



## MANAGING AGRI-FOOD PATHOGENS: **Canadian Agri-Food Industry Context and Pressures**

**Canadian agri-food systems are facing mounting pressures, including global geopolitical shifts and domestic industry changes, such as:**

- Ongoing reviews and shifts in international trade agreements.
- Combined impacts of the pandemic and climate change, exposing vulnerabilities in our supply chains, prompting review of legislation related to energy, environment, and the movement of goods.
- Sector-specific challenges such as financial strain across market sectors and limited processing capacity.

**Producers today are navigating more complex challenges than ever, ranging from evolving regulations and societal expectations, to shifting market demands, all of which influence their daily decision-making.**

Despite this, Canadian producers and commodity organizations continue to consistently serve Ontario, Canada, and international markets with safe, nourishing and high quality agricultural products. At the same time, commodity groups are working relentlessly in areas of emergency preparedness, increasing processing capacity, and securing support programs to benefit Ontario producers. At the heart of these industry efforts is a strong drive for innovation, producer-focused solutions, enhanced productivity, and improved sector-wide competitiveness.

**Across Canadian agricultural commodity groups, several reoccurring priorities and themes have emerged:**

- Strengthening collaboration within and across sectors, including deepening relationships with federal and provincial ministries of agriculture.
- Investing in risk management frameworks and emergency preparedness plans.
- Prioritizing research and innovation that leads to practical, on-farm tools and technologies.
- Building coordinated partnerships with government, industry, and cross-sector organizations to support shared goals.

**Several commodity groups are making significant strides in emergency preparedness by advancing research, tools, and practices to prevent disease outbreaks. Notable examples include:**

- Ontario Pork investing ~\$150 million into African Swine Fever (ASF) Response Program.
- Dairy Farmers of Ontario (DFO) recommending to the federal pre-budget consultation to secure funding for a Foot and Mouth Disease vaccine bank, protecting biosecurity on farms, and advocating for access to and approval of antimicrobials and alternative approaches.
- All agricultural commodity groups participating in the Agricultural Research and Innovation Ontario (ARIO) Modernization Act to advance Ontario's agricultural research.
- Developing digital tools to enhance traceability, biosecurity and operational efficiency, such as:
  1. **Ontario Swine** developed the AgManifest recording system with Ontario pork processors and transporters for automatic recording of hog movements, disease monitoring, scheduling and documenting.
  2. **Swine Health Ontario** evaluated vaccination strategies to reduce Porcine Reproductive and Respiratory Syndrome (PRRS) severity and improved PRRS genotype reporting through a collaboration with the University of Guelph Animal Health Lab.

## Current Industry Sector Efforts to Strengthen Biosecurity, Surveillance, and Collaboration to Respond to Emerging Pathogens

**Agricultural commodity groups across Ontario are taking proactive, coordinated action to address current and emerging challenges. Key efforts include:**

### 1

#### RESEARCH AND INNOVATION

- A.** Investing in research and establishing strategic research priorities to enhance sector sustainability and competitiveness.

*e.g., Beef Farmers of Ontario (BFO) check-off increase; strategic plans involving research priorities from BFO and Chicken Farmers of Ontario (CFO).*

- B.** Directing research efforts toward new methods for the control, elimination, or prevention of devastating animal diseases.

*e.g., Ontario Swine's PRRS virus research with the aim to identify prevention and treatment approaches beyond vaccines and pharmaceuticals.*



## 2

### DISEASE MANAGEMENT AND BIOSECURITY

- A. Strengthening governance models to manage multiple disease outbreaks and build surge capacity—particularly for poultry.  
*e.g., CFO in collaboration with Feather Board Command Centre (FBCC) and other industry partners.*
- B. FBCC developing a heightened biosecurity protocol list for all poultry producers.
- C. Improving Risk Management Frameworks across sectors.  
*e.g., CFO, Veal Farmers of Ontario (VFO), and Ontario Swine.*
- D. Developing tools for emergency response and biosecurity.  
*e.g., Ontario Swine's virus control tool and continued alignment with the provincial ministry on emergency plans.*
- E. Building strong response plans for potential foreign animal disease outbreaks.  
*e.g., Ontario Pork working with the provincial ministry, feed companies, transporters, packing plants, and assembly yards.*

## 3

### ADVOCACY AND SUPPORT FOR PRODUCERS

- A. Advocating for and investing in support programs for producers potentially affected by foreign animal diseases.  
*e.g., Ontario Swine's ASF, Porcine Epidemic Diarrhea, and porcine deltacoronavirus Emergency Preparedness Plans.*
- B. Supporting calls for national programs and funding for disease prevention and rapid response.

#### KEY RESEARCH FINDINGS FROM THE FOOD FROM THOUGHT RESEARCH REPORT:

## Strengthening Surveillance, Prevention and Collaboration to Respond to Emerging Pathogens

**In addition to the many pressures on our agricultural sectors, the rising frequency of biological threats to agri-food systems underscores an urgent need for attention—particularly as these risks increasingly intersect with public health.**

From Avian Influenza to antimicrobial resistance (AMR) and more – a series of risks is threatening Canada's agricultural sectors and putting producers at the forefront of responding to these risks which will impact animal health, public health and economic productivity.

Emerging research may offer solutions. Food from Thought (FFT), the Canada First Research Excellence Fund program at the University of Guelph, has highlighted key research funded over the last 8 years, with findings and calls to action related to emerging agri-food pathogens that can strengthen prevention, biosecurity and surveillance.



## Avian Influenza

Over 11 million birds have been culled in Canada since 2021 due to avian influenza, which has now been found in dairy cattle and humans, with enormous potential risk to public health. Emerging research highlights several innovations relevant to producers, that could reduce the incidence of, or protect against, avian influenza. Some key findings include:

- **Improving poultry vaccine effectiveness** by developing an mRNA vaccine and giving it to embryos *in ovo*, as well as after hatching, to boost immune response; the use of biodegradable nanoparticles can also improve immune response in chickens.
- **Probiotics** also showed promise in decreasing the incidence and severity of outbreaks and improving immune response.
- Using social media algorithms to help to **track and predict outbreaks** weeks before they are officially reported – giving producers and authorities a head start in their response.
- The development of an **artificial intelligence-based system** to help decision-makers respond to outbreaks.

Novel vaccine approaches and alternative probiotic interventions can serve as important tools in a disease outbreak prevention plan for industry. Additionally, databases and data infrastructure for the poultry industry can benefit from integrating outbreak tracking, prediction and response tools.

## Antimicrobial Resistance

Antimicrobial resistance (AMR), which occurs when bacteria evolve to resist antibiotics, is a risk to both animal and human health – and over 80% of antimicrobial use in Canada is agriculture-related. Producers and commodity groups are governed by strong regulations around the use of antimicrobials and practice responsible stewardship on farm, but research suggests several additional considerations that could further improve antimicrobial stewardship, including:

- Advanced technologies such as the **Darte-QM tool** can analyze the spread and presence of antimicrobial resistant genes quickly and cost-effectively; this tool enables a risk-based approach that will let us target interventions more effectively.
- Advanced technologies like **near-infrared spectroscopy** detect antibiotic residues in milk to ensure contaminated milk does not reach consumers.
- Research suggests that farmers are generally aware of AMR concerns, but **economic and practical concerns** may limit the adoption of both biosecurity measures and farm infrastructure, suggesting that targeted incentives, alongside continuing education and collaboration with veterinarians, could be implemented.
- Alarming levels of AMR were seen when sequencing *Streptococcus suis* (*S. suis*) isolates from swine, suggesting **ongoing surveillance** is still necessary, while other research on *S. suis* found that introducing pigs less frequently could reduce disease incidence and identified genetic markers for more disease-resistant pigs.

AMR poses a significant threat to livestock production and broader public health. The described research provides early-response tools and insights that industry can adopt now to get ahead of a growing threat. Effective knowledge mobilization about AMR risks, along with the importance of surveillance and related tools, is essential. This will support the implementation and improvement of these tools and enable producers and industry leaders to provide input on future actions to reduce AMR risks.



# Next Steps for the Livestock Sector

To strengthen preparedness, build resilience, and maximize the value of agricultural research, there are several practical actions commodity groups and industry partners can take now, if they are not already engaged in these actions:

## Short-Term Actions

**Engage in Large-Scale Research Initiatives:** Participate in ongoing and upcoming research programs at the University of Guelph or similar initiatives to ensure research aligns with producer and industry needs.

**Nominate Industry Representatives:** Appoint industry representatives to liaison groups (such as research advisory boards) to ensure that industry input is integrated from the outset of research projects, helping to address real-world needs.

**Leverage Knowledge Transfer Platforms:** Collaborate with University of Guelph knowledge mobilization hubs (e.g., Beef @ Guelph, Dairy @ Guelph, Microbiomes @ Guelph, the Ontario Agri-Food Innovation Alliance, etc.) and develop knowledge transfer hubs (e.g. DFO's The Canadian Dairy Hub) to develop and disseminate producer-friendly tools and resources.

**Provide Feedback on Existing Research Tools:** Test, evaluate, and offer feedback on new research tools and technologies to enhance their relevance and adoption at the farm level.

**Identify Immediate Pathogen Priorities:** Work with researchers to direct attention to urgent threats such as African Swine Fever, Porcine Reproductive and Respiratory Syndrome, and avian influenza.

## Long-Term Actions

**Co-Develop Funding Proposals:** Build long-term collaborations with researchers to jointly apply for funding that addresses producer-focused and industry-driven priorities.

**Develop and Refine Strategic Research Agendas:** Establish or update long-range research priorities across commodities with a focus on prevention, monitoring, vaccine development, and data collection.

**Foster Cross-Sector Collaboration on Zoonotic Diseases:** Invest in joint research on diseases with cross-species impact (e.g., avian influenza affecting poultry, dairy, and wildlife) to promote coordinated response strategies.

**Build Capacity for Knowledge Mobilization:** Develop internal processes and partnerships to systematically translate emerging research into tools and policy that benefit producers.



# Conclusion

**The Canadian Agri-Food System has always been resilient, and now new opportunities have emerged to leverage research to safeguard our future in a time of uncertainty.**

From emerging pathogens and disease risks to shifting trade landscapes, research remains one of the industry's most powerful tools. The research in this briefing highlights technologies, insights, and resources that can be adopted by producers, to aid in continuing to deliver high-quality, safe, and sustainable Canadian livestock products.

Ongoing efforts to align and integrate these research findings with the priorities of industry, commodity groups, producers, and agri-businesses will strengthen our collective ability to prevent, monitor, and respond to threats such as avian influenza. This collaboration ensures research is targeted, practical, and positioned to address both current and future challenges.

**Canadian agricultural products are globally recognized for their quality and standards. At the heart of that success is the strong, evolving partnership between research institutions and industry leaders.**

**As we look ahead, there is a timely opportunity to deepen this relationship by leveraging large-scale, innovative research programs to build resilience, enhance competitiveness, and safeguard the future of Canadian agriculture.**



**Visit the project website to access the full report:**



<https://foodfromthought.ca/agri-food-pathogens-report/>