Spotlight

FOOD SAFETY

Exploring the Trust Gap: Food Safety from Farm-to-Fork

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EXECUTIVE SUMMARY

Although Canada has one of the world's strongest and most advanced food-safety systems, a significant amount of the population still experiences food-related illnesses every year. Addressing these challenges requires an in-depth examination of all stages of the food-supply chain. This will allow for a more comprehensive approach to elevating food safety and improving public health.

This paper gives an overview of the strengths, challenges, and opportunities that affect consumer trust in the Canadian agri-food system. Three different levels of the value chain are examined: the farms where food is produced, processing centres where food is handled and controlled for quality, and retail/foodservice interfaces where food is marketed to consumers. At each level, roles and responsibilities of actors in the system, current food safety measures, and potential challenges are discussed. Each stage includes a case study to demonstrate how consumer trust is affected when something goes wrong in the food-supply chain.

Canadian farms, food processors, and food businesses are tightly governed by food policies and regulations. These regulations emphasize a proactive approach to risk detection, mitigation, and communication. Many new technologies have revolutionized our ability to produce, package, and distribute food and are also helping us to prevent, detect, trace, and report food safety risks more effectively. Consumer confidence and public health can be negatively affected when challenges such as aging populations, global markets, larger operations, new consumer preferences, and wider distribution channels are not met with effective, timely solutions.

Consumers expect that food available for purchase is safe for consumption. Many people are surprised to learn that current regulatory standards may not be enough to minimize risk. Evidence-based risk mitigation measures are needed at all stages of the food supply chain. When food safety related health incidences occur, consumer trust tends to decrease, and consumers may become wary of those responsible for producing food and participating in the food-supply chain.

To build stronger consumer trust and reduce food safety risks, we recommend policy makers focus on six key strategies: 1) foster a food safety culture, 2) strengthen quality assurance and risk prevention programs, 3) invest in

research and consumer education and awareness, 4) focus on transparency, 5) prepare and train for emergencies, and 6) look for opportunities to improve traceability through the value chain. Each step in the agri-food value chain has an important role to play in ensuring the safety of food from farm-to-fork.

Definitions

For purposes of clarity, the following definitions are used for this paper:

Value Chain
links all the actors who play a role in the production of food. The term is essentially interchangeable with “supply chain” and includes producers (farmers), processors, shippers, suppliers and marketers, food service companies, and retailers.

CURRENT CONTEXT

The Canadian agri-food system is connected from farm-to-fork, and never more so than today. Large amounts of high-quality food move quickly, efficiently, and safely across levels of the value chain. Consumers have come to expect and demand that this system provide food that is safe and healthy for them and their families to eat.

Canada has one of the highest food safety rankings among developed countries.[1] Achieving this ranking does not come easily and requires constant effort across the whole food value chain. The Canadian food safety system is generally well-positioned to respond to issues of foodborne illness. Federal and provincial food policies are in place and regulations exist at each production level to help prevent food safety issues. All levels of government are also involved in monitoring, reporting, and responding to reports of foodborne illness. These public resources are enhanced by research projects focused on improving food safety standards and practices. Together, these rules, regulations, and research projects as well as everyone working in the food system work together to keep food safe for over 37 million Canadians.

Canadians generally feel confident in the food safety systems and regulations that have been put into place.[2] However, this confidence can be shaken when food-related illnesses occur. In 2018 and 2019 when contaminated romaine lettuce caused outbreaks of *E. coli*, consumers became concerned that the current food safety measures were no longer enough to maintain the level of food safety Canadians have come to expect.[3]

A total of 4 million Canadians (about 1 in 8) are affected by foodborne illnesses every year.[4, 47] This number is expected to increase in the future, as the "baby boomer" generation of Canadians reaches the age of 65 and beyond. Older people have a higher risk of severe illness and/or death from foodborne illnesses, as they are more likely to suffer from underlying illnesses and/or weakened immune systems.[5] It is important to take this into consideration as food safety systems continue to be modified and improved.

The complexity of Canada's food systems can make it challenging to manage food safety risks. That is why it is important to continue monitoring the effectiveness of current policies, and to update them when necessary. These changes and updates are especially important as the Canadian food system evolves to meet

the consumer demand for fresh food products year-round. Consumers expect to have a variety of fresh, convenient food options to choose from, even if this means the price of food and the food safety risks are increased. This increase in cost and risk happens because this in-demand food often travels long distances to be processed and purchased. During this transit time, the food may be subject to different handling practices and levels of regulation. To best manage these risks and still meet the demand of consumers, a "one-health" solution is the best course of action, in which different sectors of food production work together to ensure healthy animals and safe environments are used to produce high-quality food.

Even with effective and extensive measures in place to uphold the safety of food, "zero risk [to food safety] is not achievable".[6] When food safety related disease outbreaks occur, such as the listeriosis outbreak at Maple Leaf Foods in 2008, the trust that consumers place in Canada's food safety system may be shaken. This trust may be further broken when consumers are faced with contradictory information on social media, where it can be difficult to distinguish between fact and fiction. It is important for stakeholders and those involved in food production to be trustworthy sources of clear, truthful information, especially during times of consumer doubt or mistrust.

GAPS AND OPPORTUNITIES

Food Safety at the Farm Level

Roles, Responsibilities, and Expectations

Food safety begins at the farm, where plants and animals are grown. The farm is also the first point at which pathogens can be introduced into the food chain. Farmers are trusted by consumers to consistently provide safe, affordable and nutritious food. Meeting these expectations is a constant challenge for food producers as production systems, regulations, and consumer preferences continue to change. Additionally, food safety challenges are not always consistent across farms and commodities. Farming practices have evolved over time to meet consumer expectations and address concerns about safety, quality, affordability and nutrition. Further innovation and change will continue to ensure consumer trust and high-quality food production, as more and more knowledge is gained about the best strategies for success.

Gaps

There are over 270,000 farmers working to produce food on over 200,000 farms across the country,[7] making it difficult at times for governing bodies to properly enforce the programs designed to protect consumers from food safety risks. The large number and huge variety of farms, producers, and commodities means that a "one-size-fits-all" approach to food safety in Canada is not possible, nor would it be effective or efficient.

Managing emerging and endemic diseases on the farm also poses a significant challenge to food safety. Ensuring the health and welfare of livestock often requires the use of antibiotics, and herbicides and pesticides are important tools to ensure good yields. It is very important that the producers using these tools follow the appropriate protocols and withdrawal times, otherwise it is possible that their product may become contaminated with residues, or trace amounts of these substances. Consumers may also be confused or misinformed about the usage of these tools in animal and crop production systems. Several popular food brands use this confusion as leverage for their marketing campaigns to differentiate themselves to consumers (e.g., "no added chemicals," "raised without antibiotics," "hormone free"). These strategies capitalize on an uninformed population of consumers and can cause confusion and undue concern about food safety.

The use of different farm inputs (e.g., chemicals, feed, energy) can also be challenging for maintaining food safety at the farm level. Food safety may be compromised when farmers buy/sell farm inputs in geographic locations other than their home farm. This is especially challenging when products are being sold to or imported from areas that contain pests or diseases not common in Canada. If these pathogens are introduced to the Canadian population, the effects can be devastating as the native population does not have any immunity, and the current infrastructure may not be equipped to deal with the incident. The increasing connections between agri-food sectors also increases the risk to food safety in this regard.

Opportunities

Many national and provincial regulations govern farm practices and influence the safety of the food farms produced on Canadian farms. Governments work closely with each commodity group to help establish and support quality assurance programs. Most established commodity groups have a representative organization (e.g., Dairy Farms of Canada, Ontario Apple Growers)and work to administer on-farm food safety programs to reduce food safety risks. These groups focus on prevention, detection and control initiatives. The primary goals of these groups are to ensure the raw food products produced on farm are safe for human consumption by the time they reach the grocery store shelves by preventing the introduction of biological, chemical, and physical hazards into the food chain.

Significant changes in farm management and technology have improved the safety of food. Genetic improvements have led to healthier, more productive plants and animals that are less susceptible to disease. These healthy and resilient populations require less antibiotics and/or pesticides for their production, lessening the risk of any residues making their way into the food chain. Farmers today are also more knowledgeable about the principles of disease. They have adopted practices such as biosecurity, vaccination, and laboratory testing to prevent and control the spread of disease on their farms. Increasing farmer knowledge and sophistication of on-farm systems can reduce the potential for pathogen contamination of food products before they leave the farm. Additionally, the emergence and adoption of other technologies such as robotics have been key to increasing the level of food safety in Canadian production systems. Technology reduces the need for laborers to handle food. This both reduces pathogen contamination and increases the efficiency of food production. With new technologies, farmers are growing considerably more food with significantly less space as they adopt vertical growing techniques and use controlled environments such as greenhouses. As a whole, technological advancements have enhanced our ability to produce the quantities and qualities of food consumers expect.

Changes in farm size and concentration also play a role in food safety. As we see a decreasing trend in number of farms across Canada, the size of the remaining farms continues to grow, and over time become more specialized in the food they produce.[11, 12, 13, 14] Despite this loss in quantity of farms, a more concentrated and specialized industry could lead to a more structured food safety system at the farm level. Monitoring and inspections for food safety hazards are then more efficient. Larger farms also mean a greater proportion of food products will be managed more consistently, making it easier to identify, trace, and solve food safety problems if and when they do occur.

E. COLI AND ROMAINE LETTUCE

Between November 2017 and December 2018, there were three separate *E. coli* O157:H7 outbreaks in Canada. Each outbreak was linked to romaine lettuce grown in the United States (U.S.). While most *E. coli* bacteria are naturally occurring and harmless to humans, *E. coli* O157:H7 is a strain that can lead to significant illness in humans. E. coli O157:H7 is resilient, contagious, and infectious at low concentrations. It was identified as the culprit in all three Canadian outbreaks.[15]

In total, these outbreaks caused 79 confirmed illnesses, 28 hospitalizations, and one death in Canada.[16] The impact was much greater in the U.S., where 210 confirmed illnesses, 96 hospitalizations, and five deaths occurred.[17] Environmental conditions at the farm level played an important role in these outbreaks. Most of North America's romaine lettuce is grown in Arizona and California.[16] While the causes of the first and third contamination events are still being investigated, the second outbreak has been linked to the use of contaminated irrigation water. In addition to producing lettuce, Arizona and California are also home to many of the country's cattle farms, which are known to shed *E. coli* in their manure. Investigators suspect that cattle manure containing the O157:H7 strain contaminated the irrigation water, thus further strengthening the hypothesis that a potential contributing factor was the proximity of cattle to the produce fields identified in traceback investigations.

Unlike other products that can be pasteurized, cooked, or have a protective shell, romaine lettuce is particularly difficult to clean, is predominantly eaten raw, and provides a suitable environment for *E. coli* to grow.[18, 19, 20]

After detection, each of these consecutive outbreaks received international media attention within a matter of hours. Coverage focused on a variety of topics: the products affected and corresponding recalls, stories of those people with illness linked to the lettuce, investigative pieces on the source of the outbreak, and recommendations for consumers. Discussions about the outbreaks were also prevalent on social media. Consumers and the "tweeting" public expressed everything from fear of contamination and/or illness to frustration over the need to throw out expensive packages of lettuce. This consistent press and media attention on a rare, but serious, foodborne disease outbreak shook consumer confidence. This led to an erosion of consumer trust in the safety of food.[21]

The industry response to these outbreaks will ultimately influence whether consumer confidence is restored. Rapid recalls are a first step, but industry must look back to the farm level and focus on opportunities for preventing future outbreaks. While many farmers test their irrigation water for contamination, University of Guelph professor Dr. Keith Warriner explains that this process is imperfect.[22, 23] The Food

and Drug Administration has focused its recommendations on growers of leafy greens, asking growers to ensure all agricultural water is safe and of adequate sanitary quality. They suggest: 1) implementing validated and verified agricultural water treatment methods, 2) using risk assessments to identify and mitigate risks related to wild animal intrusion and the use of land near or adjacent to agricultural water sources, and 3) following Good Agricultural Practices (GAPs) and adhering to the requirements of the Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption.[24, 25, 26]

This case study highlights some of the food safety challenges at the farm level and the impact these outbreaks can have on consumer trust. Farms, unlike processing plants or retail stores, are not controlled spaces. They are open to the natural environment where insects, birds, wild animals, livestock, and crops are often in close proximity as the potential for foodborne pathogen development is high in these uncontrolled situations, close attention must be paid to food safety.

Food Safety at the Processing Level

Roles, Responsibilities, and Expectations

The next major step in the supply chain is food processing, where raw farm products are sent offsite to be processed, cleaned, sorted, packaged and stored. Food processing operations vary in form and size from small-scale, value-added processing (e.g., apple cider and apple pies to sell alongside raw apples at a farmer's market), to large-scale food processing where large quantities of product are handled, processed, and refined before being passed along the value chain. Processors face significant public scrutiny, as brands are displayed on the products consumers purchase at grocery stores.

Gaps

Processing plants have also become increasingly large and consolidated but have maintained a significant level of variability between and within industries. There are some benefits to having larger, more concentrated food processing companies; however, to be profitable and meet consumer demand, these large facilities often operate 24 hours a day, seven days a week. This schedule means there is a very tight window for dismantling and cleaning equipment, offering very little margin for error when properly and effectively sanitizing equipment.

Another challenge for food processors is the workplace culture surrounding food safety. Creating a food safety culture in processing plants has been demonstrated to improve food safety.[27] Since their listeriosis outbreak in 2008, Maple Leaf Foods has become a champion of food safety culture.[28] Creating this type of culture is difficult in an undersupplied labour market. Staff turnover can make it difficult to create and maintain a consistent culture in the workplace, and thus needs to be addressed before this cultural shift can happen.

Opportunities

Canadian food processors produce some of the safest food in the world and are constantly working to improve their standards. Most Canadian food processors handle millions of kilograms of food per year from domestic and global sources.[1] Food processing is a resource-intensive industry. From labour, coordination, safety measures, transportation, temperature environments, and specific packaging, making fresh food available to consumers 24 hours a day, 365 days a year is a complex endeavour. As a net exporter of food and agricultural products, Canada has created a reputation for providing safe, high quality food, increasing international demand for Canadian products.[1, 29]

The Hazard Analysis Critical Control Point (HACCP) food safety system is widely used among Canadian food processors as a way of minimizing the risk to food-safety. HACCP is designed to reduce the hazards associated with food production and limit the risk of a foodborne disease outbreak. HACCP has seven basic principles that focus on critical points where hazards are anticipated. Awareness of possible hazards motivates processors to implement monitoring, correction,

and record-keeping systems to ensure ongoing food safety. HACCP programs take a proactive approach to food safety and often complement quality assurance inspections performed on final products. Food processing plants that export out-of-province or out-of-country are federally inspected.

The new Safe Food for Canadians Regulations (SFCR), which came into force on January 15, 2019, provides for new overarching requirements for food businesses in Canada. The SFCR generally applies to food for human consumption (including ingredients) that is imported, exported, or inter-provincially traded for commercial purposes. It also applies to the slaughter of food animals from which meat products to be exported or inter-provincially traded may be derived.

The three fundamental new elements in the SFCR that apply to most food businesses in Canada include licensing, preventive controls and traceability. Preventive controls refer to a combination of measures that form a system to control risks to food and to the humane treatment of food animals during slaughter activities. A preventive control plan (PCP), which is a requirement of the SFCR, is a written document that details how risks to your food and to the humane treatment of food animals are identified and controlled. The PCP also includes elements relating to packaging, labelling, grading and standards of identity. An important feature of the PCP is that food business operators must prevent, eliminate or reduce to an acceptable level any hazards that are identified by using control measures that are shown by evidence to be effective, including any treatment or process.

Both a HACCP plan and a PCP include a hazard analysis and a description of the control measures applied by food business operators to ensure food safety. However, a PCP also includes a description of the measures applied to meet requirements related to the humane treatment of food animals and to consumer protection. All businesses which had up to-date HACCP programs operating in their facilities prior to the coming into force of the SFCR, would have needed to review their plan against the preventive control requirements of the SFCR.

Traceability is an emerging strength in Canada's food safety system, and every step of the food supply chain is working to improve the traceability of their product. Traceability strengthens consumers' trust of food producers and processors. The Safe Food for Canadians Regulations, released on 15 January 2019, specifically addresses traceability.[30] Under these regulations, all food businesses must be able to track food one step forward and one step backward in the supply chain. In the future, it will be necessary for every step of the food supply chain to be traceable from end to end in order to maximize food safety. Food processors are key intermediaries in this supply-chain, as they often connect the farmers who grow the food to the retailers who sell it. In most instances, when processors can trace their inputs one step forward and one step backward, the severity of an outbreak of a foodborne illness is reduced, as swift and easy identification and recall of problematic products is made possible.

LISTERIOSIS AND MAPLE LEAF FOODS

A 2008 listeriosis outbreak at a Toronto-based Maple Leaf processing plant was everything that the food industry works to avoid. Several months before the outbreak, laboratory samples sent from the processing plant came back positive for *Listeria monocytogenes*, but it was never verified whether corrective actions successfully eliminated the bacteria. Although the bacterium was detected early, the company failed to identify and resolve the contamination; this case highlights some gaps in food safety practices that ultimately led to the outbreak.

In June of 2008, public health units in Ontario began to notice an increase in the number of reported listeriosis cases. Food recalls began on 17 August 2008, followed by a complete shutdown of the Maple Leaf Foods plant on 20 August.[31] A team of investigators pinpointed a few serious issues; specifically, two meat slicing machines were the likely source of contamination, compounded by inadequate cleaning solutions. The entire plant was cleaned and sanitized before reopening on 17 September—one full month after shutting down. In total, there were 57 serious cases of listeriosis linked to meat produced by Maple Leaf Foods—24 people died.[32] In addition to the devastating loss of human life, the economic costs of the tragedy were staggering. An analysis of the outbreak found that the costs associated with the cases (e.g., medical costs, nonmedical costs, productivity losses) and those incurred by the implicated plant and federal agencies responding to the outbreak were estimated to be nearly $242 million Canadian dollars.[33]

Listeria monocytogenes occurs naturally and can be found almost anywhere. The bacterium can live in animals and may contaminate meat and equipment during the butchering process. The meat processing plant environment—rich in nutrients and moisture—is conducive to *Listeria* growth. It can multiply very quickly and its ability to grow at low temperatures makes it well-suited to thriving in processing plants if effective sanitation measures are not in place.[34, 35, 36] While trend analyses would have helped identify the source of recurring positive samples, insufficient analysis and reporting protocols helped to mask any concerns.

Regardless of the specific internal causes, the public health impact was a crisis for Maple Leaf Foods. The Canadian press closely covered the events as they unfolded, frequently attacking the company and accusing them of wrongdoing. Numerous class-action lawsuits were launched, leading to further negative media attention. As a result, consumers avoided Maple Leaf products and trade customers switched suppliers. Trust in the safety of Maple Leaf foods was badly damaged.

Although this case study can serve as a cautionary tale for food safety risks and consequences, Maple Leaf's response was exemplary. Their CEO held numerous press conferences throughout the process, offering a full apology and acknowledging that his company was solely responsible for the outbreak. Numerous videos, website updates, and TV advertisements were used to communicate his message to consumers.

Maple Leaf also shifted their organizational structure and policies to emphasize food safety. Most notably, a Chief Food Safety Officer was hired.

This case highlights how a company used a disaster to rebrand itself and instill a food safety culture from top to bottom. Maple Leaf is now perceived as an industry leader in integrating food safety into their organization. Importantly, at the time of the outbreak, Maple Leaf was operating within regulatory frameworks and were actively implementing HACCP procedures. It has been over 10 years since this outbreak and Maple Leaf Foods has reclaimed any lost market share. This remains an important example of the negative consequences of poor food safety procedures at the processing level.

Food Safety at the Retail Foodservice Level

Roles, Responsibilities, and Expectations

The retail and foodservice level of the supply chain is the final step before food reaches consumers. Retailers include grocery stores, restaurants, farmer's market vendors, and food trucks. The diversity of food retailers makes it difficult to evaluate food safety across the entire sector. Here, we focus on grocery stores and restaurants.

At restaurants, consumers expect ready-to-eat food to be prepared in a timely manner. Restaurants regularly purchase low volumes of food, so they are able to supply their customers with the freshest ingredients possible. These fresh ingredients can come from farmers, processors, wholesalers or brokers. Wholesalers and brokers typically have the resources, capacity, and logistical frameworks to manage large volumes of food and then distribute it to customers (e.g., restaurants) of various sizes.

Similarly, grocery stores often purchase their foods from a wholesaler. While larger supermarket chains may have their own offsite storage facilities and distribution centres, most stores do not have the capacity or resources to store large volumes of food for extended periods of time. Most products purchased from grocery stores are expected to be taken home, stored, and prepared later. Consumers expect that these products are safe when they leave the store and will remain safe until they are ready to use them.

Gaps

The retail foodservice sector is the last step before food reaches consumers. This means that this sector is held to a high level of scrutiny and is expected by consumers to maintain a high standard of excellence in food safety. The main challenges in retail foodservice come from the sale of large volumes of food, very high employee turnover rates, the constant need for employee training, and the complexity and variety of foods that are sold.

The way food is packaged, stored, prepared, and served in businesses can create challenges that make food susceptible to contamination. Unlike processors who have controlled access and strict protocols in their facilities, restaurants and grocers must deal with many people entering and leaving their buildings unrestricted, who could contaminate food with a variety of pathogens. The most common ways in which food becomes contaminated with pathogens at retail/foodservice include i) from infected food handlers; and by ii) cross-contamination; iii) inadequate cooking and/or iv) improper handling and storage.

Like food processors, labour-force issues pose significant challenges for food retailers. The part-time labour pool is often not conducive to creating a food safety culture and there is a high turnover rate. According to the Ontario Health

Protection and Promotion Act, at any given time, only one person at a food service premise is required to have completed food handler training. This means that food preparation could be done by employees without any formal training, and little to no experience handling food in a safe way, on a large scale. Further, employees in these situations are often under time pressures, and may feel the need to cut corners to keep their times reasonable for their employers. While it is possible for employees to make food safety a priority, the working environment can make this difficult for them to balance with other pressures of their job.

Opportunities

As the final step in the value chain before food reaches consumers, there are numerous municipal as well as provincial rules and regulations aimed at governing the thousands of food retailers in Canada, such as the Health Protection and Promotion Act in Ontario.[37] These regulations include premise operation and maintenance, facility and equipment cleanliness and sanitation, and food handling. To address unique risks that some foods may pose to public health, specific rules exist for different food commodities. Many businesses operate using HACCP-based food safety programs and procedures to keep these risks as low as possible.

In Ontario, compliance with these regulations is enforced by local inspectors operating out of regional health units. During regular business hours, inspectors have permission to enter and monitor the facilities without notice. Although random, each operation has a required number of inspections per year, ranging from 1 to 3 visits depending on the risk rating given to the establishment by inspectors. Risk-ratings are based on many characteristics, including: the type of food being prepared, how it is prepared, the equipment being used, the food safety management program in place, the staff's food safety knowledge, the types of customers, and previous venue compliance records. Assessment happens yearly during the first inspection of each food service premise.[38] Retailers are also commonly required to conspicuously post their inspection status.

E. COLI AND CHIPOTLE MEXICAN GRILL

Despite their size and success, Chipotle Mexican Grill has been plagued by a number of foodborne disease outbreaks over the past few years. In July of 2015, several *E. coli* illnesses were linked to the business and within four months, a total of five separate foodborne outbreaks occurred.

Chipotle restaurants are not franchises—they are owned and operated by the company. This can make it easier to organize and coordinate local supply chains, but it can also create food safety challenges. One such challenge is Chipotle's commitment to buying from local vendors. Although this fits with the company's brand of quality fast food, sourcing food from hundreds of suppliers makes it very difficult to monitor and maintain the food safety standards of products.[3] This also makes traceability more challenging—four of the five outbreaks were never linked to a specific source of contamination. Owning rather than franchising allows Chipotle to have more control over workplace culture;[39] however, despite establishing strong safety protocols, a HACCP program, and third-party auditing for the company, these *E. coli* outbreaks still occurred.

In July 2017, Chipotle faced another crisis, when a sick employee was linked to a norovirus outbreak. This was followed by social media posts from Chipotle employees about management issues such as instances where they were reprimanded for taking sick days, contrary to official policy. Subsequent posts from Chipotle employees described a culture of ignoring company food safety protocols unless auditors were present, or even falsifying food safety sheets.[40]

These public comments resulted in a significant blow to consumer trust in the company. Chipotle's auditors further revealed that leadership at the specific restaurant where the outbreak occurred was not adhering to company protocols. The restaurant lacked leadership and oversight with respect to food safety—so, it might not surprising that the immediate challenges of filling orders and scheduling shifts took precedence over big picture issues such as food safety.

Despite the company's struggles, concern over Chipotle's food safety likely has more to do with the history of the restaurant than the actual food safety risk.[41] A string of outbreaks demonstrated to the public that food safety at the chain was not a priority. As a result, the heightened attention may have led people to believe Chipotle was the reason they felt sick, even if the underlying cause of their illness was totally unrelated.[42]

As a response to the series of outbreaks, Chipotle responded in a number of ways. For example, it 1) implemented a new testing regime for many of their ingredients before they are shipped to franchise locations; 2) made changes to food preparation and handling practices, including changing how some items are washed, as well as shredding cheese before it reaches the stores; 3) required some produce items to be blanched (dipped quickly into boiling water); 4) started new rules for marinating chicken and steak; 5) implemented new internal safety-standards training for all workers; 6) implemented a new policy on paid sick leave, which is designed to ensure that ill employees stay home when they are sick; and

7) worked with industry-leading experts to assess the safety risks of every ingredient on its menu.

In addition to the changes, enhanced procedures, and training, the company also plans to spend up to $10 million to help local farms meet its food safety standards, and to make more local ingredients available across the country. All these measures seem to have restored consumer confidence and investment in the company.[43]

However, in a recent ruling by the US Department of Justice, Chipotle agreed to pay a fine of $25 million to resolve criminal charges related to its involvement in the foodborne outbreaks that involved more than 1,100 people between 2015 and 2018—this was the largest-ever fine in a food safety case. These outbreaks and subsequent ruling emphasize the importance of ensuring that foodservice managers and employees consistently follow food safety policies.[48]

KNOWLEDGE SHARING AND POLICY FOR IMPACT

The Canadian agri-food system is able to produce high-quality food at a remarkable pace. Consumers expect and assume that the food produced will be safe for consumption, and that each level of the food-system works to make sure that production is as safe as possible. Many consumers are surprised to learn that current regulatory standards may not be enough to minimize risk in all areas, and that not all stages of the food chain employ evidence-based risk mitigation measures.

A review of the strategies required to ensure that consumer trust is maintained during and after a food incident identified 11 key strategies that should be followed.[44] The most important recommendations relate to timely transparency, taking a proactive approach to food safety, taking immediate action in the wake of an incident, and providing information from credible sources. Food businesses across Canada can learn from these recommendations as they seek to build and maintain consumer trust. There will always be a place for regulations to ensure our food system meets minimum acceptable standards, but more effort is needed to demonstrate to consumers that their safety is a priority.

Another way to improve knowledge sharing is by implementing technologies like blockchain[49] and QR codes[45] that can provide consumers with real-time information about the food they are purchasing. These technologies also offer valuable insights to verify authenticity, freshness, safety, fair trade certifications and sustainability. Providing consumers with the power to conduct their own investigations into the food they are buying and come to their own conclusions about its safety and quality can help to foster a better relationship between those that produce and consume food.[46]

Blockchain is a decentralized ledger of shared, consensually verified blocks of information accessible to all participants in the food value chain. Participants can access, inspect, or add—but never alter or delete—records. As a result, the data cannot be changed.

Quick Response (QR) Codes are scannable barcodes that can direct a user to a food company or farmer's website, where they can learn more about the product and how it was produced. QR codes can provide information that stretches from the farm to the retail store.

TABLE 1

TAKING ACTION FOR FOOD SAFETY

To take action on food safety, we must renew our focus on the role that food producers, processors, and distributors can play in a safe food system. To build consumer trust in the safety of their food, each group can follow a variety of strategies and recommendations, some of which are highlighted below.

Group	Action Item
Producers (e.g., Farmers)	• Build on existing quality assurance and HACCP-based programs. • Routinely test inputs. • Take an active role in new traceability initiatives. • When a safety concern arises, focus on a timely response. • Develop an emergency preparedness protocol to enact when an outbreak happens. • Be proactive in informing/educating consumers about where their food comes from. • Implement and support marketing and communication campaigns to keep consumers informed. • Support food literacy.
Processors and Wholesalers	• Build a food safety culture and talk about it. • Develop an emergency preparedness protocol. • Ensure emergency preparedness protocol includes public relations protocols. • Invest in continuous staff training, including the timely implementation of emergency preparedness protocols. • Explore avenues for improved traceability. • Make use of technologies like blockchain and QR codes. • Support food literacy.

TABLE 1

Group	Action Item
Retail and Foodservice	• Hire with a food safety mindset. • Build a food safety culture and talk about it. • Employ executives and managers who lead by example. • Improve communication of food safety values from top to bottom. • Invest in continuous staff training. • Evaluate compliance with evidence-based standard operating procedures. • Support food literacy.
Academics	• Research and explore emerging risks. • Research novel ways of measuring food safety culture. • Explore consumer confidence and measure the trust gap. • Investigate best practices for education and outreach.
Policy makers	• Work with the food industry at all levels of the value chain to develop evidence-based policies and regulations that keep our food industry competitive on the global stage and that can be applied in a stage-specific manner (i.e., a solution for the retail sector may not be applicable in the farm sector).
Media	• Commit to consumer education about how food is produced. • Commit to consumer education about the control and prevention of foodborne illnesses. • Support food literacy. • Demonstrate that the food industry wants to be transparent about its efforts to produce safe food. • Disseminate evidence-based messages.

Canada boasts one of the world's strongest and most advanced food safety systems. However, there is always some level of risk associated with food production, and while it cannot be eliminated, it can be minimized. When food safety related health issues do occur, they can directly impact public health and consumer confidence. Each person in the agri-food value chain, including the consumer, has an important role to play in ensuring food safety from farm-to-fork.[38]

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Workshop Summary

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Participants

Attendees of the two workshops who helped form and edit the discussion paper consisted of an interdisciplinary group from the University of Guelph. We wish to thank all participants for their insight: Kieran O'Doherty, Andreas Boecker, Tirtha Dhar, Bob Friendship, Ron Johnson, Mike Von Massow, Rebecca Shapiro, Maria Spinato, Angela Cánovas, Dana McCauley, Anne Wilcock, Jan Sargeant, Andrew Papadopoulos, Elizabeth Shantz, Alice Raine, and Keith Warriner.

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