

# Ontario Agri-Food Innovation Alliance

## 2019/20 Projects

research



The Ontario Agri-Food Innovation Alliance supports research projects across Ontario's agricultural, food and rural sectors. PHOTO: DIANNE PRIAMO AND BEEF FARMERS OF ONTARIO

## Advancing agri-food research and innovation

**T**he University of Guelph is recognized internationally as a leading comprehensive and research-intensive institution. Part of that reputation stems from the power of our research partnerships, illustrated by the longstanding, unique alliance with the Ontario Ministry of Agriculture, Food and Rural Affairs—known as the Ontario Agri-Food Innovation Alliance (Alliance).

Research funded by the Government of Ontario and supported by the Alliance solves real-world challenges and yields meaningful innovations that ensure the success of the province's agri-food sector and that promote rural economic development throughout Ontario.

The Alliance is committed to improving life by supporting the people, places and programs

that generate solutions with global impact. The Alliance helps build strong rural communities and a prosperous, safe and environmentally sustainable agri-food sector in Ontario—now and for the future.

Research funding supports the University of Guelph's critical mass of faculty, technical staff and graduate students engaged in high-quality research and training opportunities focused on the agri-food needs of Ontarians.

Research funding for individual projects is awarded through an annual, competitive program. Applications are rigorously reviewed based on scientific merit, innovation, contributing partners, potential benefits and best fit with established priorities in each theme area.

# Research Program: Tier I

## Agricultural and Rural Policy

### Value chain development in the Ontario agri-food sector: Barriers and keys to success

Examining factors that create value chains or impede their development in Ontario to improve the success of agri-food value chains.

👤 Simon Somogyi

### Markets and products diversification in the Canadian/Ontario agri-food sector: The impact of free trade agreements (FTAs) on disaggregated exports, extensive and intensive margins of trade

Evaluating how Canada's free trade agreements with emerging economies promote agri-food product diversification and exports to different markets.

👤 Sylvanus Kwaku Afesorgbor

### Factors influencing farmer adoption of soil health best management practices in Ontario

Understanding barriers and influential factors affecting farmer adoption of soil health best management practices to determine strategies for uptake.

👤 Richard Vyn

### Firm-level barriers to entry into export markets in the food processing industry

Determining the ability of Ontario's food processing sector to compete in export markets by examining influential factors and barriers to entry.

👤 Getu Hailu

## Bioeconomy – Industrial Uses

### Impact of land-use change to biomass crops and biofertilizer application on biomass productivity, soil organic carbon, nitrogen, phosphorus and soil health

Studying the influence of biofertilizer application and land conversion to biomass crops on soil health and soil organic carbon sequestration.

👤 Naresh Thevathasan

### Complex-shaped, designed bioplastics and biocomposites by 3-D printing for engineering applications

Utilizing Ontario's agri-residues, bioplastics and recycled plastics to develop three-dimensional products for biomedical and automotive applications.

👤 Amar Mohanty

### Conversion of poultry mortality hydrolysate to lactic acid, a building block for renewable bioproducts

Investigating the use of poultry mortalities as a nitrogen source for the fermentative production of lactic acid, a chemical with multiple end uses.

Brandon Gilroyed

### Production of syngas and renewable natural gas from greenhouse vegetable waste using steam reforming technology

Investigating the feasibility of thermochemical conversion of vine waste into syngas and renewable natural gas, creating a waste-to-energy strategy.

👤 Brandon Gilroyed

### Biochemical characterization and introduction of crop-beneficial endophytes into biomass grasses

Identifying and characterizing growth-enhancing endophyte isolates and testing their introduction into emerging biomass crops, big bluestem and switchgrass.

👤 Jonathan Newman

## Emergency Management

### Investigation of astrovirus as a potential emerging cause of undiagnosed neurologic disease in Ontario cattle

Analyzing archived brain tissue from Ontario cattle dying of encephalitis to determine the prevalence and frequency of bovine astrovirus infection.

👤 Jeff Caswell

### Risk-based disease surveillance system in swine populations: Machine learning approach

Developing analytical algorithms using environmental and other data to predict which swine herds have increased risk of developing an emerging disease.

👤 Zvonimir Poljak

### A temporal study of salmonella serovars in poultry breeder flocks and hatcheries in Ontario from 2009 to 2018

Analyzing 10 years' worth of surveillance data to describe long-term trends and seasonal patterns of *Salmonella* and to validate a vaccination program.

👤 Michele Guerin

### Seroprevalence of *Neospora caninum* in Ontario broodmares and its potential role in equine abortions

Conducting seroprevalence studies and a proportional morbidity of aborted fetuses to determine the role of *Neospora caninum* in equine abortion.

👤 Tracey Chenier

## Environmental Sustainability

### Tracing nitrogen losses and transfer from cover crops and cover crop mixtures to the subsequent corn crop

Investigating how changing production practices using cover crops and cover crop mixtures affect nitrogen losses and transfer to the subsequent crop.

👤 Claudia Wagner-Riddle

### Cover crop research: Scaling up to plant health and scaling out to Ontario

Evaluating the influence of cover cropping systems on corn productivity and whether soil health differences equate to differences in plant health.

👤 Laura Van Eerd

### Quantifying structural stability of agricultural soils in Ontario

Determining the impacts of structural changes imposed by agronomic practices and technologies on soil texture, organic matter and moisture status.

👤 Richard Heck

### **Developing rapid organic matter assessment tools to monitor soil health BMPs**

Determining how soil organic matter composition drives improvements in soil health to develop tools enabling rapid tracking of soil health parameters.

👤 Adam Gillespie

### **Updating and calibrating the Century soil organic matter model for Ontario's cropland sector**

Amending the plant growth sub-model in the Daily Century carbon cycling model currently used in Ontario to accommodate for regional differences.

👤 Adam Gillespie

### **Transfer of agricultural phosphate from edge-of-field to surface waters via the riparian zone during freeze-thaw cycling**

Investigating the forms and mobility of organic and inorganic phosphorus from the edge of farmed fields to surface water in response to climate stresses.

👤 Susan Glasauer

### **Development of best management practices for ecologically sustainable pollination of Ontario fruit and vegetable crops through supporting wild pollinators**

Assessing the status of pollination for six economically important crops across farms in Ontario and different best management practices.

👤 Nigel Raine

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## **Production Systems – Animal**

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### **Feed, water and rest for cattle being transported long distances in Canada**

Investigating the impact of various rest stop characteristics on cattle to define parameters for optimal rest stop duration and quality during transport.

👤 Derek Haley

### **Amino acid nutrition for optimal gut health and productivity in broiler chickens raised without antimicrobial growth promoters**

Examining amino acid requirements for poultry raised in antibiotic-free feeding regimes when exposed to enteric immunological stress.

👤 Elijah Kiarie

### **Investigating the dynamics of Johne's disease in Ontario dairy herds (2013–2018)**

Evaluating the efficacy and uptake of a Johne's disease control program over the last five years to describe changes in prevalence on Ontario dairy farms.

👤 David Kelton

### **Enhancing natural fertility in dairy cows through health and precision technologies**

Using existing and emerging technologies to develop an approach to dairy production management based on natural expression and detection of estrus.

👤 Stephen LeBlanc

### **Drug depletion study of injectable trimethoprim sulfadoxine in lactating dairy does**

Evaluating the depletion of an injectable antibiotic in lactating goat milk following administration at an extra-label dosage regime commonly used by veterinarians.

👤 Cathy Bauman

### **Baseline study of rotavirus frequency and diversity in Ontario swine herds**

Assessing the variability in types and genotypes of porcine rotaviruses to allow for comparisons, identification and decision-making.

👤 Zvonimir Poljak

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## **Production Systems – Plant**

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### **Pathogen surveillance for late blight management decisions in field tomatoes**

Evaluating the efficacy of spore traps for identification of late blight pathogen in one growing region to help conceptualize a monitoring network.

👤 Cheryl Trueman

### **Application of genomic technologies to improve fusarium resistance in Ontario winter wheat**

Applying genetic technologies to develop resistant wheat cultivars and improve pest management methodologies for fusarium head blight in Ontario winter wheat.

👤 Elizabeth Lee

### **Cyclamen mite and Strawberries: Molecular detection and host plant resistance**

Assessing cultivar susceptibility to cyclamen mite and developing detection tools to better position Ontario strawberry growers to effectively manage this pest.

👤 Rebecca Hallett

### **Incidence, timing of infection and management of bitter rot in Ontario**

Determining the incidence of bitter rot in Ontario apples and timing of fruit infection to generate pest management strategies for disease control.

👤 Katerina Jordan

### **Improving management of cercospora leaf spot in Ontario sugar beets**

Investigating methods to improve cercospora leaf spot management in Ontario sugar beets by exploring multiple approaches to disease management.

👤 Cheryl Trueman

### **Mistaken identity: The hidden threat of onion thrips to greenhouse floriculture IPM programs**

Investigating the extent of the onion thrip problem in greenhouse floriculture crops and developing a comprehensive integrated pest management strategy.

👤 Rose Buitenhuis

### **Producing a year-round supply of high-quality potatoes for Ontario**

Identifying and evaluating elite potato selections and new cultivars for adaptation to Ontario for use by fresh market and chip processing industries.

👤 J. Alan Sullivan

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**Development of high yielding, Eastern Canadian hard and soft red winter wheat cultivars and germplasm with increased resistance to fusarium head blight and leaf diseases**

Screening and identification of fusarium head blight resistance in wheat and development of high-yielding, high-quality winter wheat germplasm and cultivars adapted to Ontario.

👤 Ljiljana (Lily) Tamburic-Ilicic

**Using novel grapevine rootstocks for stabilizing yield in winter injury-prone wine districts in south-central Ontario**

Testing locally selected, native grape vine rootstocks for production efficiency to stabilize yield and reduce winter injury incidence in Norfolk County vineyards.

👤 John Cline

**The development of SCN-resistant edamame soybeans adapted to Ontario**

Producing soybean cyst nematode-resistant edamame cultivars and germplasm that are adapted to Ontario to maintain and increase local production.

👤 Mehrzad (Milad) Eskandari

**Defining mechanisms of mycotoxin degradation in fusarium head blight of wheat**

Identifying and characterizing mechanisms of fungal clearance and mycotoxin degradation within wheat with fusarium head blight.

👤 Jennifer Geddes-McAlister

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**Agricultural and Rural Policy**

**OMAFRA's guidelines on permitted uses as a tool to achieve farmland protection and farm diversification and to provide economic benefit: Assessing effectiveness and identifying best practices**

Assessing the effectiveness of OMAFRA's Guidelines on Permitted Uses in Ontario's Prime Agricultural Areas and identifying and evaluating best practices.

👤 Wayne Caldwell

**Social networks for healthy soils: Understanding the role of peer learning in driving soil BMP adoption**

Determining how and why peer learning programs work for best management practices adoption and identifying areas for improvement, support and expansion.

👤 Erin Nelson

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**Bioeconomy – Industrial Uses**

**Biodegradable straws for single-use applications**

Developing single-use biodegradable straws from bioplastics and Ontario's agri-food waste to replace the current petroleum-based product.

👤 Manjusri Misra

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**Product Development and Enhancement Through Value Chain Collaborations**

**Innovative strategies to add value to (Ontario-grown) bean-derived food ingredients**

Creating new market opportunities for the Ontario bean sector by generating novel functional ingredients through alternative processing techniques.

👤 Iris Joye

**Resource recovery and inedible biomass management in high-intensity, urban vertical farming applications**

Determining the scientific, engineering and economic feasibility of on-site resource recovery from vertical farming waste biomass composting systems.

👤 Mike Dixon

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**Production Systems – Animal**

**Molecular epidemiology of *Streptococcus suis* in Ontario nursery pigs**

Identifying molecular characteristics of *Streptococcus suis* isolates recovered from Ontario pig nurseries to aid the development of a universal vaccine.

👤 Abdolvahab Farzan

**Impact of age at transport and umbilical care on future morbidity, mortality and growth in male calves destined for the veal industry**

Investigating specific management practices of neonatal umbilical care and transportation to veal facilities to improve the health of male calves upon arrival.

👤 Dave Renaud

**Pre- and post-weaning nutrition strategies to improve growth performance, gut health and robustness of pigs after weaning**

Identifying alternative feeding strategies by altering timing and source of high-quality proteins in pig diets to optimize growth and health.

👤 Lee-Anne Huber

**Determination of the metabolic triggers responsible for sexual maturation in layer chickens and their relation to rearing environment and nutrition**

Determining the body weight and composition thresholds responsible for initiating sexual maturation in layer chickens raised in different environments.

👤 Gregoy Bedecarrats

**Enhancing digestion efficiency, weaning success and welfare of dairy and veal calves through provision of a novel calf starter**

Investigating the use of a novel milk by-product-based feed to promote greater solid feed intake and rumen development before weaning in veal and dairy calves.

👤 Trevor DeVries



# Knowledge Translation and Transfer

## Mobilization Funding

### Agricultural and Rural Policy

#### Rural immigration: strategies for rural economic development and labour force planning

Mobilizing recent research findings examining successful innovations in rural immigration to support rural businesses and economic productivity.

👤 Ryan Gibson

#### Facilitating the agricultural and local food sector in northern Ontario: Profiling the tool kit to support municipalities, OMAFRA, farmers and communities

Disseminating a tool kit that identifies strategies to support farmers and the agricultural sector in addressing food security in northern Ontario.

👤 Wayne Caldwell

### Environmental Sustainability

#### Promoting soil health knowledge exchange among researchers, producers and consumers

Breaking down barriers to adoption of sustainable soil management practices by improving knowledge exchange and public support.

👤 Kari Dunfield

### Product Development and Enhancement Through Value Chain Collaborations

#### Commercial applications of biocarbon produced from Ontario based biomass

Communicating research findings to update and motivate entrepreneurs and biomass producers about the commercial applications of locally produced biocarbon.

👤 Animesh Dutta

### Production Systems – Animal

#### Enhanced adoption of switchgrass use by the dairy sector

Disseminating research findings and growers' experiences to aid broader adoption by dairy producers of switchgrass for feed and bedding.

👤 Abigail Carpenter

### Production Systems – Plant

#### Improving the reach of integrated pest management for vegetable crops in Ontario

Expanding regional integrated pest management advice and information to help growers avoid unnecessary pesticide applications while optimizing crop protection.

👤 Mary Ruth McDonald

## Research Funding

### Agricultural and Rural Policy

#### Improving the effectiveness of advisory services for facilitating information sharing, accessibility and adoption of sustainable farm management practices in Ontario

Mapping out existing advisory services in Ontario to improve network effectiveness and adoption rates of sustainable farm management practices.

👤 Ataharul Chowdhury

#### Farmer-led research: evaluating a KTT best practice for driving environmental BMP adoption

Identifying pathways to success and the constraints of farmer-led research as a KTT best practice to drive adoption of environmentally sustainable practices.

👤 Erin Nelson

#### The role of KTT in the adoption of sustainable practices: Case studies of muck crops and grape integrated pest management

Investigating the role that KTT can play in improving the long-term adoption of sustainable practices through program design and delivery.

👤 Erin Nelson

### Production Systems – Animal

#### Influencing antibiotic use decision-making by dairy veterinarians

Evaluating methods for effective dissemination of information to dairy veterinarians on the selection of antimicrobial products.

👤 David Kelton

# Gryphon's LAAIR

## Market Validation

### Bioeconomy – Industrial Uses

#### Market validation and cost analysis of scale-up methods for production of industrial enzymes used for starch modification

Determining the cost and feasibility of scaling up an existing enzyme technology to meet the demands of industrial processes.

👤 Ian Tetlow

### Emergency Management

#### Security and resiliency of smart farming systems

Conducting a market validation to design and develop a solution that enables security of smart farming data.

👤 Ali Dehghantanha

#### Point-of-need qPCR assay for pathogens of concern in commercial greenhouse operations

Assessing the feasibility of a point-of-need tool for soil pathogen identification to meet the needs of Ontario greenhouse growers.

👤 Robert Hanner

### Environmental Sustainability

#### Assembly for multi-spectral optical imaging of large-format soil and rock thin sections

Evaluating the market potential of a technological device that simplifies the characterization of rock and soil structure and composition.

👤 Richard Heck

### Product Development and Enhancement Through Value Chain Collaborations

#### Market validation of smart whole-body vibration-attenuating cushion

Gauging market need and the viability of a smart whole-body cushion that dampens vibrations in agricultural vehicle seats.

👤 Michele Oliver

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## Market validation of protein-rich peach crisps and powder

Completing a market validation of value-added peach products to create a revenue stream for peach seconds produced in Ontario.

👤 Ashutosh Singh

## An examination of consumers' perceptions and buying behaviour of smart food packaging and smart food cabinets in unstaffed grocery stores

Examining consumer interactions with smart food technologies that record transactions and provide product advice.

👤 Simon Somogyi

## Market validation for "maple syrup-encapsulated protein powder" in domestic and international sectors

Carrying out a market validation of maple syrup-added protein powder with a maple aroma in local and global markets.

👤 Manickavasagan Annamalai

## Production Systems – Animal

### Market validation via registration of EGF containing yeast fermentation product

Verifying a yeast fermentation product as a gut modifier that enhances intestinal development, health and growth of early weaned pigs.

👤 Julang Li

### Market assessment of a stem cell service and therapeutic biobank for the equine industry

Evaluating product-market fit of a stem cell treatment derived from umbilical cord blood and tissue of newborn foals for the equine industry.

👤 Thomas Gadegaard Koch

## Production Systems – Plant

### Market assessment of farmers' needs and opportunities for a carbon-sequestering, slow-release nitrogen fertilizer

Performing a market assessment of farmers' appetite for a new slow-release nitrogen fertilizer that fixes carbon to the soil.

👤 Rafael Santos

### Market testing of new table grape varieties in a farm market context

Testing the market for new table grape varieties to pinpoint a production technology that meets consumer preferences.

👤 Helen Fisher

### PTC+: A novel culture vessel for plant propagation

Assessing the market for adoption of efficient, single-use culture vessels for micropropagation in commercial plant tissue culture laboratories.

👤 Praveen Saxena

## Product Development

## Bioeconomy – Industrial Uses

### Compostable thermoformed vegetable packaging from Ontario waste starch

Creating a compostable, cost-competitive alternative to plastic mushroom packages in Ontario using agri-food waste materials.

👤 Amar Mohanty

## Product Development and Enhancement Through Value Chain Collaborations

### Smart pumping technology for vertical farming

Trialling a new smart pump technology to reduce the operating costs of conventional pumps used in vertical farming.

👤 Wael Ahmed

### Expanding sour beer production in Ontario

Diversifying sour beer production in Ontario by identifying alternative lactic acid bacteria and yeast strains to enhance souring and flavour.

👤 George van der Merwe

### Manufacturing of plant-based meat analogues through high-moisture twin-screw extrusion

Developing a plant-based meatless steak with fibrous texture resembling that of meat using Ontario-grown cereal and pulse ingredients.

👤 Mario Martinez

### Development of a soy-based fermented cheese

Producing a soy-based fermented cheese analogue using Ontario-grown ingredients.

👤 Art Hill

## Production Systems – Plant

### "Microhazels:" A novel industry for Ontario agriculture

Commercially producing and assessing "microhazels," or plants created using micropropagation technologies, to scale up hazelnut propagation in Ontario.

👤 Praveen Saxena