In the vernacular of animal disease control, Dr. Wayne Lees spends most of his time in “peacetime.” That’s what he calls the stretches when he and his colleagues at Manitoba Agriculture, Food and Rural Initiatives (MAFRI) ministry aren’t actively engaged in the containment of infectious disease outbreaks among livestock in the province of Manitoba, Canada. As the Chief Veterinary Officer for MAFRI, Lees’ ongoing battle to safeguard Manitoba’s agri-food chain—which, like that of Canada as a whole, increasingly extends to overseas markets—is never far from his mind.

From his office near the University of Manitoba, on the banks of the Red River in Winnipeg, Lees spends a significant share of his time and energy playing defense. On a day-to-day basis, this translates into interactions with other government food safety specialists from other Manitoba agencies, from counterpart agencies in other provinces to the Canadian federal government. Their collaboration is essential in mounting a rapid and effective response to a range of animal disease threats.

Leadership Spotlight
When Dr. Wayne Lees, Chief Veterinary Officer at Manitoba Agriculture, Food and Rural Initiatives (MAFRI) ministry, isn’t addressing animal disease outbreaks, he is hard at work strategizing on how to best fight the next battle.

How MAFRI got smarter
Like many nations, Canada has learned the lessons needed for fast animal disease response. When it called for its provinces to set up a livestock premises identification solution, MAFRI built a solution that identifies the whereabouts of farms and animals across the province. This solution provides the foundation for tracking the movement of livestock across the food chain—making it possible to pinpoint risks from animal-to-animal exposure. In the meantime, MAFRI has already successfully leveraged the solution to resolve a recent outbreak. By identifying, quantifying and analyzing risk factors at the time of detection, MAFRI expects to reduce the average disease control cycle by 80%.

Let’s Build a Smarter Planet
The high stakes of fast response

The decision to tighten coordination between Canada’s provinces and federal government can be traced to the foot-and-mouth-disease epidemic that spread through the United Kingdom in the spring and summer of 2001. That watershed event, which cost the British economy an estimated $16 billion, took six months and the killing of seven million sheep and cattle to halt. It serves as the ultimate cautionary tale on the importance of shrinking the time between detection and reaction. Perhaps the biggest lesson taken away by Lees and his colleagues from the epidemic was the importance of planning, and, more specifically, of having the flexibility to change the plan of attack when the situation warrants it.

For Lees, one key part of this planning—and a key element of his job—is the alignment of MAFRI policies and response protocols with those at the federal and provincial levels. But policies for dealing with outbreaks mean little without the ability to make informed decisions that reflect accurate and up-to-date understanding of the situation. From the moment the signs of an outbreak begin to appear, response officials need all the intelligence they can get their hands on. They need to know what they’re up against, how far it’s spread and where it’s likely to go next. From there, they can set up buffer zones around infected areas to prevent contamination in other farms and herds.

With the advent of electronic maps, disease control experts have, for the most part, moved beyond the paper and pushpins they once relied on to track the path of an outbreak’s spread. While that represents a step forward in accuracy and efficiency, disease trackers still tend to lack the granular details that make for a rapid, efficient and effective response. That’s because maps—whether paper or electronic—reveal only one dimension of the outbreak situation. For a true picture of the risk of spread, responders need to know the location and number of farms in an affected region and the at-risk livestock on them. Equally important intelligence in outbreak response is the ability to track animal movement from one farm to the next, which represents a primary conduit for disease transmission.

The benefits of MAFRI’s livestock tracing capabilities

- Reduces by more than 80% the reduction in time required to bring the average animal disease outbreak under control
- Lowers by as much as 50% “downstream” containment costs, such as manpower and transport
- Enables a more targeted and accurate application of epidemic responses such as quarantines
- Reduces the risk of export restrictions and cull-related losses resulting from animal disease epidemics, which represents millions of dollars in direct losses to the Manitoba livestock industry and local economies
- Enables more efficient deployment of animal disease control specialists in the field during outbreaks
Meeting the challenge the first time

This story is about what MAFRI is doing to improve its ability to track the course of animal epidemics and minimize their impact. MAFRI is putting in place the foundational component of its tracking strategy, known as a premises ID database. The best way to illustrate its value is to show how it helped Lees and his team to track and rapidly contain a recent outbreak among hogs in Manitoba. By way of background, Manitoba is the largest pork-exporting province in Canada, with roughly two-thirds of its hog production exported to the United States for finishing. Were Manitoba to fail at containment, the financial costs to its pork industry could be catastrophic.

The indicators of a potential outbreak can originate from many sources. Cases can be detected from samples analyzed in MAFRI’s diagnostic lab. Sometimes, Lees explains, the impetus can even be rumors circulating that trigger further investigation. But most often they come from veterinary practitioners, who are obligated by law to report potential cases of certain diseases. It was through this channel that MAFRI first detected a small outbreak of transmissible gastroenteritis, or TGE—a highly contagious disease that can kill young pigs—within a cluster of three farms in southeastern Manitoba. Coming just months after the deployment of its new tracking solution, the TGE outbreak served as its first proving ground.

When first alerted of the threat, Lees and his team immediately moved to size up the risk of spread by identifying and analyzing the proximity of other pig herds. Because MAFRI had access to detailed farm information stored in its premises ID database, Lees and his team were able to quickly determine the optimal buffer zone and work with swine veterinarians to identify potentially exposed herds. Rapidly determining the affected farms also enabled MAFRI’s disease control personnel to pinpoint animals that had come onto or left the affected farms, which in turn triggered other investigations. Ultimately, the outbreak was declared contained after a matter of weeks, with no additional farms affected.

While the significance and scope of this recent event is dwarfed by the 2001 UK foot-and-mouth outbreak, both serve to illustrate what Lees sees as the key to curbing such epidemics. “For fast-moving diseases, there’s an almost exponential relationship between the time it takes to first detect the extent of outbreak and the time required to bring it under control downstream,” he says. “If we can get a handle on things three days earlier, it makes a huge difference at the other end.” Lees believes that because the traceability solution enables MAFRI to locate—and therefore react to—the threat faster, the overall time required to bring the epidemic under control is reduced by more than 80 percent.
MAFRI’s drivers and lessons

The impetus to MAFRI’s deployment of the traceability solution was the Canadian government’s decision at the federal and provincial levels to create a national traceability system—linking all the provinces—with each province free to choose its own course. As with any major expenditure of this kind, MAFRI had to make the business case for the traceability solution through a multi-step review process. Once approval was granted, the first issues that needed to be addressed, before the solution could be implemented, were protocols around data sharing and privacy. The fact that each province had its own freedom of information and privacy legislation required MAFRI to establish very specific guidelines about when and with whom it would share the information in its tracking database.

The issue of data sharing—and the need to recognize the sensitivities around it—also turned out to be one of the key lessons learned in the project. As Dr. Allan Preston, MAFRI’s Assistant Deputy Minister and a champion of the project, observes, food tracking and tracing is about 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, that they’re at the mercy of suppliers and markets. To them, this looks like one more intrusion on how they operate,” explains Preston. “On the other end, larger agribusinesses want to keep their information confidential for competitive reasons. Our challenge was to design a solution that balanced the concerns of both of these key stakeholders.”

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MAFRI: The parameters of smarter animal disease control

- **Instrumented**
  Each farm and animal is uniquely identified in MAFRI’s premises ID system, which will serve as the foundation for broader tracking systems that will monitor the movement of tagged animals wherever they are transported.

- **Interconnected**
  The system enabled by MAFRI’s premises ID solution will track seamlessly and transparently animals across all of Canada’s provinces.

- **Intelligent**
  The premises ID solution’s what-if capability enables MAFRI to model different outbreak scenarios, facilitating the formulation of optimal response strategies.
Toward proactive outbreak control

Lees and his team are proving that fast reaction isn't the only way to fight disease outbreaks. They're using the traceability solution to perform modeling studies that give them a better idea—in advance—of how outbreaks are likely to spread, given factors like farm location and animal densities. By enabling such “what-if” scenarios, Lees sees the solution as a means of formulating measures to prevent outbreaks and—in the event they occur—to have a plan of attack that enables the most rapid and effective response. “When we modeled outbreaks of avian influenza in Manitoba poultry barns, we were able to run iterative scenarios on how diseases spread and measure the likely impact of changes in reaction tactics,” explains Lees. “It gives us a greater understanding of the variables at play and how they might behave in a response situation.”

MAFRI is in the final stages of populating its premises identification database, and is working with industry, other provinces and the federal government to develop systems for tracking the movement of animals. This capability will further strengthen Canada's ability to fight the spread of infectious animal diseases by giving responders even better information to act on. “The fight to control animal epidemics will always require a mix of judgment, intuition and flexibility,” says Lees. “The solution we put in place strengthens us in each one of these dimensions and improves our ability to keep our livestock healthy and our food industry safe.”

MAFRI's traceability solution is...

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IBM® Maximo® Asset Management

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