Ontario Agri-Food Innovation Alliance

GROWING ONTARIO SOLUTIONS

UNIVERSITY of GUELPH

IMPROVE LIFE.

OMAFRA AND
UNIVERSITY OF GUELPH
AGREEMENT
ANNUAL REPORT 2018−19

Ontario

WORKING TOGETHER FOR THE BENEFIT OF ONTARIO

Prof. Beverley Hale
Associate Vice-President, Research (Agri-Food Partnership)
University of Guelph

The University of Guelph is proud to work with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) to deliver Ontario solutions with global impact.

With the top agricultural and veterinary sciences programs in Canada, the University of Guelph is committed to meeting opportunities and challenges with world-class research for the benefit of Ontario's agri-food sector.

Our shared commitment to the health of Ontario's agri-food sector is at the core of our alliance with OMAFRA. The Ontario Agri-Food Innovation Alliance – the public face of our collaboration with the Province – serves Ontario's $37-billion agri-food sector by investing in an innovative research system that returns impactful, sustainable solutions while ensuring animal well-being and public health and safety.

This year, we worked with partners across the agri-food sector – from farmers and producers to policy-makers and retailers – to strengthen Ontario's agri-food sector. We also ensured Ontario has the best agri-food researchers in the world by attracting new, globally recognized research faculty.

I'm pleased to introduce this new publication, *Growing Ontario Solutions*, to demonstrate how the people, places and programs of the Ontario Agri-Food Innovation Alliance are delivering impactful solutions in Ontario and around the world.

CONTENTS

Beef cattle on pasture. The new Ontario Beef Research Centre in Elora opened in September 2019.

ONTARIO SOLUTIONS. GLOBAL IMPACT.

The Ontario Agri-Food Innovation Alliance is a collaboration between the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the University of Guelph. We create impact by directing the efforts of our people, places and programs toward six key outcomes that support the agri-food and rural sector – at home and around the world.

OUTCOME #1

A WORLD-CLASS RESEARCH AND INNOVATION SYSTEM

OUTCOME #2

THE NEXT GENERATION OF AGRI-FOOD INNOVATORS

OUTCOME #3

A UNIQUE PLATFORM FOR COLLABORATION AND INNOVATION

OUTCOME #4

A TRANSPARENT AGRI-FOOD SECTOR YOU CAN TRUST

OUTCOME #5

A SAFE AND SECURE AGRI-FOOD SECTOR

OUTCOME #6

AN ENHANCED SYSTEM FOR RESEARCH DATA ACCESS AND STORAGE

PEOPLE PLACES PROGRAMS
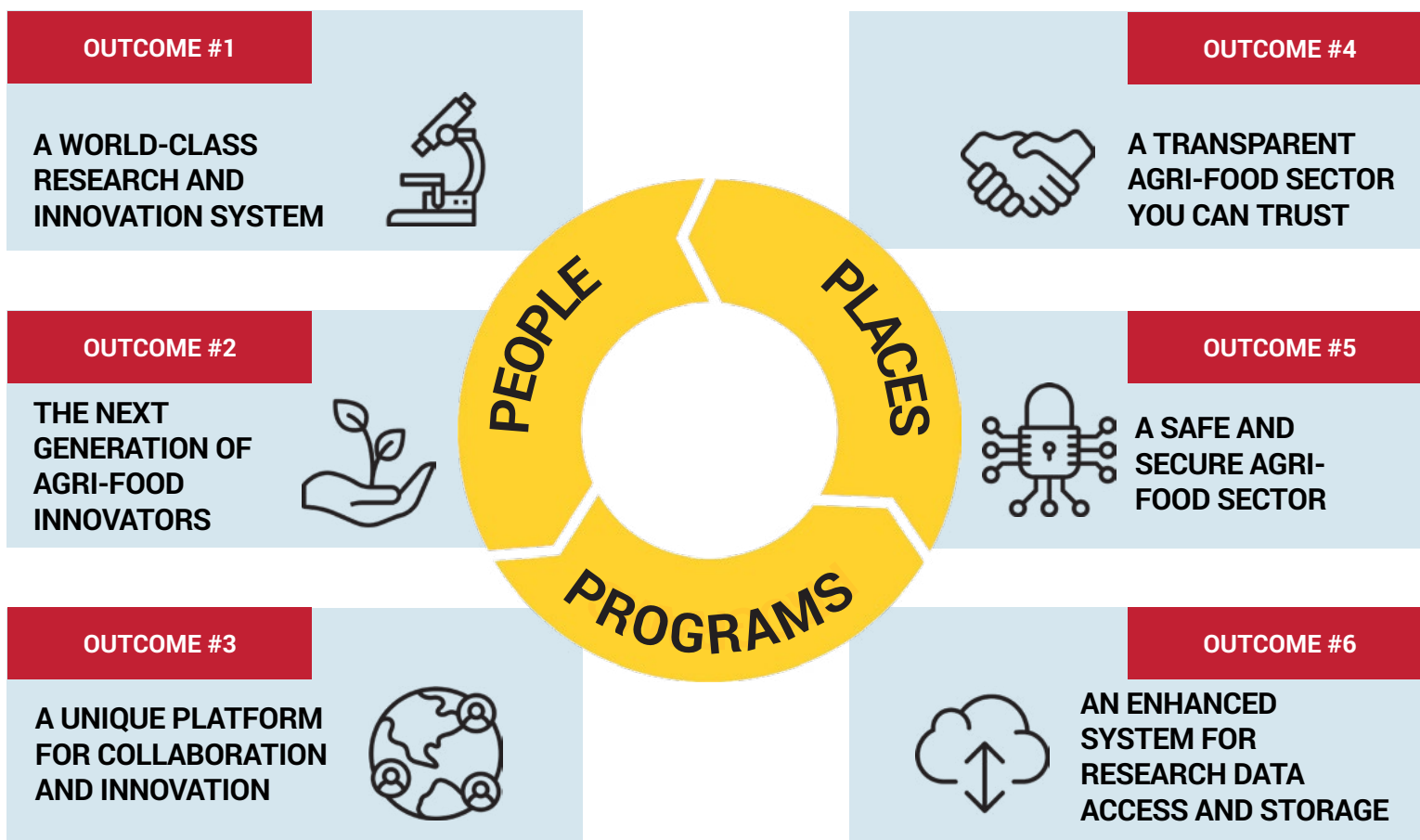
The people, places and programs of the Ontario Agri-Food Innovation Alliance

The University of Guelph and OMAFRA are delivering the next generation of agri-food innovations by supporting the people, places and programs that produce Ontario solutions with global impact.

Oluwatimileyin Abolarin, USEL program participant

Our **people** are innovators, researchers, thought leaders and problem solvers. We work with partners across the agri-food and rural sectors to address challenges and meet emerging opportunities for the benefit of Ontario.

- **RESEARCHERS**
- **TECHNICAL STAFF**
- **VETERINARIANS**
- **HIGHLY QUALIFIED PERSONNEL**

Ontario Dairy Research Centre

Our **places** enable research, innovation and laboratory testing. The University of Guelph's state-of-the-art research infrastructure complements these places to create a provincial platform for agri-food innovation.

- **15 AGRICULTURAL RESEARCH CENTRES ACROSS ONTARIO**
- **ANIMAL HEALTH LABORATORY**
- **AGRICULTURE AND FOOD LABORATORY**

Robot harvester prototype for greenhouse use developed at U of G with Alliance funding

Our **programs** support discovery, learning and outreach for the benefit of all Ontarians. Programs enable researchers to deliver quality, impactful results while training the next generation of agri-food innovators.

- **RESEARCH PROGRAM**
- **KTT PROGRAM[1]**
- **GRYPHON'S LAAIR[2]**
- **USEL PROGRAM[3]**
- **HQP SCHOLARSHIP PROGRAM[4]**
- **VETERINARY CAPACITY PROGRAM**

1 Knowledge Translation and Transfer
2 Leading to the Accelerated Adoption of Innovative Research
3 Undergraduate Student Experiential Learning Program
4 Highly Qualified Personnel Scholarship Program

A WORLD-CLASS RESEARCH AND INNOVATION SYSTEM

The Ontario Agri-Food Innovation Alliance brings people, places and programs together to create a world-class research and innovation system – the cornerstone of a successful and sustainable agri-food sector.

2018-19

78.8
Faculty FTEs in research projects

Faculty full-time equivalents (FTEs) involved in Alliance-funded research projects

$6.32M
Invested by third parties

Direct third-party investment in Alliance-funded research projects (a 1:1 ratio)

164
Staff in research projects

Research technicians and associates involved in Alliance-funded research projects

44%
U of G faculty

Full-time faculty across the University engaged in research supporting OMAFRA research priorities (364 faculty members)

$53.4M
External research dollars awarded

External research funding held by the University that supports OMAFRA research priorities

Research for a strong and sustainable agri-food sector

Research and innovation grow Ontario's capacity to produce food, drive a competitive agri-food sector and protect plant, animal and human health and the environment. Here is a sample of what we funded in 2018-19.

PLANT HEALTH AND CROP PRODUCTION
Research projects related to plant disease, pest management and production

MANAGEMENT OF CLUBROOT ON CANOLA AND *BRASSICA* VEGETABLES IN ONTARIO
Prof. Mary Ruth McDonald

Determining best practices to manage and contain clubroot disease in canola and *Brassica* vegetable crops

Carrot trials at the Ontario Muck Crops Research Centre in Bradford

ENVIRONMENTAL SUSTAINABILITY
Research projects to develop new environmental technologies, practices and on-farm solutions

SPATIAL STOCHASTIC BIOECONONOMIC MODELLING OF CROP CLIMATE RESILIENCE IN ONTARIO
Prof. Glenn Fox

Meeting the challenges of climate change with crop resilience models using novel irrigation and drainage strategies
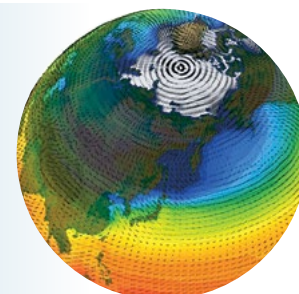
A mathematical climate model

AGRI-FOOD AND BIOPRODUCT DEVELOPMENT
Research projects to develop eco-friendly products as well as waste reduction and recycling technologies

AFFORDABLE GREEN COMPOSITES FOR COMPOSTABLE FOOD PACKAGING APPLICATIONS
Prof. Amar Mohanty

Creating cost-effective, compostable food containers by transforming food production by-products into biocomposites


Bioproducts Discovery and Development Centre

ANIMAL HEALTH AND LIVESTOCK PRODUCTION
Research projects on animal nutrition, diseases and production to help keep farm animals healthy and safe

EVIDENCE-BASED PAIN MANAGEMENT PROTOCOLS FOR DISBUDDING DAIRY CALVES
Prof. Todd Duffield

Improving animal welfare by establishing pain management protocols for neonatal dairy calf disbudding
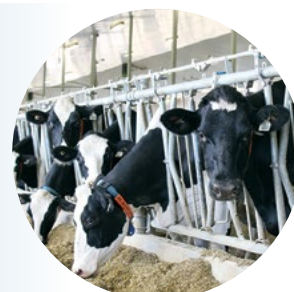
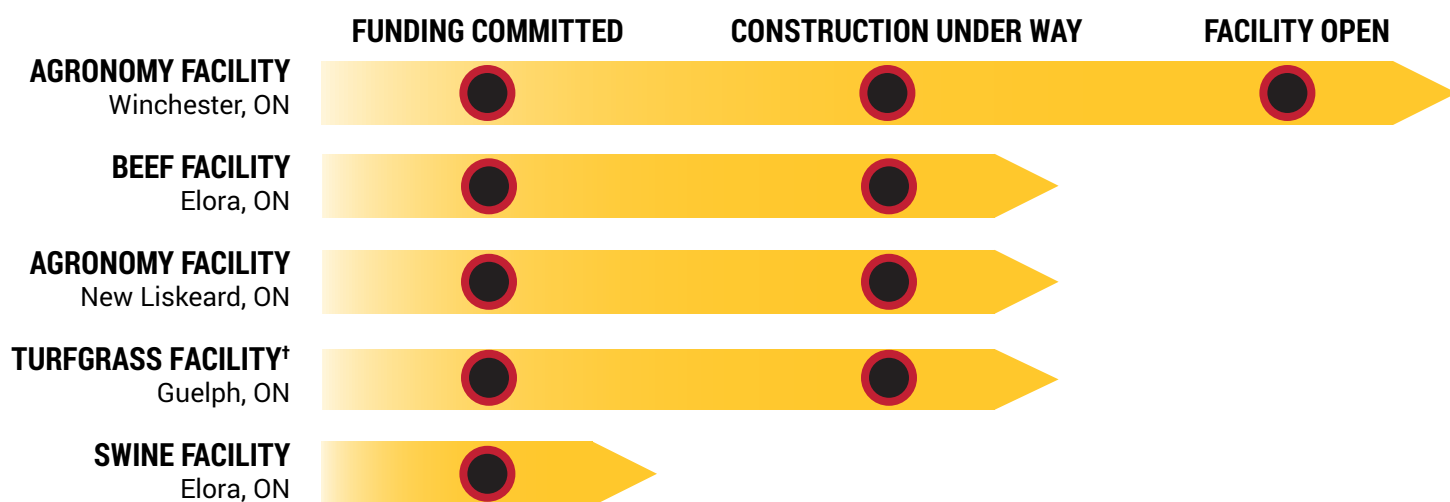Dairy cattle at the Ontario Dairy Research Centre in Elora

Ontario invests in research centres to power innovation

Innovation fuels economic development, job creation and trade across the agri-food sector. A world-class network of research centres enables multidisciplinary research that powers innovation in Ontario.

Investing in research infrastructure

In 2018-19, the University of Guelph continued to deliver on the Agricultural Research Institute of Ontario's (ARIO) Infrastructure Strategy by working with industry and government partners to enhance Ontario's agri-food research centres.

Ontario's agri-food research centres, owned by the Agricultural Research Institute of Ontario, are operated and managed by the University of Guelph through the Ontario Agri-Food Innovation Alliance.

	FUNDING COMMITTED	CONSTRUCTION UNDER WAY	FACILITY OPEN
AGRONOMY FACILITY Winchester, ON	●	●	●
BEEF FACILITY Elora, ON	●	●	
AGRONOMY FACILITY New Liskeard, ON	●	●	
TURFGRASS FACILITY† Guelph, ON	●	●	
SWINE FACILITY Elora, ON	●		

2018-19

2.59M
Animal research days

Time used in research to support animal welfare and enhance livestock production and sustainability
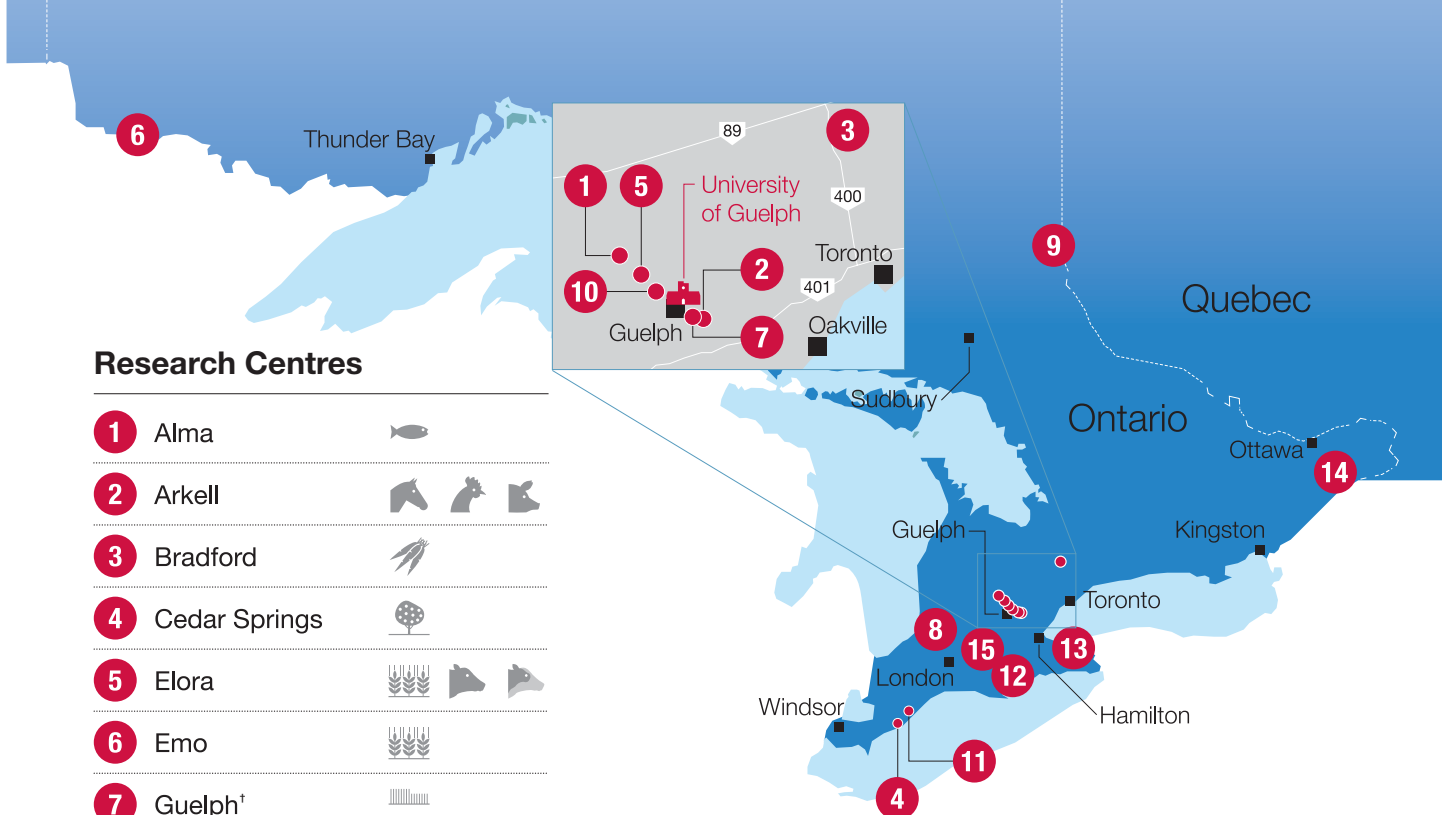
251
Hectares

Land used in research to reduce disease, manage pests, support soil health and enhance plant breeding

$6.84M
Centre revenue

Revenue from research centre operations, including sale of milk and crops, supporting network sustainability

Research Centres

1	Alma	🐟
2	Arkell	🐴 🐔 🐷
3	Bradford	🌱
4	Cedar Springs	🌳
5	Elora	🌾 🐄 🐖
6	Emo	🌾
7	Guelph†	▦
8	Huron	🌾
9	New Liskeard	🐄 🌾 🌳
10	Ponsonby	▦ 🐔
11	Ridgetown	🌾 🌳
12	Simcoe	🌳
13	**Vineland***	🌳
14	Winchester	🌾
15	Woodstock	🌾

Research Centre Focus

🐟	aquaculture	🌳	horticulture crops
🐄	beef	🌱	vegetables
🐄	dairy	🐔	poultry
🐴	equine	🐑	sheep
🌾	field crops	🐷	swine
▦	general animal facility	▦	turfgrass

†A previous version of this publication referred to the Guelph facility as the Turfgrass Institute.

*The Vineland Station is operated by Vineland Research & Innovation Centre with support from the Ontario Agri-Food Innovation Alliance.

3-D rendering of the Ontario Beef Research Centre. Phase I was completed in September 2019.

3-D rendering of the new turfgrass research facility.

Research excellence at the University of Guelph

The University of Guelph is a global leader in agri-food and rural research. It leverages investments made through the Alliance to ensure Ontario has the intellectual capacity to support a sustainable, globally competitive agri-food sector.

2018-19

#1
Agricultural university, Canada

Ranked as the top agricultural sciences university in Canada[1]

#12
Agricultural university, World

Ranked twelfth among agricultural sciences universities in the world[1]

#2
Comprehensive research university

Ranked second among comprehensive research universities in Canada[2]

#1
Veterinary college, Canada

Ontario Veterinary College (OVC) ranked No. 1 in Canada and No. 3 in North America for veterinary sciences[2]

#7
Veterinary college in the world

OVC ranked as No. 7 in the world for veterinary sciences[3]

25
New faculty hired

New faculty at U of G with research programs supporting OMAFRA priorities

> In 2018-19, the University of Guelph enhanced its capacity to address OMAFRA research priorities and solidified its position as Canada's Food University.

1 Based on 2019 ranking by *U.S. News & World Report* of best universities for agricultural sciences
2 Based on 2018 ranking by Research Infosource of top research universities
3 Based on 2019 ranking by Quacquarelli Symonds of veterinary science programs

MIKE STEELE
Animal physiology

KHURRAM NADEEM
Computational statistics

NICOLE RICKER
Pathogenomics

FOOD FROM THOUGHT LEADERS

U of G added six new faculty positions in big data in the agri-food value chain, funded by the Food from Thought initiative.

ELIZABETH MANDEVILLE
Bioinformatics and computational biology

JOHN SULIK
Precision agriculutre

DAN TULPAN
Computational biology

MARIA CORRADINI
Chair in Food Quality

PHILIP LORING
Chair in Food, Policy and Society

SIMON SOMOGYI
Chair in the Business of Food

ARRELL FOOD INSTITUTE CHAIRS

2018-19 was the first year for three Arrell Food Chairs who are driving research that shapes social, industrial and government decisions around food.

CHRISTINE BAES
CRC in Livestock Genomics

AMY GREER
CRC in Population Disease Modelling

EMMA ALLEN-VERCOE
CRC in Human Gut Microbiome Function and Host Interactions

CANADA RESEARCH CHAIRS

U of G received $2.4 million from the federal government for two new Canada Research Chairs (CRC) and the renewal of an existing chair.

THE NEXT GENERATION OF AGRI-FOOD INNOVATORS

The Ontario Agri-Food Innovation Alliance builds the future skilled workforce that will advance Ontario's agri-food and rural sectors. The Highly Qualified Personnel (HQP) scholarship program, Veterinary Capacity Program (VCP) and Undergraduate Student Experiential Learning (USEL) programs support the development of skilled, forward-thinking agri-food leaders for Ontario.

2018-19

47
HQP scholars active

The HQP program engages the next generation of agri-food researchers, policy-makers and innovators

5
USEL students trained

USEL provides undergraduate students with work experience in the agri-food sector

99%
Pass rate

North American Veterinary Licensing Exam

240
Students engaged in research projects

136 graduate students and post-doctoral researchers and 104 undergraduate students engaged in Alliance-funded research projects

15
D.V.Sc. students trained

VCP supports doctor of veterinary science students engaged in OMAFRA priorities

USEL

OLUWATIMILEYIN ABOLARIN
B.Sc. candidate, Undergraduate Student Experiential Learning program participant

"Through the USEL program, I discovered an interest in animal reproduction. The program opened my eyes to the wealth of career opportunities available in the agriculture industry."

HQP

DANIELLE ST. JEAN
M.Sc. candidate, Highly Qualified Personnel Scholar

"The HQP program has provided me with the resources to help spread my research and maximize its impacts. Industry contacts have helped to ensure my research is tangible and practical, while also helping me to develop applicable and valuable skills for future employment in the agri-food industry."

HQP

NICOLE WEIDNER
PhD candidate, Highly Qualified Personnel Scholar

"As a PhD student, I really value the industry connections I've made from the HQP program. Gaining such industry experience is very rare for doctoral students, but it means I can move on after my graduation to an industry position or to continue on in academia. I know that this program will play an integral role in ensuring my success after graduation."

VCP

TAIKA VON KÖNINGSLÖW
D.V.Sc. candidate, Veterinary Capacity Program participant

"VCP provides support for students pursuing a doctor of veterinary science degree, which is a unique graduate experience for veterinarians that includes research, clinical service and teaching."

"

Industry contacts have helped to ensure my research is tangible and practical, while also helping me to develop applicable and valuable skills for future employment in the agri-food industry."
Danielle St. Jean, Highly Qualified Personnel Scholar

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A UNIQUE PLATFORM FOR COLLABORATION AND INNOVATION

The Ontario Agri-Food Innovation Alliance brings together academia, government and industry to address a common goal – advancing the health, sustainability and productivity of the agri-food and rural sectors in an increasingly complex world.

2018-19

310
Collaborators on research projects

The Alliance fosters collaboration, investment and engagement for the benefit of Ontario

$1.68M
Commercialization revenue

Revenue generated from licences associated with Alliance-funded research

10
Patents filed

The Research Innovation Office supports commercialization of Alliance-funded research

920
KTT activities

Activities in research projects supporting collaboration, technology transfer and implementation of research results

268,000
Online engagements

Engagements generate awareness of Alliance-funded research and programming

Collaboration supports innovation

The Alliance supports a unique, world-class platform for advancing research, training, collaboration and innovation. This platform is where academia, government and industry meet to develop Ontario solutions with global impact.

ACADEMIA

GOVERNMENT

INDUSTRY
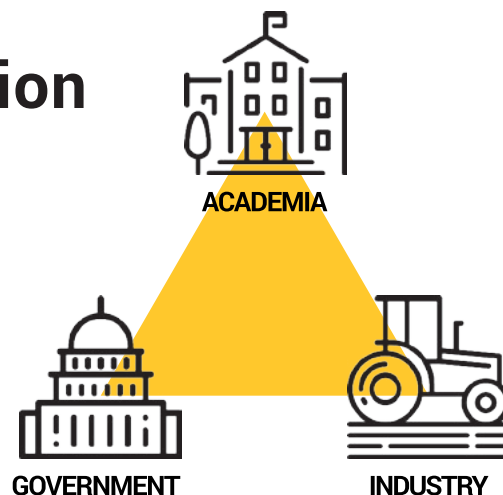
CASE STUDY ENHANCING RESEARCH IMPACT

GROWING KTT CAPACITY IN ONTARIO

In April 2019, the Alliance hosted the Growing Agri-Food KTT in Ontario event, which brought together 156 people from 33 organizations across three provinces to showcase a new resource of best practices for KTT. KTT maximizes the impact of research by getting science off the shelf and into active use.

These types of events attract such a diverse range of stakeholders all interested in agriculture and rural issues, and ignite opportunities for collaboration. **It's the perfect avenue for me to make connections."**

— Danielle Collins, economic development policy analyst, Ontario Federation of Agriculture

Visual communications expert Alex Sawatzky captured key ideas from the day in a series of illustrations. View them at uoguel.ph/3ithx

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A TRANSPARENT AGRI-FOOD SECTOR YOU CAN TRUST

The Ontario Agri-Food Innovation Alliance invests in laboratory testing and emergency planning to make Ontario's food system one of the safest in the world, building transparency and public confidence in the agri-food sector.

2018-19

65,416
Tests conducted

Services provided by the
 include laboratory testing, applied research, method development and emergency response

>99%
Turnaround time compliance

AFL compliance with test turnaround times established for the Food Safety Program

99.5%
Reporting accuracy

AFL provides timely, trustworthy results

75,788
Cases completed

Cases submitted to the AHL, leading to 846,972 procedures and more than 1M tests

>97%
Turnaround time compliance

AHL compliance with turnaround times in accordance with published guidelines

93.3%
Client satisfaction

AHL provides leading services to clients across Canada

Laboratory Services Division

Working together for a healthier future

The University of Guelph's Laboratory Services Division – consisting of the Animal Health Laboratory (AHL) and the Agriculture and Food Laboratory (AFL) – works with partners across the sector to keep our food safe and our plants, animals, people and environment healthy. It is key to Ontario and Canada's ability to detect, contain and control food-borne illness or disease outbreaks, helping keep Ontario and Ontarians safe.

More tests mean more security

Experts at the AHL and AFL are continually developing new, more efficient tests to detect everything from pesticide residues on crops to bacteria in food. New, more powerful tests mean the Laboratory Services Division can better serve agriculture, food and veterinary sectors in Ontario and around the world.

> **AFL** provides in-house scientific expertise, high-value laboratory services, applied research, method development and emergency response programs to help OMAFRA secure public confidence in the quality and safety of the agri-food sector.

> **AHL** provides animal health expertise, conducts testing and analysis in support of disease surveillance, and maintains capacity for emergency response to support transparency and public confidence in the agri-food sector.

AFL offers pesticide residue testing for all fruits and vegetables and can test for more than 500 pesticide active ingredients.

FASTER ID FOR IMPROVED FOOD SAFETY
Researchers at the Agriculture and Food Laboratory validate new technique for detecting pathogen

There are more than 700 distinct strains of *Escherichia coli* (*E. coli*) known today. Most strains are harmless or even beneficial to humans, but some are responsible for food- and water-borne illness.

Shiga toxin-producing *E. coli* (known as STEC) produce a toxin that injures the lining of the human intestinal tract, causing illness that can be dangerous for the young and elderly. The severity of the illness makes it important for labs to have the tools to quickly and precisely detect STEC in a food or water sample. Early detection can save valuable time to contain a possible outbreak or identify a source of contamination.

Laboratory tests are available to detect the most notorious of the STEC group – *E. coli* O157:H7 – but at least six other forms of STEC were difficult to identify before AFL researchers helped validate a solution.

Shu Chen's team from U of G's AFL worked with Roger Johnson of the Public Health Agency of Canada to validate a comprehensive new approach to more easily detect and identify the most common forms of STEC found in foods.

The validated method is now available for use by OMAFRA and other clients.

A SAFE AND SECURE AGRI-FOOD SYSTEM

The Ontario Agri-Food Innovation Alliance supports the Animal Health Laboratory and the Agriculture and Food Laboratory to keep Ontario's animals, people and environment healthy. With new lab tests developed and adopted continually, Laboratory Services Division stands on guard, ready to respond to emergencies and keep Ontario open for business.

2018-19

28
New tests

New tests developed or adopted by AHL increase readiness to respond to emergencies and provide enhanced service to clients

20+
Years

AHL and AFL have contributed more than 20 years of expertise to Ontario's agri-food sector

489
KTT activities

Dissemination of AFL and AHL research and testing results to maintain public confidence in Ontario's agri-food sector

$8.6M
AFL revenue

AFL is a laboratory of choice for growers, researchers, food processors and more

$7.0M
AHL revenue

AHL is a national leader, providing services to clients across Canada

On call for Ontario

▸ The **Animal Health Laboratory** monitors disease trends and sends electronic, real-time alerts to OMAFRA every day at 9 a.m. and 3 p.m. This means provincial partners are notified immediately if the AHL detects any of the 119 hazards under the Animal Health Act – ranging from rabies to highly pathogenic avian influenza – giving provincial partners crucial time to respond and contain emerging diseases.

▸ The **Agriculture and Food Laboratory** alerts OMAFRA by direct communication – even outside of working hours – to any test results that require immediate notification, including *E. coli* O157:H7. Positive tests are reported quickly and accurately to allow for rapid response.

Photo courtesy of Bruce Chessell/*Woodstock Sentinel-Review*/Postmedia Network

Learn more about how AHL worked with provincial and national partners to stave off the H5N2 avian flu epidemic, keeping the sector secure: **uoguel.ph/clrxs**

Working together for animal health

ONTARIO ANIMAL HEALTH NETWORK

This network of networks brings together government, academic and private-sector experts to monitor the health of species across the province. Species networks represent bees, fish, small ruminants, companion animals, equine, swine, bovine, poultry, alternative and wildlife species.

OAHN also provides high-quality, evidence-informed resources to Ontario's agri-food sector. Find out more at oahn.ca.

2018-19

971,000+
OAHN social media impressions

12,000+
Downloads of OAHN fact sheets and infographics

4,200
Podcast listeners, OAHN veterinary podcasts

AN ENHANCED SYSTEM FOR RESEARCH DATA ACCESS AND STORAGE

The Ontario Agri-Food Innovation Alliance is committed to leading data management practices to facilitate new agri-food and rural research. Our researchers and research centres produce an unprecedented amount of data to fully realize the promise of data-driven agriculture.

2018-19

280
Insentec feed bins

At our research centres, Insentec feed bins capturing data on date, time, amount, duration and frequency of animal feed consumption

321
Activity monitors

At the Ontario Dairy Research Centre, 321 activity monitors collect data on animal movement and behaviour

1.8M
Data points per day

Data collected by the lysimeters at the Ontario Crops Research Centre in Elora informs researchers on important soil health indicators

In 2018/19, the Alliance introduced data management plans (DMPs) as a requirement for all funded projects. Office of Research staff worked with the U of G Library to develop tools to support researchers in developing their DMPs, including 14 workshops since January 2019.

Data-driven agriculture

The University of Guelph is committed to enhancing data capture, organization, access and storage to realize the promise of data-driven agriculture. In 2018-19, the University added key leadership to the data portfolio, began a pilot project to enhance data capture at Ontario's agri-food research centres, and introduced data management plans to help researchers articulate a plan for data both during and after their project.

Capture
State-of-the-art research centres capture terabytes of data on everything from how much an animal eats to real-time soil nutrient levels.

Organize
Researchers generate and use high-quality, reliable data to inform research findings.

Access
Data management plans and data management training give researchers new tools for organizing and sharing research data.

Analyze
New platforms, such as Agri-Food Data Canada, promise to increase access and analysis of existing data to enable the next generation of agri-food research.

DATA LEADERSHIP AT THE UNIVERSITY OF GUELPH

KAREN HAND
Food from Thought, Director of Research Data Strategy

Karen Hand was named director of data strategy for the Food from Thought research program in 2018. She is leading strategic design, development and management of an integrated, cross-University, big data management strategy for agri-food research.

ROZITA DARA
School of Computer Science, U of G Data Strategy Director, Alliance

Rozita Dara was appointed as the data strategy director for the Alliance in September 2018. She is leading an initiative to increase data access and sharing to facilitate new agri-food research.
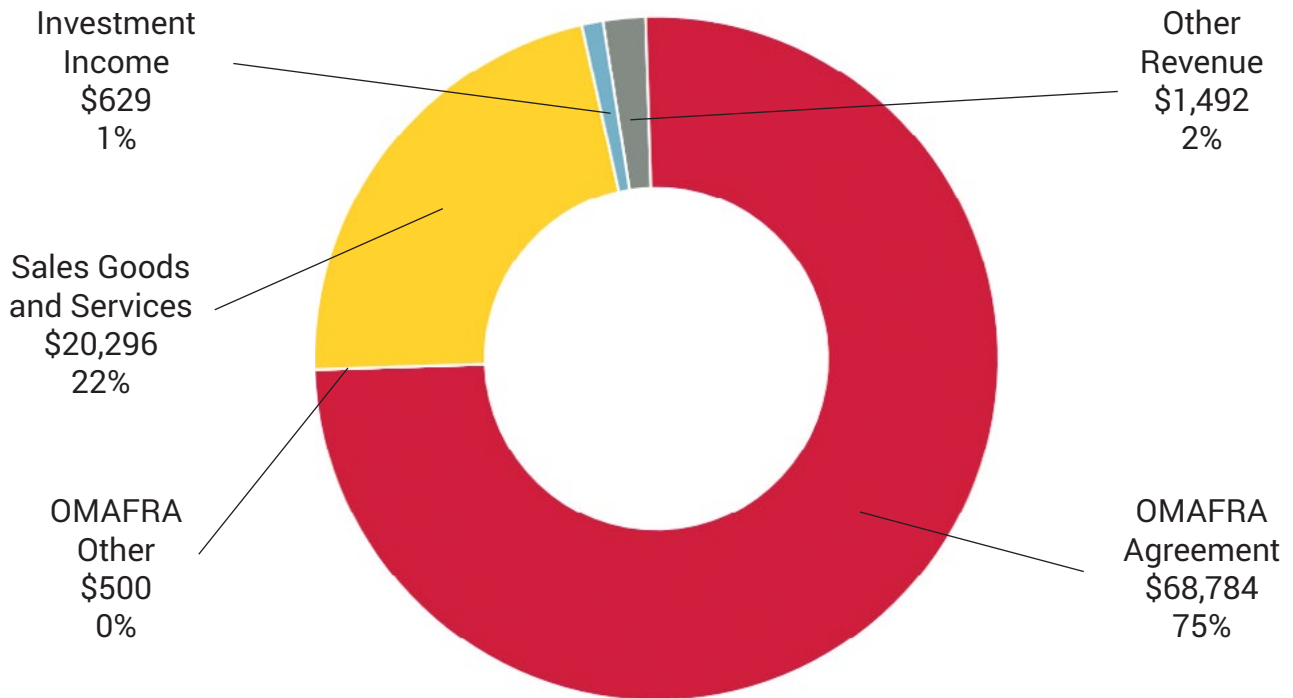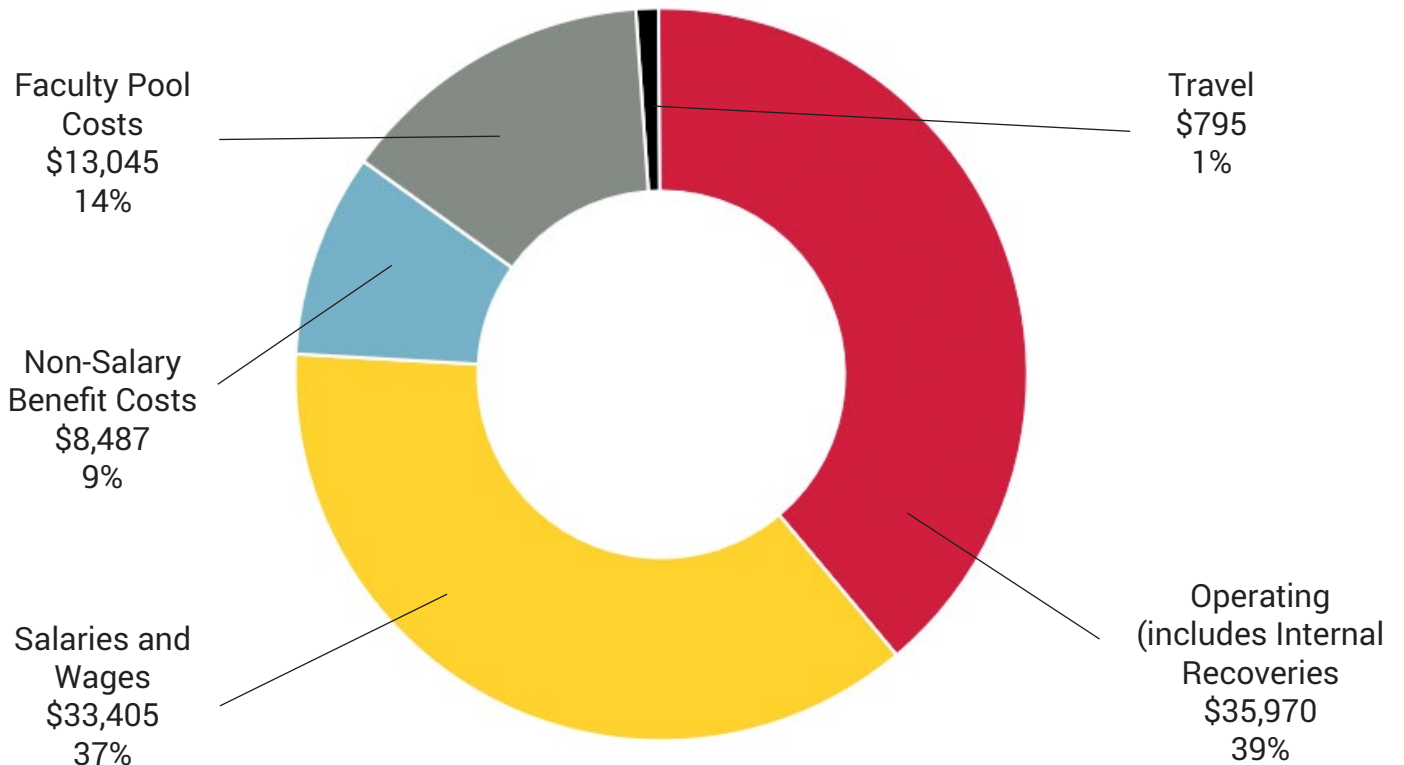
FINANCIAL OVERVIEW

Revenue
2018-19, $91,701
(all figures in thousands of dollars)

Investment
Income
$629
1%

Other
Revenue
$1,492
2%

Sales Goods
and Services
$20,296
22%

OMAFRA
Other
$500
0%

OMAFRA
Agreement
$68,784
75%

Expenses
2018-19, $91,701

Faculty Pool
Costs
$13,045
14%

Travel
$795
1%

Non-Salary
Benefit Costs
$8,487
9%

Salaries and
Wages
$33,405
37%

Operating
(includes Internal
Recoveries
$35,970
39%

Financial summary by program

(in thousands of dollars)

Standard Accounts	Research Program	VCP	AHL	AFL	Property Management	Exigency Fund	Total
Revenue							
OMAFRA Agreement	37,461	5,248	6,911	6,916	12,536	(287)	68,785
OMAFRA Other	-	-	-	500	-	-	500
Sales Goods and Services	158	-	6,999	8,557	4,582	-	20,296
Investment Income	-	-	-	-	-	629	629
Other Revenue	90	-	4	14	1,384	-	1,492
Revenue Total	**37,709**	**5,248**	**13,914**	**15,987**	**18,501**	**342**	**91,701**
Expenses							
Salaries and Wages	9,680	173	7,750	8,198	7,262	342	33,405
Non-Salary Benefit Costs	1,888	28	2,144	2,417	2,010	-	8,487
Faculty Pool Costs	11,145	1,900	-	-	-	-	13,045
Travel	399	208	99	56	33	-	795
Operating	15,091	2,938	5,940	5,863	10,985	-	40,817
Internal Recoveries	(493)	-	(2,019)	(546)	(1,788)	-	(4,847)
Total Expenses	**37,709**	**5,248**	**13,914**	**15,987**	**18,501**	**342**	**91,701**
Net Income	-	-	-	-	-	-	-