focused on compliance requirements of economic-based food features (label formats, fill weights, ingredient terminology) which are easily measured against guidelines. Endless inspection of this type has its place but contributes little to overall safety. Proactive detection of deficiencies in safety and health features of foods is desirable but more elusive because it requires insightful analysis of food system operation. Smart inspection considers the latter issues. These are less likely to garner requisite attention because they require more sophisticated inspection, more training and time to appraise.

In order to effectively address food safety issues it is important to recognize that primary responsibility for safe food manufacture rests with industry. Smart, risk-based inspection to verify that the system is operating within guidelines is highly complementary. While this may involve periodic end product testing, performance targets must be used with caution. Because pathogens normally occur with low frequency, the statistical power of product sampling schemes is inadequate to provide confidence in the overall safety of foods subject to such testing. Another danger here is that a shift in regulatory emphasis toward reliance on performance testing will draw industry resources from food system improvement and monitoring activities to satisfy this requirement. Where this has happened in the US and elsewhere, it also represents a public statement by regulatory agencies that proactive systems like Hazard Analysis Critical Control Point (HACCP) programs don't work. Industry response is predictable….

Food Safety System Performance

The US, Canada and Mexico are signatories to the Sanitary and Phytosanitary Agreement (SPS) of the WHO/WTO which sets quality and safety standards for foods traded internationally. Using the SPS criteria to evaluate food safety and animal health systems of 32 countries in the Americas, Dong and Jenson (2008) gave top ranking to the US and Canada. Criteria used included institutional elements, technological elements (controls) and regulatory elements (legislation). Again in a ranking, but based on transparency and economic freedom assessed for each major commodity produced, (including those from some European countries), both Canada and the US ranked highly for most products. The

criteria used assessed levels of corruption within regulatory systems and the effectiveness or realistic nature of regulations (Florkowski, 2008). In contrast, when the frequency of illness occurrence was used to measure performance, the Canadian system did not fare so well. Among 35 countries reporting data on gastroenteritis to Enter-net (Europe) during 2005, 80% of countries had fewer illnesses caused by *E.coli* O157:H7 and >30% had fewer cases of salmonellosis and campylobacterosis than Canada (Enter-net, 2007). However, whether the food safety systems in Canada, the US and Mexico are improving, stagnating or deteriorating is difficult to determine because data needed to make these evaluations are insufficient. Within all three countries food safety responsibility within government is structured in a multi-jurisdictional manner, with many agencies having agriculture or public health backgrounds being involved nationally, regionally and locally. Heterogeneity in terms of standards, safety programs and inspection rigour is consistent among the three tiers of government in these countries. This is an unresolved problem, in part, because change will affect the economic viability of small local businesses. However, without change it creates a loophole in the food safety/quality system which allows import of products that meet regional, but not necessarily national standards.

Jurisdictional fragmentation will continue to plague operational efficacy of illness surveillance and inspection activities until a more permanent solution is found. The impasse preventing improvement in operation of the inter-government interface is dictated by Constitutional law. A solution would be to assign all responsibility for these areas to a single level of government (the most viable choice would be the federal government). Precedent for this choice exists where both broadcasting/ telecommunication and aviation matters are federally controlled, but these activities did not exist when the Constitution was drawn up. Regional trade protectionism, plus other commercial interests as well as lingering suspicion between public health and agriculture agencies would most likely prevent such a move.

Understanding new hazards

Sustainability of agriculture is only possible when nutrients are recycled. However, reprocessing of waste animal protein as an animal feed ingredient and use of manures as fertilizer can provide opportunity for pathogens present to contaminate at some further point in the food chain.

Recent events worldwide have shown we do not consistently control agents causing foodborne illness present on produce. Directly or indirectly, domestic/ wild animals are the source of these zoonotic pathogens (organisms carried often asymptomatically and shed by animals which cause illness in humans). It is generally accepted that concentration of zoonotic pathogens in food animals can occur if manure is improperly used. In contrast, less recognition is given to the potential for feed contaminated by *Salmonella* or toxigenic *E. coli* to continuously inoculate food animals. The almost ubiquitous occurrence of these organisms in some animal environments makes it difficult for some to conclude that elimination of these pathogens from feed will have a measurable impact on food safety in the short term. When it is considered that 25 to 80% of feed samples can be contaminated with these organisms (Sapkota et al., 2007) action to eliminate their presence would appear prudent. Continuous challenge will lengthen the period of zoonotic pathogen carriage and it now seems that *E.coli* O157:H7 can be found in hogs and poultry, where its absence was previously conspicuous.

Steps to safer food in Canada

1) Government must go beyond inter-agency memoranda of understanding to develop permanent systems that facilitate cooperative action and information sharing for both foodborne illness surveillance and foodborne illness outbreak investigations.
2) Investment will be required to develop an active foodborne illness surveillance program to characterize food and food pathogen risk in Canada.
3) Data from surveillance must be used to develop inspection policy that is risk-based and uniform across the country. That policy must have as its main priority validation that approved food safety systems operation is acceptable.
4) Campylobacteriosis is an anomaly which is poorly understood. *Campylobacter* seems to survive poorly in the environment outside animals and is a zoonotic commensal in most poultry and probably beef animals. Since it causes generally mild, self-resolving gastroenteritis in humans it is infrequently captured in illness surveillance data, even though in several countries, including Canada, it is believed to cause the most cases of enteric illness (perhaps 30 cases/ 100,000 persons compared to *Salmonella* at 17/100,000 (PHAC, 2007). While research is needed to better understand this organism and the illness it causes in humans, the sheer size of its impact on human health suggests an immediate and large payback on steps to prevent campylobacteriosis from food. Experience in Belgium and Iceland suggests the sale of only frozen poultry (freezing kills *Campylobacter*) or the irradiation of poultry will reduce foodborne illness by 25-50%.
5) Since it appears (new data are needed) that most cases of foodborne illness are acquired in foodservice settings (e.g. restaurants) with the second most frequent place being in the home, education and training in food handling and preparation must continue to be a high priority.

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