Research Priorities

This section contains the details and scope of the research priority and focus areas of this call. Applicant must first identify a specific research question from this section that will help to select the focus area and priority area in the online (Research Management System) application template. Each research question is accompanied by a description of the research problem and desired outcome to help focus the proposal.

1. **Research Priority Area: Food Safety**
   
   (OMAFRA contacts: Susan Healey - Susan.healey@ontario.ca; KTT: Barb Dillingham Barbara.dillingham@ontario.ca)

   a. **Research Focus Area: Pathway Analysis**

      **Research question:** What are the main pathogen entry points and pathways for smaller-scale processed foods in Ontario?

      **Research problem/gap:** There are concerns about the movement of pathogens through the food chain, particularly in small facilities/plants where research has typically not occurred.

      **Desired outcomes:** Results would inform guidance and educational materials to advise Ontario's processors and regulators.

   b. **Research Focus Area: Prevention and Control**

     b. (1) **Research question:** How can current interventions for Salmonella, Campylobacter and other pathogens in the Ontario poultry production and processing chain be improved to further reduce the risks to food safety (e.g. hatchery/breeder level)?

        **Research problem/gap:** The presence of Salmonella and other pathogens in Ontario poultry is a continuing problem. Some jurisdictions have more stringent measures in place and have reduced the incidence of salmonella in live and processed poultry. Research findings could inform provincial operational protocols as well as prospective federal regulatory changes.

        **Desired outcomes:** Results would provide evidence to revise or introduce new operational procedures to reduce and mitigate pathogen load in Ontario poultry, and to inform prospective federal regulatory changes or industry requirements.

     b. (2) **Research question:** What interventions at any point in the value chain are effective for enhancing reduction and mitigation of pathogens and/or hazards in foods while preserving desirable product traits?
**Research problem/gap:** Minimally processed foods can be contaminated with pathogens, which could lead to outbreaks in Ontario. Although there is a considerable amount of research on effective interventions, some are known to negatively impact product quality.

** Desired outcomes:** Project results would be used to corroborate, revise or introduce new operational procedures incorporating the most effective interventions that preserve the desired qualities in processed food, while also leading to a decrease in the number of reported cases of pathogens in food, the number of food recalls, and the incidence of food-related outbreaks and illnesses. The majority of interventions tend to be applied at the processing stage.

c. **Research Focus Area:** Detection and Surveillance: Baseline Data

   c. (1) **Research question:** What is the risk profile for Ontario-grown minimally-processed fruits and vegetables and the relationship with production practices (e.g. irrigation water)?

   **Research problem/gap:** Cases of pathogen contamination of minimally processed fruits and vegetables have led to outbreaks and recalls. More information and data are needed to understand where mitigation actions should be targeted to mitigate these risks.

   ** Desired outcomes:** Project results will help to establish the risk level for minimally processed fruits and vegetables that enter the Ontario and export markets, and the relationship between risk level and production practices. The results may be used to inform changes to regulatory policy as well as industry best practices.

   c. (2) **Research question:** What is the pathogen burden in market-ready lamb, sheep, goat and/or pork in Ontario?

   **Research problem/gap:** There is no recent available data on pathogens in these meat products in Ontario. Data would establish an important baseline to which comparisons can be made in future. Furthermore, the existing surveillance data for hogs sent to slaughter is not recent (dating from 5 to 10 years ago) and little to none of it is from Ontario. Project results will provide an up to date risk profile of livestock processed at provincial slaughter houses.

   ** Desired outcomes:** Project results will help to establish the risk level of meat products that enter the Ontario market. The results may be used to inform changes to regulatory policy as well as industry best practices.

   c. (3) **Research question:** What is the pathogen burden in ground meat products prepared in small-scale, provincially-licensed facilities?
**Research problem/gap:** Currently there is no available data on pathogens in ground meats (beef, turkey, pork, etc.) processed at provincially licensed facilities. OMAFRA’s meat program currently tests (individual) carcasses but not ground meat products that combine meats from different source animals. Data on ground meat products would establish an important baseline to which comparisons can be made in future.

**Desired outcome:** Project results will help to establish the risk level of ground meat products, allowing for monitoring and evaluation of the impact of prospective food safety protocols, industry practices, and regulations.

d. **Research Focus Area:** Validation of Detection Methods

**Research question:** What is the value of using metagenomics and other CIDTs (Culture-Independent Diagnostic Tests) in pathogen detection or surveillance compared to conventional culture methods, particularly in primary production?

**Research problem/gap:** DNA testing is expected to replace conventional culture methods for detecting and undertaking surveillance of pathogens in food. Conventional methods take longer and have lower specificity. The economic and other impacts of replacing traditional testing with metagenomics and other CIDTs is not yet well understood.

**Desired outcome:** Technological advancement in detection and surveillance methodologies will inform government policies and industry practice. These methods could provide same-day flock pathogen testing results allowing for expeditious decisions.

2. **Research Priority Area: Competitive Production Systems**

(OMAFRA contacts: Kelley Knight, kelley.knight@ontario.ca; KTT- Luke Gartner, luke.gartner@ontario.ca)

a. **Research Focus Area:** Technology Development: Automation

**Research question:** What are the barriers/drivers to innovative automation and robotics technology adoption by Ontario businesses in the agri-food sector? Where agri-food businesses have adopted innovative automation and robotics, were the original reasons for making the investments achieved/ were the outcomes positive, negative or neutral? In addition, how were barriers to adoption overcome?

**Research problem/gap:** Innovative technology is an important component that will help the agri-food sector increase its competitiveness and productivity. Automation and robotics adoption
can also reduce critical labor shortages. It is therefore important to understand the factors that impact adoption by the sector.

**Desired outcome:** To remove barriers to and support drivers of automation and robotics adoption by the sector.

3. Research **Priority Area:** Trade, Market & Targeted Sector Growth Opportunities

(OMAFRA contacts: Kelley Knight, kelley.knight@ontario.ca; KTT- Luke Gartner, luke.gartner@ontario.ca)

a. **Research Focus Area:** Global Market Analysis

a. (1) **Research question:** Which global hubs (e.g. Dubai, Ethiopia, Singapore, Netherlands) present the best opportunities for Ontario’s agri-food sector to seek realistic success in the next 2-5 years? Which subsectors of Ontario’s agri-food sector might be most compatible with each market’s needs? What are the potential barriers to overcome? How can these barriers be addressed?

**Research problem/gap:** Increasing exports is an important element of Ontario’s trade agenda and can be accomplished through expanding presence in existing markets, through new regions and channels, as well as looking for opportunities in new markets, such as hubs. Government has a critical role to play in market development and diversification, as success requires long-term commitment from a relationship and logistical perspective. Not enough is currently known about the opportunities that Ontario could maximize in global hubs. Considering the significant volumes of travellers passing through hubs, extensive food service opportunities exist.

**Desired outcome:** Understanding of the challenges and growth opportunities for Ontario’s agri-food sector in key global hubs to potentially inform a strategic approach to guide key agri-food sectors to actively pursue growth.

a. (2) **Research question:** Among the secondary group of Ontario’s U.S. state trading partners, which ones (i.e. Missouri, Kentucky, Tennessee, Indiana, West Virginia, Virginia, North Carolina, South Carolina), present the best opportunities for Ontario’s agri-food sector to seek realistic success in the next 2-5 years? Which subsectors of Ontario’s agri-food sector might be most compatible with each market’s needs? What are the potential barriers to overcome, particularly in terms of logistical and transportation challenges? How can these barriers be addressed?

**Research problem/gap:** The long-term trend holds that the U.S. is the largest and most important export market for Ontario’s agri-food sector: in 2018, 95% of Ontario’s agri-food exports to the U.S. were value-added
exports. Ontario’s top U.S. trading partners are concentrated in the Northeast and Mid-Western regions of the country, in addition to Florida, Georgia, Texas and California. Highly integrated and well-established north-south supply chains facilitate this ongoing, mutually beneficial two-way trading relationship. While Ontario has much success in the U.S., the full potential of the market is far from being realized. The entire agri-food market in the U.S. (including retail, food service, etc.) is worth $1.84 trillion USD. With Ontario’s 2018 food exports at $11.9 billion CDN, the ON market share of the domestic U.S. food market is less than 1%. Even if Ontario were to double its food exports, the gains would be minor in comparison to the remaining opportunities for growth. Ontario food manufacturers have ample opportunity to work with retail and food service buyers beyond the Northeastern and Mid-West regions. Ontario could likely seek significant growth in the Southern states, to fill the gap between Ohio and Florida starting with the retail channel. Not enough is currently known about the opportunities that Ontario could maximize and the existing challenges to that success in the secondary U.S. states that Ontario trades with, beyond its top trading partners.

**Desired outcome**: Understanding of the challenges and growth opportunities for Ontario’s agri-food sector beyond its top trading partners to inform a strategic approach to guide key agri-food sectors to actively pursue growth in key channels in those markets.

a. (3) **Research question**: Which Southeast Asian markets who are CPTPP partners (i.e. Japan, Malaysia, Singapore, Vietnam) and others in the region (e.g. Indonesia, Philippines, Taiwan, South Korea) present the best opportunities for Ontario’s agri-food sector to seek realistic success in the next 2-5 years? Which subsectors of Ontario’s agri-food sector might be most compatible with each market’s needs? What are the potential barriers to overcome? How can these barriers be addressed?

**Research problem/gap**: Through extensive stakeholder engagement on the development of the OMAFRA International Trade and Market Access Strategy in 2019, ITPB heard from a wide range of key sectors that market development and diversification opportunities are emerging in more Southeast Asian markets than other areas of the world (e.g. for pet food, baked goods, agri-tech, meat, etc.). Since Canada is a CPTPP partner and has free trade agreements with South Korea and is exploring with the ASEAN group, the time is right to undertake further analysis of these markets to understand the scope of opportunities and challenges from an Ontario perspective. Increasing exports is an important element of Ontario’s trade agenda and can be accomplished through expanding presence in existing markets, through new regions and channels, as well as looking for opportunities in new markets, such as hubs. Government has a critical role to play in market development
and diversification, as success requires long-term commitment from a relationship and logistical perspective. Not enough is currently known about the opportunities that Ontario could maximize in key Southeast Asian markets. Considering the significant volumes of travelers passing through hubs, extensive food service opportunities exist.

Desired outcome: Ontario’s agri-food sector in key Southeast Asian markets to potentially inform a strategic approach to guide key agri-food sectors to actively pursue growth.

a. (4) Research question: What are the opportunities and challenges for Ontario’s agri-food exporters interested in using e-commerce channels in key Asian markets (e.g. China, South Korea) in the next 2-5 years?

Research problem/gap: A growing trend in key Asian markets is increased e-commerce in agri-food. It would be helpful to know what barriers Ontario agri-food companies are facing in using e-commerce to export their products outside of Ontario. Once more is known about the scope of those barriers (e.g. shipping costs, logistics, non-tariff barriers, consumer preferences, etc.), then OMAFRA will be able to better consider the capacity of the Ontario agri-food sector to possibly meet demands (e.g. large enough scale; right products; etc.).

Desired outcome: Understanding of the challenges for Ontario’s agri-food sector in key Southeast Asian markets to inform a strategic approach to address those barriers if the opportunity merits the effort.

a. (5) Research question: How do national and sub-national governments in other parts of the world collaborate to improve market access issues? What types of sub-national interventions in market access advancement have proven to be effective? What can we learn from trade-related coordination between sub-national and national governments, in Canada and abroad? Have other provinces in Canada or states in countries abroad successfully employed specific models when trying to advance market access issues with the federal government? Could some of these models be adapted to the Ontario-Canada relationship?

Research problem/gap: As Canada moves to secure and implement new and existing trade agreements and diversify into existing and new international markets, it is increasingly important to develop a capacity to address/advance market access issues. To support this work, OMAFRA is seeking to strengthen the use of international trade data and intelligence to better understand the impacts of existing and emerging market access issues on the Ontario agri-food sector. It is important to understand how Ontario can discover and maximize its distinct position vis-à-vis other provinces; for example, by looking for best practices in agri-food trade from other subnational jurisdictions.
**Desired outcome:** Understanding of how sub-national jurisdictions influence the advancement of market access issues to potentially inform a strategic approach for Ontario’s agri-food sector.

b. **Research Focus Area:** Value Chain Analysis and Development: Bio-Based Production Systems

**Research question:** How can bio-based feedstocks for biomaterials, biochemicals and bioenergy be identified, developed and commercialized? What policy instruments, incentives and/or changes to provincial and municipal regulations, supply chains, market structure, and/or infrastructure need to be developed to facilitate the growth of Ontario’s bio-based sector domestically and abroad to support transition away from petroleum-based products and processes

**Research problem/gap:** There is increasing interest in transition away from petroleum-based products and processes. The demand for increased plant-based products is expected to drive new economic opportunities for purpose grown feedstocks/biomass, organic residues/food wastes and other bio-based by-products. For example, Michelin plans to reduce its industrial carbon footprint by 50% by 2050 and Lego launched a range of plant-based plastic toys in 2018. Other companies/retail stores in the value chain, such as IKEA, Lego, Danone, Walmart, and Nestle are incorporating policies for reducing fossil-based products and processes with those that are bio-based. Understanding these new market opportunities (and their challenges within current understanding) for Ontario is important.

**Desired outcomes:** Understanding of emerging opportunities for Ontario bio-based sector focusing on new markets for Ontario’s agricultural operations.