When (Before) Disaster Strikes: Preparing for a Disease Outbreak

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Take Home Messages

- Diseases can have significant effects on productivity, profitability, and market access.
- The threat of foreign animal disease is growing in frequency and impact.
- On-farm planning can help to dramatically lower the risks associated with disease through emergency plans, contingency plans, and enhancements to biosecurity.
- Zoning may be an option in some cases and may allow parts of the country to continue trading while other parts of the country are managing a disease issue. Trading partners must recognize the zone and be willing to trade in that situation.
- Zoning can also be applied at the farm level as part of a contingency plan. This requires designation of certain areas of the farm as either restricted access, controlled access, or unrestricted. Establishing these zones in advance can help to ensure ongoing deliveries and pickup services in the midst of a disease outbreak with minimal risk of transmitting the disease off farm.
- Biosecurity programs that are established to prevent or reduce transmission of disease on-farm serve equally well in relation to serious foreign animal diseases, where these programs provide the last line of defence.

Introduction

There is no doubt major disease outbreaks can have significant economic consequences due to the loss of production that can result from the disease itself and from the loss of infected animals in situations where it is beneficial or mandated to cull animals as a means of controlling the disease. This problem is further exacerbated in situations that result in closure of international markets, particularly in export dependent countries that rely on foreign markets for significant portions of their production chain. Figure 1 outlines some of the risks and impacts associated with a range of disease, pest, and natural disasters.

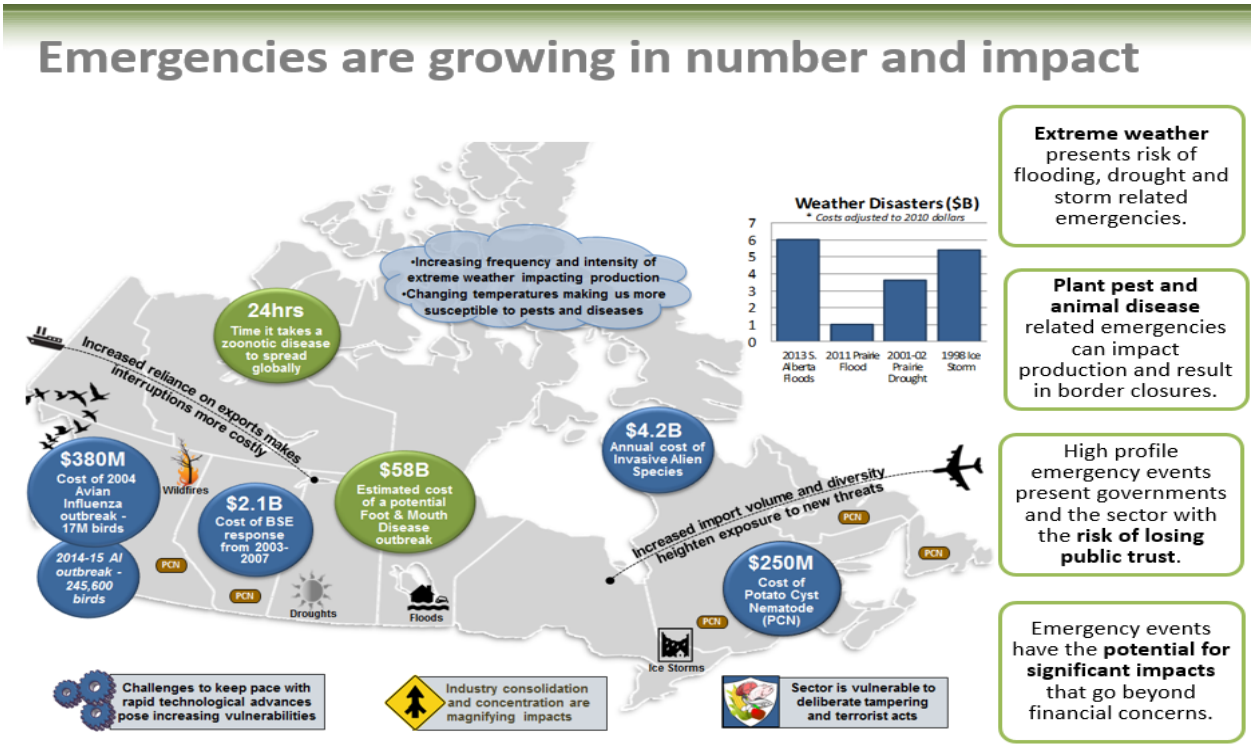

Figure 1. Risks and impacts of disease, pests, and natural disasters. (Courtesy of the Canadian Plant and Animal Health Strategy)

The most significant cattle disease related incident in recent Canadian history involves the detection of Canada's first native case of bovine spongiform encephalopathy (BSE) in May 2003. Several articles documented the financial impacts of this crisis and several estimates were circulated in the following years. The National Farmed Animal Health and Welfare Council, through contractors working on the "Animal Health Canada" initiative, has looked back on some of these reports to understand the financial impacts that these events can have to justify the need for an updated approach to management of large scale disease events.

In that summary, the contractors noted four reports relating to BSE, with each looking at various aspects of the issue including lost cattle and beef sales, loss of genetics, costs associated with managing the disease, and labour costs. While the figures reported have a wide range (from $541 million for the first month after detection to $5.5 billion over the first two years), the key takeaway is that the numbers can be extremely large.

In other disease outbreaks in Canada and around the world, the findings are similar. One Canadian Food Inspection Agency (CFIA) report from 2002-03 noted that the potential cost of a foot and mouth disease (FMD) outbreak in Canada would be $30 billion while a Serecon report from 2002 looked at three possible scenarios and estimated the cost between $8.3 billion and $46 billion.

▪ Prevention, Preparedness, Response, and Recovery

Discussions around large-scale disease outbreaks often focus on four key elements: prevention, preparedness, response, and recovery.

Prevention items can include steps taken internationally, nationally, regionally, and at the farm level. Internationally, risk assessments, inspection, and evaluations of foreign country veterinary services help to establish which countries have sufficient measures in place to ensure low risk trade potential.

Nationally, import policies and border inspections address the majority of the preventative measures taken. Regionally and at the farm level, biosecurity programs become the last line of defence.

Preparedness involves a wide range of activities. The first, and perhaps most obvious to some, comes in the form of plans for responding to a disease incursion. This can include government response plans, industry organization plans or farm level plans. Government plans often include policy decisions, which may have been made through consultation with industry in advance of the crisis, and provide strategic approaches in key areas of the disease management process. This can include decisions on the type of approach or desired outcome (eradication vs. management) and mechanisms to achieve that outcome (cull vs. vaccination). Government preparedness also includes development of infrastructure items like traceability and surveillance programs that can help understand the spread of the disease or help to establish disease control zones. Another infrastructure item involves the establishment of vaccine banks and agreements for accessing them if developed in partnership with other countries or regions.

Industry plans may include items that are critical early in the incident such as communications planning to keep members informed and engagement plans to remain in contact with government. This becomes helpful in building a collaborative approach to managing the disease and ensuring goals and outcomes of the respective stakeholders are well understood. Farm plans often include information for farmers regarding possible movement controls, enhancement of biosecurity measures, quick reference guides, risk assessment tools, and contact lists. They may also include recommendations on contingency plans that farmers can complete in advance of a crisis in order to improve their level of preparedness.

Other important elements that go along with these plans are training and exercises, both of which improve the level of understanding of the plans and how they will be implemented. Unfortunately, it is impossible to predict how a disease will enter Canada, when it will be detected, how far it will have spread prior to detection, and what market impacts might occur. It is for this reason that plans cannot be written with a completely prescriptive process for managing the disease. Training and exercises help to identify some of the different scenarios that may occur.

Some may suggest that the response plans, training, and exercises fall within the response category, while others acknowledge the importance of having them as well developed as possible prior to the need to respond. Based on that notion, response is considered here as the actual component that follows detection of a disease situation. The response will include a wide range of actions including emergency management and leadership, communications, policy development to address situations that were not anticipated, and actual disease control activities including inspections, testing, containment (movement restrictions, zoning), culling, disposal, vaccinations if applicable, cleaning and disinfection, support programs (financial, mental health), and business continuity planning.

The late stages of response often merge into recovery as ongoing surveillance and monitoring activities start to confirm eradication or control of the disease, which then provides reassurance to trading partners that it is safe to resume trading and accepting products from the affected country. Significant work must go into the recovery stage as well; both in terms of the negotiations with those foreign trading partners and the recovery work with the industry to start rebuilding any lost animal populations and genetics established over extended periods as well as identifying what a changed industry might look like.

▪ Zoning for Control of Disease

Zoning is an internationally accepted mechanism to control disease and to potentially enable trade from an unaffected portion of a country while the remainder of the country works to control or eradicate the disease. The World Organization for Animal Health provides guidance on what is required for zones to be established and recognized, and gives recommendations on application of zoning for different diseases.

Two key elements are involved in establishing a disease control zone: movement restrictions and surveillance. The movement restrictions ensure that the disease is not transmitted outside of the zone

and include controls on anything that can potentially carry that disease agent. The carriers can include animal products and the infected animals themselves. Surveillance is necessary outside of the zone to ensure that the disease agent is being effectively contained within the zone.

Implementation of a zone early in a disease outbreak is challenging. The disease situation must be understood before embarking on this process so that the size of the zone captures the diseased population. An understanding of animal movement (traceability) can provide clues in advance of an outbreak as to how the disease might be contained. However, if animal products or feed are important in spreading the disease, it is important to understand more than just the animal movement.

The initial declaration of a zone should be larger rather than smaller, with the potential to shrink the size of the zone as more information becomes available. Starting with a smaller zone and needing to expand it may be viewed as a lack of control of the zone and result in trading partners losing faith or trust in the infected country to effectively manage the disease.

A newly established zone may have three components to it. At the centre, there will be an infected zone. Surrounding the infected zone is the buffer zone that provides an area to monitor for spread of disease (surveillance) beyond the infected zone. Vaccination may also occur within that buffer zone as a means to prevent the disease from moving outside the infected zone. Beyond the surveillance zone lies the disease-free zone from which trade can potentially occur.

This establishment of a zone can be applied at a smaller scale if the disease is caught early or has low rates of transmission. If there are very few infected farms and they are not located in proximity to each other, it may make more sense to apply an infected zone around the infected farms rather than capture them all in one zone. Each zone might include all farms within a certain radius of each infected farm. A larger radius would then be used to identify farms on which surveillance and/or vaccination would occur (the buffer zone) and beyond that radius, no action taken (the disease-free zone).

The concept of zoning can also apply at the individual farm level from a preparedness perspective. During peace time, farms should consider identifying a restricted access zone (RAZ) and a controlled access zone (CAZ) so that they can be established or implemented quickly. Figure 2 provides an example of how these zones could be applied. The RAZ should contain the animal holding areas, representing the area where you need to keep disease out of, or in the case of introduction of disease, where you need to keep it contained. The CAZ represents a buffer area around the RAZ and allows access to areas that are essential to ongoing animal production without direct access to the animals. This can include such things as feed delivery, milk retrieval, or animal loading areas. Being able to access these areas while minimizing the risk of coming into contact with the disease agent in the case of an outbreak of disease in the animal holding area is critical.

In addition to having access zones defined on the farm prior to an outbreak, producers should also have plans developed that will allow them to continue to function as well as possible in the face of imposed widespread movement controls. Movement controls in the early stage of an outbreak are a critical tool to allow disease investigators to determine risks for disease spread off the farm, where spread may have occurred based on those risks, and how widespread the disease might be.

During the initial stages of a disease outbreak, producers should be prepared to deal with keeping animals on farm longer than normal and have destruction and disposal contingency plans for when movement control periods become extended. These plans can also be helpful in dealing with animals that are unfit for transport, although the volume of animals may become larger when dealing with prolonged movement restrictions.

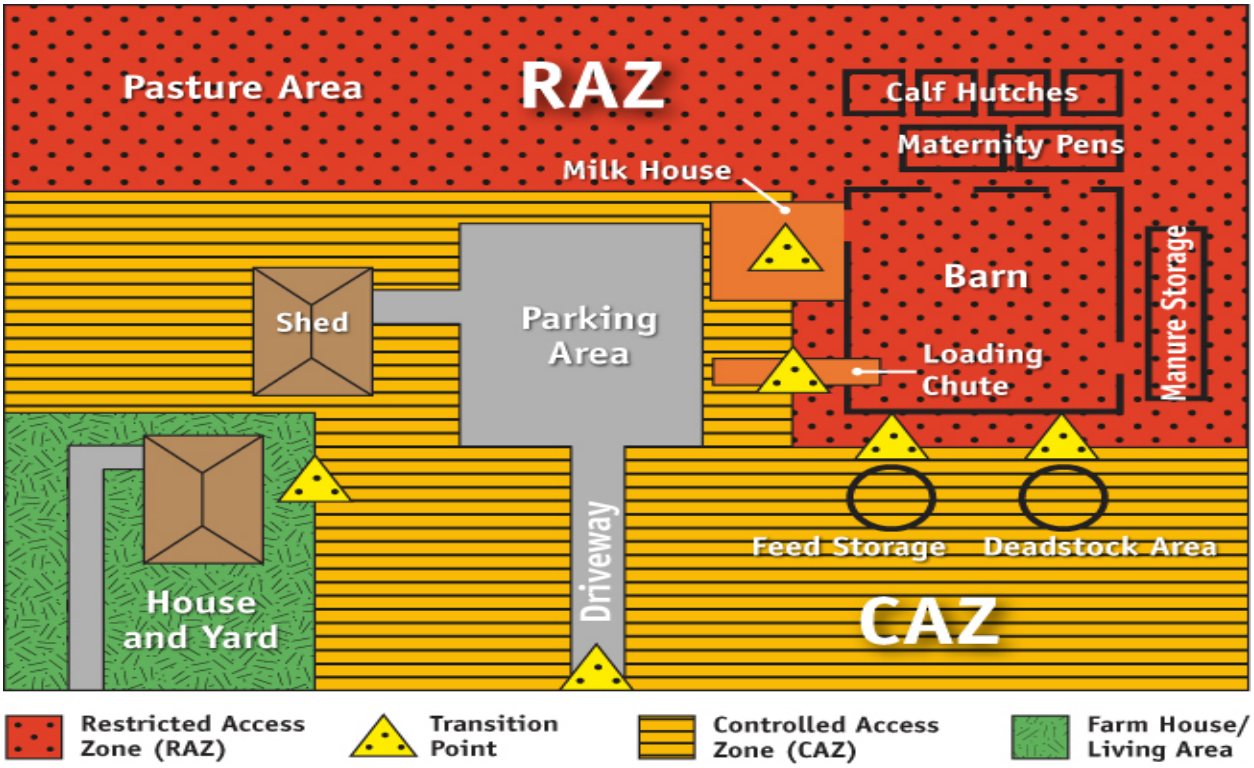

Figure 2. Diagram of possible restricted and controlled access zones. (Courtesy of the Canadian Food Inspection Agency)

▪ Vaccination

Canada has long considered vaccination a less favourable option in the face of a disease outbreak. However, advances in vaccine and testing technology that allow differentiation of vaccinated and infected animals, decreasing social acceptance of mass culling, and better understanding resource requirements for mass culling are making vaccination increasingly important in disease control strategies. Unfortunately, vaccines are not available for all diseases.

Foot and mouth disease is one disease where vaccination is being strongly considered within control strategies in Canada. Foot and mouth disease still provides a challenge in that there are several serotypes of the virus around the world and there will be a need to identify the serotype before being able to order and apply vaccination strategies. Currently, there are roughly 65 different strains identified.

Canada is working on vaccine banks for FMD with other countries around the world. Currently, Canada, the United States and Mexico participate in a North American Foot and Mouth Disease Vaccine Bank (NAFMDVB). However, the quantity of vaccine is insufficient and given the likelihood of more than one of these countries becoming infected should the disease enter North America, we will be all drawing from the same source. As a result, Canada is also pursuing options to participate in other banks with the United Kingdom, Australia, and New Zealand. Challenges with vaccine banks include their expense and the fact that the material (viral antigen) has a limited shelf life, which further adds to the expense through routine replacement or updating.

▪ On-farm Biosecurity

While on-farm biosecurity has been partly addressed in the discussion around RAZ and CAZ, there is much more to include for on-farm measures. These items can be discussed generally or conceptually, but

looking at them with a specific disease in mind might provide more value. Based on this, a disease that is provincially reportable in Alberta will be used.

Salmonella dublin (SD) is a bacterial disease that can cause pneumonia, diarrhea, and reproductive losses in cattle. Animals that recover from the disease can become persistent carriers and intermittent shedders of the bacteria. There are reports of increasing prevalence of this condition and given this as well as the fact that it can also cause illness in people, it is reportable in Alberta. The province is interested in monitoring SD trends and despite limited numbers of reports, it is suspected that there are more cases occurring. In terms of response, the Alberta government works with the herd owner and their veterinarian to assist with testing and making recommendations for disease management options in each case.

Salmonella Dublin is an opportunistic pathogen, taking advantage of stressful moments such as the period close to parturition. As a result, anything that can be done to support the cows during that time is beneficial. This can include provision of high-quality feed, adequate space, and dedicated, clean maternity areas.

The first consideration for SD, like with many other diseases, is to prevent introduction into the herd. Having programs that effectively mitigate risks associated with visitors, incoming animals, feed purchasing, and load out procedures for animals leaving are key areas to focus on.

In terms of dealing with introduction of disease or implementing practices to minimize the chance of SD becoming established on a farm, it is possible to look at various stages of production in a systematic fashion. This can provide a view to areas of risk and interventions that may be of greatest benefit.

The first stage is calving. Minimizing the number or density of cows, having a clean calving facility, keeping sick cows out, minimizing the time calves spend with mothers, and keeping calves from suckling cows can help reduce calf exposure.

The second stage is the post calving/weaning times. Feeding non-pooled colostrum, heat treating colostrum, physical separating calves from cows, separating out sick calves, and maintaining clean calf rearing areas and equipment, tools, boots, etc. further reduce calf exposure.

Manure contamination is a significant risk factor, given the ability of SD to remain viable in the environment for extended time. While this is a factor in many of the recommendations in the previous two stages, it is a primary driver for recommendations in the post weaning and heifer rearing stages. Minimizing contact with cattle of other age groups, pastures where other age groups have resided or where manure has been spread, and reducing the size and density of calf groups all help to minimize the risks of infection.

▪ Conclusion

Biosecurity and emergency preparedness are critical elements in current livestock production. While the farm represents a significant investment itself, the implications for the broader industry are significantly greater and have the potential to considerably affect market access and economics of livestock production. Many of the principles that apply to keeping herds free of endemic production-limiting diseases are highly relatable to also providing a last line of defence against foreign animal diseases. Completing a risk assessment at the farm level and outlining programs to address gaps and establish contingency plans should be strongly considered prior to incursion of disease.

Resources

Biosecurity for Canadian Dairy Farms: National Standard: https://www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/dairy-farms/eng/1359657658068/1359658301822

OIE – World Organization for Animal Health Zoning and Compartmentalization: https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_zoning_compartment.pdf

Salmonellosis in Cattle – A review https://www.vetmed.wisc.edu/dms/fapm/fapmtools/7health/Salmorev.pdf

Serecon Report https://www.ifama.org/resources/Documents/v8i1/Pritchett-Thilmany-Johnson.pdf

Website: www.wcchta.com Email: wcchta@gmail.com

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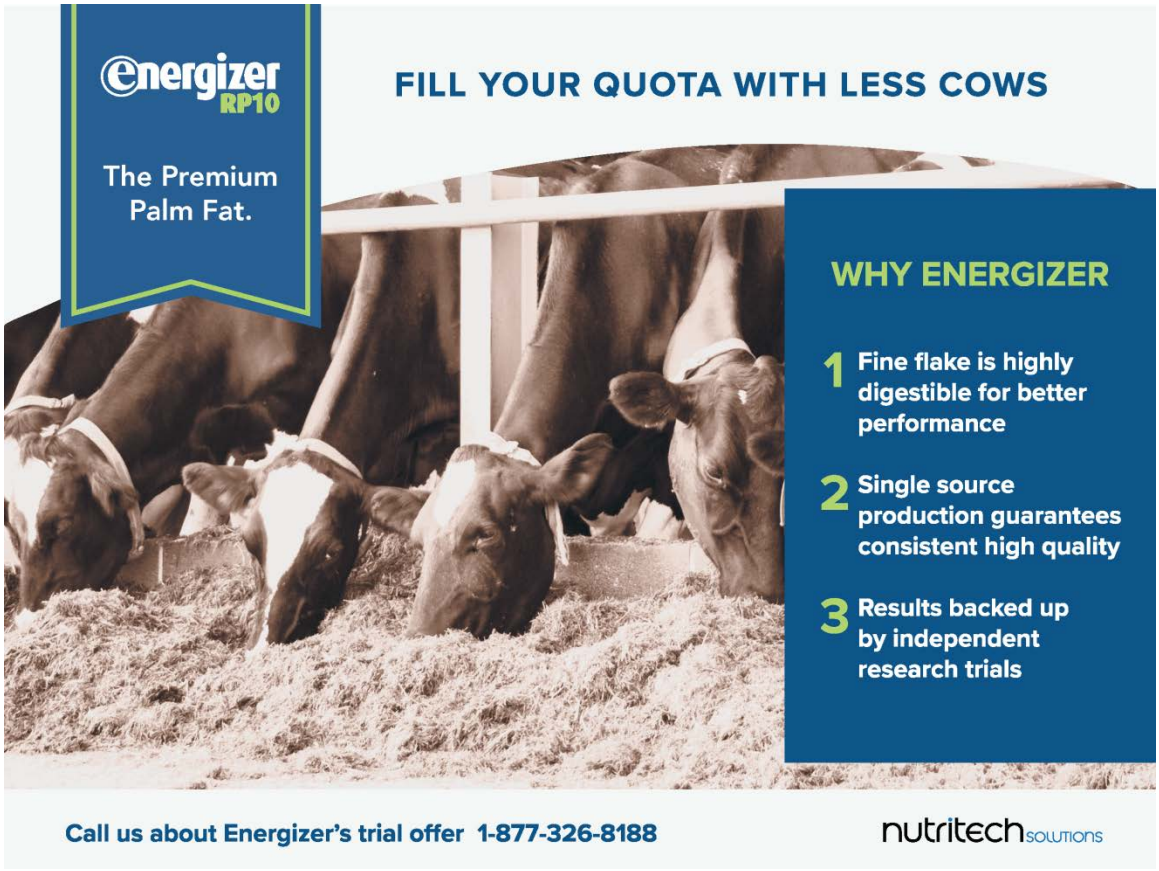
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