Government of Manitoba

Ensuring food safety through "farm to fork" tracing

Overview

The Need
To respond to increasing concern over food safety worldwide, the Manitoba government needed to enable food tracing from point of origin through to point of consumption.

The Solution
A proof-of-concept was developed with help from IBM that lays the foundation for the monitoring and aggregation of information from across the supply chain.

What Makes it Smarter
Insight that helps to certify the safety of food protects the public and adds economic value by assuring consumers of its quality—enabling farmers to charge premium prices.

The Result
"Our goal was to establish not only that food tracing could be done, but that it would deliver real value to everyone involved."

– Dr. Allan Preston, assistant deputy minister, Agri Industry Development Division, MAFRI

In recent years, food safety has become a hot-button topic around the world, due in part to the unprecedented amount of food trade. Today, thanks to globalization and efficient distribution networks, one can walk into a supermarket in New England and find fresh oranges not just from Florida or California, but literally from the other end of the earth in South Africa. Going hand in hand with this increased availability is the need to more closely monitor the food supply for contamination and disease. Yet too often, the speed of the supply chain outstrips the ability of inspectors to keep up.

Recently, the President of the United States highlighted the issue in an address[1], citing "a troubling trend that has seen the average number of outbreaks from contaminated produce and other foods grow to nearly 350 per year, up from 100 per year in the early 1990s." Food safety and controlling outbreaks is not only of global concern from a public health standpoint; it also has serious economic implications. Many governments, acting out of an abundance of caution, react to disease outbreaks by closing their borders to certain food imports, resulting in a decrease in trade and damage to the economies of food-exporting nations.

A need for greater insight

In Canada, the Manitoba Agriculture, Food and Rural Initiatives ministry (MAFRI) began to take a closer look at how it might improve food safety after the severe foot and mouth disease outbreak in the UK in 2001. "We had a good system for identifying animals and could place them at the producer level and at the processing facility, but beyond that we really did not know much," says Dr. Allan Preston, assistant deputy minister of MAFRI's Agri Industry Development Division.

Business Benefits

- Provides the means for complete, end-to-end documentation of the history and background of food products as they are produced
- Enables faster response to food contamination outbreaks
- Enhances the market value of agricultural products
- Improves the efficiency and effectiveness of the supply chain
- Assists regulatory compliance and helps to open new markets

Preston points out that truly guaranteeing the safety of, for example, the beef or pork supply requires not only knowledge of individual animals, but a clear understanding of the entire value chain—the way they're raised and handled, how they are transported, how they are processed and packaged, as well as knowing what happens to them after processing—all the way up to the point of final consumption. Even such things as the feed they're given (and its origins) have to be accounted for. Ideally, the entire history of a food product and everything that goes into it should be understood and documented. Preston calls it a view of the supply chain "from farm to fork."

The magnitude of the challenge is considerable because of its complexity and the diverse nature of the supply chain. Unlike many industries where the push for speed and efficiency has driven a high level of technology adoption and automation, agriculture is highly diverse in terms of its level of sophistication. The producers of agricultural products can range from family farmers who operate as a cottage industry, keeping records with pencil and paper, to large industrial farms with computerized management systems. There is no true standardization in terms of operations or record keeping, and there is no real information infrastructure in place.

What was needed was not only a way to vertically integrate the supply chain so that information could be shared, but an actual understanding of how the chain works. The inputs and outputs for each part of the chain—the ingredients that go into feed, for example, or which suppliers a given processor does business with—were not fully known; there was no overall, comprehensive view.

Smarter Food: Ensuring food safety while creating economic benefit

Instrumented

Information about the origin, movement and processing of food products is captured through the use of everything from RFID tags to barcodes and manual data entry.

Interconnected

All inputs and outputs of the supply chain are documented and the information is brought together to give a detailed view of food products from "farm to fork."

Intelligent

New insight into the origin, movement and processing of agricultural products helps to ensure food safety by improving accountability while also adding value to the food products themselves.

Solution Components

Software

- TraceTracker GTNet

Services

- IBM Global Business Services – Industry consulting

Getting everyone on board

A collaborative team consisting of MAFRI, industry consultants from IBM Global Business Services and independent software vendor TraceTracker was formed to create a proof-of-concept project focused on two food product streams—beef and pork. The purpose of the project was to see if MAFRI's vision of improved food safety through deeper insight into the supply chain could be achieved on a practical level. If successful, it would serve as the foundation of a fully realized solution that ultimately could include the entire Canadian agricultural supply chain.

The project was as much about understanding relationships as it was about creating systems, and getting buy-in from all of the participants in the supply chain was essential. It is this aspect of food safety that will make the final system both workable and sustainable over the long term, according to Dr. Preston. "Our goal was to establish not only that food tracing could be done, but that it would deliver real value to everyone involved," he says. "While our initial interest was in food safety for purposes of public health, we understood that what would get the support of producers and processors was a system that would help them become more competitive, by adding economic value to their product."

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— Dr. Allan Preston

Information that adds value

The beauty of increasing visibility into the supply chain is that it carries the dual benefit that MAFRI needed to make its vision work. It provides the basis for improved safety while giving businesses the tools they need to increase revenue and boost trade.

For example, Asian governments closed their borders to all North American beef after an outbreak of bovine spongiform encephalopathy (BSE, or so-called "mad cow disease") a few years ago. One of the aspects of this disease is that it only strikes animals above a certain age. So, a system that can document and conclusively prove that any given beef product comes from an animal below the critical age would make the objection moot, potentially leading to a reopening of the Asian market.

The system can also help farmers get higher prices for their products by helping them prove the pedigree of food products. Consumers are better informed than ever, and are willing to pay more for products that are certified as being produced according to established standards of safety and quality. "Consumers have the right—and the expectation—to know that their food is safe, to know how it has been produced and to know where it has been before it ends up on their plates. This has become a top-of-mind issue for them," Preston says.

The project unfolds

Since the project's purpose was to demonstrate feasibility, it was targeted at high-level goals rather than detailed technical solution development. In its final form, the system could be deployed in a variety of ways, and use a variety of inputs including existing RFID tags on animals, barcodes or even manual data entry. "All of that is yet to come," Preston says. "For now, we're focusing on the key foundational elements to lay the groundwork for the future."

The functional backbone of the proposed solution is TraceTracker's Global Traceability Network (GTNet) food tracking platform. It provides a centralized repository for information along with a flexible, Web-based interface that can be easily integrated with a variety of existing systems and sensors. The success of the project, however, depended on much more than implementing the technology.

As a critical first step, MAFRI and IBM industry consultants met with members from every part of the supply chain, from producers to shippers to processors, distributors and retailers. "It was extraordinary—the first time all of these people had been in the same room together," Preston says. The purpose of the meetings was to map the supply chain in its entirety. Every member was asked to describe all inputs, processes and outputs, so that a complete view of all the complex relationships could be created. This insight was used to design the overall system, helping to ensure that it covered all parts of the value network.

The IBM industry team also developed a series of scenarios to demonstrate the value and effectiveness of the proposed food tracing system, which helped both MAFRI and the private-sector meeting participants to view its capabilities in context and understand how it could help them meet their goals. These scenarios addressed issues that applied to both government and business stakeholders: brand protection and enhancement (i.e., adding economic value to food products); supply chain effectiveness and efficiency; the mitigation of risk associated with food contamination; and regulatory compliance.

One of the lessons learned during the meetings was the importance of understanding the sensitivities of the participants. Food tracking and tracing is based on information sharing, and businesses are often reluctant to freely provide information. "On the small end of the scale, individual farmers generally feel that they are not in control of their destiny. They're at the mercy of suppliers and markets, and on the face of it this looks like one more thing that's going to dictate how they

operate. They needed to be shown very clearly how opening up would benefit them," Preston says. "Larger agribusinesses, for their part, want to keep their information confidential so that they don't lose competitive advantage. To address these concerns over transparency while still making the system useful we had to design it in such a way that information is accessed only on a need-to-know basis."

Another key initiative was to create a centralized premises database. "We need to know about every producer, every shipper, every processor," says Dr. Preston. "We need to make sure that products don't fall through the cracks and disappear as they move through the chain. If there's a business or farm out there we don't know about, then we're blind in that area. Consider the *E. coli* outbreak that affected California spinach a couple of years ago. If the origin of that produce was not known, then finding out the source of the outbreak would have reached a dead-end at the processor and its impact on other, uninvolved producers would have been much greater."

Supporting MAFRI's future vision

Thanks to the input of the businesses involved, the greater understanding of how the supply chain works, and the effectiveness of the software platform, the project has achieved its primary goals of demonstrating both feasibility and the potential for creating economic benefit. As a result, MAFRI has gotten a commitment from the Canadian government to proceed with building a comprehensive premises database that will serve as the foundation for developing the proof-of-concept into a fully functional system in years to come.

The key to success lies in MAFRI's understanding that it takes real-world practicality to fulfill its vision. Dr. Preston emphasizes that a workable system starts with what's important to the public and the government—safety—but actually putting it in place relies on these economic benefits. "If we build a robust system that gives us the ability and the information we need to deal with food emergencies, and will serve everybody in the value chain very well on the basis of trade and market access, then that's the way we want to go," he concludes.

For more information

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[1] March 14, 2009 address by President Obama announcing the appointment of a new Commissioner for the Food and Drug Administration

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