ONTARIO MINISTRY OF AGRICULTURE AND FOOD
MINISTRY OF RURAL AFFAIRS

AND

UNIVERSITY OF GUELPH

AGREEMENT

CONSOLIDATED ANNUAL REPORT
2012/2013

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UNIVERSITY of GUELPH

Ontario

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EXECUTIVE SUMMARY

This Annual Report is being submitted to the Ontario Ministry of Agriculture and Food (OMAF) and Ministry of Rural Affairs (MRA) in accordance with the terms and commitments under the OMAF/MRA-University of Guelph (U of G) Agreement. This is the fifth Annual Report under the current Agreement between the University of Guelph and OMAF/MRA, which was signed April 1st, 2008, for the period April 1, 2008 to March 31, 2018.

The University has complied with all material provisions of the Agreement and is managing the transfer payment funds provided under the Agreement effectively and efficiently and with due regard to obtaining appropriate value for money expended.

The period covered by this Annual Report is the U of G's 2012/13 fiscal year (May 1, 2012 – April 30, 2013). This report covers the activities, budgets, expenditures and performance measures for each of the four program areas encompassed by the Agreement – Research, Veterinary Clinical Education Program (VCEP), Animal Health Laboratory (AHL) and the Agriculture and Food Laboratory (AFL).

Governance

During negotiations for the current Agreement, OMAF/MRA and the U of G agreed that effective governance is important to achieve the objectives of the Agreement. An independent consultant reviewed governance from the previous Agreements and made recommendations for improvements, and a new, joint governance model was developed. This model is collaborative, accountable and transparent.

The structure is comprised of a series of committees; the Agreement Leadership Committee (ALC), is responsible for chief oversight of the Agreement; the Executive Committee (EC), is responsible for the parties working together effectively to ensure the Agreement is fully carried out; and four program management committees (PMC) as well as a Joint Intellectual Property (IP) committee, are responsible for delivery of program level responsibilities. The program management committees are: AFL, AHL, VCEP, and Research.

All committees operate under their own terms of reference, membership, and specific responsibilities. These responsibilities and requirements are outlined in the Master Agreement and in the Committees' respective schedules of the Agreement. These documents have been provided to committee members in a program management handbook. As well, all governance documents are posted on a password protected website created for U of G and OMAF/MRA staff who sit on these committees.

A partnership secretariat was also created to provide administrative oversight for successful partnership implementation. The secretariat works collaboratively with committee co-chairs to address responsibilities and ensure relevance of the performance indicators (PIs). This

responsibility lies with OMAF/MRA, but U of G staff collaborates, where possible, to help ensure all targets and deadlines are met.

Overall Agreement

In order to ensure accountability and direction for the Agreement, a series of 39 Performance Indicators (PIs) were developed, some for the overall Agreement and several for each of the four programs operated under the Agreement – Research, Agriculture and Food Laboratory (AFL), Animal Health Laboratory (AHL), and the Veterinary Clinical Education Program (VCEP). In 2012/13 there was one change to an AHL performance indicator (#2) See Appendix B for details.

Five Year Review of the Partnership Agreement

The OMAF/MRA – U of G Partnership Agreement has played a key role in the research and innovation strategy of the Ministry of Agriculture and Food and the Ministry of Rural Affairs since it was implemented in 2008/09.

The programs of research, laboratory services and veterinary clinical training are aligned with ministry priorities, and help to ensure effective, modern infrastructure and highly trained personnel for the sector. These functions directly support the Ontario government's agenda for jobs and economy.

The Partnership Agreement also attracts significant funding from external sources each year, providing a positive return on investment.

A review of the Partnership Agreement took place during 2012/13 as mandated in Article 4.3 of the Master Agreement. According to the authors of the Agreement, a review at the mid-point of the ten year term was considered prudent and responsible management of OMAF/MRA resources to ensure it was 'on track' in its delivery of ministry priorities.

The review would be another step in the continuous improvement process that has been the *modus operandi* since the current Partnership Agreement's inception in 2008. Most importantly, it would provide a basis from which to make informed decisions regarding the allocation of resources for the second five year term. (2013/14 to 2017/18).

With these guiding principles, the following objectives were established;

- Documentation of the most important outcomes of the first five years, through economic analysis and case studies,
- Review of the Partnership Agreement's governance to ensure that both parties were in compliance with the Agreement's reporting requirements,
- Compilation of the changes (improvements) in program delivery and reporting that had occurred since April 2008,
- Solicitation of input from those most closely associated with the Partnership Agreement regarding the value of work completed in the first five years, and their suggestions for improvements going forward.

Working together under the governance structure of the Partnership Agreement, OMAF/MRA and the U of G undertook the following tasks to address these objectives:

- Economic impact study of the Partnership Agreement (2008-2013),
- Detailed study of selected performance indicators,
- Case studies of projects funded in the Research, Animal Health Laboratory and Agriculture & Food Laboratory programs,
- Compilation of outcomes of the Animal Health Strategic Investment program of AHL
- Overviews of the Highly Qualified Personnel (HQP) and Knowledge Translation and Transfer (KTT) programs, and recommendations for 2013-2018,
- Discussions and input from co-chairs for all programs, including Research Program Director Champions (OMAF/MRA) and Research Program Directors (U of G),
- An internal audit on the governance and reporting requirements of the current agreement,
- Compilation of revisions to the performance indicators, co-chair responsibilities, and other updates and improvements.

Below are excerpts of the following reports issued for the five year review:

1. Ontario Ministry of Agriculture, Food and Rural Affairs/University of Guelph Partnership Agreement: Economic Impact Study (PWC, Dec. 10, 2012)

The PWC economic impact study concluded that "*the OMAFRA funding under the Partnership Agreement provides significant economic and social benefits for Ontario*. *The ministries' investment of $363M in the Partnership Agreement over the years 2008/09 to 2012/13 resulted in $1.1B of economic activity in the province -benefitting Ontario's gross domestic product, salaries, jobs, and tax revenues.*

While economic impact analysis is a useful tool to assess spending impacts in an economy, it does not explicitly account for social, environmental and productivity benefits that result from OMAFRA Partnership Agreement (PA) funding. Discussions with stakeholders indicated that OMAFRA PA funding provides many qualitative social benefits to Ontario that are difficult to quantify. These benefits, which link to OMAFRA's strategic priorities, include:

- *Safeguarding the Ontario economy from the impacts of a foreign animal disease outbreak and protecting Ontario's access to export markets. In doing so, significant rural economic development impacts and benefits are generated.*

- *Contributing to Ontario's Innovation Agenda by attracting and maintaining research dollars in Ontario and by encouraging industry-academic partnerships which can result in improved research outcomes.*

- *Providing research results that inform public policy so that it can be "evidence-based". A significant example of this within the current Partnership Agreement is the development of the 2009 Ontario Animal Health Act.*

- *Contributing to the public health agenda by both improving the nutritional profile of foods and by providing testing and surveillance of food pathogens and infectious diseases that can be transferred from animals to humans."*

2. Analysis of Value Generated from Selected Performance Indicators for the OMAFRA/UofG Partnership Agreement (Stoddart Consulting, Sept. 2012)

"This report examines ten performance measures specified in the Partnership Agreement (PA) between the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the University of Guelph (U of G) in greater detail to provide greater understanding of the broader context of the value of the PA funding. The ten performance measures analyzed were:

- *OA2: Contribution of the partnership towards leveraging industry and other government funding*
- *OA3 OMAFRA and university staff engagement with the OMAFRA/university partnership*
- *OA4: Revenue generated from solutions, products and services developed through the partnership*
- *RD1(E): Level of utilization of selected research stations*
- *RD2: Total faculty and research personnel employed by the university related to OMAFRA research themes*
- *RD6: Level of engagement of university graduate students (HQP)*
- *RD10: Media citations related to OMAFRA themes*
- *AHL9: Effectiveness of knowledge transfer – Animal Health Laboratory*
- *AFL5: Effective response to food safety, environmental health and plant health/pest emergencies – Agriculture and Food Laboratory*
- *VCEP2: An appropriate number of high quality faculty – Veterinary Clinical Education Program*

Editorial note:

OA (Overall Agreement), RD (Research Program), AHL (Animal Health Lab Program), AFL (Agriculture & Food Lab Program), VCEP (Veterinary Clinical Education Program)

The existing Partnership Agreement sets out a number of quantitative performance measures that are reported annually. This report examines the data and information around a number of those performance measures in more detail and provides a more comprehensive discussion of the benefits Ontario is receiving for the significant investment through the PA.

For example, the PA requires the U of G to report the number of research FTEs directly funded by the PA. However, total research FTEs does not give the complete picture of how many people, their knowledge and their associated networks OMAFRA is drawing on through the PA. Similarly, there is significant leverage in the value of the AHL and AFL in the event of an emergency.

The potential impact on the provincial economy, both in the agri-food sector and the broader economy, of the diagnoses completed by the two labs is significant. Having a highly skilled, responsive diagnosis capability is critical to identifying and containing or ruling out infectious diseases. The consequences of both false positives and false negatives can be significant.

This report draws on a combination of analysis of the detailed data that underlies the performance measures reported in the annual report and a series of interviews with key individuals from both OMAFRA and the U of G. The report is intended to be a concise description of the broader context in which each of the selected performance measures exists.

For each of the performance measures examined in detail, the deeper analysis revealed a more positive outcome and greater benefit being derived than indicated by the overall performance measure reported in the PA Annual Report."

3. Partners for Progress: Innovation Along the Pathway from Idea to Impact (U of G Office of Research, 2012)

This report provides a snapshot of the 'innovation to impact' process for research funded by the OMAFRA-U of G Partnership. One of the key components for successful innovation required to maximize societal benefit through research, is investment in the full continuum of the research process. The six case studies included in this report demonstrate the various phases of this research process and how each phase provides a critical link in the eventual positive impact on society.

- *Replacing petroleum-based materials in plastics for products such as interior car parts, landscaping, and packaging with plant-based materials from Ontario fields becomes a reality through a unique multidisciplinary and collaborative research program.*

- *Developing more cost-effective treatments for critical diseases such as breast cancer through plant-based biosimilar drugs, could save the province of Ontario millions of dollars. Researcher Chris Hall discovers a novel use for tobacco plants that are an ideal platform for the creation of a bio-based version of an antibody used in the treatment of breast cancer.*

- *Researchers working in collaboration with the Ontario Pork industry are enhancing detection and potentially eradicating Porcine Reproductive and Respiratory Syndrome Virus (PRRSV).*

- *Research and development into high quality and nutrient rich vegetables will contribute to the health of Ontario residents. Collaborations along the entire value chain bring new products to market.*

- *The Animal Health Laboratory (AHL) at the University of Guelph is a key partner in protecting animal and human health. The AHL detects, characterizes and monitors influenza viruses to determine pandemic genotypes and predict outbreaks.*

- *The diagnostic method developed by the University of Guelph's Agriculture and Food Laboratory offers a rapid and sensitive way to detect over 20 mycotoxins,*

strengthening Ontario's surveillance activities, food safety programs, helping to minimize associated economic loss.

4. Animal Health Strategic Investment Program report (U of G Animal Health Lab, April 2013)

With support from the Animal Health Strategic Investment fund, the AHL has developed improved methods to detect, monitor, and recover from an animal health crisis in Ontario. Over the 5-year period, 33 new test methods have been developed and 97 methods have been improved to test for emerging disease hazards.

The development of these tests has involved high-throughput equipment, such as, the LightCycler 480 real-time PCR, GS Junior, Luminex and the ELISA robot, and Ventana autostainer, in order to expand services for PCR, ELISA , and IHC at the AHL. These enhanced test methods contribute to the global impact of Ontario agriculture by providing cost- effective and accurate methods to detect and control potential animal health events.

AHSI has been a very useful program for developing new tests, increasing our surveillance base, and preparing for emergencies. Next steps include full implementation of all of the new and revised tests that have been developed, and bringing all new equipment on-line. The ELISA robot has proved to be a boon to our testing throughput, and is being upgraded to next generation software and reconfigured for greater efficiency. The new MALDI-TOF is at full capacity, and has improved turnaround times on bacterial speciation.

We plan to further enhance integration of AHL lab surveillance results into the national picture, and would like to expand cluster analysis and other surveillance tools developed through AHSI. Annual emergency exercises will continue, as initiated by AHSI, with the aim of continuous improvement of this vital function, both with respect to postmortem room capabilities as well as laboratory surge capacity for recovery activities.

The Second Five Year Term of the OMAF/MRA – University of Guelph Partnership Agreement

Based on the favourable results of the review of the first five years of the Partnership Agreement, OMAF/MRA committed to fund the remaining five years of the 10 year term.

In January 2013, a letter of mutual acceptance was signed by both parties agreeing to work collaboratively to find further efficiencies in the programs (with any savings being reinvested into Partnership Agreement programs) and to ensure continued alignment with OMAF/MRA priorities.

The two parties also agreed to work to enhance the sustainability of the Partnership Agreement so that it could continue to provide the capacity in expertise and infrastructure required by OMAF/MRA.

Accomplishments

Research

The Research Program has seven research themes – Agricultural and Rural Policy, Bioeconomy – Industrial Uses, Emergency Management, Environmental Sustainability, Food for Health, Product Development and Enhancement through the Value Chains, and Production Systems. Each research theme is led by a Research Program Director (RPD) from the University of Guelph and a Director Champion (DC) from OMAF/MRA.

Highlights and case studies from each research theme follow later in this report. Achievements from the 2012/13 research program include; economic models for policy analysis in the Ontario agri-food sector; the development of Russian Dandelion as a rubber crop for Ontario; the prevalence, severity and economic damage of *Nosema ceranae* on honeybees in Ontario; the implementation of wash-water recycling to reduce the amount of process water required to wash and peel vegetables; the correlation between Type II diabetes and the consumption of dietary fibre; the use of organogels to replace traditional animal fat in meat products; Welfare-Friendly Eggs: alternative housing systems for laying hens; and adding more value to Ontario's floriculture industry.

As negotiations were underway for the funding for the next 5 year term (2013-2018) of the current OMAF/MRA-U of G Agreement an 'Interim' Call for Letters of Intent was issued on October 18, 2012 for applications in the Emergency Management, Food for Health & Product Development combined and Production Systems (Animal and Plant) Themes only. LOIs were due on November 22, 2012. 107 LOIs were received – 9 of them applying across two or more themes. These LOIs were reviewed by research theme committees, chaired by the Research Program Director and consisting of representatives of the research and academic community (U of G, other research institutions and universities), OMAF/MRA and other government ministries/departments, and industry or sector representatives. Of the LOIs reviewed, 49 (including 2 applying across themes) full proposals were requested for submission, and 37 (including 2 across themes) were funded with starting dates as of May 1, 2013 or later. They will be reported on in next year's annual report.

Knowledge Translation and Transfer (KTT) and Highly Qualified Personnel (HQP) continued to be successful during the 2012/13 fiscal year. Both programs had overwhelming responses to the Calls for applications. Further details on these new programs are provided in the New Initiatives section of this report.

Communications

In 2008, (the first year of the current OMAF/MRA - U of G Agreement), communications were identified as key to the initiative's success. This included outreach to the public and consumers, to increase understanding of the valuable outcomes of the agreement, and internal communications to similarly inform OMAF/MRA and U of G employees. Working with the private sector in getting new knowledge from the lab to the field and factory was seen as crucial, and numerous strategic communications activities continued through 2012/13, dedicated to building the information pipeline. These projects covered print and broadcast media, as well as internal and external communications.

For example, in 2008/09, an *Agri-Food Yearbook* was developed as a special edition of the University of Guelph's long-established *Research* magazine. Based on its enthusiastic reception, in 2009/10, the yearbook became a regular part of the Research magazine's annual publication schedule. Annually since 2010/11 the *Yearbook* has been distributed as an insert in *Ontario Farmer* newspaper. This effective, economical distribution method saw the publication delivered directly to more than 30,000 farmers, the *Ontario Farmer* subscription base, at a fraction of the cost of mailing it directly. The caché of being an insert into one of the leading commercial agricultural publications in Ontario added significant credibility and relevance to the publication. Communications have now been updated to include social media and internet information sources.

The Buzz is an electronic newsletter for and about the Partnership. Launched in 2008, during 2009/10 the format was enhanced by adding photos and including a broader collection of contributors. As well as having news about research, research stations and events, each issue now also includes regular contributions from the Catalyst Centre (formerly the Business Development Office) and the KTT program.

Similarly, News@ (Close to) Noon, the 11:00am to noon hour bimonthly speaker series which features programs and research about the Partnership, is now reaching a broader audience. Invites to the events have been extended to industry and it is now also being offered 'live' over the internet for people who can't attend in person.

Commercialization

Commercialization and licensing of research outcomes from the OMAF/MRA - U of G Agreement is reported by the Catalyst Centre (CC). For 2012/13 germplasm royalty revenues increased by 12% over last year. The Catalyst Centre reported 267 disclosures, 13 patents filed, 14 licenses granted and 1 patent issued related to OMAF/MRA funded technologies. Total license revenue for OMAF/MRA supported research reached $1,378,276.

Returns to the germplasm portfolio continue to hit new highs, accounting for 46% of the total royalty revenues returned to the Catalyst Centre in 2012/13. Total returns generated from plant technologies since the inception of the technology transfer program in 1977 reached over **$11 million in royalties**. The wider economic impact of these discoveries is striking with **billions of dollars of seed and crop sales** that have followed.

Through the Knowledge Translation and Transfer (KTT) program, the Catalyst Centre has created the 'Guelph IP Academy', which delivered 19 workshops and created a webpage focused on enhancing knowledge and understanding of issues related to commercializing university generated Intellectual Properties (IP).

The Industry Liaison Program (ILP) continues to focus on increasing economic value for Ontario, Canada and abroad through industry-sponsored research and development projects. Projects are industry-driven to answer specific technical and fundamental research questions that will help to increase sales, enhance productivity, develop new services and solutions that companies can deliver to the market. One-third of the ILP's resource is dedicated to creating new research projects based on OMAF/MRA's strategic priorities. The ILP contributed

significantly to new academic-industry partnerships, impacting more than $4.15M in leveraged industry sponsored research. The outcomes of this research will help to generate a strong pipeline for future technology transfer opportunities.

The OMAF/MRA Proof of Principle (POP) program has enabled further development of technologies toward commercialization. The Catalyst Centre has responsibility for distributing funds to appropriate projects. This program has supported commercial development of seven technologies, resulting in one issued patent, one license deal, and several potential licenses that are currently being negotiated. Proof-of-Principle program updates can be found on page 184.

Veterinary Clinical Education Program

The Veterinary Clinical Education Program (VCEP) continued to provide base funding for the operation of the Veterinary Teaching Hospital, advanced clinical training, an externship for DVM students and a one-year Veterinary Internship Program through the Ontario Veterinary College (OVC). Highlights from the program include OVC achieving continued full accreditation from the AVMA/CVMA at its annual review.

OVC's veterinary students continued the long-standing tradition of achieving a very high success rate on the North American licensing exam resulting in a high rate of post-graduate employment and very high employer satisfaction with new graduates.

The Bovine Education Trust provided financial support for veterinary students to obtain further hands-on clinical practice experience in the dairy and beef industries. Support funding for the trust was provided by the Partnership, through the VCEP program. In support of preparing students for rural veterinary practice the program also continued to provide funding for the delivery of final year elective rotations in bovine clinical skills and equine primary care.

The Centre for Public Health and Zoonoses (CPHAZ) held its Spring Symposium on Thursday, June 6th, 2013 at the Delta Hotel in Guelph. Over 180 people attended the event, where two keynote speakers, Dr. Jay Keystone and Dr. Chelsea Himsworth motivated and captivated the audience, the 18 concurrent speakers showed the breadth and depth of current public health initiatives while 13 graduate students presented their research studies.

The Masters in Public Health (MPH) enrolled its fifth class, with approximately 200 applicants for the 20 available positions. The MPH students continue to have a high level of engagement with the public health sector for their practicum placements and are very successful in gaining post-graduation employment in public health related positions. Agencies that have hosted the MPH students include, among others the Public Health Agency of Canada, the Ontario Ministry of Health and Long-Term Care, Public Health Ontario, Cancer Care Ontario, Wellington-Dufferin-Guelph Public Health, Peel Health, Halton Regional Health Department, Chicken Farmers of Ontario, Veterinarians Without Borders and the AIDS Committee of Guelph

Laboratory Services

Laboratory Services (LSD) continues to optimize the leveraging of services offered within the Partnership to other government, commercial and academic clients.

This leveraging of services benefits both the Lab and OMAF/MRA through means such as:

i) Introducing efficiencies in economies of scale;
ii) Introducing new methods/techniques for non-OMAF/MRA projects to expand the depth of services available to OMAF/MRA while bearing no development costs to the Partnership e.g. neonicotinomide testing in bees, honey and related matrices
iii) Expanding current expertise through projects with other clients that is readily applied to OMAF/MRA programs e.g. *Campylobacter* PCR profiles, MLVA testing.

The Animal Health Laboratory (AHL) and the Agriculture and Food Laboratory (AFL) report separately in the annual report under the Agreement.

Vision:

We will be a laboratory partner of choice for government and universities in Canada, for agriculture, food safety, and animal health testing. We will also be a leader in providing high-value laboratory services to the private sector in selected niche markets.

Mission:

Working together toward a healthier future … we provide high-value analytical and diagnostic services for the agricultural, food and veterinary sectors.

Agriculture and Food Laboratory

The LSD 2008-2011 Strategic Plan was updated and revised as part of the three-year strategic planning cycle agreed to by the LSD senior management team. Key learnings were incorporated into the current 2011-2014 Strategic Plan. The AFL maintains its focus on these strategies and is gaining strength in reputation and position as a fee-for-service laboratory domestically and abroad.

The Agriculture and Food Lab (AFL) continues to use strong business processes and targeted marketing activities to build revenue in identified niche areas. As always, the goal is to continue to build external revenues for reinvestment and sustainability (per Schedules “E” and “F” of the Agreement). While some of the AFL revenue is project-based and may not be recurring, the Lab continues to develop expertise and novel services that will serve well in sustaining a successful not-for-profit business enterprise. Working from its strengths, the AFL continues to develop partnerships throughout its regulatory partner organizations to secure its role as a “laboratory partner of choice” across Canada.

AFL continues to offer a high level of service to clients in agriculture, food and beverage, corporate and research sectors while meeting the challenge of maintaining technology and infrastructure that is capital intensive and rapidly changing. LSD continues to reinvest in large capital items strategically identified by its management team to target key laboratory capacity issues. Ongoing support from OMAF/MRA to provide $500,000 annually for equipment purchases by LSD is critical.

In 2012/13 the AFL continued the implementation of innovative test approaches and other initiatives that benefit the OMAF/MRA-University of Guelph Partnership Agreement:

1. AFL maintains a high profile in the industry in the use of molecular techniques. The Lab continues to collaborate on a project involving OMAF/MRA, Ontario Public Health, Health Canada, the Public Health Agency of Canada, the Canadian Food Inspection Agency and the Ontario Ministry of the Environment, specifically the use of a Multi-Locus Variable Number Tandem Repeat Analysis (MLVA) methodology and ongoing contributions to a database using a combined culture bank of 2500 *Listeria* isolates. It has proven to be quite valuable both in its contribution to the research project and its ability to provide the highest level of confidence to the work performed at the Lab for the OMAF/MRA programs. The MLVA project is highlighted in the 2012/13 University of Guelph annual Partnership Yearbook.

2. An expanded scope of residues analyses that support the annual Canadian Chemical Residue Determination in Fresh and Processed Fruits and Vegetables was introduced in 2011/12 and successfully applied to OMAF/MRA pesticide residue programs this year. In 2012/13, concerns were raised in the honey industry regarding potential neonicotinoid poisoning of bees. Results from work performed by the AFL for industry groups and federal agencies has resulted in an established method for testing of neonicotinoid residues in bees and honey that OMAF/MRA can now consider for addition to their Foods of Plant Origin or Horticulture Technology testing programs.

3. In a similar vein, the AFL has modified a Health Canada method for the determination of iodine in milk that it previously developed for a project with the Dairy Farmers of Ontario (DFO). This method is now being applied within OMAF/MRA Dairy Food Safety Program.

4. The AFL has successfully completed the third year of a five-year contract for raw milk testing in Ontario. The lab tested over 800,000 samples and worked closely with the DFO, the Ontario Dairy Council (ODC) and OMAF/MRA to support any program issues that may arise periodically in this industry.

5. The AFL laboratory scientists continue to work closely with OMAF/MRA Dairy Food Safety Program staff to develop testing programs that benefit all species in the dairy industry, including the growing sheep milk industry.

6. The AFL multi-residue methods continue to be improved upon and expanded to include regulatory testing of drug, pesticide and mycotoxin residues in the considerable variety of matrices received from OMAF/MRA. These include animal tissues and milk across several species, as well as fruits and vegetables and grains/feeds. In 2012/13

OMAF/MRA continued to survey unique product classes such as duck that can also be tested using this same high-level technology. In this regard, OMAF/MRA reaps the benefit of the AFL's position as the only non-government lab in Canada to hold accreditation that permits the application of non-routine testing to client samples under defined conditions.

7. AFL continues to look for niche sector opportunities that are critical to the success of the leveraging strategy needed to secure sufficient revenue to sustain the Laboratory Services Division as a whole. To this end, the AFL continues to build important relationships and revenue with the private sector including the bundling of complementary services for the purpose of food contaminant and/or adulteration investigations.

Animal Health Laboratory

Since October 2010, the AHL has occupied the new Pathobiology-Animal Health Laboratory building on the corner of Gordon and McGilvray Streets of the Guelph campus.

The AHL Animal Health Strategic Investment (AHSI), new initiative funding for 2008-2013, concluded April 30, 2013. AHSI supported the 3 key pillars of the initiative, which were: 1) developing new and/or improved tests for emerging diseases, 2) enhancing baseline surveillance for the early detection of emerging hazards, and 3) the development and testing of emergency and business continuity plans for the AHL. As well, AHSI provided funding for the purchase of new testing equipment needed by the AHL. The AHSI wrap-up session held November 8, 2012 was well attended by stakeholders. The AHSI Magazine was published in June, 2013, giving a complete summary of the initiative, including >100 tests developed, $1.3M of equipment purchased, 53 projects completed, and >180 publications, presentations and theses produced.

Yearly, the AHL has surveyed its clients to determine their satisfaction, by commodity, with key elements of AHL service (as described in performance indicators #4, 7 and 9). In response to feedback from clients, and with agreement from OMAF/MRA, the survey will now be conducted biennially, and was therefore not conducted in fall 2012. The next client satisfaction survey is planned for fall 2013.

The annual update to the American Association of Veterinary Laboratory Diagnosticians (AAVLD) in January 2013 resulted in continued accreditation within the five-year accreditation granted in April 2009. Since that time, annual updates have been submitted to the AAVLD Accreditation committee, and these have all been accepted. The next AAVLD audit of the AHL will be in the spring of 2014.

Program Highlights and Case Studies

Agriculture and Food Laboratory

Advancements in Molecular Biology and Microbiology

In an ongoing collaboration with regulatory partners, the AFL has further refined a simple, rapid, accurate and standardized DNA fingerprinting methodology (MLVA) and database that facilitates tracking contamination sources of *Listeria monocytogenes* in the "farm to fork" continuum. (S. Saleh-Lakha, V. Allen, J. Li, F. Pagotto, J. Odumeru, E. Taboada, M. Lombos, K.C. Tabing, B. Blais, D. Ogunremi, G. Downing, S. Lee, A. Gao, C. Nadon and S. Chen. "*Molecular subtyping of a large collection of historical Listeria monocytogenes strains using an improved Multi-Locus Variable-Number Tandem Repeat Analysis (MLVA)"*. Manuscript submitted to Applied and Environmental Microbiology.)

Results obtained from this testing are providing a better understanding of the genetic composition and the distribution of these organisms in Ontario. This method continues to be applied to OMAF/MRA programs, further enhancing food safety within Ontario.

Pesticide testing

This is the second year of testing for an expanded scope of compounds provided through the multi-residue and targeted pesticide residue testing program for OMAF/MRA's Foods of Plant Origin program. Working together, OMAF/MRA and the AFL successfully collected and tested more than the scheduled 200 produce samples for over 400 pesticides.

During the course of a non-Schedule "F" project, the AFL worked with an industry group as well as with the CFIA to install a method for the determination of neonicotinomide and related compounds in bee related matrices. As a result, the AFL would be fully prepared should there be a request from OMAF/MRA to provide similar testing for Ontario in 2013-2014. This further supports OMAF/MRA's desire to remain aligned with the national testing programs.

Through work with both the Canadian Food Inspection Agency (CFIA) and Agriculture and Agri-Food Canada (AAFC), AFL leverages its expertise and resources in pesticide testing to the benefit of OMAF/MRA. The AFL maintains Standards Council of Canada accreditation status that states the AFL complies with requirements of OECD Principles of Good Laboratory Practice (GLP) 1998. This accreditation allows the AFL to work on behalf of the AAFC to verify characteristics of new pesticides coming to market. Knowledge gained through this testing can be applied when these compounds come to routine use in the agricultural sector.

The AFL Chemistry Unit is working collaboratively with University of Guelph researchers from Environmental Biology within the School of Environmental Sciences on a number of research studies (listed in the AFL fourth quarter report). This work further establishes the AFL as experts in the area of pesticide residue chemistry and expands the scope of services that LSD is able to provide to OMAF/MRA.

Dairy Testing

Raw Milk Testing Contract

The Agriculture and Food Laboratory has successfully completed the third of a five-year, renewable contract to provide both analytical and program management support for the collection, testing and reporting of results for raw milk composition and quality program samples in Ontario. The lab tested over 800,000 samples producing more than four million test results for these samples.

Analytical testing information and quality testing for regulatory purposes are delivered through the relationship that has been in place for four decades between the Laboratory and the Dairy Farmers of Ontario, the Ontario Dairy Council and OMAF/MRA.

Other Milk Species

The goat milk industry has embraced the implementation of enumeration of bacteria in fluid goat milk using the BactoScan™ FC from the Standard Plate Count method. Verification of tests for the determination of veterinary drug residues in goat milk has been completed, along with a view to add new compounds or tests to this list of verified methods when they are identified in the field or by OMAF/MRA as priorities.

Concurrently, the AFL is working with its OMAF/MRA partners to further develop testing for Ontario's growing sheep milk market. Testing approaches are expected to evolve in line with the evolution of the sheep milk market in Ontario.

Multi- Residue Methodology

AFL is focusing significant effort into a review of the current status of multiple residue methodologies for the detection and quantitation of veterinary drugs as developed on behalf of OMAF/MRA for use in their Meat Inspection Program and Dairy Food Safety Program. Together with the OMAF/MRA Food Safety Science Unit, they are investigating how to implement changes that optimize the Ministry's testing resources toward fulfilling their mandate for food safety in Ontario within these program areas.

Research Projects:

AFL scientists have successfully developed and implemented the MLVA subtyping method for *Listeria monocytogenes* under the research projects funded by OMAF/MRA's competitive Food Safety Research Program. The MLVA method has allowed AFL to provide rapid MLVA analysis on suspicious and confirmed *L. monocytogenes* colonies isolated from RTE meat and produce samples. This provides strain type information prior to final confirmation, or prior to the isolates reaching a government reference lab, allowing OMAF/MRA to take action with increased confidence. The method has also been used to test *L. monocytogenes* isolates from the food industry to investigate contamination events (trace back/trace forward). The MLVA method is now being validated among four other government labs (PHO, CFIA, NML and HC) with the intention of future application of the methodology.

AFL has also completed the development and preliminary evaluation of a simple and cost-

effective antibody microarray for detection/identification of the Top seven Shiga toxin-producing *Escherichia coli* (STEC) O serogroup organisms using the funding from Ontario Centre of Excellence (OCE). AFL is planning to conduct a full validation of the microarray combined with an immunoblotting method for detection, isolation and identification of the top seven STEC if additional research funding is obtained via OMAF/MRA's Food Safety Research Program.

Progress and final reports for the research projects (listed in the AFL fourth quarter report) have been delivered to the corresponding funding agencies by the principle investigators. Additional activities (such as project meetings) in addition to publications and presentations as listed above for Knowledge Translation and Transfer (KTT) took place as proposed in the KTT plans for each of the projects.

Leveraging for Reinvestment and Sustainability

With the revenue and the success of the Plum Pox Virus testing program now past, the AFL must replace this revenue source with various large, on-going and one-time projects to provide the necessary reinvestment funds for the long-term sustainability of the Division. Laboratory Services continues to modify and improve its approach to securing new business opportunities and increasing external revenues for reinvestment (per Schedules "E" and "F" of the Agreement). The Division requires a reinvestment of approximately $1.5M to $2.0M into equipment, building infrastructure and new capabilities each and every year.

While typically the focus has been on replacing instrumentation, in 2011/12, the AFL faced challenges with one of two existing uninterrupted power supply (UPS) units in place in the facility. By 2012/13 both units were irreparable and required replacement. The AFL successfully adopted an interim solution through the temporary installation of a mobile rental unit. In the coming year, 2013/14, two new UPS units will be installed, shifting ownership and long term management of these power units from CBRE to the AFL.

Further capital costs related to building infrastructure were absorbed as the AFL completed the replacement of eyewash stations and safety showers to meet current building code regulations. As the building at 95 Stone Road matures, there will be on-going capital costs of program-related infrastructure repair or replacement – a cost which is over-and-above that needed to maintain/purchase laboratory equipment and new technology.

It is recognized that the contractual agreement with OMAF/MRA is a critical element in the Division's ability to maintain the balance between its capability and capacity for the leveraging of services and remaining a self-sustaining entity within the University of Guelph. For the past fifteen years the AFL has demonstrated its ability to leverage expertise and capacity by generating sufficient revenue from select commercial, government and research projects.

AFL is committed to providing timely support for urgent/emergency response initiatives as required, as well as ongoing scheduled testing programs for OMAF/MRA.

Animal Health Laboratory

Infrastructure

- Although the AHL moved into the new Pathobiology-Animal Health Laboratory on the corner of Gordon and McGilvray Streets in 2010, correction of building deficiencies and building commissioning continued through fiscal 2012/13. The 2 higher containment laboratories (CL2+) – TSE (transmissible spongiform encephalopathies) lab 1822 and FAD (foreign animal disease) lab 2811 – have undergone HVAC upgrades and await final commissioning.
- In August/September 2011, Progressive Recovery Inc. (PRI) installed an alkaline tissue digester to provide on-site disposal of hazardous animal anatomical waste from the postmortem suite. The digester is functional but awaits final approval. A commissioning run of tests was completed in summer 2012. Ministry of the Environment: Environmental Compliance Approval (MOE ECA) was received in January, 2013. Final commissioning and City of Guelph approval of condensate discharge and CFIA approval of SRM (specified risk materials) handling will occur in summer/fall 2013.
- The pneumatic tube system between building 89 and the OVC Health Sciences Center, installed to expedite delivery of specimens from the HSC to the AHL, has been further upgraded with surge protection of computer components, and is fully functional.
- Significant new testing equipment was added to the inventory of the AHL, through funding from AHSI funding (~$1.3M) and the OMAF/MRA vaccine project ($400K).

Operations

- AHL continued to offer a wide spectrum of tests, with addition/replacement of improved tests over time as enhanced through the AHSI, e.g., continue to replace gel-based PCR with real-time polymerase chain reaction (PCR). Following is a list of new and/or improved tests offered by the AHL in 2012/13:

Test Name
Bacterial culture, Brachyspira
Bacterial culture, surgical site infections
MIC – companion animal
MIC – equine
AM suscept, cmpn, MRSA
Check IGG submission
Cytology, urine OVC
Small animal hepatic screen, no bile
Phase 3 pre-surgery CBC
Phase 3 pre-surgical biochemistry profile
IHC, adenovirus
IHC, Lawsonia
IHC, Listeria

Avian Coxiella-like organism ID
Haemophilusparasuis real-time PCR
Borrelia and anaplasma in ticks, PCR
Avian encephalomyelitis virus – real time PCR
Anaplasma antibody cELISA
Astrovirus, avian, rt-RT-PCR
BCoV coronavirus – real-time PCR
Bovine parainfluenza-3 real-time RT-PCR
Equine arteritis virus real-time RT-PCR
Equine arteritis virus neutralization assay
PRRSV, NorthAm/Eur re-RT-PCR (Tetracore)
Porcine HEV real-time PCR
Porcine parvovirus rtPCR
Rotavirus rum real-time RT-PCR
Virus isolation in SPF Eggs, food

- The AHL accessioned 66,642 cases and performed 812,954 procedures in 2012/13 in support of disease surveillance. Individual procedures are often comprised of multiple tests, e.g., biochemistry profiles of 20 tests each, thus exceeding 1,000,000 annual tests.

- The AHL published 33 scientific articles in the quarterly AHL Newsletters in 2012/13. As well, AHL veterinarians were involved in 83 oral or poster presentations and 15 peer-reviewed publications in calendar year 2012.

- The AHL forwarded samples from 68 cases to CFIA laboratories for rule-out of reportable diseases, primarily rabies, but also including classical swine fever, bluetongue, AI, classic swine fever, brucellosis, scrapie, and other significant foreign animal and zoonotic diseases.

- The American Association of Veterinary Laboratory Diagnosticians (AAVLD) audited the AHL in April 2009; as a result of this audit, the AHL received full AAVLD accreditation for 5 years. The annual update provided in January 2013 was acceptable to the Accreditation Committee. The next AAVLD audit site visit will occur in spring 2014.

- The Animal Health Strategic Investment ($1.5M/year for 5 years) has funded 53 projects targeted to support the 3 key pillars of this new initiative:
    - New and/or improved tests for emerging diseases;
    - baseline surveillance for the early detection of emerging hazards; and
    - development and testing of emergency and business continuity plans for the Animal Health Laboratory.

- The AHSI Magazine, published in June, 2013, presented a complete summary of the initiative, including >100 tests developed, $1.3M of equipment purchased, 53 projects completed, and >180 publications, presentations and theses produced.

- Pathologists in both AHL-Guelph and AHL-Kemptville labs participated in a postmortem-based small ruminant laboratory FAD emergency exercise in October 2012, contracted to OLPC.

- Further to the enactment of Regulations under the Animal Health Act, (AHA) 2009, the AHL, in concert with OMAF/MRA, developed "case definitions" for the 117 notifiable hazards identified in the Regulations. Based on various triggers – positive results in the range of tests available for each hazard – automatic email alerts are sent to OMAF/MRA throughout the day. OMAF/MRA is hence kept well informed of laboratory-based identification of hazards, and can access full information on each case cited by the Web Intelligence WebI system that queries the AHL data warehouse. This auto-alert system was tested in fall 2012 and was fully functional on Jan. 1, 2013. The system has reported an average of 95 cases (144 tests) per month to OMAF/MRA in Jan-April, 2013 (see AHL2 in Performance Reports Section). Cases included a wide range of bacterial and viral organisms, although the majority (461 of 576 total identifications) were *Salmonella* serotyping.

Research

The research conducted under the OMAF/MRA - UofG Partnership Agreement is a model of government-university collaboration that generates agri-food, agri-business and rural related research aligned with government priorities, as well as providing opportunities for related industry and sectors. The research priorities are set annually through a 'Theme Advisory Group' process which includes the University, OMAF and MRA, as well as the perspectives of related sectors and stakeholders.

For 2012/13 the scope of the Research Program was reduced, due to negotiations underway for the second five year term of the ten year Partnership Agreement. For that year only, the Call for Proposals was issued for research in the following areas: Plant and Animal Production Systems, Emergency Management, and Food for Health.

Agricultural and Rural Policy

The OMAF/MRA-University of Guelph Partnership funds research in this theme in order that government can provide support to Ontario's agri-food industry and rural communities. Agricultural policy research encompasses many issues related to farming, including agricultural trade and marketing, business and finance, and innovation in economic development. Rural policy research focuses on the challenges and opportunities facing rural Ontario, including current government policies and programs, the impact of climate change, regional development, rural infrastructure, transportation and rural labour markets. Together, agricultural and rural policy research provides up-to-date, factual information on which to base sound policy decisions.

Highlights from the program this year include:

- Researchers in the School of Hospitality and Tourism Management are working to identify and compile innovative best practices in rural tourism development that specifically align with the resource strengths of Ontario's communities. Researchers will identify key strengths of rural communities including natural resources, agricultural produce, culture and heritage, the built environment and human resources. Examples of rural tourism development initiatives will be collected from within Ontario, across Canada, and as well as internationally. One example of a way to increase tourist expenditures in rural areas while at the same time increasing sustainable local food production is rural culinary and food tourism. Value chains that increase local returns related to tourism will also be looked at in this study. (Joppe, #200366)

- What is the relationship between regional industrial performance and economic performance? Researchers in the Department of Food, Agricultural and Resource Economics are theoretically and empirically analyzing this relationship for regions in rural Ontario. For a specified area, industrial composition refers to the share of employment in different industries such as agricultural, manufacturing, services, etc. while economic performance refers to a number of quantifiable measures including income and poverty rates. A principal outreach tool – Rural Economic Development and Intelligence system (REDDI) – provides support to planners and assesses communities based on industrial character. Another development in this research project was the inclusion of an analysis tool called Shift-Share, a method designed to explain change in employment across regions over time. (Deaton, 200048)

- Researchers in the School of Environmental Design and Rural Development are studying the feasibility, acceptability, and potential costs and benefits of various farm environmental certification models for Ontario farmers. Research will include an assessment of the experiences of other jurisdictions in implementing environmental and related certification on farms and will also develop a number of alternative models of on farm environmental certification. Farm organizations, producers, wholesalers, retailers and regulators will also be consulted for feedback on potential environmental certification programs. (Fitzgibbon, 200368)

Case Study

Alan Ker, Department of Food, Agricultural and Resource Economics

#200357: Economic Models for Policy Analysis in the Ontario Agri-Food Sector

November 15, 2010 – October 31, 2013

(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$294,000
Faculty/CARG FTE	$143,013

Research Station Use	N/A
Tech/Admin Support & Indirect Costs	$131,488
Total OMAF/MRA-U of G Project Value (up to and including 12/13)	**$568,501**
Partner/In Kind Contributions	$ cash, $ in-kind (none listed)
Collaborators	**Cairns, A.**, Depart. of Food, Agricultural and Resource Economics, UofG **Duff, S.**, OMAF/MRA **Kelly, J.**, Depart. of Food, Agricultural and Resource Economics, UofG **Ramadan, A.,** Depart. of Food, Agricultural and Resource Economics, UofG

Economic models contribute to industry by helping provide answers about government actions that impact their work (e.g. policies or regulations). Ontario institutions do not have the full capacity to give a complete economic analysis on the current or future state of a given industry, however, by implementing an economic model, industries and researchers are provided with tools to predict changes or scenarios that could potentially occur.

This project has a particular focus on implementing an analytic modeling capacity for Ontario's beef industry but the overall objective is for it to extend to other provincial agricultural sectors to create a comprehensive network of models that form the primary means of agricultural economic analysis in the province. Specifically, institutions like FARE, AAFC, OMAF and MRA are targeted to enhance their capability to conduct policy analysis on an ongoing basis. An important gain from this project is the identification of the complexities of each sector for policy-makers who may be unaware of any industry characteristics. It also is a teaching tool for those outside of the field of agriculture to explain how the supply-chain and affiliated markets function.

The nuclei of two models have been developed by the research team to characterize the supply-chain of the provincial beef sector. This includes all inflows and outflows of Ontario's beef market, backgrounding, finishing, and the processing or retail stages. These models are called: (1) The Static Synthetic Model (SSM); and (2) The Econometric Simulation Model (ESM). Only the nuclei have been created because each will have to be adjusted depending on what policy questions are being considered. The difference between the two models is that the SSM is a simplified version of the ESM, therefore, although less precise, the SSM is a quicker tool that is practical for lack of intimate knowledge of simulation models or time. The project is currently in the course of documenting the models' structure, origin of the data used, and the estimation of the process, in order to be able to provide a manuscript to permit replication so the model can be updated as necessary.

Collaborations have played an essential role in creating and enhancing these models as the models have been developed with help from value chain experts in the beef industry. The head researcher of the project, Dr. Ker says, "The Ontario Cattlemen's Association has been very instrumental [to this research] and especially OMAFRA."

The results of this research are difficult to gauge because of its purpose to accommodate questions pertinent to policy development and discussion. However, there has been lots of interest shown at by industry and the scientific community. The research team has facilitated a number of meetings with industry stakeholders and scientific members to further demonstrate the capacity the models have to assist in policy questions. The model is currently being finished and tested and will be released to the beef industry on November 21st of this year.

Bioeconomy – Industrial Uses

Plant and animal products in agriculture have long been used primarily for food and feed. The terms "bioeconomy" and "industrial uses" refer to the incorporation of renewable biomass resources – in whole or in part – into non-food and non-feed manufactured products, or energy systems. Often biomass is used to replace petrochemicals, with the benefit of making production more environmentally sustainable. This research theme focuses on three major product categories – biomaterials (e.g., textiles, carpets and panels), biochemicals (e.g., lubricants, sealants and oil) and bioenergy (e.g., ethanol, methanol and biodiesel) – all of which involve the use of agriculturally derived biomass to reduce dependency on petroleum-based materials.

Highlights from the program this year include:

- A study by IntertechPira predicts nearly a $1.24 billion market value by 2017 for green/bio-adhesives and sealants. Currently most of the adhesives for paper, board or wood products are obtained from petro-based raw materials which make the final product non-biodegradable and less 'green'. Starch-based adhesives are attracting attention as an eco-friendly substitute; however these adhesives suffer from poor water resistance. This project aims to develop low cost, simple and effective hybrid adhesives by integrating lignin and Distiller's Dried Grains with Solubles (DDGS) into a starch system. Dr. Amar Mohanty and his research team will complete processing and material chemistry using industry prevalent reactive extrusion technology. (Mohanty #200543)

- Since 2008, nearly $2.5 million has been invested in developing a production of low-cost xylose. Due to supply constraints and production costs of xylitol, demand has been constrained at 10,000 tonnes per year. Most of this is produced at a single facility in the United States Midwest. Fermentation of biomass directly to xylitol opens production opportunities for agriculture and forest feedstocks that will allow xylitol to be produced at competitive costs in Ontario to meet demand. Reduction in cost will open new markets and displace market share possessed by sweeteners without the health and dental benefits of xylitol. Hung Lee and his research team will assess the feasibility of a biological process to convert xylan-rich material from agricultural residues, relevant to Ontario to the value-added product xylitol, using a naturally occurring yeast strain. (Lee #200452)

- Despite the initial success of Dr. John Dutcher's PHYTOSPHERIX project, the corn cultivars selected that grow well in Southwestern Ontario, have a relatively high yield of PHYTOSPHERIX particles, and are sufficiently resistant to dry-down, and do not completely mature in the field. Harvesting in the pre-mature state, followed by drying on the cob in commercial driers before further shelling and grain storage, requires a large amount of energy and is therefore very costly. Further work is needed to continue

cultivar optimization so that researchers can identify those which mature sufficiently in order that regular shelling combines can extract grain in the field. At the very least, the team will be able to significantly reduce drying times. This research will lead to significant improvements in the economics of PHYTOSPHERIX particle production. Dutcher and his research team will also work to optimize the production process through plant trials. (Dutcher #200454)

Case Study

David Wolyn, Department of Plant Agriculture

#200451: Development of Russian Dandelion as a Rubber Crop for Ontario

June 1, 2012 – May 31, 2015

(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$19,766
Faculty/CARG FTE	$39,726
Research Station Use	Simcoe Total use: $11,038
Tech/Admin Support & Indirect Costs	$127,285
Total OMAF/MRA - U of G Project Value **(up to and including 12/13)**	**$197,815**
Partner/In Kind Contributions	$10,000 cash, $10,000 in-kind
Collaborators	**Van Acker, R.,** Depart. of Plant Agriculture, UofG **Grohs, R.,** Depart. of Plant Agriculture, UofG **Stoffyn, O.**, Depart. of Plant Agriculture, UofG **Todd, J.**, OMAF/MRA **Lidster, P.,** AFMnet **Kaine, M.** Award Rubber **Handlos, B.,** Bridgestone Canada **Marshall, A.,** Lanxess Inc. **Kelly, J.** Erie Innovation & Commercialization

Natural rubber is a strategic commodity, necessary for many applications including airplane and heavy equipment tires. Prices have increased 10-fold since 2001 due to expanding economies in Asia and demand is expected to exceed supply in the coming decade. The world's supply, coming from rubber trees in Southeast Asia, is vulnerable to political instability and disease. Consequently, development of a domestic rubber source is important for national security and the economy.

The Russian Dandelion was found during World War II to be adapted to Southern Canada and provide rubber in its roots of equivalent quality to that tapped from the rubber tree. The crop can be grown as an annual in rotations and preliminary market analysis indicates returns compare favorably to those of other major crops.

The overall objectives of this research are to breed populations of Russian Dandelion with high yield and adaptation to Southern Ontario and develop agronomic practices such that the crop can be grown effectively when the first cultivar is released. The principle investigator of the project, Dr. David Wolyn, a professor in the department of Plant Agriculture, stresses that "we need a concerted effort on the breeding and agronomy side of the research" to figure out things such as how to grow the crop and how fertilizing should be handled. Specifically, research includes recurrent selection, development of methodologies to effectively select for establishment under water stress, optimization of vegetative propagation and greenhouse conditions for seed production, herbicide testing and general agronomy.

Results from the first year of this study are promising and the research team is optimistic that rubber yields can be improved significantly in the domestication of the crop. While trials are ongoing, the research team has engaged in many KTT activities to share their findings including grower meetings, mass media, web presence and field tours with target audiences during the growing seasons.

The industry partners directly involved in the project include Bridgestone Canada and Lanxess Inc., while many others provided strong letters of support for the project signaling the need for the project within the domestic industry. The University of Guelph research team has also collaborated with the Program of Excellence in Natural Rubber Alternatives (PENRA) at Ohio State University to share results and help the research move forward more quickly.

"Shortages of natural rubber in the coming decade are a serious threat. Natural rubber is essential, like oil – the economy can't function without it," says Wolyn. "Investing in research now, ahead of shortages is important."

Emergency Management

The goal of Emergency Management research under the OMAF/MRA-UofG Partnership is to provide a proactive, coordinated and comprehensive approach to managing agri-food emergencies in Ontario. Events such as SARS, BSE, swine and avian influenza and invasive plant pests have shown Canadians the profound impact that outbreaks can have on agriculture, the environment, human health and the economy. Emergency Management research encompasses issues related to zoonoses and public health, foreign animal disease, plant pests, and food safety. The focus is on disease agents and pests whose sudden emergence or re-emergence in Ontario requires an immediate and comprehensive response.

Highlights from the program this year include:

- In animal agriculture, a variety of data sources offer opportunities for syndromic surveillance, including abattoir data. The identification of space-time clusters in condemnation rates of carcasses and specific organs among Ontario's provincial abattoirs can offer insight into the location and timing of outbreaks of disease. However, a variety of factors including season, abattoir capacity, and the economics of the industry can have an impact on statistical methods designed to identify these clusters. Through controlling for 'background noise' in abattoir data using multi-level regression models prior to running space-time scans, researchers hope to provide the Ontario agri-food sector with a more rational and effective means to conduct syndromic surveillance. (Pearl, 200376)

- How much would an animal disease outbreak cost a diagnostic laboratory? With the help of researchers at both the Animal Health Laboratory and in the College of Management Economics, veterinary laboratories will be able to use a simple Excel template to determine the benefits and costs of preparing for, responding to, and recovering from an emergency animal disease outbreak in their particular province. To be considered effective, the diagnostic veterinary laboratory's response during a foreign animal disease outbreak must meet surge testing demands in a cost-efficient manner, while maintaining long-term business viability so that the provincial capacity for passive surveillance of all livestock sectors is maintained. This financial tool will assist diagnostic laboratories and their funding agencies prepare for emergency events such as a foreign animal disease outbreak. (Spinato, 200377)

- With the recent unprecedented losses of honeybee colonies in North America and Europe, researchers are working hard to understand the different factors at play in this potentially devastating trend. Researchers from the School of Environmental Science and from the Department of Mathematics and Statistics have teamed up to take advantage of the power of mathematical modelling to predict the long term fate of diseases, how the diseases depend on crucial biological parameters and to investigate the likelihood of success of remedial strategies. In particular, this project is looking at the honeybee-varroa-Acute Bee Paralysis Virus (ABPV) complex. (Eberl, 200382)

Case Study

Ernesto Guzman, School of Environmental Sciences

#200456: Prevalence, Severity, and Economic Damage of Nosema ceranae *in Ontario*

June 1, 2012 – May 31, 2015

(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$84,500
Faculty/CARG FTE	$47,671
Research Station Use	GTI use: $4,425
Tech/Admin Support & Indirect Costs	$52,746
Total OMAF/MRA-U of G Project Value **(up to and including 12/13)**	**$189,342**
Partner/In Kind Contributions	$10,000 cash, $3,000 in-kind
Collaborators	**Hamiduzzaman, M.**, School of Environmental Sciences

The role that honeybees play in our ecosystems is often overlooked or underestimated. Honeybees are in fact the most beneficial insects to human societies because of the part they play in pollinating crops. The activity of pollinating by honeybees accounts for one third of food produced (McGregor 1976), therefore, it is important that honeybees maintain good health.

Currently, the Ontario beekeeping industry is faced with an emergency issue that puts this very insect at risk. This emergency issue is the recent reporting of a new species of honeybee fungus: *Nosema ceranae*. This fungus threatens Ontario's beekeeping industry because of its potential association with bee colony mortality. Yet, the frequency and infectivity that *Nosema ceranae* has to bees in Ontario remains unknown. Without this knowledge it is difficult to properly assess the risks of *Nosema ceranae*, making the task of designing effective control strategies more complicated.

Ernesto Guzman, Professor in the School of Environmental Sciences and Head of the Honey Bee Research Centre, set out with his colleagues to investigate *Nosema ceranae*'s effect on honeybees in Ontario. Guzman intends to use this knowledge to enable the assessment of control recommendations, preventative measures, and treatment calendars. He also hopes to provide the beekeeping industry with reliable information that risk assessment studies and effective policies of disease control from which Ontario's apiaries can be based.

While samples are ongoing, the research team has facilitated 10 discussions with beekeeping clubs in Ontario and published two articles in the Ontario Bee Journal. Results gathered thus far from 750 honeybee colonies across Ontario are promising. Guzman says early results indicate that "infection levels of *Nosema ceranae* in the province are generally higher in spring than in other seasons, but fluctuate tremendously. In 2013, levels were three times higher than in 2012." Infection levels have reached as high as 3 million *Nosema ceranae* spores per bee. The research team speculates that the jump in infection rates may be due to differences in climatic conditions between the years. "Our message to the beekeeping industry is to control *Nosema ceranae* infection in the spring", says Guzman. "If there are low levels of infection, no significant damage to colonies will occur, but if infection levels are at 3 million spores per bee, there will be serious consequences for the colonies."

The project has made important connections with two essential players in Ontario's beekeeping industry: Burns Apiaries and the Ontario Beekeepers Association. The project has also benefited from the funding that OMAF/MRA has provided; Guzman says that "the support of the OMAF/MRA-UofG partnership program has been invaluable for us".

Environmental Sustainability

OMAF/MRA and the University of Guelph's Environmental Sustainability research theme focuses on maintaining the ability of natural resources – soil, air, water and biodiversity – to support and strengthen the agriculture, food and bioproduct sectors, and rural communities. To protect Ontario's diverse environment, researchers provide science-based direction for government policies and legislation. Population growth presents opportunities for new markets and challenges for agriculture and the environment.

The OMAF/MRA-UofG Partnership aims to balance the needs of people and the agri-food industry with environmental priorities in order to achieve sustainable agriculture and food production.

Highlights from the program this year include:

- School of Environmental Sciences researchers are taking a multi-disciplinary approach to understand and quantify the role that different land management practices have on controlling the amount, fate and pathways of contaminants in rural areas. This study includes the development of a numerical groundwater flow model, a surficial geology mapping project, as well as bedrock aquifer characterization, sampling technique innovation, and Quaternary mapping. Anticipated beneficiaries and users of these research results include soil science and land resource specialists at OMAF/MRA who are interested in the fate of nitrate and pathogens at depth and in the overall improvement of land management practices in the context of source water protection. (Arnaud, 200280)

- How do farmers choose which 'green energy' system might be the most cost-effective for them to install? With help from researchers in the School of Engineering, poultry farmers will soon have a Complementary Energy Decision Support Tool (CEDST) to assist them with making smart business decisions when it comes to exploring green energy generation options on their operation. This tool will also serve to provide a benchmark for current farm energy usage tied to production as well as the predicted economic and environmental impact of adopting green energy technologies. This tool will be freely available to producers with the support of the Poultry Industry Council. (Van Heyst, 200299)

- Digital Elevation Models (DEMs) are a critical component for hydrological modelling related to source water protection. DEMs help to delineate stream networks and sub-catchments, as well as terrain features and the identification of variable source areas for runoff. However, the collection of topographic data necessary to complete a high resolution DEM is costly. Researchers in the Geography Department are investigating novel methods for the production of a DEM data set and post-processing techniques to reduce costs for this type of mapping. (Berg and Lindsay, #200388)

Case Study

Richard Zytner, School of Engineering

#200383: Reducing the amount of process water needed to wash and peel vegetables by optimizing and implementing wash-water recycling

September 1, 2011 – August 31, 2014

(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$82,000
Faculty/CARG FTE	$95,342
Research Station Use	N/A
Tech/Admin Support	$105,492
Total OMAF/MRA-U of G Project Value (up to and including 12/13)	$ 282,834
Partner/In Kind Contributions	$2,000 cash, $4,000 in-kind

Collaborators	**Zhou, H.**, School of Engineering, U of G **Cheng, S.**, School of Engineering, U of G **Melanson, D.**, Carrot Washer **Smith, A.**, OFVGA **Shortt, R.**, OMAF & MRA

The process of vegetable production uses substantial amounts of fresh water to uphold a high quality of manufactured goods. Zytner talks about how times have changed from vegetables coming right out of the ground and to the store, "that's not good enough today… the consumer wants a washed product." This is one of the many factors contributing to Ontario's large footprint. The high volume of wash-water this involves has made the disposal process an issue for vegetable producers and has created the need for proper disposal techniques for the leftover residue.

Richard Zytner, a Professor in the School of Engineering at the University of Guelph and nationally recognized Fellow Engineer of Canada (FEC), along with his colleagues are working to develop solutions to address both of these concerns. Together, their goal is to construct a sustainable approach that farmers and processors would be able to use to manage their wash-waters and related residue, while maintaining the production of a high level of food quality. "By identifying a possible way to recycle part of the water to the initial washing phase, it has the potential to save 40-50% of the fresh water," says Zytner. It is also important that the new approach needs to be easily accessible and affordable, and yet effective. Zytner explains that they need to consider if producers can afford to pay for sophisticated treatment technology, and therefore, the goal is to, "keep things simple… one of our constraints is to make sure it is easy to use and not so high-tech."

Zytner's research currently focuses specifically on carrot producers but will be checked to determine if applicable to other vegetable production processes as well. Ideally, the outcome of this research would be for all Ontario vegetable producers to adopt more sustainable wash-water approaches to significantly reduce the current water footprint. "Since we have been able to test carrot wash-water, which includes soil residue and carrot peelings, we have also begun the process of testing other vegetables from an industrial setting. We have now been able to get another grant from a Canadian Water Network so we are going to be testing a whole bunch more of washing facilities including other carrot producers, sweet potatoes, ginseng, root celery, squash, and apples," says Zytner. Since the project has started, preliminary system designs have been completed, samples to identify water quality parameters have been collected, and tests have been done to determine which designs work best. The completed research suggests that a centrifuge or dissolved air flotation should be used in the clean-up of the wash-water. In terms of residue disposal, Zytner's group has teamed up with Professor Sheng Chang's group, who is also a Professor in the School of Engineering, to evaluate the application of the anaerobic digestion MBR process. Other alternatives were standard anaerobic digestion and composting. The tests results to date for all three options remain inconclusive. Zytner says, "In the past year, the most significant research findings have been that we have identified a process that does remove the solids from the carrot wash-water and this gives us the potential to recycle the water."

Zytner is also collaborating with another Professor at the University of Guelph, Keith Warner, from the Department of Food Science who works with fresh greens (i.e., spinach, salads). Zytner says, "the lettuce or spinach pieces are 'floaters', while we're moving dirt in the washing process and peels from the peeling process, which settle faster, so those are going to be the challenges to see if the technologies identified will they apply to other ones."

Industry collaborations have been formed with OMAF and MRA (Water Quality Branch), and the Ontario Fruit and Vegetable Growers Association. In total they are funding a leveraged $8,000 in cash and in-kind contributions. Additionally, a local carrot washer has provided $8,000 in applicable in-kind contributions for the use of company facilities. The diversity in industry collaborations shows the strong project applicability and ensures the maximum dissemination of the research. Zytner stresses the value that these collaborations have helped add to the project by, “getting exposure and showing that it can work, it has shown other groups that it is worth pursuing”.

Food for Health

Today’s consumers are more interested in food and nutrition than ever before. OMAF/MRA and the University of Guelph’s research into consumer trends, and food production and formulation have the potential to improve the health of Ontarians. It also provides competitive opportunities for producers and agri-food companies. The OMAF/MRA-U of G Partnership is committed to supporting research to provide consumers with functional foods – foods that have been shown to have health benefits, such as reducing heart disease and the incidence of diabetes. The scope of this research theme is large and complex, but the social and economic benefits can be enormous. Consumers’ purchasing decisions, dietary patterns and increased knowledge about the relationship between food and health will drive this research theme forward.

Highlights from the program this year include:

- Consumption of fruits and vegetables by Ontarians is low. Given the strong link between diets high in fruits and vegetables and improved human health, effective health promotion strategies are key. While there are a number of public intervention programs aimed at increasing consumption, there has been no research completed to identify effective strategies. Dr. Lisa Duizer and her research team are evaluating the effectiveness of a number of such programs to make recommendations. They will also investigate the attitudes and behaviour of individuals living in food deserts, and compare these patterns to those who have better access to fruits and vegetables. This research will increase the positive impact of health promotion strategies, as well as determine the relationship between access to fruits and vegetables and consumption. (Duizer #200469)
- Recent epidemiological evidence indicates that members of the population with higher intake of dairy products are less at risk for developing type II diabetes and the symptoms of metabolic syndrome such as obesity, high blood sugar, dyslipidemia, glucose intolerance, and hypertension. Dr. John Cant and his research team are working to identify the components of milk responsible for anti-diabetic effects in order to develop a concentrated form targeted specifically as pre-diabetic therapy. To find out which components of milk can reverse insulin resistance, and their mode of action, the research team will measure effects of milk fractions in the diet on insulin sensitivity and functional regulation of the insulin signaling system in liver, muscle and adipose tissues. (Cant #200520)
- Consolidation within the food system has led to limited access to healthy food in areas known as food deserts. Dr. Wayne Caldwell and his research team are examining the co-operative business model as a means to provide healthy, local food to food deserts

and under-serviced, rural areas. By combining local food with short food supply chains in a co-operative manner, this research will determine the opportunities and challenges that exist for co-operatives in the current local food market. The research team will produce a tool kit that outlines marketing strategies, common challenges and financing models for capital investment. (Caldwell #200467)

Case Study

Douglas Goff, Department of Food Science
#200468: Dietary Fibre and Glycemic Response: Developing foods to assist the increasing Diabetic population

September 1, 2012- August 31, 2015

(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$23,000
Faculty/CARG FTE	$47,671
Research Station Use	N/A
Tech/Admin Support & Indirect Costs	$52,745
Total OMAF/MRA-U of G Project Value (up to and including 12/13)	$123,416
Partner/In Kind Contributions	$1,500 in-kind
Collaborators	**Wright, A.,** Human Health & Nutritional Science, UofG **Duncan, A.,** Human Health & Nutritional Science, UofG **Cui, S.,** Agriculture and Agri-Food Canada

Diabetes is a chronic disease due to either the body not being able to make an adequate amount of insulin, or because the body does not have the ability to properly use the insulin it produces. Low insulin creates high levels of blood glucose which can have serious negative health impacts such as damage to organs, blood vessels and nerves. All of which place individuals at greater risk of health issues, for instance, heart disease or stroke, hypertension, kidney disease, non-traumatic amputations, and vision loss.

Type II diabetes, which affects 90% of Canadian diabetics, can often be mitigated by making proper dietary modifications. One dietary modification recommended is to increase consumption of high-fibre foods. Increased levels of Type II diabetes can be correlated to the current concern that most age groups in Canada are only meeting half of the required daily fibre intake (Health Canada, 2012).

Professor Douglas Goff's research focuses on the relationship between dietary fibre and its ability to control blood glucose (glycemia). For this project the overall objective of the research is to identify dietary means to control and prevent Type II diabetes. This research will not only benefit individuals who are affected by the disease personally, but it will also relieve the financial pressures diabetes places on the Canadian healthcare system and society as a whole. Additionally, it also has the prospective for the development of consumer products. Goff

elaborates, “We have potential value-added applications for Ontario agricultural by-products because we are examining the underutilized portion of some of the crops we are looking at.”

The first goal is the development of a more basic understanding of the relationship between polysaccharide structure and physiological functionality in order to identify which types of dietary fibres are more effective for glycemia control. With this new understanding, fibre sources from Ontario agricultural by-products will be studied to identify innovative opportunities for food producers and manufacturers to develop new value-added products that have a positive impact on glycemia for consumers. Lastly, Goff and his research team will explore strategies for new product development and investigate the purchasing habits of diabetic and pre-diabetic consumers, to determine their likelihood to purchase novel high-fibre foods.

In terms of collaborations Goff says, “The OMAF funding has been fundamental in terms of providing students required to do the work which was necessary to pull the project forward.” There has also been substantial interest resulting from collaborations made with important industry partners such as NSERC, Dairy Farmers of Ontario, and AAFC (Developing Innovative Agri-Products). Although research is still in the preliminary stages, Goff explains, “This has great potential, we are up and running, and we have a project that we hope will parlay itself into further collaborations as we move along.”

Product Development and Enhancement through the Value Chains

This research theme focuses on strengthening agri-food value chains in Ontario, through research to provide innovation in product development and enhancement. Businesses operating along a value chain can combine their resources and capabilities to achieve commercial success that might not otherwise have been possible. Agri-food value chains are not limited to primary production and processing. The OMAF/MRA-UofG Partnership supports research into other important components, including market analysis, consumer behaviour, commercialization and quality assurance. By improving any or all aspects of product development, overall productivity, profitability and sustainability can be increased.

Highlights from the program this year include:

- In poultry farming, controlling and manipulating exposure to light is used to optimize reproduction. Given the upcoming ban on inefficient light sources, there is a great sense of urgency for an effective replacement within the industry. Despite the multiple alternatives available, a well-defined and studied system that specifically addresses the requirements of egg-laying birds is lacking. Dr. Gregory Bedecarrats and his research team have designed a LED light bulb that delivers 60% red light, which they found to be critical to stimulate the reproductive axis (hypothalamic–pituitary–gonadal axis). The research team will test the efficiency and resiliency of the bulb in a simulated industrial environment. They will also compare the bulbs use to standard incandescent and compact fluorescent lights. Bedecarrats and his team anticipate that egg production will increase, while energy consumption will decrease, with the use of their LED bulb. Their results will be further validated through testing in an operational egg farm. (Bedecarrats #200498)

- Castration of intact male pigs to prevent high levels of boar taint is an increasing concern. Several European Union (EU) countries have banned castration and large retailers in Europe will no longer accept pork from castrated males. A total ban will take

effect in the EU in 2018, and similar restrictions may be imposed on domestic markets in the future. Although castration is common practice and is effective in eliminating the unpleasant odour and flavor in meat from intact male pigs, it is an animal welfare concern. Dr. James Squires and his research team will improve the set of genetic markers they have shown in previous studies in order to reduce the amount of boar taint. Genetic selection to reduce boar taint to an acceptable level for consumers offers an innovative solution and will help maintain global markets for domestic pork. (Squires #200497)

- Fluidized Bed combustors are used commercially, but are large and generate a high-temperature and high-pressure steam to run turbines. The design and operation of the Fluidized Bed is complex. Niche applications, such as greenhouse heating, is creating the demand for smaller combustors with significant fuel flexibility to justify biomass as a reliable and cost-effective energy option. Boilers currently used in the greenhouse industry are predominantly natural gas or fuel oil-fired. Dr. Animesh Dutta and his research team are developing a small-scale, fuel-versatile, biomass-fired, Fluidized Bed combustor to address the need. The combustors have the potential to minimize the impact of fuel price fluctuations, reduce CO2 emissions and allow the greenhouse industry to use a sustainable energy source. The combustors also have other potential applications including process heating, drying, and water/space heating for domestic, community and industrial applications. (Dutta #200474)

Case Study

Shai Barbut, Department of Food Science

#26754: Novel use of organogels to replace traditional animal fat in meat products

September 1, 2009 - August 31, 2012

(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$285,000
Faculty/CARG FTE	$125,290
Research Station Use	N/A
Tech/Admin Support & Indirect Costs	$133,154
Total OMAF/MRA-U of G Project Value **(up to and including 12/13)**	**$543,446**
Partner/In Kind Contributions	$54,000 cash, $25,000 in-kind
Collaborators	**Marangoni, A.,** Depart. of Food Science **Zetzl, A.,** Depart. of Food Science **Wood, J.,** Depart. of Food Science **White, E.,** University of Western Ontario **Gravelle, A.,** Depart. of Food Sciences

In Canada, weight related health issues are at an all-time high; 23% of Canadians are categorized as obese with a Body Mass Index (BMI) greater than 30, and 36% are overweight

but not obese. With more than half of the Canadian population struggling with maintaining a healthy weight, there is a need for change. (Statistics Canada, 2004) A reason for the high levels of obesity and health issues could be contributed to the high levels of saturated fats in food products.

The Canadian meat industry is the largest food sector in Canada, valued at $21 billion, and the province of Ontario produces the leading amount of processed meat (Canadian Meat Council, 2008). These Canadian meat goods can contain amounts of animal fat as high as 40% (USDA 2009, Handbook #8). Therefore, the development of meat products with healthier fatty acid profiles (more unsaturated, less saturated), as well as lower overall fat levels is important to improve provincial and national health.

Professor Shai Barbut aims to develop a polymer-stabilized organogel that could be substituted as a healthier alternative for fat in meat products. Organogels are made from common vegetable oils and then structured into semisolid fats. The functional characteristics are the same with the distinction that organogels are better for overall nutritional health. The objective of this is to produce a new generation of meat products with reduced saturated fat that will assist in lowering the current high levels of Canadians suffering from weight difficulties, cardiovascular disease and type II diabetes. This will include the research of fundamental aspects (rheology, relations of microstructure to functionality, thermal behavior), as well as the practical application of organogels in two very different meat systems.

The research team implemented many KTT techniques to reach target audiences and disseminate information about their project. Meetings and discussions took place with Ontario meat producers, as well as taste panels to test products. Additionally, the project's reach extended internationally through presentations at meetings such as the International Symposium-Delivery of Functionality, the American Oil Chemists' Society Annual Meeting, and the International Symposium on Food Rheology and Structure. This research has resulted in the publications of eight peer-published reviews, four popular press articles, one theses, and two book chapters.

Production Systems

This research theme seeks to enhance the profitability of agricultural production. It encompasses other areas of the OMAF/MRA-U of G Partnership research program that may play a significant role in productivity or profitability, including environmental sustainability, consumer demand, bioproduct opportunities, and agricultural and rural policy. Government support of Production Systems research is critical for a number of reasons. Animal and plant health and the impact of agriculture on the environment are closely tied to important priorities like safe food and clean water. Legislative requirements, Ontario's changing demographics and market opportunities, and the enormous significance of agricultural production to the Ontario economy all point to the importance of this research theme.

Highlights from the program this year include:

Livestock:

- Understanding the dynamics of influenza in swine will help in the assessment of commercial vaccines and ultimately better disease control. This project aims to describe genotypes of influenza viruses that commonly circulate in Ontario swine. This will be

done by sampling of herds that have history of respiratory problems suggestive of influenza, and by establishing full genome sequencing (high throughput) of influenza virus segments. (Poljak, 200482)

- Identifying cattle with higher immune responses to prevent infectious disease risks could improve costs for both producers and consumers. Researchers in the Department of Pathobiology are looking at genetic approaches for the identification and selection of high and low immune responders to provide an additional tool for dairy producers to maintain healthy cattle herds which have food safety and economic advantages. (Mallard, 200093)

- Day length is an important factor for efficient poultry productivity in terms of reproduction cycles. Conventional artificial light sources such as incandescent do provide a broad spectrum that is effective for controlling day length; however, this type of lighting is the least efficient light source and the sale of these bulbs is banned in Canada as of 2012. Researchers in the Department of Animal and Poultry Science are working with industry partners (Thies Electricals) to develop and test a novel lighting system using LED technology that will be more cost effective for producers while still maintaining production efficiencies. (Bedecarrats, 200128)

Plants:

- Unlike many crop and horticulture plant species, Miscanthus and Prairie Cordgrass have received little breeding effort to improve their performance. Current Miscanthus varieties have limitations in terms of cold tolerance, lodging and yield potential, thus varieties adapted to Ontario conditions with high performance attributes need to be developed. Prairie Cordgrass may be better suited for Ontario's production climate, and evaluation of new lines will be completed. The establishment of a Miscanthus nursery and evaluation of the new lines of Prairie Cordgrass will strengthen collaborations between the research team and the industry partners, as well as lay the foundation for the development of varieties of Miscanthus and Prairie Cordgrass that are adapted to Ontario conditions, have high yield potential and possess quality characteristics required by end users. (Bowley #200488)

- To increase profitability and compete globally, Ontario apple producers are strategically improving prices by adopting new cultivars and enhancing quality. Producers are also adopting labour saving technologies such as mobile platforms, new chemical thinning strategies, and new orchard systems in combination with new horticultural technologies. Dr. John Cline and his research team will be conducting a series of field trials to address key industry-identified problems. This research will help Ontario producers grow high quality apples in the volumes required for the Ontario produce industry. Improved production practices and efficiencies will help ensure producers are financially viable and are able to compete globally. (Cline #200485)

- The swede midge is an invasive pest of cruciferous plants, first identified in Ontario in 2000. Recently, swede midge incidence and damage to canola has increased to economically damaging levels throughout Ontario canola production regions. There are currently no insecticides available for swede midge control in spring canola. Dr. Rebecca Hallett and her research team will develop an integrated pest management program for swede midge in spring canola, including identifying effective insecticides and optimal application timing. The research team will also develop decision-making

guidelines for determining whether insecticide applications will be effective against swede midge for canola yield protection. Comprehensive management recommendations for canola growers, resulting from this project, will maximize canola productivity. (Hallett #200489)

Case Study (Livestock)

Tina Widowski, Department of Animal and Poultry Science

#200424: Welfare-Friendly Eggs: Meeting the needs of laying hens, producers and consumers through alternative housing systems
(Also funded under Product Development)

June 1, 2011 – May 30, 2014

(up to and including 12/13)

OMAF/MRA - UofG Research Project Operating	$157,500
Faculty/CARG FTE	$127,124
Research Station Use	Arkell Poultry: $447,343
Tech/Admin Support & Indirect Costs	$140,654
Total OMAF/MRA-UofG Project Value (up to and including 12/13)	**$872,621**
Partner/In Kind Contributions	$87,600 cash, $199,822 in-kind
Collaborators	**Cranfield, J.**, Food, Agricultural and Resource Economics, UofG **Leeson, S.**, Office of VP Research – OMAF/MRA Research Support **Torrey, S.**, AAFC/APS **Guerin, M.**, Depart. of Population Medicine, UofG **Caston, L.**, Depart. of Animal and Poultry Science, UofG **Arnone, A.**, AAFC

Globally, legislation and consumer expectations pertaining to the welfare of laying hens' housing systems are changing. Concerns raised by consumers about the conventional caging systems are encouraging egg-producers to incorporate alternative housing systems to make their eggs more "welfare-friendly". In some parts of the world, legislative changes have been made, such as, requiring the type of housing system be labeled directly on the product.

In Canada, 95% of eggs are still produced by laying hens housed in conventional caging systems."Ontario is the largest egg producer in Canada, producing about 40% of the nation's eggs, and also, has some of the largest egg producers in Canada," says Tina Widowski a professor in the department of Animal and Poultry Science at the UofG. The overall aim of this research is to generate knowledge to inform Ontario egg producers about alternative production systems and Widowski explains that this is especially important because of, "the huge public pressure for egg producers to adopt alternative housing systems." Specifically, research that includes investigating how cage size, space allowance and rearing environment affects the

welfare and production of hens in enriched systems, examining socio-demographic factors associated with the acceptance of eggs from hens housed in different systems, and lastly, exploring consumers' valuation of eggs produced in those systems.

Although the project is still in progress, enriched caging systems have been proven to perform as well as or better than conventional cages. Feed intake was higher in small enriched cages than in larger ones and low space allowance (540 cm^2/hen) resulted in poorer plumage condition and cleanliness scores compared to high (750 cm^2/hen). Widowski describes, "At the production level, the furnished cages have generally been better than the conventional cages and the birds have more freedom of movement and stronger bones." The enriched caging systems are a promising development because of the ability they have to provide hens with more space and opportunities to perform natural behaviors including laying their eggs in an enclosed nest area, perching, scratching, and potentially dustbathing without risk of a decrease in welfare or productivity and without compromise to Ontario egg producer revenue.

"This information is market ready, it tells producers what to expect, how to manage the bird and much more," Widowski confirms. In fact, emerging research conducted as part of this project suggests that consumers are willing to pay a premium for eggs from housing systems that embody enhanced animal welfare characteristics. John Cranfield, a professor from the department of Food, Agricultural and Resource Economics and researcher on this project, says, "The most significant research findings are that consumers are asked to evaluate eggs from housing systems with enhanced characteristics, if those housing systems involve cages in any way shape or form, even if they are what we call an enhanced or furnished cage system, consumers have responded negatively." Amongst the various housing system attributes that were considered, the absence of cages in the housing system carried a significant premium, as did birds having access to the outdoors. What is more, this consumer research points to consumer valuation of verification of the housing system by third-party agents.

Interest and value of this project is evident in the collaborations made with the Poultry Industry Council, and Egg Farmers of Canada. "These industry collaborations have played an important role in trying to help give some guidance about some bigger picture issues that have caused us to explore things that we otherwise probably wouldn't have," says Cranfield. Collaborations made between researchers have also proven to be significant, Cranfield says, "the project was funded through a grant from OMAF that Tina Widowski was the principal investigator on so I have been collaborating with Tina and it has been great to work with an animal scientist… she has provided a great deal of technical expertise from an animal behavior or an animal science perspective and that has been valuable."

Widowski still feels as if, "there is a lot of work that needs to be done and continued on, and there are more partners that we are engaged in so I expect to be doing this research for a long time… it's very exciting actually." Cranfield also talks about the future when he says, "I think that the question is where we are going next with the research? I am working with Michael Von Massow in the School of Hospitality and Tourism Management in order to put together a survey where we take the responses outside of the home."

Case Study (Plants)

J. Alan Sullivan, Department of Plant Agriculture

#27090: Native ornamental species for novel applications for greenhouse and landscape culture

May 1, 2011 - April 30, 2014
(up to and including 12/13)

OMAF/MRA - U of G Research Project Operating	$46,300
Faculty/ CARG FTE	$95,342
Research Station Use	Elora Crop: $13,800
Tech/ Admin Support and Indirect Costs	$200,726
Total OMAF/MRA- U of G Project Value (up to and including 12/13)	**$356,168**
Partner/ In Kind Contributions	$298,498 cash
Collaborators	**Saxena, P**., Department of Plant Agriculture **Conev, R**., VRIC **Tschanz, R**., Department of Plant Agriculture **Nichols, R**., Department of Plant Agriculture **Brown, W**., OMAF/MRA **Li, S**., Department of Plant Agriculture

The Canadian floriculture industry is worth billions of dollars annually and within that, Ontario contributes to a large portion of the market. The Ontario floriculture encompasses greenhouse production for cut flowers, potted plants and bedding plants for both retail and wholesale trade. Recently, this industry has been threatened by imports from countries where capital costs and costs of production are much lower. This is directly evident in the decline of floriculture business in Ontario. "Native plants could be transformational for the ornamental industry and change our approach to gardening" says Sullivan.

This project aims to add more value to Ontario's floriculture industry. The research will contribute to increasing product diversity by providing consumers with a unique plant species that has the ability to survive in versatile and harsh conditions. Overall, the outcomes will have a positive impact on productivity, reduce operational cost, and enhance overall greenhouse management in Ontario.

The specific objectives of this project are to create new varieties, unique germplasm and in vitro propagation schemes. This will include a breeding program that will select plants based on their ability to adapt to environments that have low water, light and nutrients. Subsequently, an additional benefit could be that the decrease in watering will help with the ultimate reduction of municipal water usage. Parallel to the breeding program, unique variants will be produced using mutagenic agents and then incorporated into the breeding program. The value this will have is the ability to bring new varieties to the markets in months rather than the years that would be necessary for traditional propagation.

Collaborations have been made with in different groups such as industry, academia, and community. These partnerships are imperative to the project and provide evidence for the practical interest the outcomes will have. The Gosling Foundation, Canapolin Network, NSERC, Vineland Research and Innovation Centre, and the University of Guelph have all been involved and contributed funding to the project.

Catalyst Centre (formerly the Business Development Office)

"University of Guelph continues to rank among Canada's most inventive universities. A recently released survey ranks Guelph No. 1 for the number of inventions in proportion to research funding and No. 2 for the number of inventions per faculty." *

"The survey, conducted by The Impact Group, ranked Canada's universities and public sector research organizations for inventiveness and research commercialization in 13 performance indicators. Categories include total research expenditure, number of inventions per full-time faculty, inventions per million dollars of research funding, and patents and licences issued. Rules requiring researchers to disclose all ideas with commercial potential allow for equitable comparisons of inventiveness among institutions." *

"Guelph held its No. 1 position in cost per invention in the 2013 report. U of G researchers produce 1.28 invention disclosures for every million dollars of research funding received. U of G also ranked third for number of licences executed per million in research expenditure, and sixth overall for total licensing income by institution." *

Excerpts taken from U of G News Release dated June 27, 2013

University of Guelph research is recognized as producing solutions to regional, national and global challenges. This activity leads to new technological developments, commercial activity and societal advances based on the spectrum of U of G traditional and emerging research strengths. The Catalyst Centre (CC) oversees all aspects of the University's intellectual property (IP) management and technology commercialization activities. Through the OMAF/MRA-U of G Partnership, the CC is responsible for managing IP and commercialization activities related to OMAF/MRA funded research projects.

The CC is a service-oriented, revenue-focused center organized for the purpose of helping U of G faculty, staff, and students identify, manage, protect, and commercialize the University's intellectual property assets to maximize the benefit to society and the environment, and spur economic growth. In addition, the CC is committed to developing and fostering long-term university-industry relationships. Through the Industrial Liaison Program (ILP), the CC helps businesses access the University's intellectual capital, and state-of-the-art labs and research facilities to create strategic partnerships that drive innovation.

The primary objectives of the Catalyst Centre are:

1. To effectively exploit University-owned intellectual properties (IP) in response to the needs of industry, the University, its faculty, Ontario, and Canada. This includes managing all OMAF/MRA-funded technology disclosures and IP as per Schedule N of the OMAF/MRA-U of G Partnership.
2. To foster relationships with industry partners that broaden the opportunities for faculty to engage in collaborative or sponsored research with the goal of increasing the competitiveness of Ontario and Canadian-based industry sectors;

3. To encourage and support increased entrepreneurialism by U of G faculty, staff and students;
4. To support the dissemination of new knowledge and ideas from the University of Guelph for societal use through Knowledge Translation and Transfer;
5. To provide the University with thoughtful and up-to-date counsel concerning its intellectual property policies and their effectiveness in stimulating faculty participation in the technology transfer process.

The Catalyst Centre markets and licenses technologies developed at the University of Guelph, encourages broad utilization of the results of University research, and supports the transfer of new technology and ideas from the University to the community-at-large. In addition to patentable inventions, the CC also handles copyright, trademark licensing, Plant Breeders Rights (PBR), Confidentiality Agreements (CA, NDA and CDA), and inbound and outbound Material Transfer Agreements (MTA).

The CC's activities contribute to the financial vitality, and the economic, environmental and social impact of the OMAF/MRA - U of G Partnership.

- The Agreement's Joint IP Management Committee is responsible for coordination between OMAF/MRA and U of G. Regular meetings provide an opportunity for the CC to provide OMAF/MRA with details regarding new technology disclosures, and to update activities related to previously disclosed technologies.

- The royalty split between OMAF/MRA and U of G is under review by the Joint IP Committee. A process based on mutually agreed upon standard splits between the parties is being considered. It is intended to be more efficient for both teams, maintains fair recognition of the inventor and funder contributions, and encourages use of the disclosure process.

- The position of Industry Liaison Officer (ILO) is currently funded through the KTT program of the OMAF/MRA – U of G Agreement. Its primary role is to seek industry sponsored research partners for food, agriculture, and human and animal health scientists at U of G. Industry funds are often leveraged with OMAF/MRA funding, helping to create a strong pipeline of future commercializable technologies from the OMAF/MRA-U of G Partnership. Additional industry liaison support to the OMAF/MRA portfolio has also been provided by other staff members within the CC.

- The Catalyst Centre has received funding for several KTT programs, including the initiation of the 'Guelph IP Academy', a series of 19 workshops designed to enhance the knowledge and understanding of issues related to commercializing university-created IP and technologies. An IP Academy webpage has been developed within the CC website providing useful links, case studies, access to experts in the field and educational tools for faculty, staff, students and partners to access information about intellectual property as required.

- The IP Academy provided an opportunity to review IP considerations with the OMAF/MRA Research & Innovation Branch research management to ensure potential IP is being recognized within research applications. Additional questions were added to the OMAF/MRA research application templates, requiring more details from researchers about background IP, the origination of materials used in the course of a research project, and potential IP that will be developed in a research program. The program has helped raise

awareness around what questions to ask, and how to best manage arising IP for maximum benefit.

- The Technology Transfer team is currently managing over 213 active technology licenses, 173 (81%) of which are associated with OMAF/MRA-funded technologies. Of the 294 technology disclosures received in 2012/13, 267 (91%) were partly funded by OMAF/MRA. Germplasm disclosures accounted for 87% of total disclosures. Royalty revenues from OMAF/MRA funded technologies topped $1.38M with over $672K returned to OMAF/MRA, the majority of which is annually invested back into the Research Program.

- The following chart details CC metrics, and associated OMAF/MRA funded technology results:

2012/13 OMAF/MRA FUNDED TECHNOLOGY RESULTS			
	Catalyst Centre Total	# OMAF/MRA	% OMAF/MRA
Disclosures	**294**	**267**	**91%**
Non-Seed	37	10	27%
Seed	257	257	100%
Agreements	**18**	**14**	**78%**
Non seed licenses	13	9	69%
Seed licenses	5	5	100%
Active Licenses	**213**	**173**	**81%**
Non-seed	62	22	35%
Seed	151	151	100%
Patents Filed	**26**	**13**	**50%**
Non-Seed	26	13	50%
Seed	0	0	-
Patents Issued	**5**	**1**	**20%**
Non-Seed	5	1	20%
Seed	0	0	-
Royalty Revenue	**$ 1,909,872**	**$ 1,378,276**	**72%**
Non-Seed	$ 1,025,752	$ 494,156	48%
Seed	$ 884,120	$ 884,120	100%
Distribution to OMAF/MRA	**$ 1,909,872**	**$ 672,265**	**35%**
Non-Seed	$ 1,025,752	$ 200,699	20%
Seed	$ 884,120	$ 471,566	53%

- Since 1977, the germplasm portfolio has generated over 11 million dollars in net royalties. Net royalties for the 2012/13 fiscal year were 12% higher compared to the previous fiscal. This was primarily due to increased revenue derived from tofu-type soybean varieties from the Guelph and Ridgetown soybean breeding programs and a notable gain from the asparagus variety Guelph Millennium.

- The crop technologies that generated the greatest net revenue for 2012/13 were the soybean varieties OAC Wallace developed by Dr. Rajcan's program at Guelph and DH410 developed by the late Dr. Ablett's program at Ridgetown. The horticulture technology that generated the greatest net revenue for the same fiscal period was the asparagus variety Guelph Millennium developed by Dr. Wolyn's breeding program.

- Representatives from U of G's Catalyst Centre have attended several conferences and industry meetings which brought together leading bio and food technology innovators and companies providing an excellent venue to market U of G - OMAF/MRA inventions and research innovations. Notable conferences attended and connections that were made are listed in the tables below:

Conference/meeting	Date
BIO International Convention	April 2012
OCE Discovery	May 2012
Plant Intercluster meeting (Portugal)	June 2012
Austria-Canada Connect	June 2012
FUMEC Mexcian Trade Delegation	September 2012
French Trade Delegation (Food & Ag)	September 2012
Advancing Innovation in the Food Processing Industry Presentation	November 2012
Licensing Executive Society Annual Meeting	November 2012
Association of University Technology Managers (AUTM) Annual Conference	March 2013
Grupo BIMBO trade delegation	January 2013
ARIO Board Meeting Presentation	March 2013

The Catalyst Centre staff continues to manage the Proof of Principle (POP) Fund. Details of POP technologies are found on page 184.

Case Study #1

Technology: Hall 20110906

Title: *Plant expression vectors for high-level recombinant protein production*

Disclosure Date: September 6, 2011
OMAF/MRA split: 33.33%
Theme: Product Development

Technology Summary: The Hall lab has developed a vector system useful for driving high levels of protein expression in plants. The primary identified use has been in the production of antibodies.

Intellectual Property: Patent applications have been filed in the United States and Canada

OMAF/MRA Support: The Hall lab has received substantial support from OMAF for several years.

License: The Catalyst Centre completed a license agreement for this technology with the company PlantForm in March 2013, who issued a press release upon signing. This license agreement complements previous license agreements with PlantForm. For this agreement, the University received equity in the company, which gives the University a stake in its success going forward. PlantForm is currently raising funds to initiate clinical trials of their product, and has also recently entered a product development agreement with Brazilian company PharmPraxis.

Expectations: If PlantForm is successful in raising sufficient funds, it is expected that the company will have product revenue by 2018. It is expected that an exit opportunity, either through a purchase or a public offering, would not occur before then.

Case Study #2

Technology: Guelph Millennium Asparagus / G24 x G305 (ZZ Aspar 1995-002)

Title: Into the new Millennium: Asparagus research at University of Guelph

Disclosure Date: March 31, 1995
OMAF/MRA split: 42.25%
Theme: Production, Plant Systems

Technology Summary: It can take up to twelve years to develop a new variety at the University of Guelph's Simcoe Research Station.

Dave Wolyn, a professor in OAC's Department of Plant Agriculture, explains that asparagus takes about three years to establish itself before its yields can be harvested. Years four, five and six of the trial's life are used to study and measure before the research starts again to compare the best of the preliminary trials at multiple locations, taking another six years.

All that waiting is worth it, though. The time and effort Wolyn and his team have put into developing better asparagus has already paid off with the Guelph Millennium variety - a male hybrid asparagus variety bred in Ontario, Canada. The plant is hardy, tolerant to cold winters and also a top performer in hot harvesting seasons. Guelph Millennium was named Seed of the Year in 2005, recognition for the sustained high yields and quality of the variety, and now comprises more than three-quarters of the Ontario market.

Guelph Millennium has become popular with producers as far away as Michigan, Washington State, and the UK due to its exceptionally high quality spears. It is in a league of its own for top quality asparagus spears in the late season. It has also gained popularity for traits the team didn't intentionally select for. While sandy soil is ideal for most asparagus, explains Wolyn,

Guelph Millennium has thrived in heavier soils, allowing producers to expand into land that was previously unsuitable for asparagus and avoid replanting in exhausted soil.

“In Michigan they’ve had to replant in the same soil,” he says. “With Millennium, growers can move into virgin soil that wouldn’t have been considered ideal for asparagus before.”

OMAF/MRA Support: OMAF/MRA has provided project support to the asparagus breeding program at U of G in 2004/05 and 2012/13. According to Schedule N of the OMAF/MRA – U of G Agreement, the U of G is responsible for commercialization of all OMAF/MRA funded technologies.

License: In 1996, a long-term research and commercialization agreement with the Asparagus Farmers of Ontario (AFO), (former the Ontario Asparagus Growers’ Marketing Board) was struck, granting AFO exclusive rights to produce, market, distribute, and sell seed of cultivars for crop production worldwide, This agreement was based on ongoing annual funding (~$250K/ last year) provided by AFO to the asparagus breeding program at U of G.

Results: Royalty revenues from the asparagus have increased significantly in the past three years as the worldwide market for Millennium Asparagus seed has grown, and AFO through their sales arm, Fox Seeds, has doubled production capacity by establishing a second hybrid seed production cage.

The return on OMAF/MRA’s $62K investment in asparagus research has yielded a 4.77-times return with more than $296K in royalties collected just in the past three years (2010-2013).

Fox Seed has plans to expand its seed production capacity further in order to fulfill the increasing market demand for Millennium Asparagus seed. Royalty revenues are expected to continue to increase significantly with increased seed sales.

Expectations: Planting, pollinating and harvesting are all done in spring, and, with the plant’s rapid growth rate, the tender stalks must be harvested daily for about six weeks.

Ontario asparagus growers, now produce more than the local market demands.

Wolyn, who has been breeding asparagus since 1988, is now focused on improving quality by developing varieties that maintain a tight spear tip, a long harvest lengths, and tender texture.

Fox Seeds is ready to introduce these new varieties to the market, to capture more market share, and increase economic gains for Ontario, asparagus farmers and seed growers thanks to this U of G agricultural innovation supported by OMAF/MRA.

Case Study #3:

Technology: Water Buffalo Milk Production Research Program

Principle Investigator: Dr. Allan King

Title: Developing a domestic supply of buffalo mozzarella

OMAF/MRA split: TBD

Theme: Food for Health, Animal Production

Research Summary: Buffalo mozzarella cheese has become one of Canada's favourite delicacies, so much so that demand for the thick, creamy cheese has increased by nearly 20 per cent in the last five years.

However, more than 95 per cent of the world's water buffalo live in Asia. That means Canada's supply of the cheese is mostly imported to meet Canada's growing market demands.

And imported cheese is expensive. At prices as high as $50 per pound, buffalo mozzarella is a luxury many Canadians can't afford.

To meet the demands, some Ontario dairy farms are exchanging their Holsteins for water buffalo. Among these farms is Stirling-based Ontario Water Buffalo Co. With more than 200 water buffalo in its herd, it's Ontario's largest producer of buffalo milk.

And while the farm is extremely productive, it's facing its share of production challenges as it tries to keep up with its traditional dairy counterparts. For example, a single Holstein cow can produce more than 75 litres of milk per day, but water buffalo produce only about 10 litres per day.

Furthermore, the water buffalo breeding season is short, and calving doesn't coincide with consumer demands for buffalo milk products.

To help maximize its herd's potential, the Ontario Water Buffalo Co. teamed up with animal reproductive technologists Prof. Allan King and Ph.D. candidate Leslie Gonzalez Grajales from the University of Guelph. These animal fertilization specialists are looking for ways to make the water buffalo breeding season longer.

A longer breeding season would mean longer lactation periods for buffalo cows, and ultimately higher milk and cheese production.

One approach involves hormone implant, which mimic the effects of natural reproductive hormones. The researchers believe implants could extend the breeding season to last year-round. Right now, they're trying to find optimal hormone balances to artificially inseminate and collect embryos from females with high milk production.

Collaborating Company Relationship: With assistance from OMAF/MRA's Business Development Branch the Catalyst Centre's Industry Liaison team introduced the Ontario Water Buffalo Co. (who had expressed interest in conducting research to enhance milk production in their water buffalo) to Dr. Allan King, Canada Research Chair in Animal Reproductive Biotechnology as an ideal expert to help the company.

The Industry Liaison team has been able to leverage several funding sources to help Ontario Water Buffalo Co. Research and development funding originated with a FedDev Ontario Applied

Research & Commercialization initiative project between the Ontario Water Buffalo Co. and Dr. Allan King.

Recognizing the value of supporting the growth of a new Canadian industry, this project has attracted support from a variety of other funding sources, including: OMAF/MRA, the Canada Research Chairs program, the Natural Sciences and Engineering Research Council and the Toronto Zoo.

OMAF/MRA Support: OMAF/MRA brought the initial lead to the University of Guelph through the Business Development Branch. Research support has been provided from OMAF/MRA to develop new technologies to increase buffalo milk production.

License: No license is in place currently as research is still underway. A natural license partner exists with the industry funding partner, Ontario Water Buffalo Co.

Expectations: The goal of this industry-academic research program is to develop a technology to increase the lactation period for buffalo cows, and ultimately create higher milk and cheese production. This solution would enable the domestic buffalo mozzarella cheese market to grow and could potentially lead to a healthy export opportunity.

Veterinary Clinical Education Program

Vision

A veterinary clinical educational program that is fundamental to supporting the health and well-being of the province and its citizens.

Mission

To support the economy of Ontario by training professionals skilled in maintaining the health and welfare of animals and their interrelationships with people and the environment.

Capacity and Outreach

- An internationally renowned, accredited and respected leader in training veterinarians skilled in maintaining the health and welfare of animals and knowledgeable about their interrelationship with people and the environment.

The VCEP program supports the international reputation and accreditation of the Ontario Veterinary College (OVC) and its role in training veterinarians who are skilled in maintaining the health and welfare of animals and knowledgeable about their interrelationship with people and the environment.

Although OVC was granted renewal of full accreditation in March 2009, based on a formal site visit, an annual update report is required to the AVMA/CVMA Council on Education (COE). On March 29, 2013 a letter was received from the COE indicating continued full accreditation. These two organizations represent the highest standard of achievement for veterinary medical

education in the world. In the accreditation process, a veterinary college is reviewed to determine whether it meets 11 accepted standards of quality. The accreditation process focuses on the Doctor of Veterinary Medicine program and the institutional resources, infrastructure and personnel that support it. Graduation from a fully accredited institution permits graduates to take the national licensure examination for professional practice in Canada and the USA.

Of the 36 OVC faculty directly involved with farm animal health and welfare, food safety, public health, disease surveillance and emergency management, 11 are funded by the VCEP faculty pool. The other 25 faculty are funded from the OMAF/MRA Research faculty pool and the Ontario Ministry of Training, Colleges and Universities. In addition, VCEP provides funding for 3.2 non-faculty veterinarians who provide health management programs and clinical teaching and service for dairy, swine and equine.

Clinical Training Programs

- Graduate competent veterinary professionals with skills in maintaining the health and welfare of animals who will meet the needs of Ontario's animal populations at the people-animal-environmental interface.

OVC's veterinary students continued the long-standing tradition of achieving a very high success rate on the licensing exam resulting in a high rate of post-graduate employment and very high employer satisfaction with our new graduates. The North American Veterinary Licensing Exam (NAVLE) is a requirement for obtaining licensure in order to practice veterinary medicine. Successful completion ensures portability of licensure to essentially anywhere in the world. Graduates are highly sought after by employers and virtually all of those seeking positions found jobs within a few months of graduation. Annual employer surveys of new graduates showed a continued trend of high satisfaction with these new veterinarians. This is due in part to the externship program that OVC students complete, which is funded by VCEP.

All students are required to complete the 8 week externship (practicum) in a rural practice that provides service to both large and small animal. Practices throughout Ontario participate, giving students hands-on experience in not only clinical medicine but also working in a rural environment. This program ensures that all of OVC graduates have an understanding of the issues related to food animal production and rural communities.

The Bovine Education Trust, a charitable endowment fund established by the Ontario Association of Bovine Practitioners (OABP) and the Ontario Veterinary College (OVC), provided funding to several final year DVM students. The objective is to provide financial support for veterinary students to obtain more real-life learning opportunities and on-the-job experiences that they need to develop successful careers serving the dairy and beef industries. Support funds are being provided by OMAF/MRA through the Veterinary Clinical Education Program.

Post-Graduate Training Programs

- Highly respected post-graduate training and continuing education programs raising the standard of veterinary health care and related public health in Ontario.

VCEP funds interns in the Veterinary Teaching Hospital, a one year post graduate program, and approximately 12 DVSc students annually. In addition, VCEP supports: The Master of Public

Health (MPH) program is a 5-semester professional degree with concentration in epidemiology, environmental public health, infectious diseases, and zoonotic, foodborne and waterborne diseases. The MPH program prepares public health students and professionals for careers in which they will address the present and future needs of public health in Ontario, Canada, and internationally. Graduates will emerge as influential local, national, and international leaders committed to improving quality of life by protecting and promoting the health of their communities and by anticipating and preventing disease from both a policy and a science perspective.

The Centre for Public Health and Zoonoses (CPHAZ), supported by VCEP, continues to grow both internal and external collaborations on research projects. CPHAZ is a virtual centre with approximately 50 faculty members from 13 departments in 6 colleges at the University of Guelph. In the past 5 years, CPHAZ members have co-published with over 200 groups / organizations. The research provides graduate training in the area of public health and currently there are approximately 85 DVM and graduate students working on a wide variety of research projects.

THE OMAF/MRA - U OF G PARTNERSHIP FINANCIAL REPORT

The financial reporting included in this Annual Report 2012/13 for the OMAF/MRA-U of G Partnership consists of two sections, as follows:

1. The "Audited Statement of Revenues and Expenses for the fiscal year May 1, 2012 to April 30, 2013", as submitted to OMAF/MRA on September 19, 2013 and included here in its entirety. (Appendix C)

2. Summary of Revenues and Expenses (Fully Allocated)

   This summary shows the **actual revenues and expenses (fully allocated) for fiscal 2012/13 (May 1, 2012 to April 30, 2013) for each of the four programs** (Research, VCEP, AFL and AHL) as well as for the Agriculture Research Institute of Ontario (ARIO) Minor Capital Fund (see note *) funded, as applicable, through:
   - the renewed Agreement,
   - the New Initiatives fund (the special one-time funding of $56 million received in March 2008, which the University will spend over five years in support of specific new initiatives in the overall partnership), and
   - the Total Partnership (Agreement + New Initiatives).

   "Fully allocated" refers to the fact that '**indirect costs**' (such as providing program support services, administrative services such as budget management and human resources functions, and physical plant infrastructure) have been allocated to each individual program using a consistent methodology. This 'fully allocated' presentation of costs has been utilized beginning in the 2004/05 Annual Report, at the request of OMAF/MRA. This format provides a much more informative arrangement of the financial data, and is not subject to the same problems in interpretation of program costs as presented in the years previous to 2004/05. Nevertheless, it is not advisable to use these data for making decisions about incremental allocations/reductions in budget, since such decisions may have variable impact on the direct versus indirect cost bases. For example, reducing 'Production Systems (PS) Research Theme' expenditures may have less impact than intended, unless the continuing cost of operating the research stations on which the PS program is built is also part of the decision process.

   The second page of this summary shows the **revenues and expenses for the Research Program** itemized for each of seven Themes, as well as for the Research Stations (broken down by "Operations" and "Utilities, Repairs and Maintenance" see note *) and the HQP (Highly Qualified Personnel) and KTT (Knowledge Translation and Transfer) programs. This summary also shows the Research Stations costs allocated across the seven Research Themes, thus providing fully allocated totals for expenses by theme.

   Note *: Financial support for upkeep and maintenance of the ARIO-owned lands and facilities (referred to in the Agreement as ARIO-Locations, and consisting of the three regional campuses and 14 other research stations, all 17 of which are managed and operated by the University) is provided for the "Utilities, Repairs and Maintenance" program (generally referred to as O&M, funded within the Agreement) and the "ARIO Capital Fund" (funded outside of the Agreement). This O&M and Capital funding is in addition to the normal day-to-day operation of the livestock and crops

research stations (station staffing, inputs such as feed, bedding, fertilizer, seed, etc.) at these 17 locations, which is termed Research Station "Operations" (funded within the Agreement, as shown in the broken out costs within the Research Program summary).

The OMAF/MRA - U of G Partnership Financial Report - Row Definitions	
Revenue	
OMAF/MRA Agreement	That portion of the total Agreement funding recognized for eligible expenses in the reported fiscal year (May 1, 2012 - April 30, 2013).
OMAF/MRA – Other	Theses revenues include OMAF/MRA funding designated for specific activities as well as the "ARIO Minor Capital" funds received.
Sales of Goods and Services	Sales of services or goods from the Agreement operations and provided to external organizations and clients. This category records revenues for testing services provided to external clients by the two Lab Services divisions, as well as sales of milk, eggs, crops and other farm products from the research stations.
Other Revenue and Interest	Includes interest earned on the net cash flow in accordance with section 14.6 of the Agreement as well as miscellaneous revenues generated within the Agreement operations. The major component of this category is facility rental income for space managed within the O and M budget. Other Revenue may also include sponsorship revenues, recoveries from the disposal of surplus equipment or other miscellaneous program revenues.
Expenses	
Personnel	All salary and employee benefit costs excluding transfers for Research and VCEP faculty costs. (refer to Faculty Pool Costs definition)
Faculty Pool Costs	Agreement funds transferred to the University in support of the salary and benefits costs of University faculty effort toward Agreement priorities. Two "pools" have been established for the Research and VCEP Programs.
Operating	Expenses for all costs other than salary and benefit costs.
Internal Sales & Recoveries	Sales of goods and services or recovery of costs between units within the University, such as Lab Testing performed by Lab Services or research station recoveries for researchers or departments. In addition, the agreement recovers costs where OMAF/MRA funded operations provide shared support for other activities such as MTCU-funded Diploma Teaching. The charges for these recoveries are normally approved as 'invoices' for services between the specific unit requisitioners and providers within the University. Internal Charges are recorded under "Operating".
Indirect Costs	Includes costs of program support services, administrative services such as budget management and human resources functions, and physical plant infrastructure, which support the overall Agreement or New Initiatives programs, but cannot be attributed as direct costs to specific programs.

Summary 12/13 Actuals - Revenue & Expenses of Entire Agreement by Program (*in thousands of dollars*)

Renewed Agreement: All Programs

	Object Category	Research	Vet Clinical Education	Agri-Food Lab	Animal Health Lab	ARIO Minor Capital	Total Agreement
Revenue	OMAF/MRA Agreement	(41,554)	(5,280)	(5,381)	(5,947)	-	(58,162)
	OMAF/MRA Other	(59)	-	(500)	(500)	(3,658)	(4,717)
	Sales Goods & Services	(4,585)	-	(8,124)	(4,803)	-	(17,512)
	Other Revenue & Interest	(1,827)	-	(37)	(33)	-	(1,897)
	Total Revenue	**(48,025)**	**(5,280)**	**(14,042)**	**(11,283)**	**(3,658)**	**(82,288)**
Expenses	Personnel	18,440	-	9,293	8,276	16	36,025
	Faculty Pool Costs	9,915	1,900	-	-	-	11,815
	Operating	13,753	3,275	4,888	4,896	3,642	30,454
	Internal Sales & Recoveries	(3,492)	-	(426)	(2,088)	-	(6,006)
	Indirect Costs	9,409	105	287	199	-	10,000
	Total Expense	**48,025**	**5.280**	**14,042**	**11,283**	**3,658**	**82,288**
	Net Expense (Revenue)	**-**	**-**	**-**		**-**	**-**

New Initiatives: All Programs

	Object Category	Total Research	Vet Clinical Education	Agri-Food Lab	Animal Health Lab	ARIO Minor Capital	Total New Initiatives
Revenue	OMAF/MRA Agreement	(9,599)	(495)	-	(1,711)	-	(11,805)
	OMAF/MRA Other	-	-	-	-	-	-
	Sales Goods & Services	(8)	-	-	-	-	(8)
	Other Revenue & Interest	(33)	-	-	-	-	(33)
	Total Revenue	**(9,640)**	**(495)**	**-**	**(1,711)**	**-**	**(11,846)**
Expenses	Personnel	6,034	368	-	622	-	7,024
	Faculty Pool Costs	-	-	-	-	-	-
	Operating	2,750	139	-	1,025	-	3,914
	Internal Sales & Recoveries	(65)	(27)	-	-	-	(92)
	Indirect Costs	921	15	-	64	-	1,000
	Total Expense	**9,640**	**495**	**-**	**1,711**	**-**	**11,846**
	Net Expense (Revenue)	**-**	**-**	**-**	**-**	**-**	**-**

Con't-SUMMARY 12/13 Actuals-Revenue and Expenses of Entire Agreement by Program*(in thousands of dollars)*

Total Partnership (Renewed Agreement & New Initiatives): All Programs												
	Object Category	Total Research [1]		Vet Clinical Education		Agri-Food Lab		Animal Health Lab		ARIO Minor Capital		Total Partnership
Revenue	OMAF/MRA Agreement	(51,153)		(5,775)		(5,381)		(7,658)		-		(69,967)
	OMAF/MRA Other	(59)		-		(500)		(500)		(3,658)		(4,717)
	Sales Goods & Services	(4,593)		-		(8,124)		(4,803)		-		(17,520)
	Other Revenue & Interest	(1,860)		-		(37)		(33)		-		(1,930)
	Total Revenue	**(57,665)**		**(5,775)**		**(14,042)**		**(12,994)**		**(3,658)**		**(94,134)**
Expenses	Personnel	24,474		368		9,293		8,898		16		43,049
	Faculty Pool Costs	9,915		1,900		-		-		-		11,815
	Operating	16,503		3,414		4,888		5,921		3,642		34,368
	Internal Sales & Recoveries	(3,557)		(27)		(426)		(2,088)		-		(6,098)
	Indirect Costs	10,330		120		287		263		-		11,000
	Total Expense	**57,665**		**5,775**		**14,042**		**12,994**		**3,658**		**94,134**
	Net Expense (Revenue)	**-**		**-**		**-**		**-**		**-**		**-**

1. See the following pages; 53 and 54, for the breakout of Research Program by Theme / Sub-program.

Summary 12/13 Actuals – Revenue and Expenses by Research Sub- Program (*in thousands of dollars*)

Renewed Agreement: Research

		Research							ARIO Research Stations		Research		Total
	Object Category	**Prod Sys**	**Prod Dev**	**Food for Health**	**Env Sust**	**Bio-economy**	**Ag Rural Policy**	**Emg Mgmt**	**Operations**	**Utilities / R&M**	**HQP**	**KTT**	**Research**
Revenue	OMAF/MRA Agreement	(17,530)	(990)	(2,085)	(2,512)	(1,612)	(1,564)	(775)	(7,439)	(7,074)	-	-	(41,554)
	OMAF/MRA Other	(20)	-	-	-	-	-	-	(33)	(6)	-	-	(59)
	Sales Goods & Services	(224)	-	-	-	-	-	-	(4,240)	(121)	-	-	(4,585)
	Other Revenue & Interest	(322)	(12)	(22)	(26)	(14)	(15)	(7)	(542)	(867)	-	-	(1,827)
	Total Revenue	**(18,096)**	**(1,002)**	**(2,107)**	**(2,538)**	**(1,626)**	**(1,579)**	**(782)**	**(12,254)**	**(8,041)**	**-**	**-**	**(48,025)**
Expense	Personnel	6,621	12	170	247	19	93	8	8,409	2,861	-	-	18,440
	Faculty Pool Costs	4,846	438	1,059	1,304	946	866	456	-	-	-	-	9,915
	Operating	1,170	230	270	268	265	205	128	5,035	6,182	-	-	13,753
	Internal Sales & Recoveries	(630)	(2)	(4)	(5)	(3)	(3)	(1)	(1,6379	(1,165)	-	-	(3,492)
	Indirect Costs	6,089	324	612	724	399	418	191	486	163	-	-	9,409
	Total Expense	**18,096**	**1,002**	**2,107**	**2,538**	**1,626**	**1,579**	**782**	**12,254**	**8,041**	**-**	**-**	**48,025**
	Net Expense (Revenue)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

New Initiatives: Research

		Research							ARIO Research Stations		Research		Total
	Object Category	**Prod Sys**	**Prod Dev**	**Food for Health**	**Env Sust**	**Bio-economy**	**Ag Rural Policy**	**Emg Mgmt**	**Operations**	**Utilities / R&M**	**HQP**	**KTT**	**Research**
Revenue	OMAF/MRA Agreement	(1,299)	(533)	(1,111)	(674)	(560)	(978)	(749)	-	-	(1,895)	(1,800)	(9,599)
	OMAF/MRA Other	-	-	-	-	-	-	-	-	-	-	-	-
	Sales Goods & Services	-	-	-	-	-	-	-	-	-	-	(8)	(8)
	Other Revenue & Interest	-	-	(13)	-	(1)	-	-	-	-	-	(19)	(33)
	Total Revenue	**(1,299)**	**(533)**	**(1,124)**	**(674)**	**(561)**	**(978)**	**(749)**	**-**	**-**	**(1,895)**	**(1,827)**	**(9,640)**
Expense	Personnel	1,117	463	787	570	571	922	573	-	-	20	1,011	6,034
	Faculty Pool Costs	-	-	-	-	-	-	-	-	-	-	-	-
	Operating	102	22	223	72	(61)	(40)	111	-	-	1,680	641	2,750
	Internal Sales & Recoveries	(28)	(7)	(3)	(23)	-	-	(3)	-	-	-	(2)	(65)
	Indirect Costs	108	55	117	55	51	96	68	-	-	195	177	921
	Total Expense	**1,299**	**533**	**1,124**	**674**	**561**	**978**	**749**	**-**	**-**	**1,895**	**1,827**	**9,640**
	Net Expense (Revenue)	-		-	-	-	-	-	-	-	-	-	

Continued: Summary 12/13 Actuals Revenue and Expenses by Research Sub (*in thousands of dollars*)

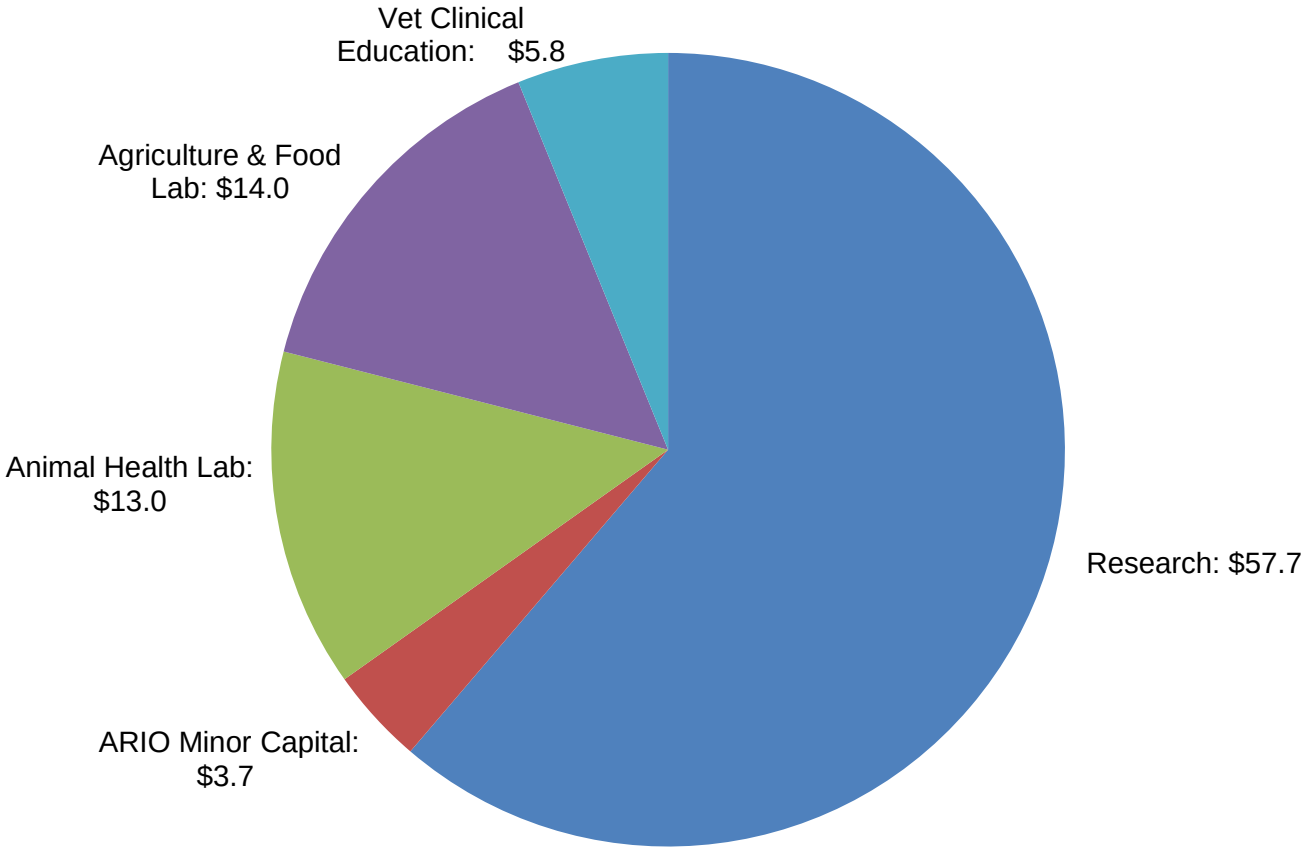
Total Partnership (Renewed Agreement & New Initiatives): Research

		Research							ARIO Research Stations		Research		Total
	Object Category	Prod Sys	Prod Dev	Food for Health	Env Sust	Bio-economy	Ag Rural Policy	Emg Mgmt	Operations	Utilities / R&M	HQP	KTT	Research
Revenue	OMAF/MRA Agreement	(18,829)	(1,523)	(3,196)	(3,186)	(2,172)	(2,542)	(1,524)	(7,439)	(7,047)	(1,895)	(1,800)	(51,153)
	OMAF/MRA Other	(20)	-	-	-	-	-	-	(33)	(6)	-	-	(59)
	Sales Goods & Services	(224)	-	-	-	-	-	-	(4,240)	(121)	-	(8)	(4,593)
	Other Revenue & Interest	(322)	(12)	(35)	(26)	(15)	(15)	(7)	(542)	(867)	-	(19)	(1,860)
	Total Revenue	**(19,395)**	**(1,535)**	**3,231)**	**(3,212)**	**(2,187)**	**(2,557)**	**(1,531)**	**(12,254)**	**(8,041)**	**(1,895)**	**(1,827)**	**(57,665)**
Expenses	Personnel	7,738	475	957	817	590	1,015	571	8,409	2,861	20	1,011	24,474
	Faculty Pool Costs	4,846	438	1,059	1,304	946	866	456	-	-	-	-	9,915
	Operating	1,272	252	493	340	204	165	239	5,035	6,182	1,680	641	16,503
	Internal Sales & Recoveries	(658)	(9)	(7)	(28)	(3)	(3)	(4)	(1,679)	(1,165)	-	(2)	(3,557)
	Indirect Costs	6,197	379	729	779	450	514	259	489	163	195	177	10,330
	Total Expense	**19,395**	**1,535**	**3,231**	**3,212**	**2,187**	**2,557**	**1,531**	**12,254**	**8,041**	**1,895**	**1,827**	**57,665**
	Net Expense (Revenue)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Summary 12/13 Actuals - Fully Allocated Research Program Expenses by Research Sub- Program (*in thousands of dollars*)

	Research							ARIO Research Stations		Research		Total
	Prod Sys	Prod Dev	Food for Health	Env Sust	Bio-economy	Ag Rural Policy	Emg Mgmt	Operations	Utilities/R&M	HQP	KTT	Research
Total Theme Expenses as above:	19,395	1,535	3,231	3,212	2,187	2,557	1,531	12,254	8,041	1,895	1,827	57,665
Allocation of ARIO Research Station Costs	18,586	-	-	1,639	35	-	35	(12,254)	(8,041)	-	-	0
Fully Allocated Theme Expenses	**37,981**	**1,535**	**3,231**	**4,851**	**2,222**	**2,557**	**1,566**	**-**	**-**	**1,895**	**1,827**	**57,665**

Summary 12/13 Actuals – Revenue and Expenses of Entire Agreement by Program ($millions)



PERFORMANCE REPORTS

Performance Indicators for the OMAF/MRA – U of G Agreement (2012/13)

Thirty nine performance indicators (PIs) were jointly developed by OMAF/MRA and the U of G at the outset of the current Agreement, to provide better accountability and transparency of funding under the new Agreement. The over arching objective of the PIs was to help ensure maximum return on provincial investment according to OMAF/MRA core business priorities.

PIs were assigned to the overall agreement and to each of the four program areas: agriculture and food laboratory, animal health laboratory, research and veterinary clinical education and two PIs were also later developed for joint management of intellectual properties.

In 2012/13 the AHL program management committee of the Agreement reviewed and made a recommendation to the Executive Committee for revisions to one of their performance indicators. The objective of revisions is to better reflect program outputs that are meaningful in their contribution to the Agreement's overall objectives.

PIs for each of the program management committees are reported on the following pages. PIs for Joint Intellectual Property management are included in Research PI #8 and Proof of Principle Fund under 'Other Reporting' on page 184.

OVERALL AGREEMENT

Selected Performance Indicators and Accomplishments

Overall Objective: A world renowned model of government-university collaboration that is instrumental to the success of Ontario's agriculture, food and bioproducts sectors, to the vibrancy of its rural communities, and to the health and well-being of the province, its environment and its citizens.

OVERALL AGREEMENT

- Leveraged third-party research dollars related to Agreement research: $23.1 million
- Ratio of leveraged funds to OMAFRA research operating funds = 3.6:1

35 U of G faculty were Canada Research Chairs, of which 16 had active Partnership research projects.

U of G again ranked 2nd overall in Canada for comprehensive universities and 1st for 'Financial Input' indicators (Research Money Inc.).

Successful communications initiatives continue: The Buzz newsletter, News@Noon speaker series, Affiliated Researcher Program, Agri-Food Research Yearbook, SPARK AIR web videos

Overall Agreement Performance Report

Performance Indicators

Data collection for each Performance Indicator (PI) was completed with the assistance of OMAF/MRA. The table below summarizes the Overall Agreement performance according to the six PIs in the Agreement.

Key Outcome	**A world class cluster of agriculture, food, bioproduct and rural community resources including academic, government, industry and supplier organizations.**	
Performance Indicator OA1	Recognition of the University as a world leader in agri-food, veterinary and associated sciences.	
	Metric (a)	Overall University ranking. Same as R3, metric (b)
	Baseline:	Ranking as per 2008 results. U of G ranked 2nd in the 'comprehensive university category.
	Target:	2010-13: Maintenance or improvement of university standing according to the Research Money Inc. ranking of Canadian universities.
	Results (2012/13):	The most current (2012) Research Money Inc. report of Canadian universities' standings ranks U of G 2nd in the 'comprehensive university category.
	Metric (b)	Total number of scientific and technical FTEs, and faculty supported or leveraged by the Partnership.
	Baseline:	Scientific and technical FTEs as per 2008/09 results. Research: 171.9 VCEP: 45.9 AFL: 53.0 AHL: 71.0

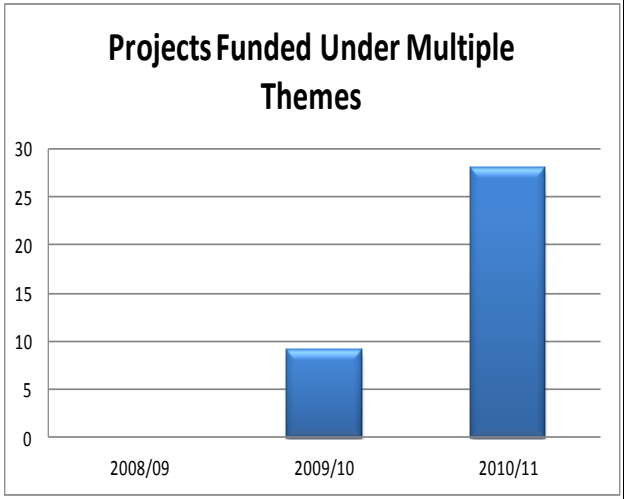
	Target:	2010-13: Maintain total number of scientific and technical FTEs and faculty supported or leveraged by the Partnership at 2008/09 levels. May decline due to inflation.
	Results (2012/13):	Number of faculty, scientific and technical FTEs supported or leveraged by the Partnership research projects: Research: 315.2 Number of faculty FTEs engaged in projects supportive of OMAF/MRA priorities (but not allocated to approved OMAF/MRA Partnership projects) is estimated at 200 'Research' FTEs. When these 'Research FTEs' are 'converted' to full faculty FTEs, it is clear that this represents 100 full faculty FTEs devoted to research related to theme priorities VCEP: 45.9 AFL: 55.0 AHL: 71.0
	Metric (c)	Number of faculty/researchers/staff related to the research theme areas, recognized by their peers, for example through research chairs, awards of recognition, appointment to prestigious positions (international panels) and leadership of national and international research initiatives etc.. (Same as R3, metric (a)).
	Baseline:	2008/09 results are the baseline. 25 faculty members were Canada Research Chairs, of which 10 had active Partnership research projects.
	Target:	2010-13: Number of faculty/researchers/staff recognized by their peers, and significance of awards, appointments etc. to be ≥ baseline.
	Results (2012/13):	During 2012/13, 35 faculty members at the U of G were Canada Research Chair holders, of which 16 had active OMAF/MRA research projects.

Key Outcome	Broader stakeholder community contributing research funding to building capacity for developing solutions to relevant issues and opportunities	
Performance Indicator OA2	Contribution of the Partnership towards leveraging industry and other government funding and collaboration for building capacity to address sector needs, opportunities and issues.	
	Metric (a)	Total dollars invested/generated from third-party sources, by program
	Baseline:	For 2008/09, total dollars invested from third-party sources were reported below as: • Research (operating): 9.2 million (excluding all Provincial government funding). This is funding secured for research projects from third-party sources. • AHL: 3.6 million • AFL: 9.8 million • VCEP: no revenue generation
	Target:	2010-13: total dollars invested/generated from third-party sources ≥ 2008/09 baselines.
	Results (2012/13):	Research (operating): 23.1 million – see R1(b) AHL: 4.8 million – see Financial Table on page 51 AFL: 8.1 million – see Financial Table on page 51 VCEP: no revenue generation
	Metric (b)	Total non-OMAF/MRA program revenue
	Baseline:	2008/09, total non-OMAF/MRA program revenue Research: 6.4 million AHL: 3.7 million AFL: 9.5 million, 0.3 million from OMAF/MRA, not related to Agreement VCEP: no revenue generation
	Target:	2010-13: total non-OMAF/MRA revenue ≥ 2008/09 baselines.

	Results (2012/13):	Research: 4.6 million AHL: 4.8 million AFL: 8.1 million VCEP: no revenue generation (Sales of services or goods from the Agreement operations and provided to external organizations and clients. This category records revenues for testing services provided to external clients by the two Lab Services divisions, as well as sales of milk, eggs, crops and other farm products from the research stations.)
Key Outcome	**Partnership seen as integrative and collaborative**	
Performance Indicator OA3	**OMAF/MRA and University staff engagement with OMAF/MRA/University partnership**	
	Metric	Level of overall OMAF/MRA - U of G staff engagement/satisfaction with overall Partnership
	Baseline:	Joint staff engagement survey distributed to all OMAF/MRA and U of G personnel involved with the partnership.
	Target:	2010-13: maintenance or improvement of 2008/09 survey results.
	Results (2012/13):	An evaluation of the Partnership Agreement was undertaken in 2012/13 (the mid-point of the 10 year Agreement) as mandated in the legal Agreement (Article 4.3). As part of the evaluation, a consultant's study (Stoddard, Sept. 2012) addressed performance indicator OA3: OMAF/MRA and University staff engagement with OMAF/MRA - University Partnership. (This survey was anecdotal and results cannot therefore be directly compared to the quantitative results of the 2010 survey.) In the study, six individuals with significant roles in the Research Program were surveyed in 2012: three (OMAF/MRA) Research Program Director Champions and three (U of G) Research Program Directors – to document their perceptions of staff engagement and satisfaction. The following are excerpts from the report:

The overall sentiment was that the new structures introduced with the latest Partnership Agreement are working well. Specifically, there were three topics that came up repeatedly and in most interviews:

- *collaboration has increased between OMAFRA staff and U of G researchers, between traditional researchers and researchers in non-traditional disciplines, and across themes.*
- *the pool of researchers submitting proposals has broadened beyond OAC and OVC;*
- *the flexibility of the coordinating structure allowed each theme to develop structures and processes that best met their needs within the structure of DC's, RPD's and TAG's.*



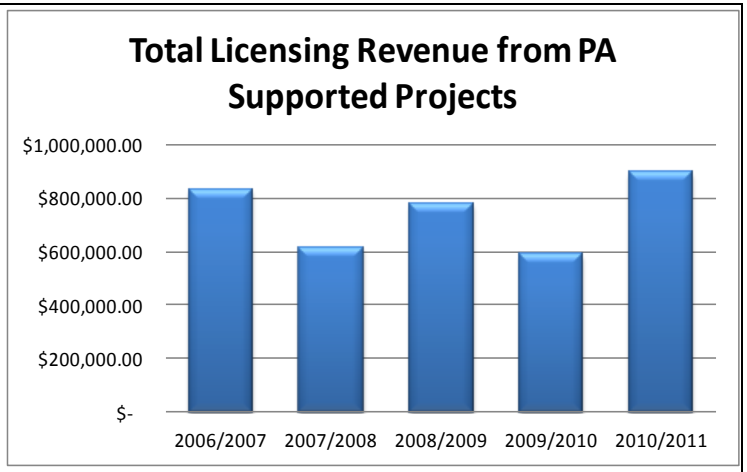
Increased collaboration was mentioned in each of the interviews conducted but it has many dimensions. The obvious layer is the collaboration between OMAFRA staff and U of G researchers. Increased collaboration is evident in the proposal development process with U of G researchers actively seeking out OMAFRA staff to vet LOI's and research proposals prior to submitting them. OMAFRA staff are engaged during the research itself, in some cases even sitting on graduate student advisory committees. Interviewees also saw increased unprompted collaboration between non-traditional research collaborators of the U of G research community.

Rather than being forced, these relationships grew naturally from related research interests and in many cases continues after the specific project is complete...

Overall, the individuals interviewed saw the new structure as an improvement that was engaging a wider circle of researchers and improving communication between OMAFRA and researchers.

Key Outcome	Leading edge solutions to agriculture, food, bioproduct, animal health and rural community issues and opportunities	
Performance Indicator OA4	Revenue generated from solutions, products and services developed through the Partnership	
	Metric	Outcomes and PIs outlined for OA4, 5 and 6 will be assessed as part of the overall 5-year evaluation of the Partnership, to be conducted by an external third party.
	Baseline:	PIs OA4, 5 and 6 will be achieved through a study similar to the Deloitte report of 2007 (U of G / OMAF/MRA Impact Study), to be conducted in 2012. In the interim, the Deloitte study serves as the baseline.
	Target:	2010-13: Evaluation plan for year five to be undertaken and approved in 2009-10, describing content and format of 2012-13 report
	Results (2012/13):	An evaluation of the Partnership Agreement (PA) was undertaken in 2012/13 (the mid-point of the 10 year Agreement) as mandated in the legal Agreement (Article 4.3). As part of the evaluation, a consultant's study (PWC Dec. 2012) addressed performance indicator OA4: *revenue generated from solutions, products and services developed through the Partnership.* The following are excerpts from the report: *The total revenue stream from licensing intellectual property developed in PA supported projects has been oscillating around a flat trend line for the last five years (see chart above, right). At first glance, a flat line trend might be cause for concern. However, when one considers the economic environment that these licensing revenues were generated in, the picture brightens. Licensing revenue held steady despite the recession, despite material revenue coming from premium consumer products and despite the end of the licensing stream from Omega-3 milk.*

The chart (below) shows the contributions of the top six licensing revenue streams. While seed royalties continue to lead the way in total revenue, revenues from the Pasturella haemolytica vaccine continue to represent a material percentage of the revenue. Also evident in the chart is the renewal of revenue streams. From 2006 to 2008, the Omega-3 milk licensing revenue declines but it is replaced by the growing revenue stream for DHA enhanced milk from 2008-2011 and the vaccine. Revenues from the DHA Enhanced Milk are expected to grow in future years.



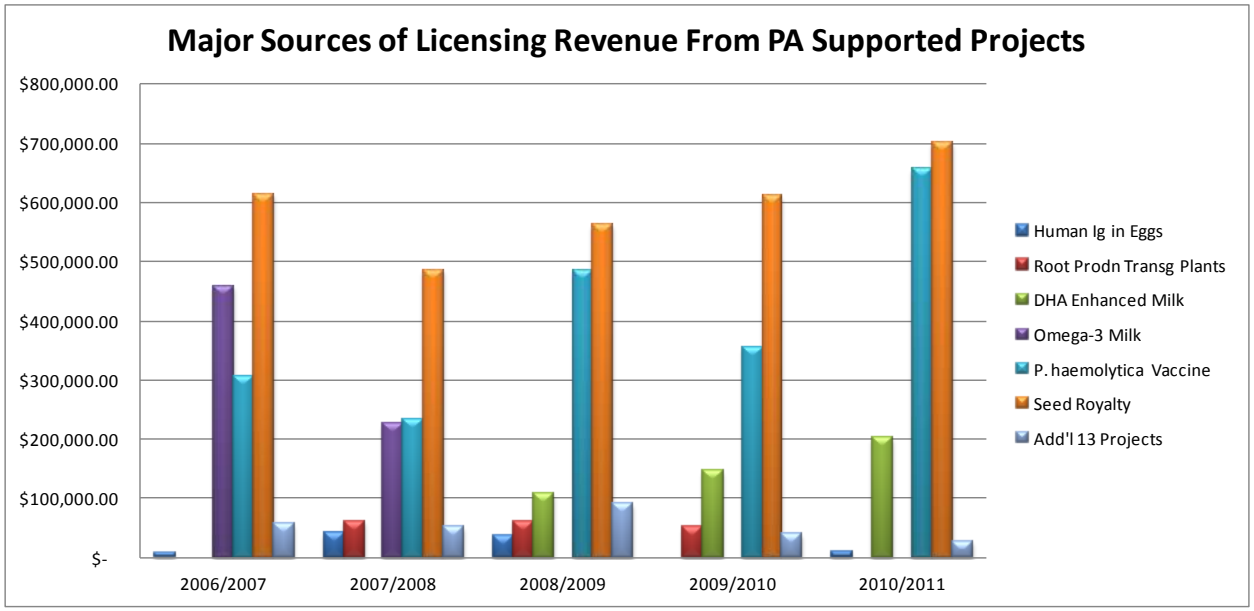
Structurally, the portfolio exhibits the expected pattern of the top twenty percent of projects generating over eighty percent of revenue. What is more interesting is the diversity of the licensing revenue in terms of species, disciplines, and points in the agriculture and food value chain represented by the revenue generating projects. The PA is generating revenue from products and procedures targeted to:

- *improving the health of all the major livestock and poultry species in Ontario,*
- *improving the nutrient profile of meat and milk and therefore the health of consumers,*
- *improving the resilience of crop plants, and*
- *developing methods, procedures and products that have direct relevance and applicability to human health.*

Note: *The sharp uptick in revenues from the vaccine in 2010/11 were the result of an audit discovering errors in reporting and therefore collecting revenue owed from previous years. This is a one-time recovery.*

The projects funded under the PA are having a material impact not only on the agriculture and food sector but are also being leveraged to have significant impacts on human health.

The final piece that the charts of licensing revenue does not reveal is the portfolio of disclosed intellectual property that has yet to be licensed. There are forty-nine additional disclosures. Of those, thirty-one have been disclosed in the last four years. The average time from disclosure to licensing of the revenue generating projects is four years. Fully 60% of the unlicensed PA disclosures have been "on the market" for less time than the average time it took to license the existing portfolio of revenue generating intellectual property. This gives optimism for the continued



reliability of the revenue and the potential for growth into the future.

Other performance indicators contained within this annual report also address OA4. For example, see additional results on the following pages in the 'Performance Reports' section of this and previous annual reports for the following:

- Research Program performance indicator #R8: Patents, products (technologies, software, germplasm, registered trademarks, copyright), licences to existing or start-up companies,

		existing businesses spun out and community-based service businesses created, and the economic impact. • Joint Intellectual Property case studies • Proof of Principle Program project outcomes
Key Outcome	**Economic and health benefits generated from adoption, utilization and commercialization of knowledge and capacity**	
Performance Indicator OA5	Economic and health benefits from solutions, products and services developed though the Partnership	
	Metric	Outcomes and PIs outlined for OA4, 5 and 6, will be assessed as part of the overall 5-year evaluation of the Partnership, to be conducted by an external third party.
	Baseline:	PIs OA4, 5 and 6 will be achieved through a study similar to the Deloitte Study – 2007 (U of G / OMAF/MRA Impact Study), to be conducted in 2012. In the interim, the Deloitte study serves as the baseline.
	Target:	2010-13: Evaluation plan for year five to be undertaken and approved in 2009/10, describing content and format of 2012/13 report.
	Results (2012/13):	An evaluation of the Partnership Agreement was undertaken in 2012/13 (the mid-point of the 10 year Agreement) as mandated in the legal Agreement (Article 4.3). As part of the evaluation, a consultant's study (PWC Dec. 2012) addressed performance indicator OA5: economic and health benefits from solutions, products and services developed though the Partnership. The following are excerpts from the report: *The OMAFRA funding under the Partnership Agreement ("OMAFRA/ PA funding") provides significant economic and social benefits for Ontario. While economic impact analysis is a useful tool to assess spending impacts in an economy, it does not explicitly account for social, environmental and productivity benefits that result from OMAFRA PA funding. Discussions with stakeholders indicated that OMAFRA PA funding provides many qualitative social benefits to Ontario that are difficult to quantify in economic terms. These benefits, which link to OMAFRA's strategic priorities, include:* • *Safeguarding the Ontario economy from the impacts of a foreign animal disease outbreak*

		and protecting Ontario's access to export markets. In doing so, significant rural economic development impacts and benefits are generated. • *Contributing to Ontario's Innovation Agenda by attracting and maintaining research dollars in Ontario and by encouraging industry-academic partnerships which can result in improved research outcomes.* • *Providing research results that inform public policy so that it can be "evidence-based". A significant example of this within the current Partnership Agreement is the development of the 2009 Ontario Animal Health Act.* • *Contributing to the public health agenda by both improving the nutritional profile of foods and by providing testing and surveillance of food pathogens and infectious diseases that can be transferred from animals to humans.* *From FY 2009 to FY 2013, OMAFRA's $363 million in funding provided to the U of G is expected to leverage additional investment of $402 million for research and development purposes from private sector and other public sector organizations. These expenditures are estimated to generate additional expenditures throughout the Ontario economy – indirect economic impacts of $327 million. In total, OMAFRA PA funding is estimated to facilitate roughly $1091 million of spending at the U of G and across the Ontario economy from fiscal year 2009 to 2013.* The following are excerpts from another report prepared by the U of G as part of the five year evaluation of the Agreement. Entitled 'Partners for Progress' (2012), it consists of a series of case studies and also addresses this PI: *One of the key components for successful innovation required to maximize societal benefit through research, is investment in the full continuum of the research process. The six case studies included in this report demonstrate the various phases of this research process and how each phase provides a critical link in the eventual positive impact on society.* *Case Study 1: Replacing petroleum-based materials in plastics for products such as interior car parts, landscaping, and packaging with plant-based materials from Ontario fields becomes a reality through a unique multidisciplinary and collaborative research program.* *Case Study 2: Developing more cost-effective treatments for critical diseases such as breast cancer through plant-based biosimilar drugs, could save the province of Ontario millions of dollars. Researcher Chris Hall discovers a novel use for tobacco plants that are an ideal platform for the*

		creation of a bio-based version of an antibody used in the treatment of breast cancer. *Case Study 3: Researchers working in collaboration with the Ontario Pork industry are enhancing detection and potentially eradicating Porcine Reproductive and Respiratory Syndrome Virus (PRRSV).* *Case Study 4: Research and development into high quality and nutrient rich vegetables will contribute to the health of Ontario residents. Collaborations along the entire value chain bring new products to market.* *Case Study 5: The Animal Health Laboratory (AHL) at the University of Guelph is a key partner in protecting animal and human health. The AHL detects, characterizes and monitors influenza viruses to determine pandemic genotypes and predict outbreaks* *Case Study 6: The diagnostic method developed by the University of Guelph's Agriculture and Food Laboratory offers a rapid and sensitive way to detect over 20 mycotoxins, strengthening Ontario's surveillance activities, food safety programs, helping to minimize associated economic loss.* Other performance indicators contained within this annual report also address OA5. For example, see results on the following pages in the 'Performance Reports' section of this and previous annual reports for the following: • Research Program performance indicator #R5 (case studies): Benefits to the economy, the environment and the health and wellbeing of the province, generated from the Research Program. • Animal Health Lab Program performance indicator #AHL5 (case studies): Effective and timely diagnosis and reporting of diagnostic results to OMAF/MRA, in the investigation and response to suspected foreign animal and other serious human/animal diseases. • Agriculture & Food Lab Program performance indicator #AFL5*:* Effective response to food safety, environmental health and plant health/pest emergencies & unanticipated urgent incidents / requirements in a reasonable timeframe using existing or new methodologies / tests.

Key Outcome	Key stakeholders aware of economic and social benefits of solutions led by the Partnership	
Performance Indicator OA6	External stakeholder satisfaction with benefits and accomplishments of the OMAF/MRA - U of G Partnership	
	Metric	Outcomes and PIs outlined for OA4, 5 and 6 will be assessed as part of the overall 5-year evaluation of the Partnership, to be conducted by an external third party.
	Baseline:	PIs OA4, 5 and 6 will be achieved through a study similar to the Deloitte Study – 2007 (U of G / OMAF/MRA Impact Study), to be conducted in 2012. In the interim, the Deloitte study serves as the baseline.
	Target:	2010-13: Evaluation plan for year five to be undertaken and approved in 2009/10, describing content and format of 2012/13 report. Note: OMAF/MRA-U of G evaluation plan was developed in 2010/11.
	Results (2012/13):	An evaluation of the Partnership Agreement was undertaken in 2012/13 (the mid-point of the 10 year Agreement) as mandated in the legal Agreement (Article 4.3). As part of the evaluation, a consultant's study (Stoddart, Sept. 2012) addressed external stakeholder satisfaction with the benefits and accomplishments of the Partnership Agreement through a survey of 27 public and private sector stakeholders. They were interviewed with respect to the importance with which they viewed the work of the Partnership Agreement. The following are excerpts from the report: *Interviews with private sector and public sector funding partners suggested that a significant portion of the leveraged PA* (Partnership Agreement) *funding was directly attributable to the critical mass of experienced research personnel and infrastructure at the U of G, which is sustained by the OMAFRA PA funding. Indeed, in a few cases stakeholders mentioned specific academic personnel at the U of G as to why they chose to partner with the U of G.* *Some stakeholders also pointed to the U of G's international reputation in agricultural research – to a significant extent a direct by-product of the longstanding funding relationship between OMAFRA and the U of G – as another important reason for conducting research projects at the U of G. Other stakeholders indicated that they could have easily located their projects in other jurisdictions in Canada or the US, further emphasizing the importance of OMAFRA PA funding in attracting funding from private sector and other public sector organizations.*

		Discussions with stakeholders indicated that OMAFRA PA funding provides many qualitative social benefits to Ontario that are difficult to quantify. These benefits, which link to OMAFRA's strategic priorities, include: • *Safeguarding the Ontario economy from the impacts of a foreign animal disease outbreak, and protecting Ontario's access to export markets. In doing so, significant rural economic development impacts and benefits are generated.* • *Contributing to Ontario's Innovation Agenda by attracting and maintaining research dollars in Ontario and by encouraging industry-academic partnerships which can result in improved research outcomes.* • *Providing research results that inform public policy so that it can be "evidence-based. A significant example of this within the current Partnership Agreement is the development of the 2009 Ontario Animal Health Act.* • *Contributing to the public health agenda by both improving the nutritional profile of foods and by providing testing and surveillance of food pathogens and infectious diseases that can be transferred from animals to humans.* Other performance indicators contained within this annual report also address OA6. For example, see additional results on the following pages in the 'Performance Reports' section of this and previous annual reports for the following: • Animal Health Lab Program performance indicator #AHL7: Level of customer satisfaction with services provided by AHL program, by commodity. • Agriculture & Food Lab Program performance indicator #AFL2: Proportion of completed tests that meet quality, sample integrity and service level standards. • Veterinary Clinical Education Program performance indicator #VCEP3: Readiness of graduates for employment (Metric: Percentage level of satisfaction of students and employers satisfaction regarding readiness for employment).

AGRICULTURE AND FOOD LABORATORY

Selected Performance Indicators and Accomplishments

Program Objective: Scientific, diagnostic and analytical capacity to detect risks and enable effective response to support the health and well being of the province and its citizens.

AGRICULTURE AND FOOD LABORATORY

- **DNA fingerprinting methodology (MLVA) and database that facilitates tracking contamination sources of *Listeria monocytogenes***
- **Successful 3rd year of five-year contract for milk composition with DFO (>800,000 samples)**
- **Refining of methodology and re-organization of Chemistry Unit for the testing of drug and pesticide residues introduced financial savings and value-added information for OMAF/MRA**
- **Contribution to 10 graduate students' programs**

- **Completion of second year of CFIA contract for microbiological food safety testing**
- **Acquisition of contract for CFIA National Research Study of Poultry Products**
- **Successful completion of third year of CFIA chemical residue testing further aligning OMAF/MRA's efforts nationally**
- **Successful development of chemical residue tests addressing bee industry concerns**

- **Nine successful collaborative research proposals**
- **One invention report**
- **Twelve KTT events (presentations and posters)**
- **Six peer-reviewed journal publications**

- **Successful achievement of established benchmarks across all 7 performance indicators (98% compliance or greater where required)**
- **Accreditation to ISO/IEC 17025 standard & individual test accreditations by recognized bodies (e.g. SCC, CALA)**

Program Performance Reports

Agriculture and Food Laboratory

Performance Indicators

Data collection for each Performance Indicator (PI) was completed with the assistance of OMAF/MRA. The table below summarizes AFL's performance according to the seven PIs in the Agreement.

Key Outcome	**Highly qualified & skilled lab personnel & equipment supported by required accreditation.** **Improved lab and food safety technology & practices.**	
Performance Indicator AFL1	Maintain required accreditations, proficiency testing and ISO registration to ensure a continuous quality improvement program is applied to laboratory operations.	
	Metric	Summary reports of accreditation and proficiency reports
	Baseline:	Accreditation to by the ISO/IEC 17025 standard. Individual test method accreditation by recognized bodies e.g. Standards Council of Canada (SCC), Canadian Association for Laboratory Accreditation (CALA). Maintenance of proficiency for individual test methods per program availability.
	Target:	2010 – 2013: Maintenance of accreditation
	Results (2012/13):	LSD, including AFL, is accredited by both of Canada's internationally recognized accrediting bodies, Standards Council of Canada (SCC) and the Canadian Association for Laboratory Accreditation (CALA) to the ISO/IEC 17025 standard. In 2012-2013, under Schedule "F", LSD/AFL provided testing services for 3 programs within the Food Inspection Branch. The AFL is accredited to the ISO/IEC 17025 quality standard for specific tests listed in scope. In addition, LSD/AFL performs 35 tests for Horticulture and Agriculture Land Use program and

		Environmental Management program, accredited methods in this program may be accredited by SCC, CALA or OMAF/MRA soil fertility program. **Standard Council of Canada** LSD is accredited by SCC in two program specialty areas: Agriculture Inputs, Food, Animal Health and Plant Protection (AFAP) and Test Method Development, Evaluation and Non-routine Testing (TMDENRT). As of May 2013, LS has 119 scope listings including 100 AFL tests and 19 AHL tests. In the 2012/13 fiscal year, LSD/AFL reviewed our scope of accreditation and testing activities and significantly revised our SCC scope of accreditation. In total, we added 8 tests (7 AFL tests) and withdrew accreditation from 43 inactive tests. On April 15, 2013, LSD submitted a scope extension application to SCC to add 8 tests, including 5 AFL tests. The application is under review by the SCC technical assessors. (Please refer to posted scope of accreditation for laboratory number 100 on the SCC website for full details.) **Canadian Association for Laboratory Accreditation** LSD is accredited by the Canadian Association for Laboratory Accreditation (CALA) for environmental tests. As of April 30, 2013, LSD is accredited by CALA for 14 tests including 11 AFL, 3 AHL tests and 4 licensed tests under the Ontario Safe Drinking Water Act. There was no change in the CALA accreditation in 2012/13. The accrediting bodies require a biennial assessment of the quality management system and tests listed on the scope of accreditation. The next SCC and CALA biennial assessment is scheduled for September 30, 2013. Note that some methods are used to analyze multiple parameters e.g., CHEM-041 MRD is used to analyze samples for amphenicols, beta-lactams, sulfonamides, and tetracyclines. **Proficiency Testing** In support of OMAF/MRA Schedule “F” testing in 2012/13, LSD/AFL analyzed and received over 300 PT results. PT participation was down this year because one large set of PT samples was received in unacceptable condition for testing for microbiological testing.

Key Outcome	**Scientific & statistical integrity of routine analytical test data to ensure quality, reliable results.**	
Performance Indicator AFL2	Proportion of completed tests that meet quality, sample integrity and service level standards.	
	Metric	Percentage / Level of compliance with service level standards, reported by program, related to: • Turnaround times for screenings and confirmation • Corrected reports • Non conforming samples
	Baseline:	98% compliance met.
	Target:	2010 – 2013: maintain 98% compliance with service level standard
	Results (2012/13):	The Agriculture and Food Laboratory has met or exceeded the requirement: • Turnaround time for test results was met 99.7% of the time over the full fiscal year 2012/13. • Correct reports – 98% compliance met (99.8%) • Non-conforming samples – 98% compliance met (99.2 %)
Key Outcome	**Strong linkages built to ensure effective, timely sharing of information and to communicate violative / actionable test results to stakeholders in a timely manner.**	
Performance Indicator AFL3	Track and review incident reports (LabTrack [2011] or CAPA [2012]) and report all non-conformances, resolution and continuous improvement initiatives.	
	Metric	a) LabTrack (2011) or CAPA (2012) reporting of all non-conformances
	Baseline:	Service level standard is to continually improve through the process of documenting an reviewing incident report (LabTrack or CAPA) and associated follow-up and resolution initiatives
	Target:	2010 – 2013: To manage the incidents every year with demonstration of continuous improvements.

	Results (2012/13):	AFL understands that the focus of this performance measure is to demonstrate the AFL's ability to address those results ***required for OMAF/MRA actionable response***. 63 incident reports were identified during the processing/testing/reporting of 68,390 tests reported for OMAF/MRA Schedule "F" samples, excluding the raw milk testing program. 32/63 incidents resulted from AFL non-conformance, 30/63 incidents resulted from OMAF/MRA non-conformance, 1/63 incidents resulted from shared AFL/OMAF/MRA non-conformance. A total of 68,390 tests (excluding raw milk testing program) were performed for OMAF/MRA in the Schedule "F" programs. Over 99.8% of these tests reported met the performance standards of the agreement. Improvements installed over the past year are aimed at eliminating recurrence of specific non-conformances and preventing future ones. Specifically: • Customization of submission documents and the process in collaboration with the Dairy Food Safety Program to improve sample information consistency. • IT implemented automated contact with laboratories to enhance reporting of adverse test result details to OMAF/MRA. • IT adjusted the laboratory information system to adapt to changes in the Ministry's system (SIEBEL) • IT solution for adverse reporting continues to expand information available to labs for reporting per SOP 95S-028 e.g. Meat plants information for project 3300/3350 • Enhancement of Microbiology lab processes including replacing manual with automated steps and use of rapid methods. • Restructuring of Chemistry section to improve efficiencies and capacity for LC-MS/MS testing including extended work week, larger batch sizes and more target compounds per method. • Improved regular access to key AFL advisory staff on-site at one Stone Road.
Key Outcome	**Ability and capacity to detect and confirm positive test results to provide effective response to food contamination incidents and other serious plant and environmental hazards with severe human health or economic consequence.**	
Performance	Level of compliance with communication requirements in the lab testing and sampling protocols.	

Indicator AFL4		
	Metric	LabTrack reporting of all non-conformances.
	Baseline:	Baseline is service level standard of 98%.
	Target:	2010 – 2013: maintain 98% compliance with service level standard
	Results (2012/13):	**Over 98%** (99.9%) **compliance**: Eight (8) incidents of non-compliance with the communication requirements established in the lab testing and sampling protocols for the reporting of adverse results affecting 8 of the 15,698 (excluding raw milk testing program) sample sets for the 2012/13 fiscal year(0.05% of samples).
Key Outcome	**Capacity and capability to support coordinated and effective emergency management, and the ability and capacity to detect and confirm positive test results to provide effective response to unanticipated / urgent testing requirements and food safety, environmental health and plant health / pest emergencies.**	
Performance Indicator AFL5	Effective response to food safety, environmental health and plant health/pest emergencies & unanticipated urgent incidents / requirements in a reasonable timeframe using existing or new methodologies / tests.	
	Metric	Evaluation / case study of AFL's response to, and management of significant / unanticipated / urgent situations / events of environmental, health and plant / pest emergencies including any requirement for the development of new AFL tests / methodologies.
	Baseline:	Case study approach.
	Target:	Completion of case study.
	Results (2012/13):	There has been no incident in 2012/13 requiring a case study documenting the development of new AFL test / methodologies
Key Outcome	**Ability to detect contamination of the food supply and other testing projects through the implementation of statistically valid sampling plans and ensure the cost effective use of available resources.**	
Performance Indicator	Level of compliance with sampling schedule as described in the annual sampling and testing plan agreements and documented in year changes.	

AFL6		
	Metric	Percentage compliance with annual Testing and Sampling plans, by program (Schedule F).
	Baseline:	Baseline is service level standard of 98%.
	Target:	2010 – 2013: maintain 98% compliance with service level standard
	Results (2012/13):	The AFL met and exceeded the required 98% service level standard [99.8% correct reports; 99.7% turnaround time achieved], achieving the testing requirements as specified in the annual testing and sampling plans for the full list of requested parameters across all programs. OMAF/MRA Sampling Plan Request: 16,426 individual test samples (excluding raw milk testing program contract) AFL Tested: 15 698 individual test samples (per OMAF/MRA Sample Reconciliation Report for (2012/13) The AFL found that 99.9% of the samples submitted by OMAF/MRA in the Food Safety Program were suitable for testing; 100% of the samples submitted by OMAF/MRA in the Crop Technology Branch & other Programs were suitable for testing. OMAF/MRA strives to reach 100% with its annual sampling and testing plans. Several factors develop throughout the testing year that can affect the ability to meet this compliance goal. They include factors such as: sample collection issues; logistical and resource issues; and various other issues that OMAF/MRA works diligently to adapt and overcome. Some factors are however outside the control of OMAF/MRA such as: weather and seasonal issues; licensing issues; processing facilities going out of business; new facilities coming online; and other factors that can affect OMAF/MRA's ability to collect the agreed upon number of samples.

Key Outcome	**Improved U of G research through laboratory-based expertise.**	
Performance Indicator AFL7	Contribution of AFL/UofG students to articles, posters and final project reports presented/published.	
	Metric (a)	Total number of publications in peer reviewed journals and / or final project reports presented, related to OMAF/MRA strategic research themes.
	Baseline:	There is no existing baseline. Producing more publications year over year does not provide an accurate measure of performance. Continuous improvement and measuring beneficial impacts of contributions is more in line with the intent of this measure
	Target:	Demonstration of continued contribution by the AFL; year-to-year fluctuation expected.
	Results (2012/13):	Six (6) publications in peer-reviewed journals/book chapters and nine (9) research grant awards. Four (4) Post Doctoral Fellows trained under OMAF/MRA, OCE, MITACS and MOE research grants Three (3) Masters students trained under FSQA program of Department of Food Science, University of Guelph One (1) Ph.D candidate hosted under the Department of Food Science, University of Guelph
	Metric (b)	Summary of knowledge transfer events re new practices, including number of attendees.
	Baseline:	There is no existing baseline. Conducting more events year over year does not provide an accurate measure of performance. Continuous improvement and measuring beneficial impacts of contributions is more in line with the intent of this measure.
	Target:	Demonstration of continued contribution by the AFL to knowledge transfer.
	Results (2012/13):	Nineteen (19) knowledge transfer events: Nine (9) oral presentations (50 – 150 attendees) Two (2) poster presentations at scientific conferences (20 -100+ attendees) Three (3) research reports One (1) report of invention

ANIMAL HEALTH LABORATORY
Selected Performance Indicators and Accomplishments

Program Objective: Surveillance, method development and emergency response and surge capacity in place to support Ontario's animal health system and the health and well-being of the province and its citizens

ANIMAL HEALTH LABORATORY

Animal Health Strategic Investment (AHSI) results:
- 31 baseline surveillance projects for early detection of emerging hazards
- 21 new test projects for emerging diseases
- 1 project dedicated to emergency preparedness
- development and testing of lab-based emergency and business continuity plans

Small ruminant industry emergency postmortem simulation completed.

AAVLD accreditation is being maintained, and ISO/IEC 17025 scope of accreditation was expanded.

Commissioning of the alkaline digester and the enhanced containment level 2 labs continued.

Autoalerts of identification of notifiable hazards are sent by email to OMAF/MRA throughout the day.

Use of AHL by farm animal vets was stable both geographically and by commodity

Continued high level of client satisfaction, and timely diagnostic reporting to OMAF/MRA

Animal Health Laboratory

Performance Indicators

Data collection for each Performance Indicator (PI) was completed with the assistance of OMAF/MRA. The table below summarizes AHL's 2011/12 performance according to the 9 PIs in the Agreement. To the extent possible, data collection and analysis was used to develop numeric performance metrics. While most of these PIs have supporting documentation, some include narratives, which provide additional information and perspective on the PI results. This supporting documentation is available upon request.

Key Outcome	**Contributes effectively to developing and implementing an animal health strategy for Ontario/Canada**	
Performance Indicator AHL1	Participation in and contribution of surveillance information to relevant national and provincial bodies or committees that inform Federal/Provincial animal health strategies	
	Metric:	a) The number of faculty and/or staff participating on federal/provincial animal health strategy committees (report only – no target.) b) Percentage of available working time spent participating on federal/provincial animal health strategy committees
	Baseline:	All 17 AHL vets/supervisors participated on federal and/or provincial animal health strategy committees and 13 attended meetings or conferences for these committees in 2008/09. Average per staff member = 2.9% of available working time
	Target:	2010-2013: 1.5% – 3.0 % of available working time
	Results (2012/13):	14 of 17AHL vets/supervisors participated in 90 meetings of 26 international and national organizations (total 622hrs). 17 of 17AHL vets/supervisors participated in 124 meetings of 22 provincial organizations (total 563hrs). In total, all 17AHL vets/supervisors participated on federal and/or provincial animal health strategy committees and 14 attended meetings or conferences for these committees in 2012/13. **Average per staff member:**

		65.8 meeting hours per year spent on relevant committees, equivalent to 3.8% of available working time. *The value presented this year is 3.8% vs. 2.9% in previous years. This is a result of revising the total possible working hours to include 50 weeks/year vs. 52 weeks/year, to account for at least 2 week vacation.
		This PI is supported by a table of AHL staff participation in national and provincial committees and scientific meetings. The table also includes information regarding AHL staff holding officer roles in these organizations. Two international organizations are included (AAVLD and ACVP), as participating in this capacity, contributes to international and thus national policy. As requested, this tabulation has otherwise been limited to national and provincial bodies or committees to which AHL veterinary staff members belong. Many AHL staff are also ordinary members of various international organizations and local organizations, which have not been included. Participation in the large number of provincial and national veterinary organizations provides an opportunity to interact with both private practitioner colleagues as well as industry, and brings a laboratory perspective on issues of the day that impact or inform policy development. Participation in the Canadian Animal Health Surveillance Network (CAHSN) has been most useful in helping to train and equip the AHL staff to deal with a foreign animal disease at an enhanced level of preparedness – also a key feature of the new OMAF/MRA - U of G Agreement. As core members of the Ontario Animal Health Surveillance Network (OAHSN), the AHL and OMAF/MRA exchange and integrate information from many sources such that OAHSN serves as a cornerstone of the larger Ontario Animal Health System and related public health. Cross-Canada representation at the Canadian Animal Health Laboratorians Network (CAHLN) in Winnipeg, MB included provincial, university and federal laboratories (Past-President Grant Maxie attended). Other annual meetings held concurrently were the Canadian Association of Veterinary Pathologists (CAVP), the Canadian Animal Health Surveillance Network (CAHSN), the TSE Lab Network, and Canadian Association of Poultry Veterinarians (CAPV).

Key Outcome	Acts as a critical resource effectively contributing to animal health policy development and in ongoing program delivery for OMAF/MRA	
Performance Indicator AHL2	Diagnostic services offered by the AHL are appropriate to detect hazards* present in Ontario and test results are provided within published turnaround times.	
	Metric:	Ability of the lab to provide high quality diagnostic services for hazards* within published turnaround times. *Appendix A & B, Ontario Regulation 277/12. (Reporting of Hazards and Findings). Animal Health Act 2009
	Baseline:	N/A
	Target:	No target to be set
	Results (2012/13):	**AHL, Laboratory Services, University of Guelph** **Notifiable and Alertable Tests January 1, 2013 to April 30, 2013** **Notifiable Tests Completed**

Tests	**No. of Tests**	**No. of Cases**
CFIA African swine fever	3	2
CFIA Classical swine fever	3	2
Rabies FA	21	20
Salmonella Serotyping	434	299
Total	**461**	**323**

Notifiable Pathology Cases

Pathology Code	**No. of Cases**
Clostridium botulinum	1
Coxiellaburnetii	2
Listeria monocytogenes	5
avian herpesvirus type 1 (AHV-1)/ ILT	3

Total	**11**	
Notifiable Alerts		
Tests	**No. of Tests**	**No. of Cases**
AEV AGID V2	15	15
C burnetii PCR	15	10
CWD ELISA	4	1
Culture Bact	8	5
Eqhrpsv 1 rt PCR	1	1
HSFP Env Culture	7	4
IHC Infl A Virus	2	2
ILV rt-RT-PCR	8	3
InfluAvirMultiS-sc	1	1
L mono Isol	1	1
S pull-typh tube	1	1
SIF H1N1 ELISA	1	1
SIF H3N2 ELISA	6	1
SIF Virus Typing	7	2
Swinflurt RT-PCR	24	8
VTEC PCR Geno	3	2
	104	**58**
Total	**576**	**381**
Average	**144**	**95.25**

Key Outcome	**Acts as a critical resource effectively contributing to animal health policy development and in ongoing program delivery for OMAF/MRA**	
Performance Indicator AHL3	Proportion of farm animal veterinary practices using AHL services by geographic area across the province	
	Metric:	Percentage of veterinarians accessing/utilizing laboratory services, by commodity and geographic

		area.
	Baseline:	<u>For 2008/09,</u> <u>By Commodity</u>: Equine (EQ): 70% Food Animal (FA): 73% <u>By Geographic Area</u>: North = 64% East = 78%
		Central = 58% West = 65%
	Target:	2011-2013: ≥ 65% for each commodity; ≥ 60% for each region
	Results (2012/13):	<u>By Commodity</u> **Equine:** Proportion of EQ accredited facilities submitting EQ samples to the AHL = 203/284 (**71.5%)** Numerator: total number of accredited facilities with EQ submissions (whether or not they are identified as EQ accredited facilities in the CVO database) Denominator: total number of Ontario accredited facilities identified as EQ in the CVO database + all other accredited facilities which have submitted EQ samples to the AHL **Food Animal (FA):** Proportion of FA accredited facilities submitting FA samples to the AHL = 237/274(**85%**) Numerator: total number of accredited facilities with FA submissions (whether or not they are identified as FA accredited facilities in the CVO database)

		Denominator: total number of Ontario accredited facilities identified as FA in the CVO database + all other accredited facilities which have submitted FA samples to the AHL <u>By Geographic Area (Area Code)</u> Proportion of EQ & FA accredited facilities in each area submitting EQ and/or FA samples to the AHL: Numerator: total number of accredited facilities with EQ and/or FA submissions (whether or not they are identified as EQ or FA accredited facilities in the CVO database). Denominator: total number of Ontario accredited facilities identified as EQ or FA in the CVO database + all other accredited facilities which have submitted EQ and/or FA samples to the AHL. North Area Code 705, 289 = 70% Area Code 807 = 0(Average: **70%**) East Area Code 613 = **(75%)** Central Area Code 416, 905, 647 = (65%)(Average: **65%**) West Area Code 519 = **(72%)**
		Commodity (Equine and Food Animal) analysis is based on all Ontario accredited facilities identified as EQ or FA (respectively) in the CVO database, plus all other clinics which have submitted EQ or FA samples (respectively) to the AHL. **Note:** As noted in previous reports, the commodity analysis is somewhat misleading, as the AHL serves a much higher percentage of FA practices in Ontario than is reported here, i.e., should be close to 100%. The difference between the reported percentage and the actual percentage is a result of the fact that some companion animal clinics hold food animal certifications for the purposes of dispensing medication but do little to no actual diagnostic work with food animals. As a result, the denominator is artificially large with a resulting lower percentage. All Ontario food animal and equine practitioners are aware of the availability of AHL services, and are able to

		access AHL resources on an as-needed basis. Geographic analysis is based on all Ontario accredited facilities identified as EQ and/or FA in the CVO database, plus all other clinics which have submitted EQ or FA samples to the AHL, and is presented by region, using telephone area code.
Key Outcome	A key node within a formal network of animal health professionals, providing a critical link to the North American flow of diagnostic information for surveillance and risk assessment	
Performance Indicator AHL4	Timely communication of relevant changes in the patterns of existing disease or the appearance of new disease to veterinary practices, producers and industry groups	
	Metric:	Level of customer satisfaction with services provided by AHL program, by commodity.
	Baseline:	Client Satisfaction: 93% satisfaction rating (2008/09)
	Target:	2011-2013: ≥ 90 % satisfaction rating
	Results (2012/13):	By agreement with OMAF/MRA, the AHL Client Satisfaction Survey will be conducted biennially, rather than annually. This survey was not conducted in fall 2012, but will be in fall 2013. As an alternative documented form of feedback on client service, minutes of the bi-monthly AHL/OVC-HSC/PBI liaison meetings (AHL, OVC Health Sciences Center -Veterinary Teaching Hospital and Pathobiology) and the annual AHL Feedback Group meeting (a range of AHL clients attend) were reviewed. Meeting minutes are available upon request. Satisfaction is high with the timeliness of communications, however we do not have a numerical satisfaction rating.

Key Outcome	**Early detection and effective response to foreign animal diseases and other serious diseases with human/animal health or economic consequences**	
Performance Indicator AHL5	Effective and timely diagnosis, support and reporting of diagnostic results to OMAF/MRA, in the investigation and response to suspected foreign animal and other serious human/animal diseases	
	Metric:	a) Evaluation/case study of AHL response to "*significant animal health events" such as suspected foreign animal and other serious human/animal disease (*) as defined by OMAF/MRA b) Utilization of AHL lab by third-party sources (Note: reporting on this metric will be very general to ensure client confidentiality and market competitiveness and no target will be set.)
	Baseline:	OMAF/MRA satisfaction of AHL detection and response in case studies.
	Target:	2011-2013: satisfactory handling of all cases by AHL
	Results (2012/13):	a) The AHL selected three cases from their 2012/13 case work, with potential significance to animal health. The three cases were: 1) An outbreak of swine dysentery *(Brachyspira hyodysenteriae)* in Ontario 2) A case of avian encephalomyelitis in 12-week-old chicken layers in Ontario 3) Alveolar hydatid disease (*Echinococcus multilocularis*) in a dog from southern Ontario b) Evaluation of the three AHL case studies found that each had been handled effectively according to the established criteria. The AHL was used by approximately 118 third-party sources (excluding OMAF/MRA and Ontario veterinary clinics), including 10 federal ministry, 0 Ontario ministry, and approximately 108 other private organizations including other diagnostic laboratories, large FA producers, genetic and cell line companies, feed companies, shipping companies, Canadian universities, Canadian hospitals and more. Excerpts from the OMAF/MRA evaluation, completed in July 2013, are as follows:

		Case 1 – An outbreak of swine dysentery *(Brachyspira hyodysenteriae)* in Ontario This case of diarrhea in an Ontario swine finishing facility occurred when a new strain of *Brachyspira* had recently been diagnosed in the U.S. Midwest and western Canada. The referring veterinarian as well as the Animal Health Laboratory (AHL) at the University of Guelph combined to determine the etiology of this diarrhea accurately and effectively. Noteworthy are the following. Sample collection by the referring veterinarian was complete and allowed for thorough testing. The AHL was aware of the need for reagents to identify the new strain of *Brachyspira* and had initiated efforts to acquire these reagents prior to the outbreak of clinical signs in this herd. AHL worked closely with two well-respected veterinary diagnostic laboratories to confirm the diagnosis. Also noteworthy is the fact that there wasn't complete agreement in the diagnostic testing between the AHL and the other two reference laboratories. This reinforces the need for confirmatory testing from outside laboratories in cases where new tests are being applied or where a positive diagnosis has far reaching consequences for the swine industry. Communication between the AHL and all involved parties was timely and acceptable. At times there appeared to be some uncertainty regarding which individuals should be made aware of test results. As this case developed, there was a need for on-going communications with OMAF/MRA which did occur but was not documented in this report. Responses to queries addressed to the referring veterinarian and his proxy were delayed in some instances. The referring veterinarian felt he was expected to spend a greater amount of time in communication regarding this case with various individuals and organizations than time or compensation allowed. A less cooperative veterinarian may have made follow-up inquiries of significance to this case more difficult to resolve. Compensation for private practitioners asked to contribute their professional time and expertise for the "public good" should be considered to ensure diagnosis and control of new diseases is done effectively within the province. It is uncertain that *B. hyodysenteriae* has re-emerged in Ontario as indicated in section 1.8 of the report. Such undocumented conclusions by the AHL should be guarded against. It is at least equally likely that this diagnosis is indicative of a detection bias due to recent reports of *B. hampsonii* in the U.S. and western Canada stimulating requests for *Brachyspira* testing. The clinical expression of this perhaps previously subclinical endemic infection may have resulted from

		the enrolment of the farm in an antibiotic free niche market program. In conclusion the AHL rapidly and effectively diagnosed and communicated the cause of an outbreak of diarrhea in an Ontario finishing facility while at the same time ruling out other potential etiologic agents of particular concern to the Ontario swine industry. This case emphasizes the importance of appropriate sample submission from the field, laboratory preparedness for new and emerging swine diseases, cooperative efforts between diagnostic laboratories in Canada and the U.S., and effective and accurate communication strategies. <u>Case 2 – A case of avian encephalomyelitis in 12-week-old chicken layers in Ontario</u> OMAF/MRA's poultry specialist: "I have reviewed the avian encephalomyelitis cases and I think that the diagnosis was timely and effective. The pathologists worked effectively to make a final diagnosis for a disease, which is not common in Ontario chickens. The test results were effectively communicated to the submitting veterinarian". OMAF received the lab results in a timely manner. <u>Case 3 - Alveolar hydatid disease (*Echinococcus multilocularis*) in a dog from southern Ontario</u> Effective diagnosis and timely communications in this case - with one proviso. While the report does not indicate as such – we are assuming that the initial communication as well as the subsequent communication on July 9th provided a potential rule-out of a public health risk due to a parasite. The veterinarian is best instructed to let the clients know and indicate that medical advice should be sought if the in-contact persons had any medical concerns. Eventual connection with MOH authorities after confirmation was appropriate. *Each complete case description and narrative prepared by the AHL (along with the case evaluations prepared by OMAF/MRA staff) is available upon request.*

Key Outcome	Diagnostics/tests meet best practice standards	
Performance Indicator AHL6	The University maintains appropriate accreditations at the Animal Health Laboratory, but not limited to AAVLD, CFIA and ISO registration	
	Metric:	a) Review of accreditation reports in order to assess performance and maintenance of accreditation b) Review of client satisfaction survey in order to assess performance c) Review of actual adherence to published turnaround times (TATs) d) Review of proficiency testing results to assess performance
	Baseline(a):	2008-2009 AHL accreditations & certifications
	Target:	2010-2013: Maintenance of accreditations & certifications
	Results (2012/13):	a) The University maintains appropriate accreditations at the Animal Health Laboratory (AHL), including ISO/IEC 17025, the American Association of Veterinary Laboratory Diagnosticians (AAVLD), and CFIA. **ISO 9001 registration** After careful consideration and discussions with our clients, University of Guelph - Laboratory Services Division (LSD), decided not to seek renewal of our ISO 9001 registration. LSD is an ISO/IEC 17025 accredited laboratory by both Standards Council of Canada (SCC) and the Canadian Association for Laboratory Accreditation (CALA) for specific tests listed on our scopes of accreditation. Our quality management system is thoroughly audited every 2 years by these Canadian laboratory accrediting bodies. The standard, *ISO/IEC 17025 - General requirements for the competence of testing and calibration laboratories,*consists of a strong quality management system component (section 4) and is the standard of choice in laboratory testing. The ISO/IEC 17025 introduction states: "Testing and calibration laboratories that comply with this International Standard will therefore also operate in accordance to ISO 9001." Our ISO 9001 registration was allowed to expire on April 12, 2012.

		American Association of Veterinary Laboratory Diagnosticians (AAVLD) accreditation The AHL is accredited by AAVLD, meeting AAVLD accreditation requirements for full accreditation, all species. For the 2012/13 fiscal year, the AHL maintained AAVLD accreditation. The AAVLD accreditation follows a five year cycle; the last AAVLD accreditation audit was in 2009 and the next AAVLD site visit will be in 2014. **ISO/IEC 17025 accreditation** LSD, including AHL, is accredited by both of Canada's internationally recognized accrediting bodies, the Standards Council of Canada (SCC) and the Canadian Association for Laboratory Accreditation (CALA) to the ISO/IEC 17025 standard, for specific tests listed on our scopes of accreditation. LSD/AHL is accredited by SCC in the program specialty area (PSA): Agriculture Inputs, Food, Animal Health and Plant Protection (AFAP). As of July 29, 2013, LSD had 125 tests in AFAP PSA including 22 tests performed by AHL. On November 16, 2012, AHL applied to add the test, MMV-348 *Anaplasma* antibody competitive ELISA, to Laboratory Services' SCC scope of accreditation.On January 7, 2013, the test was officially added to the scope. In March 16, 2013, AHL applied to add 3 tests to the SCC scope of accreditation. On July 29, 2013, the following three tests were officially added to the scope: 1. BAC-028 Culture detection of Salmonella spp. in hatchery samples and in poultry environmental samples 2. BAC-029 Culture detection of *Salmonella* Pullorum*, Salmonella* Gallinarum and other *Salmonella* spp. 3. MYC-117 *Mycoplasma hyopneumoniae* ELISA The next SCC biennial assessment is scheduled for October 1–4, 2013. LSD/AHL is accredited by the Canadian Association for Laboratory Accreditation (CALA) for 13 environmental tests, including 3 AHL tests. There was no change in the CALA scope of accreditation in 2012/13. The next CALA biennial assessment is scheduled for October 1-4, 2013.

Canadian Food Inspection Agency (CFIA) accreditation
The AHL has maintained accreditation by the CFIA – Retrovirology Centre for Expertise for Equine Infectious Anemia (EIA) ELISA. The CFIA-RCE audited the AHL quality system and EIA ELISA protocol on March 21-22, 2013. The AHL responded to the audit findings on May 10, 2013. The CFIA-RCE accepted the AHL's corrective actions. One corrective action involves a LIMS upgrade scheduled for the end of 2013 and is still open. AHL maintained accreditation for EIA.

Baseline / Target / Results(b/c)

Target 2011-2013	**Baseline 2008/09**	**Results 2011/12**
≥ 90% satisfaction rating	96% satisfaction rating	88.5% satisfaction rating 93% AHL TAT rating

Results (2012/13):

b) By agreement with OMAF/MRA, the AHL Client Satisfaction Survey will be conducted biennially, rather than annually. This survey was not conducted in fall 2012, but will be in fall 2013. Alternative support documentation includes feedback on client service, minutes of the bi-monthly AHL/OVC-HSC/PBI liaison meetings (AHL, OVC Health Sciences Center Veterinary Teaching Hospital Pathobiology and the annual AHL Feedback Group meeting (a range of AHL clients attend) were reviewed.

Meeting minutes are available upon request.

Satisfaction is high with the timeliness of communications; however we do not have a numerical satisfaction rating.

c) The actual adherence to published turnaround times from the AHL Laboratory Information Management Systems (LIMS) was **96.7%**.

Turnaround time is one of the most critical measures of a laboratory's effectiveness and efficiency. Customer loyalty is often based on this one aspect of service. Given that there are a large number of tests and services provided, it is often a challenge to maintain TAT and manage clients' expectations.
The AHL has done this by proactively measuring and analyzing their TAT performance to identify areas needing continuous improvement. A component of the AHL's AAVLD accreditation is an analysis of the adherence to quoted TAT expectations as published in the AHL User's Guide and

		Fee Schedule. A detailed explanation of the 2012/13 TAT statistics report is available upon request.
	Baseline (d):	Performance on Proficiency Test (PT) Panels : Biological Panels: 98% pass rate Chemistry Panels: 95% satisfactory 3% questionable 2% unsatisfactory
	Target:	Biological Panels: 2011-2013: ≥ 95% pass rate Chemistry Panels: 2011-2013: ≥ 95% satisfactory rating
	Results (2012/13):	AHL participated in 43 different proficiency test (PT) programs in 2012/13. PT programs are divided into 2 main categories: 1. Biological programs – a panel of samples are tested, or identification agrees with consensus ID and results are usually pass / fail. 2. Chemical programs which produce numerical results and the results are usually categorized as satisfactory, questionable and unsatisfactory. When a PT result is identified as questionable or unsatisfactory, the problem is investigated, and for unsatisfactory results corrective action is applied and documented. Summaries of biological and chemical PT results are available for on-site review. **Biological PT programs** In 2012/13 AHL reported 315 biological results or panels as shown in Table 1 (available upon request) and 99.4% of results were satisfactory (satisfactory = 95.6% acceptable and 3.8% questionable) with 0.6% unsatisfactory. **Chemical PT programs** In 2012/13 the chemical sections of AHL, Clinical Pathology and Toxicology/ Soil & Nutrient, participated in 19 different PT programs. Note that multiple sets of samples were tested within each PT program.

		In 2013/13, AHL reported over 1900 chemical PT results. The OMAF/MRA soil PT program results are not included in these totals since the OMAF/MRA soil PT program is based on NAPT proficiency samples results and including both programs double counts results. A summary of chemical PT results is available for onsite review. Overall the chemistry results are as follows: 1. satisfactory 96.6% (Satisfactory = 93.4% acceptable and 3.2% questionable) unsatisfactory 3.4%
Key Outcome	**Capacity and capability in place to provide coordinated and effective emergency management**	
Performance Indicator AHL7	The University maintains an appropriate range of diagnostic specialties, anatomic pathology services and other technologies	
	Metric:	Level of customer satisfaction with services provided by AHL program, by commodity
	Baseline:	AHL Client Satisfaction: 98% satisfaction rating
	Target:	2011-2013: ≥ 90% satisfaction rating
	Results (2012/13):	By agreement with OMAF/MRA, the AHL Client Satisfaction Survey will be conducted biennially, rather than annually. This survey was not conducted in fall 2012. Alternative support documentation includes feedback on client service, minutes of the bi-monthly AHL/OVC-HSC/PBI liaison meetings (AHL, OVC Health Sciences Center, Veterinary Teaching Hospital, Pathobiology) and the annual AHL Feedback Group meeting (a range of AHL clients attend)were reviewed. Meeting minutes are available upon request. Satisfaction is high with the range of services offered by the AHL; however we do not have a numerical satisfaction rating.
Key Outcome	**Impacts associated with animal health incidents minimized**	
Performance Indicator AHL8	Emergency response plans are effectively implemented in response to emergency animal health incidents	

	Metric:	a) Adherence to the milestones in Schedule G of the OMAF/MRA - U of G Agreement
	Baseline:	Year 3 Milestone as defined in Schedule G of the Agreement was achieved
	Target:	2011-2013: As defined in Article 4.3 (years 2 to 5 milestones for AHL program) Schedule G of the Agreement
	Results (2012/13):	Several activities involving the AHL occurred in 2012/13 related to emergency preparedness. **AHL Guelph Necropsy FAD Emergency Exercise** **Small Ruminant "Lips and Toes Disease" Simulation** **October 24, 2012 – Dr. Maria Spinato** **Observations and After Action Plans** **<u>CFIA:</u>** 1) Necropsy report should not be released to vet or producer; all information flow through CFIA. **Action:** Dr. Grant Maxie and pathologists to meet and review notification process. 2) Can video surveillance identify people entering/exiting both SR and Truck Bay during the interval between contamination and decontamination? **Action:** Dr. Grant Maxie to follow-up with Physical Facilities. 3) Disinfection of Necropsy suite should include the entire transit pathway for infected carcass (hoist, trolley). 1840 band saw/anteroom should also be decontaminated **Action:** Dr. Maria Spinato and Mr. Rick Roth to meet with Ken Wallace of CFIA for audit and advice re appropriate decontamination of Necropsy suite. 4) Pathologists/techs exiting Restricted Avian PM room 1843 to facilitate showering out process will be entering contaminated Truck Bay. Plans for avoiding contamination or decontamination of these personnel? **Action:** Dr. Spinato to meet with pathologists to review the Oct. 24th exercise and revise SOP AHL-046. 5) Decontamination of SR entry currently insufficient. Drainage grates will have to be lifted,

		trays cleaned and scrubbed. Fridge should be pulled out and floor underneath scrubbed. Significant problem identified re potential cross-contamination between SR staff and producer who enters client washroom: decontamination procedure would therefore extend to SR lab at a minimum, and remainder of building (lower risk). Cross-contamination of SR staff entering vestibule also identified as a risk. **Action:** Drs. Jim Fairles, Grant Maxie, Maria Spinato and Ms. Kris Lesniewski will meet to conduct risk assessment and action plan. **OMAF/MRA Evaluator (Dr. Jocelyn Jansen):** Dr. Jansen commented that the simulation was well organized and all objectives were achieved within the allotted times. Preparation and resources were judged to be sufficient, and communication among participants was deemed to be very good. The only recommendation by the official evaluator was to add a "clean" person to the pathologist-technician team handling the carcass sampling and disinfection processes. Since the FAD SOP is relatively detailed and involves many critical steps, this person could assist by guiding the team through the SOP, and providing a second verification. This person could be linked into the PM room via webcam or phone line. **Action**: Dr. Spinato to meet with pathologists to review the Oct. 24th exercise and determine if adding another pathologist to the process is a feasible and desirable option. **AHL Staff:** 1) Notification protocol confusing for pathologists: currently separate notification e-mail lists for CFIA and OMAF. If pooled, how manage provincially-notifiable diseases that are not federally-reportable. **Action**: MGM to review and revise notification protocols, and include clear instructions for all contacts (CFIA, OMAF/MRA, U of G) in a binder to inform Acting Directors. 2) SR staff require clear direction regarding document management for all CFIA cases (Rabies, FAD confirmatory negative). **Actions**: Ms. Lesniewski and Dr. Spinato to meet with SR staff to develop protocol; Dr. Spinato to post instructions in PM dictation/copy room 1804 and inform pathologists. **AHL-Kemptville Emergency FAD Exercise October 11, 2012 – Dr. Andrew Brooks**

		Exercise summary: On October 11, 2012 a foreign animal disease (FAD) simulation of foot and mouth disease (lips and toes disease) was held at the AHL-Kemptville necropsy facility as part of a multiple stake-holder exercise. The role of the AHL-Kemptville was to perform a necropsy of a sheep, and, following our Standard Operating Procedure (SOP) *AHL-016- Post mortem room and general laboratory procedures for handling a mammalian foreign animal disease (FAD) suspect*, conduct the appropriate sampling, decontamination and reporting. Laboratory staff participants included Dr. Andrew Brooks, Dr. Jan Shapiro and Mr. Tom McLean. External evaluators were Dr. Erica Wylie and Ms. Jane Patterson (from the CFIA Ottawa District Office) and Ms. Anita O'Brien (OMAF Small Ruminant Specialist). The AHL-Kemptville was assessed by the evaluators as having fully met the objectives of the exercise. Participants were well-prepared, and all tasks were completed within the suggested time limits. No significant weaknesses were identified. The following observations and comments arose: 1. Evaluators did not directly observe one action during the exercise: Contaminated personnel signed the Necropsy Reportable/FAD Suspect Log Sheet. This action was completed during the exercise and the signed log sheet was shown to one evaluator (Patterson) after the exercise had completed. **Action:** During the postmortem and the laboratory lockdown there is limited staff available to answer the telephone. One evaluator asked whether phones could be forwarded to one location. *Action: We will review our ability to answer phone calls during a FAD scenario and will adjust the SOP accordingly.* 2. Two phone conversations between Dr. Andrew Brooks (pathologist) and the CFIA (Dr. Ed Creighton (initial contact via CFIA FAD Hotline), and Dr. Rosa Ivanovich (referral from Dr. Creighton) were required to confirm the list of samples to collect. Confirmation of the list occurred within the expected time limit. **Action:** One evaluator suggested consideration of a "sub SOP" to address cleaning and disinfection of the open and close buttons for the overhead door to the unloading dock. *Action: Presently these buttons are disinfected with Lysol spray. We will review this practice and modify the SOP accordingly.*

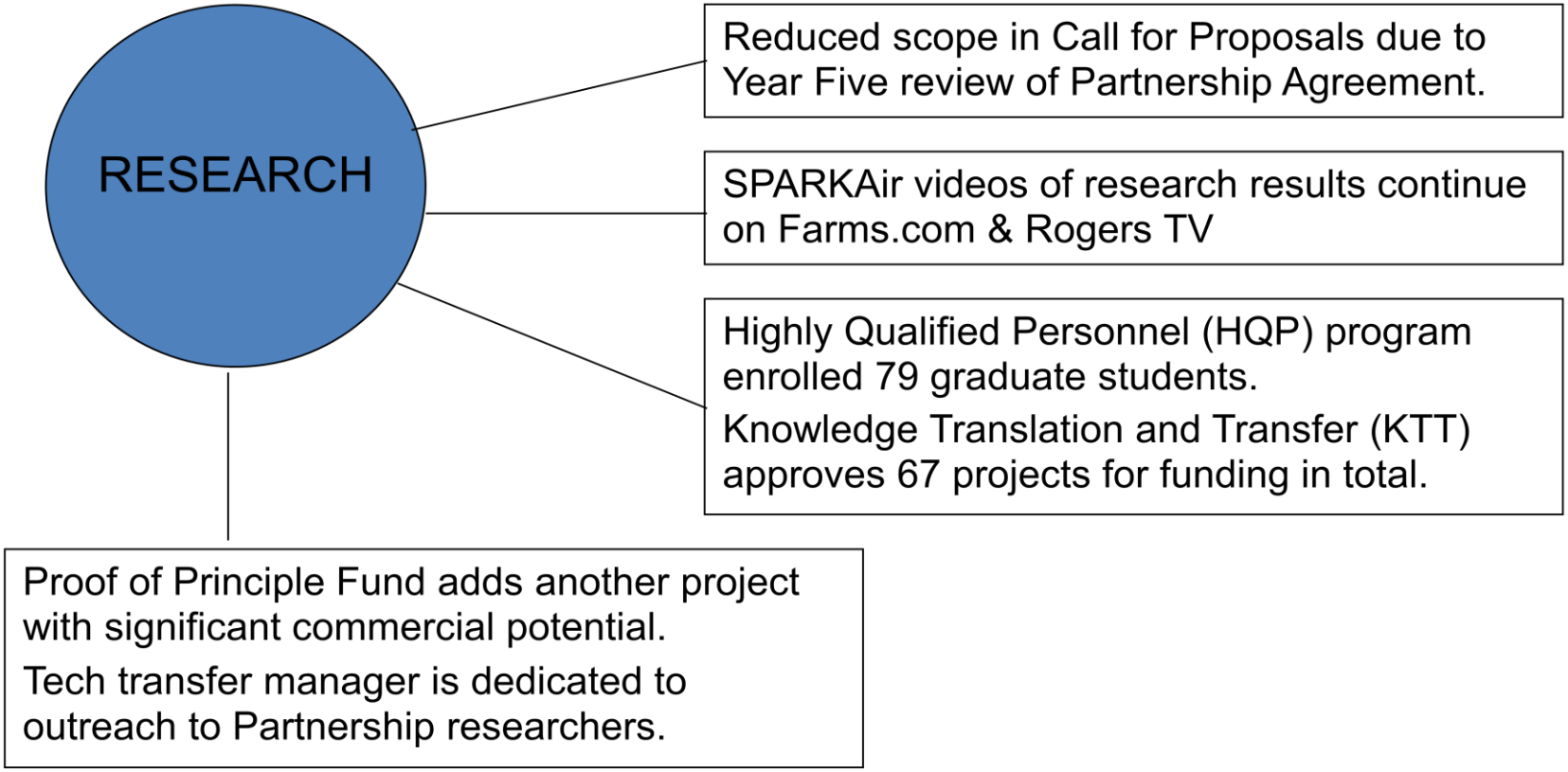
		3. During the postmortem and the laboratory lockdown there is limited staff available to answer the telephone. One evaluator asked whether phones could be forwarded to one location. **Action:** With respect to disinfection of the client reception and trim room floors, one evaluator questioned whether mopping was the most effective method of applying the disinfectant solution. Spraying was suggested. *Action: Spraying is not ideal since a computer and other sensitive electronic lab equipment are housed in this area. This area is considered a low risk for contamination. Mopping is efficient for disinfecting the floor but we will discuss alternatives and modify the SOP accordingly.* 4. One evaluator suggested consideration of a "sub SOP" to address cleaning and disinfection of the open and close buttons for the overhead door to the unloading dock. **Action:** One evaluator questioned whether additional disease alert signs should be posted internally, within the trim room area. *Action: None at this time. The trim room is an internal area that would not be accessible to the public once the laboratory is locked down according to the existing SOP.* The FAD exercise was deemed a success in both of the AHL postmortem laboratories. Plans are underway to address the recommendations of evaluators. It is anticipated that the AHL will conduct annual table-top or operational exercises to enhance and maintain its emergency preparedness status. With the conduct of the notifiable exercise and the participation in a full disease outbreak simulation, the Year 5 Milestones as defined in Schedule G of the Agreement were achieved.
Key Outcome	**Laboratory expertise and advice on animal health issues available to veterinary and stakeholder organizations**	
Performance Indicator AHL9	Effectiveness of knowledge transfer and consultations provided to veterinary practices and other stakeholders	
	Metric:	Level of customer satisfaction with services provided by AHL program, by commodity
	Baseline:	AHL Client Satisfaction: 90% satisfaction rating

	Target:	2010-2013: ≥ 85 % satisfaction rating
	Results (2012/13):	By agreement with OMAF/MRA, the AHL Client Satisfaction Survey will be conducted biennially, rather than annually. This survey was not conducted in fall 2012, but will be in fall 2013. As an alternative documented form of feedback on client service, minutes of the bi-monthly AHL/OVC-HSC/PBI liaison meetings (AHL, OVC Health Sciences Center -Veterinary Teaching Hospital and Pathobiology) and the annual AHL Feedback Group meeting (a range of AHL clients attend) were reviewed. Meeting minutes are available upon request. Satisfaction is high with the timeliness of communications; however we do not have a numerical satisfaction rating. Many clients are aware of and use the AHL Newsletter, LabNotes and/or the AHL website. Knowledge transfer from the AHL to clients and partners occurs via in-person discussions, newsletters, contributions of scientific articles, and peer-reviewed publications. The 17veterinarians/supervisors in the AHL are typically involved in numerous conversations with private practitioners daily, concerning individual case details, test selection, test interpretation, and technology updates. AHL staff members also attend practitioner meetings on a regular basis. For example, Dr. Jim Fairles, who is AHL's Client Service Veterinarian, provides frequent updates to the Ontario Association of Swine Veterinarians and the Ontario Association of Bovine Practitioners. Dr. Susy Carman, Mammalian Virologist, retired December 31, 2012. More broadly, the AHL provides a wealth of information with emphasis on disease trend updates in the quarterly AHL Newsletter, which is distributed widely as well as being posted on the AHL website, and is well regarded. As well, AHL staff occasionally submit contributions to OMAF/MRA's newsletter, "Ceptor". AHL staff are regular participants at numerous conferences, e.g., the OVMA annual conference, both as exhibitors, and as guest speakers or expert panel members. Dr. Fairles (supported by Ms. Josie Given & Rina Pigozzo), actively markets the services of the AHL, and is in regular contact with AHL clients. As a matter of course, the AHL has added many new testing methodologies and tests; such, as porcine HEV real-time polymerase chain reaction (PCR) method, *Haemophilusparasuis* real-time PCR, and maedi-visna virus (MVV) antibody ELISA, which are presented in the AHL Newsletter. The AHL also produces a series of "LabNotes" for more in-depth analysis of current topics, e.g.,

		concerns surrounding chicken jerky products for dogs. Finally, AHL staff contribute to a number of peer-reviewed scientific publications every year. From the analysis of survey questions related to knowledge transfer effectiveness, there are some areas for potential improvement which should be considered. While, in general, client responses show a good level of satisfaction in the area of AHL knowledge provision, there remains a significant gap in accessing and using this information by a large proportion of clients. Graphed results provided by the AHL point to the significant opportunity to improve access to scientific information and knowledge transfer.

RESEARCH PROGRAM
Selected Performance Indicators & Accomplishments

Program Objective: High quality, high impact research results that strengthen Ontario's agriculture, food and bioproducts sectors, and rural communities



Research

Performance Indicators

Data collection for each Performance Indicator (PI) was completed with the assistance of OMAF/MRA. The following table summarizes the Research Program's performance according to the 10 PIs in the Agreement. The majority of the data within this table was collected and summarized from annual and final project reports submitted each year by lead researchers of OMAF/MRA funded projects. Other information has been provided by OMAF/MRA, the U of G's Catalyst Centre and Budget Office.

Key Outcome	**Research programs reflect OMAF/MRA strategic needs, coordinate U of G's capacity and mobilize the province's unique competitive strengths.**	
Performance Indicator R1 (a)	Comparison of actual versus planned OMAF/MRA - U of G Research Program spending, in total, and in each of the research theme areas.	
	Metric (a-i)	Annual actual dollars in the OMAF/MRA - U of G partnership research program spent on research versus planned, in total by research theme.
	Baseline:	Baseline is the allocation of project planned $ for 2008/09 by theme.
	Target:	2010-13: Ratio of actual to planned dollars spent of 1:1.
	Results (2012/13):	See table below. The table below outlines the total amount of research funds, by theme, committed to projects and the amount of funds available for the Fall 2012 Call.

Research Program Project Operating Funds

Themes	Total Committed to Projects (April 1/08 - April 30/11)*	Total Committed to Projects Approved for 2011/12**	Total Committed to Projects Approved for 2012/13***	Total Commitments for 5-Year Theme Budget	Overall 5-Year Theme Budget
Ag & Rural Policy	2,778,675	616,160	620,750	4,015,585	4,000,000
Bioeconomy	3,618,443	942,074	439,483	5,000,000	5,000,000
Emergency Mgmt	1,098,891	580,880	820,229	2,500,000	2,500,000
Environmental Sust.	3,318,425	1,010,473	654,750	4,983,648	5,000,000
Food for Health	3,318,698	1,194,914	465,824	4,979,436	5,000,000
Product Development	2,680,790	456,755	1,155,875	4,293,420	4,500,000
Production Systems	7,946,894	2,035,149	2,245,868	12,227,911	12,000,000
Total	**24,760,816**	**6,836,405**	**6,402,779**	**38,000,000**	**38,000,000**

* includes commitments to 2nd & 3rd year projects approved to start in fiscal 2009/10 & 2010/11

** includes commitments to 2nd & 3rd year projects approved to start in fiscal 2012/13 & 2013/14

*** includes commitments to 2nd & 3rd year projects approved to start in fiscal 2013/14 & 2014/15

	Metric (a-ii)	Total number of projects funded in each theme area through peer review and advisory committee, compared to the number of letters of intent and proposals received (i.e., level of demand for funding) in each theme area.
	Baseline:	The number of letters of intent (LOIs) and projects submitted, and projects funded for each of the seven research theme areas in the call of 2008/09.
	Target:	2010-13: An adequate number of quality research proposals submitted in each research theme area, from which to select projects to be funded in each call for proposals.
	Results (2012/13):	See table below. In the 2010, 2011 and 2012 calls for LOIs, there were sufficient number of quality proposals submitted in each research theme.

2012/2013 (Results from Call 2011 for projects to begin May 1, 2012)

Theme	Ag & Rural Policy	Bioeconomy	Emerg Mgmt	Env Sust	Food	Prod Dev	Prod Syst I	Prod Syst II	Total
Number of active projects	28	23	29	29	30	25	76	70	**310***
Number of LOIs*	11	13	17	16	21	19	74	N/A	**171****
Number of Proposals*	8	6	10	9	7	14	37	41	**132****
Number of proposals funded**	6	4	10	5	4	8	22	38	**97*****

* Includes recently approved projects
** Some LOIs and proposals were reviewed under more than one theme
*** Some proposals were funded under more than one theme

2011/2012 (Results from Call 2010 for projects to begin May 1, 2011)

Theme	Ag & Rural Policy	Bioeconomy	Emerg Mgmt	Env Sust	Food	Prod Dev	Prod Syst I	Prod Syst II	Total
Number of active projects	20	15	10	23	20	13	44	60	**306****
Number of LOIs*	13	16	20	30	24	18	57	N/A	**178***
Number of Proposals*	7	7	14	19	14	6	30	11	**108***
Number of proposals funded**	5	7	12	10	9	4	23	11	**81****

* Some LOIs and proposals were reviewed under more than one theme
** Some proposals were funded under more than one theme

2010/2011

Theme	Ag & Rural Policy	Bioeconomy	Emerg Mgmt	Env Sust	Food	Prod Dev	Prod Syst I	Prod Syst II	Total
Number of active projects	21	17	15	30	24	15	51	78	**208****
Number of LOIs*	25	20	14	34	36	29	106	0	**203***
Number of Proposals*	16	9	9	17	16	14	56	53	**190***
Number of Proposals funded**	13	9	9	12	11	7	23	52	**125****

* Some LOIs and proposals were reviewed under more than one theme

** Some proposals were funded under more than one theme

2009/2010

Theme	Ag & Rural Policy	Bioeconomy	Emerg Mgmt	Env Sust	Food	Prod Dev	Prod Syst I	Prod Syst Tier II	Total
Number of active projects (incl. continuing from previous Agreement)	19	10	12	19	10	10	38	51	**160*** **
Number of LOIs*	0	0	0	0	0	0	0	0	**0**
Number of Proposals **	23	13	15	22	18	20	53	17	**130** **
Number of Proposal funded ***	12	5	11	8	6	6	26	17	**65*** **

* The LOI process was skipped in this call and only full proposals were reviewed

** Some proposals were reviewed under more than one theme

*** Some proposals were funded under more than one theme

2008/2009

Theme	Ag & Rural Policy	Bioeconomy	Emerg Mgmt	Env Sust	Food	Prod Dev	Prod Syst I	Prod Syst Tier II	Total
Number of active projects (incl. continuing from previous Agreement)	14*	5	2	15	9	5	13	43	**92**
Number of LOIs** (Last Call)	0	5	Note 1	20	10	Note 1	Note 2		**35**
Number of Proposals **	10	3		12	6				**31**
Number of Proposal funded	4	1		10	6				**21**

** One project was funded by the RPD discretionary fund*

** LOIs and proposals that were not funded were re-mapped as follows: RME to Environmental Sustainability, Food to Food for Health, Bioeconomy to Bioeconomy and SRC to Ag and Rural Policy. Note: for SRC only proposals were submitted ie the LOI process was skipped

Note 1: Emergency Management & Product Development Themes did not exist at the time of the “Last Call” for LOIs.

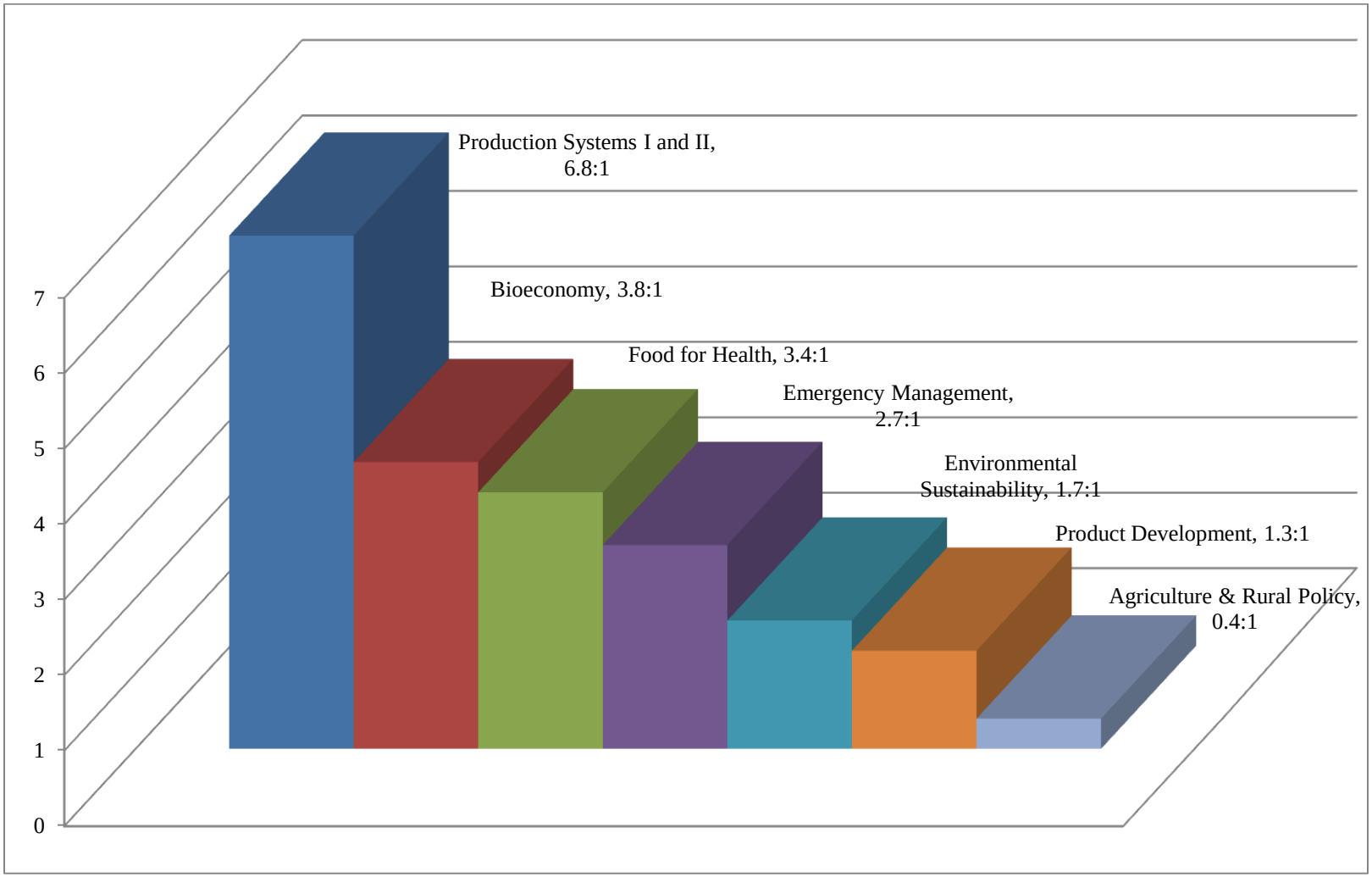
Note 2: No Calls for LOIs were issued under Production Systems in 2008/2009.

Performance Indicator R1 (b)	Total external research funding to the University related to OMAF/MRA's Research Program in aggregate.	
	Metric (b)	Ratio of third-party investment (cash and in-kind) operating funds, leveraged by OMAF/MRA research program, in total and for each theme area.
	Baseline:	2008/09: Baselines are shown in the table below.
	Target:	2010-13: leveraged dollars to OMAF/MRA funding (in total, and by theme) to be ≥ 2008/09 baselines.
	Results (2012/13):	Ratio of 3.6:1 third party investment to Agreement funding (ranging from 0.4:1 in Ag & Rural Policy to 6.8:1in Production Systems).Total amount of third party investment - $23.1m. Ratio is based on total OMAF/MRA operating funds of $6,402,779 committed to projects approved for 2012/13 of See table in performance indicatorR1(a-i).

2012/2013 Theme	**Ag & Rural Policy**	**Bioeconomy**	**Emerg Mgmt**	**Env Sust**	**Food**	**Prod Dev**	**Prod Syst I and II**		**Total**
Cash and in-kind leveraged	252,233	1,663,737	1,699,485	1,093,461	1,587,647	1,489,024	15,312,991		**23,098,578**
Ratio of Third Party-Investment to OMAF/MRA	0.4:1	3.8:1	2.7:1	1.7:1	3.4:1	1.3:1	6.8:1		3.6:1
2011/2012 Theme	**Ag & Rural Policy**	**Bioeconomy**	**Emerg Mgmt**	**Env Sust**	**Food**	**Prod Dev**	**Prod Syst I and II**		**Total**
Cash and in-kind leveraged	237,301	1,479,933	1,458,036	2,491,600	2,569,587	1,405,427	10,079,382		**19,721,266**
Ratio of Third Party-Investment to OMAF/MRA	0.4:1	1.6:1	2.5:1	2.5:1	2.2:1	3.1:1	5.0:1		2.9:1
2010/2011 Theme	**Ag & Rural Policy**	**Bioeconomy**	**Emerg Mgmt**	**Env Sust**	**Food**	**Prod Dev**	**Prod Syst I and II**		**Total**
Cash and in-kind leveraged	158,640	2,084,502	785,209	1,529,965	2,604,688	901,011	10,387,414		**18,451,429**
Ratio of Third Party-Investment to OMAF/MRA	0.2:1	2.0:1	2.0:1	1.5:1	2.4:1	1.4:1	5.2:1		**2.6:1**

2009/2010 Theme	**Ag & Rural Policy**	**Bioeconomy**	**Emerg Mgmt**	**Env Sust**	**Food**	**Prod Dev**	**Prod Syst I and II**		**Total**
Cash and in-kind leveraged	466,379	1,103,453	406,720	1,304,577	1,217,062	559,929	13,527,734		**18,585,854**
Ratio of Third Party-Investment to OMAF/MRA	0.6:1	2.3:1	1.5:1	1.7:1	2.1:1	1:1	5.7:1		**3.2:1**
2008/2009 Theme	**Ag & Rural Policy**	**Bioeconomy**	**Emerg Mgmt**	**Env Sust**	**Food**	**Prod Dev**	**Prod Syst I and II**		**Total**
Cash and in-kind leveraged	283.900	323,626	500	1,037,475	782,324	734,324	5,990,994		**9,153,412**
Ratio of Third Party-Investment to OMAF/MRA	1:1	0.7:1	0.1:1	1.8:1	2.2:1	1.1:1	4:1		**2.3:1**

Ratio of Third Party Investment to OMAF/MRA Operating Funds, by Research Program Theme in 2012/13



	Metric (c)	Total external research dollars attracted each year by the University related to the research program areas in total.
	Baseline:	The baseline for 2008/09 of leveraged dollars to OMAF/MRA funding is $54.6 million of external research dollars relative to $51.4 million OMAF/MRA – U of G Agreement Research expenditures, or a ratio of approx. 1.1:1. This was determined by recalculating the actual leverage of "total external research dollars related to the OMAF/MRA research programs" in 2007/08 relative to the new $7.6 million base of project operating funding.
	Target:	2010-13: Total external dollars leveraged is to be ≥ 2008/09 baseline of $54.6 million.
	Results (2012/13):	2012/13 results: $31.9 million of external funds were leveraged from OMAF/MRA's $57.7M investment. The reduction in total external research dollars attracted has been largely due to a significant drop in federal funding each year, as well as that of business and industry (see table below).

Fiscal Year	Total U of G Research Funding (' 000) (Note 1)	Total OMAF/MRA Partnership Research Funding ('000) see Financial Table pg 54	Funding Leveraged from OMAF/MRA Agreement					Ratio
			Total Funding from All Sources (Est. ' 000)	Breakdown by Source (Note 2)				
				Federal	OMAF/MRA	Other Provincial	Business / Industry / Private / Other	
2012/2013	***127,089***	***57,665***	***31,847***	***19,923***	***1,783***	***1,754***	***8,387***	***(31.9:57.7) 0.6:1***
2011/2012	*141,748*	*56,958*	*37,129*	*24,740*	*1,253*	*418*	*10,718*	*(37.1:57.0) 0.7:1*
2010/2011 (Note 3)	*141,494*	*52,309*	*49,525*	*23,206*	*1,668*	*7,783*	*16,868*	*(49.5:52.3) 0.9:1*
2009/2010	*158,954*	*50,604*	*59,326*	*27,765*	*3,354*	*10,190*	*18,018*	*(59.3:50.6) 1.2:1*
2008/2009	*159,093*	*51,388*	*54,651*	*35,400*	*3,428*	*3,007*	*12,816*	*(54.6 : 51.4) 1.1:1*

Note 1: **"Funding Leveraged from OMAF/MRA Contract"** (thousands of $) is the total of all individual research project awards from all sources

other than the OMAF/MRA - U of G Agreement for projects (across all U of G Departments/researchers) which support the objectives of OMAF/MRA's research priorities**. "Total U of G Research Funding"** is the total of all research projects (including OMAF/MRA - U of G Agreement projects), regardless of whether or not they support OMAF/MRA's priorities.

Note 2: **"Breakdown by Source"** shows the **"Funding Leveraged from the OMAF/MRA Agreement"** by the source of the funding **("Federal"** includes NSERC, SSHRC, CIHR, CFI, all federal departments, etc**.; "OMAF/MRA"** includes OMAF/MRA's 'competitive research programs' such as New Directions, etc**.; "Other Provincial"** includes funding from all other provincial ministries or agencies; and " Business/Industry/Private/Other " includes all other sources.

Note 3: Values for "Total Research Funding" and "Leverage as % of Total" were adjusted slightly from the values used in the 2010/2011 OMAF/MRA-U of G Partnership Annual report, to reflect the actual "Total Research Funding" value for 2010/2011 as finalized and published on the U of G Office of Research website.

Explanation of Results: Total funding 'Leveraged from the OMAF/MRA Partnership' from all sources (including OMAF/MRA outside the Partnership and other Provincial Ministries, as well as Federal, and Business/Industry/Private/Other sources) dropped by $5.3 Million (14%) to $31.85 Million in 2012/2013. This is largely paralleled by a $14.6 Million (10%) drop in overall U of G research grant funding from 2011/2012 to $127 Million in 2012/2013. Thus the leveraged funding as a percentage of overall funding dropped slightly to 25.1%.

On the positive side, the amount of leveraged funding secured from both OMAF/MRA (non-partnership programs) and other Provincial Ministries increased, especially in the latter case (increase by >4X). However, funding from Federal and Business/Industry/Private/Other sources both dropped by ~20%.

It is noteworthy that these statistics demonstrate a fairly consistent longer term trend over the 5 year period (2008/2009 through to 2012/2013) for the overall research funding, the portion of that that is leveraged on OMAF/MRA (non-partnership) and Other Provincial funds.

	Metric (d)	Number and list of active research projects funded, by program area.
	Baseline:	Number of active research projects established as per performance indicator 1(a-ii), above.
	Target:	2010-13: Targets for number of projects funded in each area to be ≥ 2008/09 levels.
	Results (2012/13):	

Number of Active Projects by Theme	**2012/13**	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	28	23	27	19	14*
Bioeconomy – Industrial Uses:	23	22	17	10	5
Emergency Management:	29	22	16	12	2
Environmental Sustainability:	29	33	30	19	15
Food for Health:	30	27	24	10	9
Product Development:	25	18	16	10	5
Production Systems I:	76	67	51	38	13
Production Systems II:	70	75	77	51	43
Total number of Active Projects:	**310*******	**287********	**230*****	**160****	**92**

* one project funded by Research Program Director discretionary fund

**9 projects are funded in more than one theme

*** 28 projects are funded in more than one theme

****26 projects are funded in more than one theme

*****32 projects are funded in more than one theme

See Table in performance indicator R1 (d) for a complete listing of 2012/13 projects

	Metric (e)	Level of utilization of research stations.
	Baseline:	Established based on 2008/09 data. Utilization to be reported in three ways – i) # of projects using each station, ii) percentage of utilization and iii) $ value of research station usage
	Target:	2010-13: Research station utilization to be ≥ 2008/09 levels.

Results (2012/13):	Explanatory Note: Although 'Percentage Utilization' rates for most of the livestock stations (including Alma Aquaculture Station) may appear low, this is in large part attributable to the fact that most of these are based on a breeding herd/flock, and thus it is necessary to 'carry' an inventory of animals covering the full age span (neonates to fully mature production animals). As a consequence, a much smaller percentage of the total animal population are utilized in research projects, but those that are may be used relatively intensively/extensively. For the crops-based stations, the percent utilization values can vary from very high (where acreage dedicated to research is relatively small, and the balance of the station acreage is used for feed production for nearby livestock stations, i.e., Arkell, Alfred, NLARS, Kemptville) to much lower by comparison (where 'excess acreage' has limited utility for alternative use, i.e., Vineland, Woodstock.) Most crops sites fall between these extremes, reflecting the relatively efficient use of crop acreage in research (allowing for generally a 3 or 4 year crop rotation), which results in 'utilization rates' of approximately 33% or 25% respectively.

Animal Research Stations		Number of Projects OMAF/MRA - U of G Projects		Percentage of utilization- (note this includes all research not just OMAF/MRA - U of G projects)		$ value of research station usage for all active OMAF/MRA - U of G Projects	
		2012/13	Average of 4 years (11/12 - 08/09)	2012/13	Average of 4 years (11/12 - 08/09)	2012/13	Average of 4 years (11/12 - 08/09)
Arkell Poultry		20	13.5	66.67	56.83	398,374	430,744
Arkell Swine		15	9.15	74.07	37.60	126,406	329,722
Arkell Equine		8	6.00	98.39	55.75	231,255	176,269
Elora/Ponsonby Dairy		16	10.5	14.00	15.95	244,175	264,114
Elora Beef		8	5.15	67.00	57.60	667,054	910,378
Ponsonby Sheep		3	2.85	37.00	26.30	10,500	104,192
Ponsonby General *	Sheep	1	7.35	100.00	91.00	62,347	89,937

*Note this research station does not maintain a resident herd/flock so all animals are used for research	Cattle	3	3.15	100.00	44.50	2,096	37,852
	Swine	0	1.50	100.00	66.65	64,488	33,265
Alma Aquaculture							
(in tank days)	Tanks	7	4.85	28.00	19.25	88,584	61,510
Alfred Dairy		3	0.35	50.00	5.70	12,566	7,596
Kemptville Dairy		5	3.85	70.00	18.70	41,943	83,823
New Liskeard (NLARS) Beef **		6	3.00	38.43	8.00	21,310	153,827
** NLARS Beef is the source of calves for Elora Beef so nearly all animals are used for research at Elora							
Ridgetown Swine		0	1.65	0***	15.75	6,048	61,412
******* No longer housing swine at Ridgetown							
Crop Research Stations		**Number of OMAF/MRA - U of G Projects**		**Percentage of utilization- note this includes all research not just OMAF/MRA - U of G projects**		**$ value of research station usage for all active OMAF/MRA - U of G Projects**	
		2012/13	**Average of 4 years (11/12 - 08/09)**	**2012/13**	**Average of 4 years (11/12 - 08/09)**	**2012/13**	**Average of 4 years (11/12 - 08/09)**
Arkell Crops		4	2.15	100.00	100.0	2,953	1,945
Elora Crops		22	22.35	48.25	39.4	351,371	285,432
Alfred Crops		0	0.85	10.00	55.3	0	10,080
NLARS Crops		3	3.50	58.54	100.0	14,500	19,775
Emo Crops		0	2.65	57.29	100.0	0	43,272
Ridgetown Crops		12	13.85	67.79	49.8	94,463	150,494

Kemptville Crops **		1	3.50	14.08	90.9	3,000	60,723
Simcoe		15	10.65	60.00	29.5	244,878	213,392
Vineland		2	4.15	80.00	15.7	1,860	39,068
Guelph Turfgrass		13	11.00	87.50	56.3	140,695	64,276
Bradford Muck Crops		2	4.15	80.00	50.4	5,776	65,559
Woodstock Crops		9	7.65		12.0	71,538	66,643
Total (all crops and livestock stations)		180	158.35			2,908,179	3,651,277
*Vineland in 2010/2011 was $0							

** 300 of the 350 acres available are used to produce feed for the equine/dairy programs at Kemptville.

Key Outcome	A critical mass of world class faculty, technical staff and graduate students addressing OMAF/MRA critical challenges and opportunities.	
Performance Indicator R2	Total faculty and research personnel employed by the University related to OMAF/MRA research themes, and the proportion funded through the OMAF/MRA - U of G Research Program.	
	Metric (a)	Total number of faculty full time equivalents (FTEs) and list of faculty and CARG researchers showing area of expertise, employed at the university related to theme areas.
	Baseline:	Established at 128 Faculty Research FTEs
	Target:	2010-13: Number of FTEs to be ≥ 2008/09 baseline.
	Results (2012/13):	2012/13 Results 100 Faculty Research FTEs

	Research / Researcher Awards supportive of OMAF/MRA priorities		
	No. of Researchers engaged in research supportive of OMAF/MRA priorities	"Faculty Research FTEs" focused on OMAF/MRA-related priorities (Note 1)	No. of OMAF/MRA-Supportive Research Awards (outside the OMAF/MRA - U of G Partnership)
2012/13 Total	**218**	**100**	**505**
2011/12 Total:	236	105	593
2010/11 Total:	224	102	654
2009/10 Total:	265	115	737
2008/09 Total	280	128	852

"Research FTE" (Research Full Time Equivalent) should not be confused with faculty FTE. Each faculty member has a defined "Distribution of Effort (DOE)" apportioning their full FTE to 'research', 'teaching' and 'service'. In some departments (i.e., CA, CSAHS) the majority of faculty may have a relatively low 'Research DOE' (therefore low Research FTE, say 0.25), whereas in some other Colleges/Departments (i.e., OAC, OVC) a greater number of faculty may have a much higher 'Research DOE' (therefore a higher Research FTE, perhaps 0.5 or 0.6).

Note 1: *'Portion of "Research FTE" focused on OMAF/MRA-related priorities'* is estimated for each researcher based on the value of their OMAF/MRA-supportive research awards received as a portion of their total research awards received. These individual research FTE portions were averaged across those faculty with some portion of their research time engaged on OMAF/MRA Supportive Research project(s).

Explanation of Results: (for Research Performance Indicator R#2 a) Total number of U of G Faculty FTEs and list of faculty and CARG researchers showing area of expertise related to Theme areas).

For 2012/2013 it is estimated that the "Total number of Faculty FTEs showing expertise related to Theme areas" (i.e., engaged in research supportive of OMAF/MRA priorities) is approximately 200 'Research FTEs' (compared to ~211 and 204 in the two previous years, respectively). This is comparable to the level of engagement (in terms of both number of researchers engaged and their average level of engagement) demonstrated in 2010/2011. Compared to last year's metrics, the number of researcher engaged in OMAF/MRA supportive research dropped from 236 to 218 (with these reductions spread across most Colleges), although the average portion of their research FTE increased slightly for 89% to 92% (with reductions in some Colleges being more than offset by gains in other Colleges). **These 200 'Research FTEs' would equate to approximately 100 full person FTEs of time devoted to research, if one were to assume, reasonably, that on average (across all U of G faculty) a 'research FTE' represents 0.5 of each faculty member's full FTE** (see note above explaining 'Research FTE' and diversity across Colleges).

As in previous years, there was a broad diversity between departments, with 106 out of 117 researchers in OAC (91%) receiving funding in 2012/2013 for research related to OMAF/MRA priorities (for 302 out of 328 or 92% of OAC research projects), whereas in the College of Social & Applied Human Sciences only 7 out of 57 researchers (12%) received funding for research related to OMAF/MRA priorities (for 9 out of 108 or 8% of CSAHS research projects) and in the College of Management and Economics (CME) only 7 out of 38 researchers (18%) received funding for research related to OMAF/MRA priorities (for 12 out of 64 or 19% of CME research projects). For added context, these 218 researchers across all U of G Colleges that received funding awards for research supportive of OMAF/MRA priorities were out of total number of 525 researchers receiving awards for any research in 2012/2013 (down slightly from 530 in 2011/2012).

Overall, there was a further substantial drop in the number of projects supportive of OMAF/MRA research priorities which received funding in 2012/2013 (505 down from 593 in 2011/2012). However, this trend was reflective of the broader University trends wherein there was a decrease in the overall number of projects that received research funding outside of the OMAF/MRA-U of G Partnership (1,091 in 2012/2013, down from 1,253 in 2011/2012 and 1,290 in 2010/2011), a trend possible compounded by the reduced number of researchers receiving awards, as noted above.

A listing of faculty engaged in research supportive of OMAF/MRA priorities, along with their area of expertise and relation to the OMAF/MRA Themes has been compiled and is available to OMAF/MRA.

	Metric (b-i)	Number of faculty FTEs funded by OMAF/MRA partnership
	Baseline:	65 faculty FTEs as of 2008/09, compared to ~52 faculty FTEs as of 2007/08
	Target:	2010-13: to retain the number of faculty FTEs to the 2008/09 level as possible, but may erode due to inflation & other financial pressures.
	Results (2012/13):	Number of faculty FTEs specifically allocated to OMAF/MRA Partnership research projects: Total: **72.71** plus an HQP Director at 0.30 (this is not included below).

By Theme	**2012/13**	**2011/12**	**2010/11**	**2009/10**	**2008/09**
Agricultural and Rural Policy:	6.69	5.98	4.31	3.31	2.1
Bioeconomy – Industrial Uses:	4.79	3.31	2.86	1.79	1.2
Emergency Management:	4.85	3.74	3.22	2.32	0.8
Environmental Sustainability:	8.82	9.57	9.37	5.2	5.1
Food for Health:	10.1	8.63	6.6	3.69	2.2
Product Development:	4.31	2.76	2.94	3.37	2.5
Production Systems I:	19.98	19.09	17.87	22.81	25.2
Production Systems II:	13.17	15.71	15.82	12.38	13
Totals	**72.71**	**68.79**	**62.99**	**54.87**	**52.1**

	Metric (b-ii)	Total number of research personnel FTEs (i.e. post-doctoral students, graduate students, research associates), that are funded through the OMAF/MRA / UG Partnership, in total and by research theme area.
	Baseline:	2008/09: 113 research personnel (post-doctoral students, graduate students, research associates) funded through OMAF/MRA approved projects.

	Target:	2009-13: to retain the number of research personnel FTEs to the 2008/09 level as possible, but may erode due to inflation & other financial pressures.
	Results (2012/13):	Total number of research personnel FTEs: **243.91** A change in the reporting template has provided a more thorough reporting of research personnel FTE's, thus providing a more accurate account of the FTE's.

By Theme	**2012/13**	**2011/12**	**2010/11**	**2009/10**	**2008/09**
Agricultural and Rural Policy:	19.45	16.5	14.2	14.13	4
Bioeconomy – Industrial Uses:	15.35	14.25	15.46	5	0.09
Emergency Management:	27.17	23.75	23.06	7.5	1.9
Environmental Sustainability:	17.37	15.1	12.85	10.01	11.8
Food for Health:	40.61	34.8	23.46	15.85	5.14
Product Development:	23.32	20.21	13.21	7.38	0.29
Production Systems I:	65.81	56.28	40.87	18.18	57.18
Production Systems II:	34.83	34.91	30.77	42.7	32.44
Totals	**243.91**	**215.8**	**173.88**	**120.75**	**112.84**

	Metric(b-iii)	Number of faculty, CARG researchers and research personnel FTEs that are funded through the OMAF/MRA U of G Partnership in total and by research theme area.
	Baseline:	2008/09: Established at 172 faculty and CARG researchers funded through the partnership in total.
	Target:	2010-13: to retain the number of FTEs as close to the 2008/09 level as possible, but may erode due to inflation & other financial pressures.
	Results (2012/13):	Total number of Faculty, CARG & Research Personnel FTEs: **315.16** A change in the reporting template has provided a more thorough reporting of personnel FTE's, thus providing a more accurate account of the FTE's.

Total FTEs by Theme	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	22.8	20.78	18.86	20.89	6.24
Bioeconomy – Industrial Uses:	20.14	18.93	19.04	7.69	2.1
Emergency Management:	32.12	25.58	26.61	9.82	2.65
Environmental Sustainability:	25.34	25.42	24.61	19.59	19.59
Food for Health:	50.76	43.82	30.41	7.34	7.34
Product Development:	27.63	22.91	16.15	2.79	2.79
Production Systems I:	87.27	77.15	60.87	84.74	84.74
Production Systems II:	49.1	52.32	48.19	46.52	46.52
Totals	**315.16**	**286.91**	**244.74**	**181.98**	**171.97**

Key Outcome	A critical mass of world class faculty, technical staff and graduate students addressing OMAF/MRA critical challenges and opportunities	
Performance Indicator R3	Level of recognition of faculty and students by their peers.	
	Metric (a)	Number of Faculty/researchers/staff related to the research theme areas, recognized by their peers through research chairs, awards of recognition, appointment to prestigious positions (international panels) and leadership of national and international research initiatives
	Baseline:	In 2008/09, 25 U of G faculty members were Canada Research Chair holders, of which 10 had active OMAF/MRA research projects. Same as performance indicator OA1 metric (c).
	Target:	2010-13: Recognition as indicated by awards, appointments etc. to be ≥ 2008/09.
	Results (2012/13):	During 2012/13, 35 faculty members at the U of G were Canada Research Chair holders, of which 16 had active OMAF/MRA research projects.
	Metric (b)	U of G's position compared to other Canadian universities, and their ranking in the previous year in the comprehensive category as published annually by Research Money Inc.
	Baseline:	Research Money Inc.'s 2009 rankings put U of G in second place among Canadian 'comprehensive' universities. Same as performance indicator OA1 metric a).
	Target:	2010-13**:** U of G's ranking to be second or better among comprehensive universities in Canada.
	Results (2012/13):	Research Money Inc.'s most current (2012) rankings put U of G in second place among Canadian 'comprehensive' universities. The 2013 results will be available October 2013 and will be reported in the 2013/14 Annual Report.
	Metric (c)	Number of faculty who publish in high impact journals.
	Baseline:	91 faculty published in high impact journals in 2008/09. 'High impact' journals were identified by OMAF/MRA - U of G research program directors.
	Target:	2010-13: Number of faculty publishing in high impact journals to be ≥ 2008/09 baseline.

	Results (2012/13):	Total number of faculty published in high impact journals: 80

No. of Faculty by Theme	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	8	8	3	2	3
Bioeconomy – Industrial Uses:	6	2	1	3	3
Emergency Management:	5	0	0	2	0
Environmental Sustainability:	4	12	8	5	5
Food for Health:	11	13	2	1	7
Product Development:	4	6	4	0	6
Production Systems I & II:	42	44	44	75	67
Totals	**80**	**85**	**62**	**88**	**91**

Key Outcome	**High quality research focused on OMAF/MRA priorities**	
Performance Indicator R4	Scientific merit and relevance of research projects in each research theme area supported through the Agreement.	
	Metric (a)	Report how composition of advisory committee is representative of stakeholders in each theme
	Baseline:	2008/09 baseline for stakeholder representation is described in 'Theme Research Proposal Review'**.**
	Target:	2010-13: adequate representation of stakeholders on advisory committees, as achieved in 2008/09.
	Results (2012/13):	See table below that indicates satisfactory representation of stakeholders in 2011/12.

Theme	**Ag & Rural Policy**		**Bioeconomy**		**Emerg Mgmt**		**Env Sust**		**Food**		**Prod Dev**		**Prod Syst - Livestock**		**Prod Syst - Plants**	
	LOI	**FP**	**LOI**	**FP**	**LOI**	**FP**	**LOI**	**FP**	**LOI**	**FP**	**LOI**	**FP**	**LOI**	**FP**	**LOI**	**FP**

Research /Scientific	-	-	-	-	4	4	-	-	3	3	-	-	4	4	3	3
OMAF/MRA / Gov't	-	-	-	-	3	3	-	-	5	5	-	-	4	3	5	3
User Community / Industry / Non-Gov't	-	-	-	-	2*	2	-	-	3	3	-	-	4	3	3	3
Total	-	-	-	-	9	9	-	-	11	11	-	-	12	10	11	9

LOI – Letters of Intent

FP – Full Proposals

* 3 Accepted; however, only 2 participated;

** Calls for LOI/FP for Ag & Rural Policy, Bioeconomy and Environment were issued under the OMAF/MRA New Directions Program.

*** LOIs/FPs for Food for Health and Product Development were combined under the FFH Theme for this Call

	Metric (b)	Total number of publications in peer reviewed journals and % of those appearing in high impact journals (as identified by Research Program Directors).
	Baseline:	2008/09 baseline of 265 publications, 57% of which were in 'high impact' journals.
	Target:	2010-13: Number of publications and % in high impact journals to be≥ 2008/09 baselines.
	Results (2012/13):	Total number published in peer reviewed journals: 177. Total percentage in high impact journals: 56%

Total number of publications in peer reviewed journals (by theme), & ratio in high impact journals

Theme	**2012/13**	**2011/12**	**2010/11**	**2009/10**	**2008/09**
Agricultural and Rural Policy:	8 - 88 %	5 - 63%	3 - 100%	3 - 66%	8 -50%
Bioeconomy – Industrial Uses:	26 - 35%	23 - 9%	6 - 17%	3 - 66%	8 -75%
Emergency Management:	10 - 50%	3 - 0%	0 - 0%	2 - 50%	0 - 0%
Environmental Sustainability:	16- 25%	19 - 63%	8 - 100%	9 - 89%	6 -67%
Food for Health:	20 - 65%	17 - 76%	7 - 29%	5 - 20%	17 -35%
Product Development:	7 - 71%	13 - 46%	10 - 40%	14 - 0%	10 -10%
Production Systems I & II:	90 - 57%	82 - 54%	62 - 71%	144 - 59%	216 -58%

		Totals **177 - 56%** **162 – 52%** **96 - 65%** **180 - 49%** **265 -57%**
	Metric (c)	Number of collaborations and/or partnerships with external institutions.
	Baseline:	Number of collaborators in 2008/09 (265) will be the baseline.
	Target:	2010-13: Number and significance of collaborations and/or partnerships targeted to be ≥ 2008/09 baseline.
	Results (2012/13):	i) Total number of collaborators for continuing projects in 2012/13: **326** ii) Total number of collaborators for new projects approved for 2012/13**: 146** <u>Collaborators by theme: i)</u> <u>Collaborators by theme: ii)**</u>** Agricultural and Rural Policy: 31 (includes 16 OMAF/MRA staff) 4 (includes 1 OMAF/MRA staff) Bioeconomy – Industrial Uses: 72 (includes 15 OMAF/MRA staff 13 (includes 2 OMAF/MRA staff) Emergency Management: 25 (includes 18 OMAF/MRA staff) 10 (includes 7 OMAF/MRA staff) Environmental Sustainability: 42 (includes 21 OMAF/MRA staff 5 (includes 7 OMAF/MRA staff) Food for Health: 43 (includes 7 OMAF/MRA staff) 4 (includes 4 OMAF/MRA staff) Product Development: 31 (includes 2 OMAF/MRA staff) 10 (includes 0 OMAF/MRA staff) Production Systems I & II: 82 (includes 67 OMAF/MRA staff) 38 (includes 20 OMAF/MRA staff)
	Results (2010/11	i) Total number of collaborators for continuing projects in 2010/11: 168 ii) Total number of collaborators for new projects approved for 2010/11: 269
	Results (2009/10	i) Total number of collaborators for continuing projects in 2009/10: 203 ii) Total number of collaborators for new projects approved for 2009/10:167
	Results (2008/09)	i) Total number of collaborators for continuing projects in 2008/09: 230 ii) Total number of collaborators for new projects approved for 2008/09: 47

Key Outcome	High quality research focused on OMAF/MRA priorities	
Performance Indicator R5	Benefits to the economy, the environment and the health and well-being of the province, generated from the Research Program.	
	Metric	One case study completed annually of initiatives undertaken related to each research theme that impacted Ontario This outcome would also be assessed by the Expert Review of each research theme area scheduled at the end of five years.
	Baseline:	One case study provided from the 2008/09 research of each research theme.
	Target:	2010-13: a case study to be provided annually from each research theme, for use by the Expert Review at year five.
	Results (2012/13):	One case study is provided for each theme (two for Production Systems – livestock and crops) and included in the Program Highlight section of this annual report.
Key Outcome	**Highly skilled U of G graduates meet changing workforce demands**	
Performance Indicator R6	Level of engagement of University graduate students in OMAF/MRA - U of G research projects.	
	Metric (a)	Total number of graduate students working on research projects related to each theme areas, under the Partnership.
	Baseline:	140 grad students in 2008/09.
	Target:	2010-13: Number of grad students to be maintained at 2008/09 level, but may decline due to inflation.

	Results (2012/13):	

Graduate Students by Theme	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	19.10	15.00	12.60	21.00	4.00
Bioeconomy – Industrial Uses:	12.90	7.50	8.45	0.50	5.00
Emergency Management:	12.41	15.80	9.00	5.00	3.00
Environmental Sustainability:	17.27	19.55	11.05	4.50	8.00
Food for Health:	29.96	22.85	15.87	8.00	4.00
Product Development:	20.95	14.25	9.50	5.00	4.00
Production Systems I & II:	80.38	65.40	51.20	57.00	112.00
Totals	**192.97**	**160.35**	**117.67**	**101.00**	**140.00**

	Metric (b)	Total number of graduate students enrolled in the Highly Qualified Personnel (HQP) program funded under the Partnership.
	Baseline:	HQP program scheduled to be implemented in summer 2009.
	Target:	Target to be based on 2009-2010 student enrolment, which was 32.
	Results (2012/13):	79 graduate students were enrolled in the HQP program during 2012/13. 20 students from the first year (2009/10), 17 from the second year (2010/11), 23 from the third year (2011/12) and 19 from the fourth year (2012/13) of the HQP program.
	Metric (c)	Percentage of HQP graduates that are employed in sectors or fields related to the theme areas.
	Baseline:	Results for this PI will not be available until after first HQP program students graduate (likely 2012 for MSc 'HQP' graduate students).
	Target:	2012-2013 will be baseline year.
	Results (2012/13):	31 HQP students graduated from the program between May 1, 2012 and April 30, 2013 of which 95% are estimated to be employed in sectors or fields related to their theme areas.

Key Outcome	Industry and other stakeholders adopt state of the art practices and systems	
Performance Indicator R7	Transfer of new knowledge and utilization by industry and other stakeholders, related to OMAF/MRA research theme areas.	
	Metric (a)	Total number of knowledge transfer events related to new practices and technologies in each theme area.
	Baseline:	See table below for 2008/09 baseline of knowledge transfer events.
	Target:	2010-13: Number of knowledge transfer events ≥ 2008/09 baseline.
	Results (2012/13):	The table below shows that in 2012/13, the number of knowledge transfer events exceeded the average number of the past three years, for most of the research themes.

	Ag & Rural Policy		Bioeconomy		Emerg Mgmt		Env Sust		Food		Prod Dev		Prod Syst I & II		Total	Total
	2012/13	Avg of past 4 years	2012 /13	Avg of past 4 years	2012 /13	Avg of past 4 years	2012 /13	Avg of past 4 years	2012/ 13	Avg of past 4 years	2012/ 13	Avg of past 4 years	2012 /13	Avg of past 4 years	2012/ 13	Avg of past 4 years
Peer-reviewed journal publications	17	4.50	13	13.84	9	1.84	11	13.34	19	9.34	13	12.17	84	116.67	166	**172.17**
Presentations at scientific conferences,	15	19.34	4	24.34	16	9.17	14	27.50	26	14.34	13	9.84	74	157.00	162	**251.67**
Articles published in the public press	14	19.34	12	20.50	11	11.00	9	15.00	12	5.67	3	4.34	95	119.34	156	**194.50**

New presentations posted on the internet	11	8.17	3	13.67	1	2.84	4	16.50	4	7.50	1	8.00	14	29.34	38	**89.67**
Presentations to stakeholder or industry	29	32.50	35	24.17	19	14.67	29	45.84	37	22.00	20	12.00	123	204.50	292	**369.34**

	Metric (b)	Examples of utilization of new knowledge by stakeholders.
	Baseline:	Anecdotal reports of utilization of new knowledge by stakeholders
	Target:	2010-13: Annual reports of utilization of new knowledge by stakeholders
	Results (2012/13):	Example of 2012/13 research yielding new knowledge being used by stakeholders • Prof. Van Heyst's Project: "Development of a Complimentary Energy Decision Support Tool (CEDST) for Objective Selection of Green Energy Systems in Intensive Farming Operations" is an online tool helping farmers go "Green". Farmers can now find out which green technologies are the most cost-effective and environmentally friendly. • More examples are provided in the Research Program Highlights and Case Studies, The Catalyst Centre and Appendix A (SPARK Research Stories) sections of this report.
	Metric (c)	Total number of licenses and patents and those applied for:
	Baseline:	See R8, metric (b) and (c)
	Target:	See R8, metric (b) and(c)
	Results (2012/13):	See R8, metric (b) and (c)
	Metric (d)	Ratio of third-party investment leveraged by OMAF/MRA research funding, by each theme area.
	Baseline:	See R1, metric (b)
	Target:	See R1, metric (b)
	Results (2012/13):	See R1, metric (b)

Key Outcome	Research results commercialized	
Performance Indicator R8	Patents, products (*technologies, software, germplasm, registered trademarks, copyright*), licenses granted to existing or start-up companies, existing businesses spun out and community-based service businesses created, and the economic impact. R8 is also a performance indicator for the Joint Intellectual Property Committee of the Partnership.	
	Metric (a)	Number of disclosures and technology assessments, by theme
	Baseline:	364 total disclosures and technology assessments in 2008/09
	Target:	2010-13: number of disclosures and technology assessments ≥ 2008/09 baseline.
	Results (2012/13):	Total number of OMAF/MRA related disclosures: 267

Disclosures by theme:	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	0	0	0	0	0
Bioeconomy – Industrial Uses	2	3	3	1	0
Emergency Management	0	0	0	0	0
Environmental Sustainability:	0	0	0	1	0
Food for Health:	0	1	0	2	0
Product Development:	6	5	2	1	2
Production Systems (Animals):	1	1	4	16	3
Production Systems (Crops):	258	68	151	100	359
Totals:	**267**	**78**	**160**	**121**	**364**

Note: Fluctuation in disclosure numbers is due primarily to fluctuation in the number of seed varieties that have been disclosed in a particular year. For example, in the 2008/09 fiscal year, there was an inordinately large disclosure of 176 tomato varieties. A similar event also occurred in 2012/13, with the disclosure of 100 grape varieties, however the total disclosures fall short of the 2008/09 numbers. Despite fewer disclosures in recent years, royalty revenues have continued to increase on an annual basis.

	Metric (b)	Number of patent applications filed, by theme
	Baseline:	9 patents filed in 2008/09
	Target:	2010-13: Number of patent applications to be ≥ 2008/09 baseline.
	Results (2012/13):	Total number of OMAF/MRA related patents filed: 13

Patents filed by theme:	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	0	0	0	0	0
Bioeconomy – Industrial Uses:	3	3	4	5	0
Emergency Management:	0	0	0	0	0
Environmental Sustainability:	0	0	0	0	0
Food for Health:	0	1	2	1	0
Product Development:	7	3	1	0	2
Production Systems (Animals):	0	1	4	3	7
Production Systems (Crops):	3	0	4	1	0
Totals:	**13**	**8**	**15**	**10**	**9**

Note: Fluctuation in the number of patent applications is common. Applications are only made for technologies that have been evaluated to have strong patentability. On average most years, the CC has outperformed the baseline of 9 applications.

	Metric (c)	Number of licenses granted by theme
	Baseline:	17 licenses granted in 2008/09
	Target:	2010-13: Number of licenses granted to be ≥ 2008/09 baseline.

	Results (2012/13):	Total number of OMAF/MRA related licenses granted: 14

License & amending agreements by theme:	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	0	0	0	0	0
Bioeconomy – Industrial Uses:	2	3	0	1	0
Emergency Management:	0	0	0	0	0
Environmental Sustainability:	0	0	0	0	0
Food for Health:	0	1	0	0	0
Product Development:	4	0	1	1	0
Production Systems (Animals):	2	2	1	1	0
Production Systems (Crops):	6	27	13	18	16
Totals:	**14**	**32**	**15**	**20**	**17**

Note: There were slightly fewer license agreements signed in 2012/13 due to regular fluctuations in the sales/licensing cycle. It often takes a number of years for disclosed technologies to be transferred to industry partners. As such, the number of deals closed in a given year varies. These licenses lead to market impact from the technology, and future revenues for the program.

	Metric (d)	Number of patents issued
	Baseline:	Five patents issued, as per 2008/09
	Target:	2010-13: Number of patents issued to be ≥ 2008/09 baseline.
	Results (2012/13):	Total number of OMAF/MRA related patents issued**:** 1

Patents issued by theme:	2012/13	2011/12	2010/11	2009/10	2008/09
Agricultural and Rural Policy:	0	0	0	0	0
Bioeconomy – Industrial Uses:	0	0	0	0	1
Emergency Management:	0	0	0	0	0
Environmental Sustainability:	0	0	0	0	0
Food for Health:	0	0	0	0	0
Product Development:	0	0	1	0	0

Production Systems (Animals):	0	0	2	0	0
Production Systems (Crops):	1	0	0	0	4
Totals:	**1**	**0**	**3**	**0**	**5**

Note: Patents are evaluated and issued by the patent office. The Catalyst Centre does not have control over the schedule of evaluations/issuances by CIPO or USPTO, or other patent offices around the world. The CC has a healthy pipeline of patent applications which are managed by the Technology Transfer team, and will eventually lead to issued patents.

Metric (e)	Total dollar value of revenue generated from licenses associated with OMAF/MRA-supported research
Baseline:	$1.3 million revenue generated as per 2008/09.
Target:	2010-13: Total dollar value to be ≥ 2008/09 baseline.
Results (2012/13):	Total dollar value of revenue generated from licenses associated with OMAF/MRA-supported research: $1,378,276

Revenue from OMAF/MRA-supported non-seed research from fiscal year end April 30, 2013: $494,156

Revenue from OMAF/MRA-supported seed research fiscal year-end March 31, 2013: $884,120

License revenue generated	2012/13	2011/12	2010/11	2009/10	2008/09
Non-seed research	$494,156	$666,490	$893,551	$590,258	$778,731
Seed research	$884,120	$789,445	$699,280	$610,221	$561,851
TOTAL:	**$1,378,276**	**$1,455,935**	**$1,592,832**	**$1,200,480**	**$1,340,583**

*Note: Non-seed research revenues were down in 2012/13 due to the very successful shipping fever vaccine technology, which went off-patent in 2012. Also, a substantial one-time interest payment was made by Pfizer related to the shipping fever vaccine in 2011/12.

Revenue from seed-based technologies has increased 12% over the 2011/12. This reflects the growing portfolio of seed varieties that have gained market traction and continue to see increased sales for both seeds and crop.

	Metric (f)	Three brief case studies of individual files from different themes and initiatives taken to advance commercialization
	Baseline:	Three case studies as per 2008/09.
	Target:	2010-13: Three case studies to be presented annually.
	Results (2012/13):	Three case studies are provided in the Program Highlights Section of this report
Key Outcome	**Awareness of research outcomes and impacts among decision makers, staff and stakeholders**	
Performance Indicator R9	Stakeholder assessment of OMAF/MRA/ University research outcomes on industry, the economy and the health and well-being of Ontario citizens.	
	Metric	This outcome would also be assessed by the Expert Review of each theme area schedule at the end of five years.
	Baseline:	This performance indicator will be addressed through an assessment similar to the Deloitte Study – 2007 (U of G / OMAFRA Impact Study), to be conducted in 2012/13. An assessment was completed in 2012.
	Target:	A 2012/13 expert review of awareness of research outcomes and impacts among decision makers.
	Results (2012/13):	An evaluation of the Partnership Agreement was undertaken in 2012/13 (the mid-point of the 10 year Agreement) as mandated in the legal Agreement (Article 4.3). As part of the evaluation, a consultant's study [2] (Sept. 2012) addressed several performance indicators closely related R9. For example: OA4: Revenue generated from solutions, products and services developed through the Partnership OA5: Economic and health benefits from solutions, products and services developed through the Partnership. OA6: External stakeholder satisfaction with the benefits and accomplishments of the OMAF/MRA – U of G Partnership The reader is directed to these performance indicators and their reported results in the 'Overall Agreement' section of the 'Performance Reports' of this annual report.

Key Outcome	Awareness of research outcomes and impacts among decision makers, staff and stakeholders	
Performance Indicator R10	Media citations related to research in OMAF/MRA research theme areas.	
	Metric (a)	Total number of media citations
	Baseline:	A total of 190 media citations were identified by researchers in their 2009 U of G annual and final reports. Additionally, 135 media articles were picked up by clipping services. This 2008/09 baseline is likely a significant underestimate of media pick-up but it represents the best available measure.
	Target:	2010-13: Number of media citations to be ≥ 2008/09 baseline.
	Results (2012/13)	From researchers' 2012 annual and final research reports, number of media citations: Note: this number is considered to be a significant underestimate; however it is difficult to access a more reliable source. Agricultural and Rural Policy: 6 Bioeconomy – Industrial Uses: 2 Emergency Management: 0 Environmental Sustainability: 9 Food for Health: 11 Product Development: 4 Production Systems: 11

OMAF/MRA - U of G Research Program Projects – 2012/2013
Research performance indicator R1 metric (d) Listing of Active Research Projects

Agricultural and Rural Policy Theme

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
026528	1-May-07	31-May-12	Ag. & Rural Policy	Evaluating the Effects of National and International Agrifood Policies on Canada	Meilke, K.
026594	1-Sep-08	30-Dec-12	Ag. & Rural Policy	Economic and Community Capacity Analysis of the Alternative Land Use Services (ALUS) - Norfolk County Pilot Project	Fox, G.
200047	1-Sep-09	31-Aug-14	Ag. & Rural Policy	Environmental Sustainability Policy Compliance Costs, Comparative Advantage, and Competitiveness of Ontario Livestock Industry	Fox, G.
200048	1-Jun-09	30-Jun-13	Ag. & Rural Policy	Industrial Composition and Economic Performance in Rural Ontario	Deaton, B.
200050	1-Sep-09	31-Dec-12	Ag. & Rural Policy	Local Food Initiatives in Ontario from the Farmer's Perspective	Devlin, J.
200051	1-Jul-09	1-May-12	Ag. & Rural Policy	Prospering with a Stable or Declining Population: Best Community Economic Development and Planning Practices for Rural Communities	Caldwell, W.
200112	1-May-10	31-Aug-13	Ag. & Rural Policy	Regional Development: Planning for Resiliency In the 21st Century - A Methodology and Approach for Communities Dealing with Climate Change and Rising Oil Prices	Caldwell, W.
200183	1-Jun-10	31-May-13	Ag. & Rural Policy	An Economic Analysis of Profitability, Income Variability and Competitiveness of Farms under Different Size Categories in Ontario	Sarker, R.
200195	1-Apr-10	31-Mar-13	Ag. & Rural Policy and Bio	Identifying successful business models, strategies and policies for promoting the Canadian bioeconomy	Cranfield, J.
200221	1-Jun-10	30-Jun-13	Ag. & Rural Policy	Innovations in Managing Risk and Stochastic Simulation Modeling for Ontario Farming Sector	Hailu, G.
200222	1-Jun-10	30-Jun-13	Ag. & Rural Policy	Productive Efficiency and Competitiveness of Ontario Farms	Hailu, G.
200243	1-Apr-10	30-Nov-12	Ag. & Rural Policy	Examining non-farmer ownership of farmland in southern Ontario: Implications for policy and competitiveness	Deaton, B.
200265	1-Apr-10	31-Mar-13	Ag. & Rural Policy	Competitiveness and Profitability of Ontario Swine Farms – Farm Size, and Production Type versus Profitability	McEwan, K.

200287	1-Jun-10	30-Jun-13	Ag. & Rural Policy	Investigating the Effect of Climate Change on Crop Yields: Implications for Policy and Programs and Identifying Opportunities for Ontario's Agrifood Sector	Ker, A.
200289	1-Apr-10	31-Mar-13	Ag. & Rural Policy and Env. Sust.	Land Use, Climate Change and Policy Impacts of the Transition to a Green Economy	Weersink, A.
200290	1-Sep-10	30-Aug-13	Ag. & Rural Policy	The Agricultural and Rural Policy Implications of a Changing Agricultural Sector	Weersink, A.
200304	1-Jun-10	30-Aug-13	Ag. & Rural Policy	Young Workers in Ontario's Rural Labour Market: An exploration of job quality and training/skills requirements & choices	Mann, S.
200357	15-Nov-10	31-Oct-13	Ag. & Rural Policy	Economic Models for Policy Analysis in the Ontario Agri-Food Sector	Ker, A.
200364	1-Jun-11	1-Jun-14	Ag. & Rural Policy	Innovative Partnerships for Regional Economic Development: Ontario's Colleges Of Applied Arts and Technology in Collaboration with Rural Small/Medium Enterprises	Lauzon, A.
200365	1-May-11	30-Apr-14	Ag. & Rural Policy	Identifying opportunities and strategies to enhance Ontario agribusiness' capacity to capture value from emerging marketing channels for organic food.	Cranfield, J.
200366	1-Jun-11	31-May-14	Ag. & Rural Policy	A Study of Innovative Best Practices to Foster Place-based Tourism Development in Ontario's Rural Communities.	Joppe, M.
200367	1-May-11	31-Mar-14	Ag. & Rural Policy	Evaluating regional economic development initiatives: Understanding the challenges for rural regions in Ontario	Devlin, J.
200368	1-May-11	30-Apr-13	Ag. & Rural Policy	An assessment of the potential economic benefits of Environmental Certification for Ontario's Farms	FitzGibbon, J.
200445	1-Jun-12	31-May-15	Ag. & Rural Policy	Intermunicipal Collaboration an Assessment of the Potentials for improving delivery and cost effectiveness of rural water and waster water services.	Fitzgibbon, J.
200446	1-Jun-12	31-May-15	Ag. & Rural Policy	Assessing the Impact of Food Safety and Quality Measures in Export Markets on Ontario's Agri-Food Sector	Henson, S.
200447	30-Jun-12	15-May-15	Ag. & Rural Policy	The Fusion Youth and Technology Centre: An Assesment of an Integrated Rural Youth and Labour Force Development Model	Lauzon, A.
200448	1-Jun-12	31-May-15	Ag. & Rural Policy	An Evaluation Framework for Community Food Hubs	Landman, K.
200449	1-Jun-12	31-May-15	Ag. & Rural Policy	Opportunities for Improved Efficiency in Water Use in Ontario Agriculture	Fox, G.
200491	1-Jun-12	31-May-15	Ag. & Rural Policy	An Evaluation of the Potential for Terroir Value Chains in Ontario	von Massow, M.

Bioeconomy - Industrial Uses Theme

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
200001	1-Jul-09	30-Jun-13	Bioeconomy	Design and Engineering of Nano-enhanced Biopolyurethanes for Green Manufacturing	Misra, M.
200004	1-Jun-09	30-May-13	Bioeconomy	Renewable, Recyclable and Lightweight Hybrid Green Composites from Lignin, Switch grass, Miscanthus and Bioplastics for Sustainable Manufacturing	Mohanty, A.
200007	1-Jul-09	30-Dec-13	Bioeconomy	Evaluation of biomass production, nutrient cycling, harvesting, and end-use of biofuel crops in Eastern and Northern Ontario.	Rennie, T.
200013	1-Sep-09	31-Aug-12	Bio and Env Sust	Life Cycle Analysis Framework and Model for Assessing Life Cycle Impacts and Environmental Sustainability of Ontario Agricultural Feedstocks for Bioenergy	Wagner-Riddle, C.
200114	1-May-10	30-Apr-14	Bioeconomy	Acid-, Water-, and High-temperature Stable Homogeneous and Heterogeneous Catalysts for the Deoxygenation of C4-C6 Sugars to Alcohols, Alkenes and Alkanes	Schlaf, M.
200144	1-May-10	30-Apr-13	Bio and PD	Cost-Effective Processing Technologies to Improve the Value to Aquaculture Species of Products and By-Products from the Agricultural, Food and Bio-Fuel Sectors in Ontario	Bureau, D.
200165	15-May-10	15-May-13	Bio and ES	Life Cycle Analysis (LCA) and Economic Assessment of Short Rotation Willow (Salix) Crops for Bioenergy	Gordon, A.
200172	1-May-10	30-Apr-13	Bioeconomy	Production of Novel Starches for the Biopolymer Industry	Tetlow, I.
200195	1-Apr-10	31-Mar-13	Bio and ARP	Identifying successful business models, strategies and policies for promoting the Canadian bioeconomy	Cranfield, J.
200199	1-May-10	30-Apr-13	Bioeconomy	New Generation Traits for Field Crops – Defining Genes for Fibre Quality in Crop Residues for Biocomposite Manufacture for the Auto Industry	Pauls, K.P.
200245	1-Jul-10	30-Jun-13	Bioeconomy	Light Weight and Recyclable Sustainable Green Composites from Engineered Soy Hull and BioABS for Transportation Applications	Misra, M.
200283	1-Jul-10	31-Jul-13	Bioeconomy	Eco-Composites from Corn Cob Derived Thermoset Resin and Biofibre Mats for Housing Panel Applications	Misra, M.
200369	1-Jun-11	1-Jun-14	Bioeconomy	Carbon Dioxide based Bioplastics and Their Engineered Biomaterials for Industrial Uses	Mohanty, A.
200370	1-May-11	30-Apr-14	Bioeconomy	Study and development of a self-sustained torrefaction process for upgradation of fuel properties of agricultural residues.	Dutta, A.
200371	1-Jul-11	30-Jun-14	Bioeconomy	Renewable Resources Based High Conducting Cellulose-Carbon Nanocomposites for Energy Storage Devices	Misra, M.
200372	1-Sep-11	1-Sep-14	Bioeconomy	Development of Branching Enzymes as Agents for Modifying Glucan Branching in Industrial Processing	Tetlow, I.
200373	1-Apr-12	31-Mar-14	Bioeconomy	Development of the Castor oil plant as a new oil-seed crop for a new industrial bio-economy in Ontario	Van Acker, R.
200374	1-Jun-11	30-Apr-14	Bioeconomy	Dry Fermentation of Solid Manures with Yard and Kitchen Wastes for Enhanced Methane Production	Crolla, A.

200425	1-Jun-11	1-Jun-14	Bioeconomy	Development of Biocomposites for Plant Pots from Proteinous Co-products and Natural Fibres for Greenhouses in Ontario	Mohanty, A.
200451	1-Jun-12	31-May-15	Bioeconomy	Development of Russian Dandelion as a Rubber Crop for Ontario	Wolyn, D.
200452	3-Jul-12	28-Jun-13	Bioeconomy	Biological Production of Xylitol from Agricultural Residues	Lee, H.
200453	1-Jun-12	31-May-15	Bioeconomy	New Bioadhesives from Starch, DDGS and Lignin for Industrial Uses	Mohanty, A.
200454	1-Jun-12	31-May-15	Bioeconomy	Optimization of Agricultural Feedstock Selection and Scale-up of Production and Chemical Modification of PHYTOSPHERIX Polysaccharide Particles	Dutcher, J.

Emergency Management Theme

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
200016	1-Sep-09	30-Sep-12	Em Mgmt	Spatial and Network Individual-level Models of Infectious Disease Spread within a Bayesian Statistical Framework via Markov Chain Monte Carlo (MCMC)	Deardon, R.
200117	1-May-10	1-May-13	Em Mgmt and Prod Syst	Immunity against avian influenza virus (AIV) in chickens and development of rational vaccines for control of avian influenza	Sharif, S.
200159	1-May-10	30-Aug-12	Em Mgmt	Rapid Diagnostic techniques and susceptibility of commercially important fish species for the suveillance of spring viremia	Lumsden, J.
200236	1-May-10	30-Apr-13	Em Mgmt	Enhanced surveillance for viral and bacterial pathogens in commercial broiler chicken flocks in Ontario	Guerin, M.
200270	1-Apr-10	31-Mar-13	Em Mgmt and Prod Syst	Western Bean Cutworm Monitoring and Management Strategies for Ontario and the Great Lakes Region. A Proactive and Coordinated Approach to Prepare and Respond to a Newly Emerging Corn and Dry Bean Pest in Ontario	Schaafsma, A.
200272	1-May-10	30-Aug-13	Em Mgmt	Johne's Disease in Ontario's Small Ruminant Dairy Industries: Prevalence, potential risk factors, and performance comparison of serum, milk and fecal diagnostic methods	Jones-Bitton,A.
200312	1-Apr-10	31-Mar-14	Em Mgmt	Barcode of Life Data System Support for Emergency Management I: OMAF/MRA and Greenhouse Industry Stakeholders	Hanner, R.
200375	1-Sep-11	31-Dec-12	Em Mgmt	Understanding the effect of diagnostic misclassification bias on spatial surveillance methods with emphasize on farm location health data such as swine influenza"	Berke, O.
200377	1-Jul-11	30-Jun-13	EM Mgmt	Development of a benefit/cost financial management template for veterinary laboratory emergency preparedness.	Spinato, M.
200378	1-May-11	30-Apr-14	Em Mgmt	Emerging and potentially zoonotic viruses in pigs and pork: identifying public health risks	McEwen, S.
200379	1-May-11	30-Apr-14	Em Mgmt	Assessing the emergency preparedness of livestock producers (beef, dairy, swine, sheep) and Large Animal Veterinarians in Ontario	Kelton, D.
200380	1-Sep-11	31-Aug-13	Em Mgmt	A Surveillance Study to Determine the Prevalence of *Clostridium difficile* in Manure Derived from Animal Production and Dissemination of the Pathogen via Watercourses	Warriner, K.

200381	1-May-11	30-Apr-14	Em Mgmt	Development and applications of an amoeba-based pathogen-capture trap for detection of persisting and emerging microbial pathogens in farm and aquaculture environments	Mutharia, L.
200382	1-Jul-11	30-Jun-14	Em Mgmt	Predictive modeling of the disease dynamics of honeybee – varroa mite – virus complexes	Eberl, H.
200416	1-May-11	30-Apr-13	Em Mgmt and Prod Syst	Peri-weaning failure-to-thrive syndrome (PFTS) in pigs in Ontario	Friendship, R.
200417	1-Sep-11	30-Sep-14	Em Mgmt and Prod Syst	The epidemiology of inclusion body hepatitis in broiler breeders in Ontario	Guerin, M.
200418	1-Sep-11	31-Aug-14	Em Mgmt and Prod Syst	Johne's disease prevention and control on organic dairy farms in Ontario	Kelton, D.
200419	1-May-11	30-Apr-14	Em Mgmt and Prod Syst	Emerging plant pathogens: Identification, biology, pathogenicity and integrated management of emerging pathogens infecting asparagus, cucumber and basil.	McDonald, M.R.
200450	1-Jun-12	31-May-15	Em Mgmt	Development of PCR for the detection of *Cylindrocladium buxicola*	Hsiang, T.
200455	1-Jun-12	31-May-16	Em Mgmt	Functional tool for the prioritizing of zoonotic diseases in ON	Sargeant, J.
200456	1-Jun-12	31-May-15	Em Mgmt	Prevalence and Severity of Nosema cerane in Ontario	Guzman, E.
200457	2-Jul-12	30-Jun-15	Em Mgmt	Novel immunological compounds as an emergency response tool for control of avian influenza virus	Sharif, S.
200458	1-Jun-12	31-May-15	Em Mgmt	Development of a Framework for Cost Benefit Analysis in Emergency Management	von Massow, M.
200459	1-Jun-12	31-May-15	Em Mgmt	Short-term field study of a culture-independent methodology for water quality surveillance of zoonotic and animal pathogens due to fecal pollution	Habash, M.
200460	2-Jul-12	30-Jun-15	Em Mgmt	Threat Assessment for the Spotted Winged Drosophila (SWD) in Southern Ontario	Newman, J.
200461	1-Jun-12	31-May-15	Em Mgmt	Development of a multiplexed PCR-based platform for diagnosis of avian respiratory pathogens	Kirby, G.
200492	1-Sep-12	31-Aug-15	Em Mgmt and Prod Syst	The design and analysis of experiments and observational studies on infectious disease spread in the livestock industries.	Deardon, R.
200493	3-Sep-12	31-Aug-15	Em Mgmt and Prod Syst	Development of risk-based and consequence-based approaches to surveillance in swine populations using PRRS virus as a model	Poljak, Z.
200494	1-Jun-12	30-Jun-15	Em Mgmt and Prod Syst	Prevalence of Enteric Disease Agents in Ontario Commercial Rabbits: Zoonotic Potential and Impact on Animal Health	Turner, P.V.

Environmental Sustainability Theme

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
200013	1-Sep-09	9-Nov-12	Env Sust and Bio	Life Cycle Analysis Framework and Model for Assessing Life Cycle Impacts and Environmental Sustainability of Ontario Agricultural Feedstocks for Bioenergy	Wagner-Riddle, C.

200027	02-Sep-09	31-Dec-12	Env Sust	Abatement of Agricultural Ammonia Emissions via Sequestration and Conversion to Nutrient and Bio-enercy Feedstocks	Dixon, M.
200029	01-Jul-09	30-Apr-13	Env Sust	Life-Cycle Assessment of Greenhouse Gas Emissions and Economics of On-Farm Anaerobic Digesters	Wagner-Riddle, C.
200057	1-Jun-09	31-Dec-12	Env Sust and Prod Dev	Conversion of Poulty Manure into Value-added Products Using Fly Larvae	Zheng, Y.
200081	1-May-09	31-Oct-12	Env Sust and Prod Syst	Long term field trials to examine yield, soil productivity and environmental impacts of Ontario corn, soybean and wheat production systems	Deen, B.
200119	1-May-10	30-Nov-12	Env Sust	Development of a Behavioral Decision Model for adoption of BMPs for Environmental Stewardship: Implications for policy and program design	Fitzgibbon, J.
200128	1-May-10	30-Apr-13	Env Sust and Prod Syst	Development of New Energy Efficient Lighting Systems for Poultry Farming using Light Emitting Diodes (LEDs)	Bedecarrats, G.
200148	1-May-10	30-Apr-14	Env Sust	Impacts of biofuel production systems on soil health, microbial biodiversity and nutrient cycling	Dunfield, K..
200165	15-May-10	15-May-13	Env Sust and Bio	Life Cycle Analysis (LCA) and Economic Assessment of Short Rotation Willow (Salix) Crops for Bioenergy	Gordon, A.
200173	1-May-10	30-Apr-13	Env Sust and Prod Dev	Green Roof Technologies for Northern Climates	Zheng, Y.
200239	1-May-10	30-Apr-13	Env Sust	Impact of manure application timing on temporal changes in runoff losses of N, P and fecal bacteria as assessed through controlled runoff and microbial source tracking technologies	O'Halloran, I.
200244	1-May-10	30-Apr-14	Env Sust	Municipal Biosolids as a Soil Amendment to Improve Quality and Growth for Sod Production	Habash. M.
200280	1-Sep-10	30-Apr-13	Env Sust	The effect of land use practices and the subsurface environment on the distribution of non-point source pollution at depth	Arnaud, E.
200284	1-May-10	30-Dec-13	Env Sust	Mapping of Variable Source Areas for Nutrient Management and Environmental Sustainability	Rudra, R.
200284	1-May-10	30-Dec-13	Env Sust	Mapping of Variable Source Areas for Nutrient Management and Environmental Sustainability	Rudra, R.
200289	1-Apr-10	31-Mar-14	Env Sust and Ag & Rural Policy	Land Use, Climate Change and Policy Impacts of the Transition to a Green Economy	Weersink, A.
200299	1-May-10	30-Apr-13	Env Sust	Development of a Complimentary Energy Decision Support Tool (CEDST) for Objective Selection of Green Energy Systems in Intensive Farming Operations	Van Heyst, B.
200383	1-Sep-11	31-Aug-14	Env Sust	Reducing the amount of process water needed to wash and peel vegetables by optimizing and implementing wash-water recycling	Zytner, R.
200384	1-Jun-11	31-May-14	Env Sust	Evaluation of Control Strategies to Minimize the Emissions of Particulate Matter, Ammonia and other Gaseous Pollutants from Poultry Operations	Van Heyst, B.
200385	1-May-11	30-Apr-14	Env Sust	Development of a Hybrid Constructed Wetland Technology to Treat Dairy Farm Wastewaters	Kinsley, C.
200386	1-May-11	30-Apr-14	Env Sust	Management Tool for Design and Evaluation of Seasonal performance of Vegetative Filter Strips and Setbacks along the Stream	Rudra, R.
200387	1-Jun-11	31-May-14	Env Sust	Characterizing Risks of Triclosan from Biosolids: Uptake and Distribution in Plants and Effects on Plant-Arbuscular Mycorrhizal Fungi Relationships	Sibley, P.

200388	1-May-11	30-Apr-14	Env Sust	RADAR-derived digital elevation models for improved drainage mapping	Lindsay, J.
200389	1-Sep-11	1-Sep-14	Env Sust	Development of Membrane Anaerobic Baffled Reactor (ABR AnMBR) for Food Processing Wastewater Treatment	Chang, S.
200390	1-May-11	30-Apr-14	Env Sust	Cover crops for sustainability: Evaluating the role of cover crops in low crop residue production systems.	Van Eerd, L.
200391	1-May-11	30-Apr-14	Env Sust	Evaluating the environmental pillar of sustainability for bioenergy crop production	Newman, J.
200420	1-May-11	30-Apr-14	Env Sust and Prod Syst	Novel Tests for Nitrogen and Testing of Inoculants With Potential to Reduce Chemical Inputs for Ontario Crop Production	Raizada, M.
200462	1-Sep-12	31-Aug-15	Env Sust	Treatment of Vegetable Processor Wastewater	Zytner, R.
200463	1-Jun-12	31-May-15	Env Sust	Evaluation and Optimization of a Potato Wash Water Treatment System	Gordon, R.
200464	1-Jun-12	31-Jan-15	Env Sust	Nitrogen Mass Balance and Pathogen Fate from the Land Application of Digested Manure in Two Soil Types	Crolla, A.
200465	1-Jun-12	31-Aug-15	Env Sust	Development of Integrated Soil Quality Indicators for Ontario Agro-Ecosystems based on Advanced Physical and Biological Techniques	Heck, R.
200495	1-Jun-12	31-May-15	Env Sust and Prod Sust	Red clover non-uniformity: field assessment of drought tolerant red clover, delayed overseeding strategies, and spatial nitrogen application	Martin, R.

Food for Health Theme

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
200032	01-Sep-09	31-Aug-12	Food for Health	The regulation of adipocyte differentiation and insulin signalling by dietary monounsaturated fatty acids	Mutch, .
200035	1-Jun-09	30-Aug-12	Food for Health	Bio-accessibility, Bio-availability and Anti-inflammatory Action of Nutraceutical Components from Ontario Berry Fruits, Tender Fruits and their Products	Paliyath, G.
200040	01-Jul-09	31-Jul-12	Food for Health	Encapsulation of bioactive peptides using protein based nanostructures	Corredig, M.
200043	01-Jun-09	31-May-13	Food for Health and Prod Syst	Bean (Phaseolus vulgaris) Improvement for Health and Consumer Acceptance	Pauls, K. P.
200064	01-Sep-09	31-Aug-12	Food for Health and Prod Dev	Characterizing the sensory attributes of whole grain wheat-based products and the phenolics associated with these attributes	Duizer, L.
200121	1-May-10	30-Apr-13	Food for Health	Human clinical trial to investigate the effects of high rosmarinic acid spearmint tea on measures of disease activity and cartilage degradation in rheumatoid arthritis	Kott, L.
200124	1-May-10	30-Apr-14	Food for Health	Role of mechanostimulation of gut epithelial cells and gut content viscosity in human health and gastrointestinal responses to functional foods	Purslow, P.
200130	1-May-10	31-Dec-13	Food for Health	Impact of prebiotics on the intestinal microbiome: a multidisciplinary approach based on predictive modeling and experimentation	Eberl, H.

200133	1-Jun-10	31-Oct-13	Food for Health	Development, sensory evaluation and consumer acceptance of 'Golden Prunes' from novel Yellow European Plum [YEP] selections	Subramanian, J.
200175	1-May-10	30-Apr-13	Food for Health and Prod Syst	Improving profitatbility in asparagus production through enhanced breeding, management and human health.	Wolyn, D.
200201	1-Jul-10	30-Jun-13	Food for Health	Alleviation of the metabolic syndrome through betaine and choline enriched functional food diets	Bakovic, M.
200207	1-Sep-10	30-Aug-13	Food for Health	Matching expectation to reality for modified texture foods: Comparison of in-house to commercial pureed products	Duizer, L.
200216	1-Jun-10	31-May-13	Food for Health	Sticking it to the gut: Steps towards establishing probiotics in the distal colon	Khursigara, C.
200218	1-May-10	30-Aug-13	Food for Health	Exploring the Feasibility and Benefits of Incorporating Local Foods into Ontario's Healthcare System	Padanyi, P.
200293	1-Jun-10	31-May-12	Food for Health	Functionality of Novel Potato Clones Selected for Promoting Human Gut and Heart Hearth in Studies with a Pig Model	Fan, M..
200342	1-Sep-10	31-Oct-13	Food for Health and Prod Dev	Characterizing starch structure and digestibility of millet flour when incorporated into baked products.	Marcone, M.
200392	1-May-11	30-Apr-13	Food for Health	Soy peptide-based Interventions to Prevent Chronic Inflammation and Oxidative Stress-related Diseases.	Mine, Y.
200393	1-Sep-11	30-Aug-14	Food for Health	Malleability of the mitochondrial proteome and respiratory function in response to polyunsaturated fatty acids.	Holloway, G.
200394	1-Jun-11	31-May-13	Food for Health	CLA content in cow's milk and the potential impact of its consumption on glucose tolerance and insulin resistance.	Dyck, D.
200395	1-Sep-11	31-Aug-14	Food for Health	The impact of Resistant Starches in healthy baked products on mitigation of risk for Type 2 Diabetes and Colorectal Cancer	Emes, M.
200396	1-May-11	30-Apr-13	Food for Health	Does consumption of selenized milk protein improve or exacerbate insulin resistance?	Cant, J. P.
200397	1-Jun-11	30-Apr-15	Food for Health	Using proteins and protein fragments from meat to enhance human iron uptake from dietary supplements	Purslow, P.
200398	1-May-11	30-Apr-14	Food for Health	Nutraceutical and cosmeceutical components from sea buckthorn fruits, their health benefits, and stabilization in processed products	Paliyath, G.
200421	1-May-11	30-Apr-14	Food for Health and Prod Syst	Purple vegetables for better health: a study of the antioxidant and other beneficial effects of anthocyanin pigments in potatoes and carrots	McDonald, M. R.
200422	1-May-11	30-Apr-14	Food for Health	Selecting Ontario potatoes for improved processing quality, food safety and health: The role of asparagine, reducing sugars, acrylamide and phenolic compounds	Yada, R.
200466	1-Jun-12	31-May-15	Food for Health	Improving the nutrient intake of older adults in long term care	Duizer, L.
200467	1-Sep-12	31-Aug-15	Food for Health	Co-operatives as an alternate distribution system to supply healthy local foods for rural economic development.	Caldwell, W.
200468	1-Sep-12	31-Aug-15	Food for Health	Dietary Fibre and Glycemic Response: Developing foods to assist the increasing Diabetic population	Goff, D.

200469	1-Sep-12	4-Sep-15	Food for Health	Developing consumer driven strategies for imparting sustainable healthy eating habits in Ontarians' diet	Duizer, L.

Product Development and Enhancement through Value Chains

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
200057	1-Jun-09	31-Dec-12	Prod Dev and Env Sust	Conversion of Poultry Manure into Value-added Products Using Fly Larvae	Zheng, Y.
200059	01-Sep-09	31-Aug-13	Prod Dev	Development of high performance edible soy protein nanocomposite films and coatings for co-extrusion applications	Lim, L-T.
200062	01-Sep-09	31-Aug-12	Prod Dev	Novel use of organogels to replace traditional animal fat in meat products	Barbut, S.
200064	01-Sep-09	31-Aug-12	Prod Dev and Food for Health	Characterizing the sensory attributes of whole grain wheat-based products and the phenolics associated with these attributes	Duizer, L.
200071	01-Jul-09	30-Jun-12	PD and PSP	Product enhancement and cost reduction in greenhouses through application of advanced robotics systems	Moussa, M.
200118	01-May-10	01-Oct-13	Prod Dev	Vaccination of chickens for control of Campylobacter jejuni	Sharif, S.
200144	1-May-10	30-Apr-13	Prod Dev and Bioeconomy	Cost-Effective Processing Technologies to Improve the Value to Aquaculture Species of Products and By-Products from the Agricultural, Food and Bio-Fuel Sectors in Ontario	Bureau, D.
200173	1-May-10	30-Apr-13	Prod Dev and Env Sust	Green Roof Technologies for Northern Climates	Zheng, Y.
200190	01-Jun-10	31-May-12	Prod Dev	A Novel Prebiotic for Improving Weanling Pig Gut Health and Growth without Using Antibiotics	Fan, M.
200193	01-May-10	30-Apr-13	Prod Dev and Food for Health	Nanoencapsulation of omega-3 fatty acids in edible carriers using electrostatic forming technologies	Lim, L-T.
200261	02-Jul-10	31-Dec-13	Prod Dev	Improving Icewine Innovation through Evaluating Innovative Clusters and Consumer Trends & Demands in Ontario's Icewine Industry	Teng, L.
200342	1-Sep-10	31-Oct-12	Prod Dev and Food for Health	Characterizing starch structure and digestibility of millet flour when incorporated into baked products.	Marcone, M.
200399	1-Jul-11	30-Jun-14	Prod Dev	Improved Utilization of Biochar for the Production of New Industrials Bioproducts	Mohanty, A.
200400	1-May-11	30-Apr-13	Prod Dev	Utilization of spent coffee grounds in compostable food packaging applications	Lim, L-T
200423	1-May-11	30-Apr-14	Prod Dev and Prod Syst	New hybridizations for Ontario apple cultivar development.	Somers, D.
200424	1-Jun-11	30-May-14	Prod Dev and Prod Syst	Welfare-Friendly Eggs: Meeting the needs of laying hens, producers and consumers through alternative housing systems	Widowski, T.
200470	1-Jun-12	31-May-15	Prod Dev	Education Needs and Skill Development of Seasonal Workers in Ontario's Agri-Food System	Mann, S.

200471	1-Jun-12	31-May-15	Prod Dev	Developing strategies to incorporate prebiotics in refrigerated and frozen dough systems	Seetharaman, K.
200472	1-Jun-12	1-Jun-13	Prod Dev	A continuous plant health monitoring and early disease detection vision based system for applications in greenhouses	Moussa, M.
200473	1-Jun-12	31-May-15	Prod Dev	Forming new composite organogels for fat reduction in complex food systems	Barbut, S.
200474	1-Jun-12	31-May-15	Prod Dev	Biomass-fired Fluidized Bed Combustion System for Greenhouse Heating	Dutta, A.
200496	1-Jun-12	31-May-15	Prod Dev and Prod Syst	Developing High Yielding, Broadly Adapted, Non-Darkening Pinto Beans	Pauls, K.P.
200497	1-Jun-12	31-May-15	Prod Dev and Prod Syst	Expansion and validation of genetic marker set for boar taint	Squires,J.
200498	1-Jun-12	31-May-15	Prod Dev and Prod Syst	Validation of a new LED light bulb designed for the egg-laying industry	Bedecarrats, G.

Production Systems Theme Tier I

Project #	Approved Start Date	Approved End Date	Approved Program	Title	Project Leader
200043	01-Jun-09	31-May-13	Prod Syst and Food for Health	Bean (Phaseolus vulgaris) Improvement for Health and Consumer Acceptance	Pauls, K. P.
200069	1-Jun-09	31-Jan-13	Prod Syst	The pathogenesis and control of necrotic enteritis in broiler chickens	Prescott, J.
200071	01-Jul-09	30-Jun-12	Prod Syst and Prod Dev	Product enhancement and cost reduction in greenhouses through application of advanced robotics systems	Moussa, M.
200075	1-Jul-09	28-Feb-13	Prod Syst	Biomarkers to relate management of piglets post-weaning to subsequent growth performance, carcass and meat quality	deLange, K.
200083	1-Jun-09	31-May-12	Prod Syst	Understanding the spatial and temporal spread and clinical signs associated with various genotypes of the Porcine Reproductive and Respiratory Syndrome (PRRS) in Ontario	Dewey, C.
200086	1-Sep-09	31-Dec-13	Prod Syst	Nutritional Strategies and monitoring of the peri-parturient sow.	Luimes, P.
200087	1-Jun-09	31-May-12	Prod Syst	Development of an integrated mycotoxin management system in Ontario grains	Schaafsma, A
200093	1-Jun-09	30-Jun-12	Prod Syst	Dairy Health and High-Low Immune Responders	Mallard, B.
200100	1-Oct-09	30-Sep-13	Prod Syst	EGF expressing *Lactococcus lactis (L. lactis)* for enhancing intestine development, health, and productivity of early-weaned pigs	Li, J.

200101	01-Aug-09	31-Dec-12	Prod Syst	Natural enrichment of milk with functional bioactive compounds	Cant, J.
200116	1-Jun-10	31-May-13	Prod Syst	On-farm practical environmental enrichments for mink, to improve welfare and productivity	Mason, G.
200117	1-May-10	1-Oct-13	Prod Syst and Em Mgmt	Immunity against avian influenza virus (AIV) in chickens and development of rational vaccines for control of avian influenza	Sharif, S.
200122	1-May-10	31-Mar-13	Prod Syst	Management of foliar disease and insect pests in vegetable crops and sugar beet	Trueman, C.
200127	1-May-10	30-Aug-13	Prod Syst	Stimulating Host defenses as an alternative to pesticides for controlling plant diseases	Goodwin, P.
200128	1-May-10	30-Apr-13	Prod Syst and Envir Sust	Development of New Energy Efficient Lighting Systems for Poultry Farming using Light Emitting Diodes (LEDs)	Bedecarrats, G.
200131	1-May-10	30-Apr-13	Prod Syst	Impact of 1-MCP and controlled atmosphere conditions on physiological injury of apple fruit during storage: a mechanistic study of γ-aminobutyrate and polyamine metabolism	Shelp, B.
200132	1-May-10	30-Apr-13	Prod Syst	Enhancing the persistence of underseeded forage legumes under drought stress	Bowley, S.
200149	1-May-10	30-Apr-13	Prod Syst	New and Innovative Diagnostic, Prevention, and Treatment strategies for Poor Adaptive Responses to Negative Energy Balance in Transition Dairy Cows	Duffield, T.
200155	1-May-10	30-Apr-13	Prod Syst	Healthy Potatoes to Benefit the Ontario Producer and Consumer	Sullivan, A.
200160	1-May-10	30-Apr-13	Prod Syst	Development of a complete solution for boar taint	Squires, E. J.
200175	1-May-10	30-Apr-13	Prod Syst and Food for Health	Improving profitatbility in asparagus production through enhanced breeding, management and human health.	Wolyn, D.
200181	1-Jun-10	31-May-12	Prod Syst	Modulation of Optimal Dietary True Digestible Calcium (Ca) to True Digestible Phosphorus (P) Ratio for Improving Growth and Nutrient Utilization in Pigs	Fan, M.
200203	1-May-10	30-Aug-14	Prod Syst	Effects of Gender, Season of the Year, and Management Regimen on Determining Saleable Meat Yield in Lamb Carcasses Using Ultrasound and Electronic Probe Technologies	Mandell, I.
200204	1-Sep-10	31-Aug-13	Prod Syst	The Impact of Residual Feed Intake Classification and Management Regimen on Feedlot Growth Performance, Carcass Traits, and Beef Quality	Mandell, I.
200223	1-May-10	30-Apr-13	Prod Syst	Development of Immune Strategies for control of viral diseases of poultry	Nagy, E.
200246	1-Jun-10	31-May-13	Prod Syst	Optimizing Biological Control Strategies in Greenhouse Floriculture: Interactions, Integration and Implementation	Scott-Dupree, C.
200268	1-Apr-10	31-Mar-13	Prod Syst	Maintaining Plant Health with Effective Integrated Weed Management Strategies	Tardif, F.
200270	1-Apr-10	31-Mar-13	Prod Syst and Em Mgmt	Western Bean Cutworm Monitoring and Management Strategies for Ontario and the Great Lakes Region. A Proactive and Coordinated Approach to Prepare and Respond to a Newly Emerging Corn and Dry Bean Pest in Ontario	Schaafsma, A.
200275	1-May-10	30-Apr-13	Prod Syst	Integrating new technologies for improved management of soil-borne plant diseases: Biological controls, disease forecasting, and pathogen interactions	McDonald, M. R.

200302	1-May-10	1-May-13	Prod Syst	Swine Liquid Feeding Research II: Increase co-product usage, reduce energy input costs, impact on meat quality, gut health and the environment	de Lange, K.
200313	1-May-10	30-Apr-13	Prod Syst	Genetic evaluation and selection tools for profitability improvement in Canadian sheep production	Miller, S. P.
200314	1-May-10	30-Apr-13	Prod Syst	Improving feed efficiency and beef quality through genomics and novel selection criteria	Miller, S. P.
200401	1-May-11	31-Dec-13	Prod Syst	The behaviour and welfare of cattle unloaded for feed, water and rest during long-duration transportation	Haley, D.
200402	1-Aug-11	30-Aug-13	Prod Syst	A two-stage method for reducing weaning stress in horses	Merkies, K.
200403	1-Jun-11	31-May-14	Prod Syst	Identification of small regulatory RNAs in gametes and embryos.	LaMarre, J.
200404	1-May-11	30-Apr-14	Prod Syst	Monitoring and managing metabolic health to prevent reproductive disease in postpartum dairy cattle	LeBlanc, S.
200405	1-May-11	30-Apr-13	Prod Syst	Improving the management of bacterial coldwater disease in rainbow trout aquaculture via autogenous vaccination and family susceptibility.	Lumsden, J.
200406	1-Aug-11	31-Jul-14	Prod Syst	Effect of early life feeding and management strategies on weaning success and development of feeding behaviour patterns in dairy calves	DeVries, T.
200407	1-May-11	31-Dec-13	Prod Syst	Effect of peri-parturient housing and calving management practices on the behaviour,	Haley, D.
200408	1-Jul-11	30-Apr-14	Prod Syst	Understanding early-life growth, and the diagnosis and long-term impacts of respiratory disease, on health, performance, and survival of dairy calves	Leslie, K.
200409	1-May-11	30-Apr-13	Prod Syst	Is tilmicosin useful in reducing viremia and the clinical impact of Porcine Reproductive and Respiratory Syndrome (PRRS)?	Friendship, R.
200410	1-May-11	31-Dec-13	Prod Syst	Remediation strategies to suppress vine decline disease complex in processing tomatoes.	Loewen, S.
200411	1-May-11	30-Apr-14	Prod Syst	Adapting cultivars and production systems of dayneutral strawberries to the changing and diverse climate of Ontario.	Dale, A.
200412	1-May-11	30-Apr-14	Prod Syst	Combining Anthracnose Resistance with Resistance to other Major Diseases in Ontario Common Bean (*Phaseolus vulgaris* L.) Germplasm	Navabi, A.
200413	1-May-11	30-Apr-14	Prod Syst	Native ornamental species for novel applications for greenhouse and landscape culture	Sullivan, A.
200414	1-May-11	30-Apr-14	Prod Syst	Effect of high corn residue levels on soybean production	Deen, B.
200415	1-May-11	30-Apr-14	Prod Syst	Cultivar resistance/tolerance and management of plant-parasitic nematodes on strawberries in southern Ontario	Jordan, K.
200416	1-May-11	30-Apr-13	Prod Syst and Em Mgmt	Peri-weaning failure-to-thrive syndrome (PFTS) in pigs in Ontario	Friendship, R.
200417	1-Sep-11	30-Sep-14	Prod Syst	The epidemiology of inclusion body hepatitis in broiler breeders in Ontario	Guerin, M.
200418	1-Sep-11	31-Aug-14	Prod Syst	Johne's disease prevention and control on organic dairy farms in Ontario	Kelton,D.

200419	1-May-11	30-Apr-14	Prod Syst and Em Mgmt	Emerging plant pathogens: Identification, biology, pathogenicity and integrated management of emerging pathogens infecting asparagus, cucumber and basil.	McDonald, M.R.
200420	1-May-11	30-Apr-14	Prod Syst and Envir Sust	Novel Tests for Nitrogen and Testing of Inoculants With Potential to Reduce Chemical Inputs for Ontario Crop Production	Raizada, M.
200421	1-May-11	30-Apr-14	Prod Syst and Food for Health	Purple vegetables for better health: a study of the antioxidant and other beneficial effects of anthocyanin pigments in potatoes and carrots	McDonald, M.R.
200423	1-May-11	30-Apr-14	Prod Syst and Prod Dev	New hybridizations for Ontario apple cultivar development.	Somers, D.
200424	1-Jun-11	30-May-14	Prod Syst and Prod Dev	Welfare-Friendly Eggs: Meeting the needs of laying hens, producers and consumers through alternative housing systems	Widowski, T.
200475	1-Jun-12	31-May-15	Prod Syst	Patterns of nitrogen retention and nutrient utilization efficiency in gestating and lactating sows	de Lange, K.
200476	1-Jun-12	31-May-15	Prod Syst	Using knowledge of dairy cow behaviour to improve feeding management	DeVries, T.
200477	1-Jun-12	31-May-15	Prod Syst	Effect of targeted selective treatment at lambing on Haemonchus burdens on Ontario sheep farms with anthelmintic resistance	Peregrine, A.
200478	1-Jun-12	31-May-15	Prod Syst	Genome-wide identification of genetic defects in innate disease resistance genes of swine	Lillie, B.
200479	4-Jun-12	3-Jun-15	Prod Syst	Antibody responses and modulation of fecal bacterial shedding during subclinical Johne's disease in calves	Plattner, B.
200480	1-Jun-12	31-May-15	Prod Syst	Uncovering new applications for probiotics and their mode of action in dairy cow production systems	McBride, B.
200481	1-Jun-12	31-May-15	Prod Syst	Molecular pedigree analysis for the establishment of an elite rainbow trout broodstock with maximal growth and spawn-timing performance	Danzmann, R.
200482	1-Jun-12	31-May-15	Prod Syst	Which variants of influenza viruses commonly circulate in Ontario swine?	Poljak, Z.
200483	1-Jan-13	31-Dec-16	Prod Syst	Genomic applications in the feedlot to improve beef quality and efficiency	Miller, S.
200484	2-Jul-12	30-Jun-15	Prod Syst	Enhancing the efficacy of poultry vaccines using innate immune adjuvants	Sharif, S.
200485	1-Jun-12	31-May-15	Prod Syst	Pomological Research on New Apple Cultivars for the Ontario Apple Industry	Cline, J.
200486	1-Jun-12	31-May-15	Prod Syst	Enhanced monitoring and management of spotted wing Drosophila, an invasive pest of soft-skinned fruit in Ontario	Hallett, R.
200487	1-Jun-12	31-May-15	Prod Syst	Reducing the effects of environmental stress on spring canola in Ontario	Earl, H.
200488	1-Jun-12	31-May-15	Prod Syst	Establishing a miscanthus germplasm collection	Bowley, S.
200489	1-Jun-12	31-May-15	Prod Syst	Integrated Pest Management of the Swede Midge in Canola.	Hallett, R
200490	1-Jun-12	31-May-15	Prod Syst	Strategies for extending the greenhouse vegetable growing season in Ontario	Micallef, B.

200492	1-Sep-12	31-Aug-15	Prod Syst and Em Mgmt	The design and analysis of experiments and observational studies on infectious disease spread in the livestock industries.	Deardon, R.
200493	3-Sep-12	31-Aug-15	Prod Syst and Em Mgmt	Development of risk-based and consequence-based approaches to surveillance in swine populations using PRRS virus as a model	Poljak, Z.
200494	1-Jun-12	30-Jun-15	Prod Syst and Em Mgmt	Prevalence of Enteric Disease Agents in Ontario Commercial Rabbits: Zoonotic Potential and Impact on Animal Health	Turner, P. V.
200495	1-Jun-12	31-May-15	Prod Syst and Envir Sust	Red clover non-uniformity: field assessment of drought tolerant red clover, delayed overseeding strategies, and spatial nitrogen application	Martin, R.
200509	14-Jan-13	1-May-13	Prod Syst PSA	Best Management Practices for Control of Nuisance Flies in Poultry Production	Lachanc, S.

Production Systems Theme Tier II

Project #	Start Date	Approved End Date	Approved Program	Title	Project Leader
026621	1-May-08	30-Apr-13	Tier II	Genetics of disease resistance in ruminants: Interaction between the HP-adrenal axis and the immune system.	Karrow, N.
026639	1-Feb-07	31-Aug-13	Tier II	Investigating Radiation Bystander Effects in Fish: Implications to Resource Management, Environment and Farm Animal Health	Moccia, R.
026640	25-Aug-08	31-Mar-13	Tier II	A comparison of the extent of frost tolerance in facultative winter annual weeds	Van Acker, R.
027032	13-Aug-10	30-Apr-13	Tier II	Tunnel-growing Systems for raspberries	Dale, A.
027035	1-Oct-10	1-Oct-13	Tier II	The impact of nutrition and RFI on tissue and molecular characterization of maintenance energy costs, and fetal growth and programming in wintering pregnant beef cows	Swanson, K.
027036	8-Sep-10	30-Apr-13	Tier II	Vegetable fertility management and new crops development	McKeown, A.
027038	13-Sep-10	30-Apr-13	Tier II	Recruitment biology and ecology of large [*Digitaria sanguinalis* L. (Scop.)] and small [*Digitaria ischaemum* (Schreb.) ex Muhl.] crabgrass in turf, with implications for management under municipal pesticide bans	Van Acker, R.
027044	4-Oct-10	30-Apr-13	Tier II	Improving Dry Bean (*Phaseolus vulgaris*) Production through Breeding, Genetics, Pest Management and Agronomy	Pauls, K.P.
027049	1-Sep-09	31-Aug-13	Tier II	Evaluating the substitution of high quality vegetable oils for fish oil in rainbow trout feed.	Moccia, R.
027185	1-Dec-10	31-Oct-13	Tier II	Regulation of Immune Response in Pigs	Wilkie, B.
027188	1-May-10	30-Apr-13	Tier II	Cover crops preceding 2nd year soybeans	Deen, B.

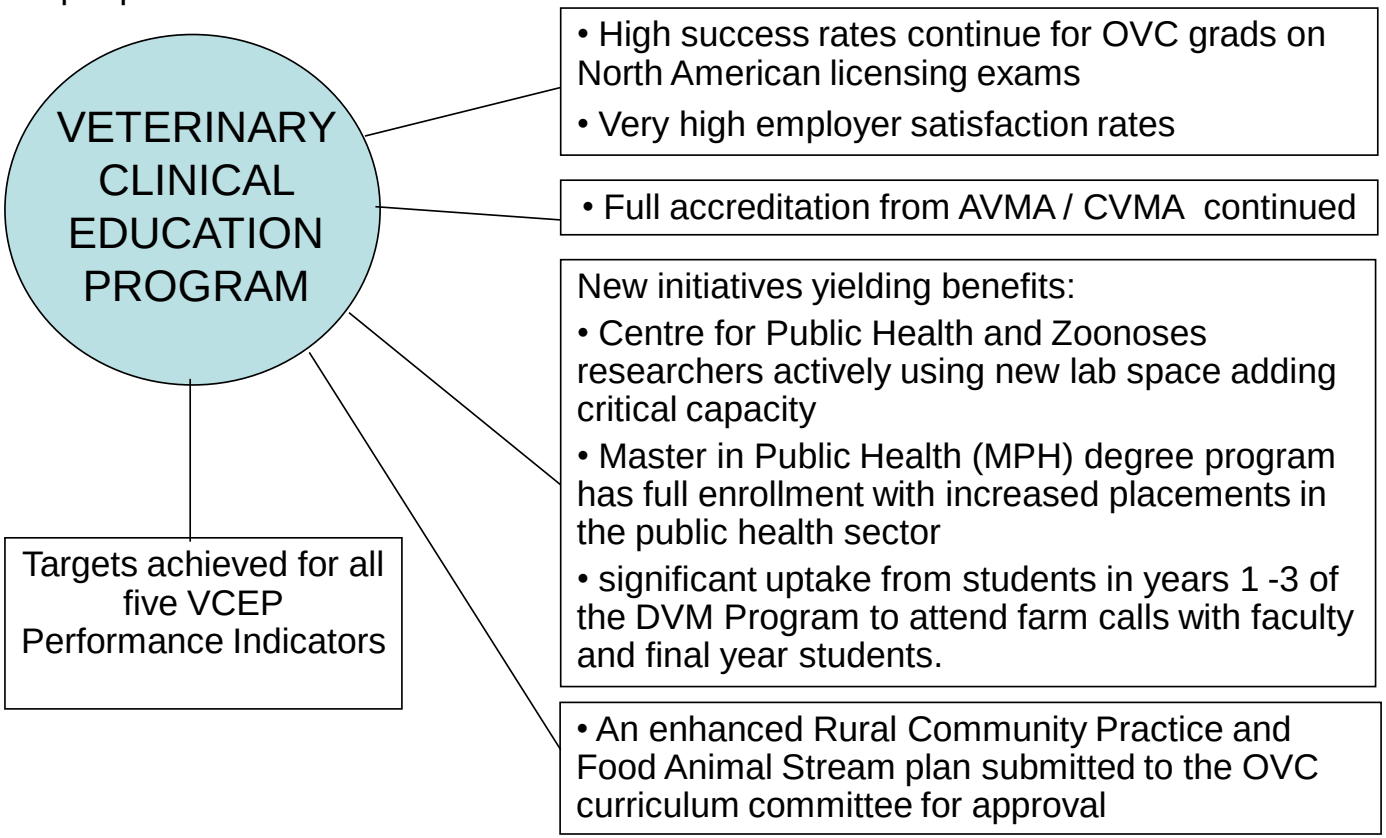
027189	1-May-10	30-Apr-13	Tier II	Long-term effect of nitrogen rates on corn	Deen, B.
027190	1-May-10	30-Apr-13	Tier II	Cover crops preceding corn in a corn/soybean rotation where corn silage/residue is harvested for bioenergy biomass	Deen, B.
027191	1-May-10	30-Apr-13	Tier II	Evaluation of Miscanthus and Switchgrass, for bioenergy potential, adaptation and yield under Ontario conditions	Deen, B.
027193	1-Apr-11	1-Aug-14	Tier II	Equine Stem Cells – in vivo assessment and in vitro isolation optimization and characterization	Koch, T.
027195	1-May-11	1-May-13	Tier II	Promotion of litter size in commercial swine using an immune-stimulant	Tayade, C.
027197	25-Mar-11	25-Mar-13	Tier II	Improving efficiency of feed use through reduced variability in nutrient consumption in lactating dairy cows	deVries, T.
027198	1-Jun-11	1-Jun-13	Tier II	Sow Housing: risk factors and assessment techniques for lameness, productivity and longevity in group and individually housed gestating sows.	Friendship, R.
027199	2-May-11	1-Aug-13	Tier II	The effect of Fusarium mycotoxins on the frequency and severity of equine gastric ulcer syndrome	Smith, T.K.
027200	1-May-11	30-Apr-13	Tier II	Etiologic agents and their interaction with macrophages in heaves	Bienzle, D.
027202	1-May-11	1-Dec-13	Tier II	Reducing the Impact of Soil Water Deficits on Soybean Yields in Ontario	Earl, H.
027205	6-May-11	30-Apr-14	Tier II	Nitrogen Utilization Efficiency	Rothstein, S.
027207	1-May-10	30-Apr-13	Tier II	Management of foliar diseases of vegetable crops	McDonald, M. R.
027209	31-Dec-10	31-Mar-13	Tier II	Is glycerol from biodiesel and ethanol production equivalent to corn grain in its ability to stimulate milk protein yields of dairy cows?	Cant, J.
027212	1-Jan-11	1-Jan-14	Tier II	Investigations on the practicality and safety of neuroprosthesis induced bronchodilation for the treatment of Recurrent Airway Obstruction in the horse.	Viel, L.
027213	1-Jul-11	31-Aug-15	Tier II	Farm-scale Assessment of GHG Mitigation Strategies in Dairy livestock Cropping Systems	Wagner-Riddle, C.
027216	1-Sep-11	30-Apr-14	Tier II	Intravascular Assessment of the Pulmonary Artery Heamodynamics: A pilot study	Arroyo, L.
027218	1-Mar-12	28-Feb-15	Tier II	Maximizing immunity to *Mannheimia (Pasteurella) haemolytica* before feedlot arrival	Hodgins, D.
027219	1-Nov-11	1-Nov-14	Tier II	Evolutionary, Developmental and Physiological Genetics of Salmonid Fishes	Danzmann, R.
027221	5-Apr-12	30-Jul-12	Tier II	Characterization and prevention of *Fusarium* mycotoxicoses in turkeys	Smith, T.
027222	1-May-12	30-Apr-15	Tier II	Effect of dietary supplementation of *Saccharomyces cerevisiae* on the ruminal microbiota and epithelium in lactating cattle during subacute ruminal acidosis	McBride, B.
027224	1-Apr-12	30-Oct-14	Tier II	Rodenticide ingestion in swine: a project to assist veterinarians with detection and establishing withdrawal times.	Johnson, R.
027225	31-Mar-11	31-Dec-14	Tier II	Crop enhancement through classical breeding and novel biotechnologies: canola, spearmint, rutabaga and corn.	Kott, L.

027227	1-Jun-12	31-May-15	Tier II	The effects of stall mattress compressibility on the behaviour and welfare of dairy cows	Haley, D.
027229	1-Feb-12	31-Oct-13	Tier II	Development of Rootstocks to Extend vinifera grape production into Areas with More Severe Winters in the south Central Ontario region	Dale, A.
027230	1-Apr-12	30-Oct-13	Tier II	To develop the Value-Chain for a Hazelnut Industry in Ontario, Based on Hardy Cultivars, Rapidly Propagated Locally	Dale, A.
027231	1-Apr-12	30-0ct-13	Tier II	Pathogenesis of Recombinant Enzootic nasal tumor Virus in Newborn Lambs and in high and Low Cortisol Responder Sheep	Wootton, S.
027232	5-Jun-12	30-Jun-13	Tier II	Use of exhaled breath condensate and evaluation of potential biomarkers to detect respiratory disease in cattle	Hewson. J.
027233	31-Jul-12	31-May-13	Tier II	The effect of antimicrobials on the intestinal microbiome	Weese, S.
027234	1-Sep-12	30-Apr-13	Tier II	Dairy Health: Genetic Selection for High-Low Immune Responders	Mallard, B.
027235	1-Nov-12	31-Oct-15	Tier II	Effects of Strategic Supplementation of Low Quality Diets to Optimize Beef Cow Performance	Mandell, I.
027236	1-Dec-12	31-Aug-14	Tier II	Effects of Pig Genotype, Immunological Castration, and Use of Ractopamine on Growth Performance, Carcass Traits, and Pork Quality of Male Pigs	Mandell, I.
027237	1-Dec-12	1-Dec-13	Tier II	Is feather pecking in turkeys related to activity levels?	Torrey, S.
027238	1-Jan-13	30-Jun-13	Tier II	Immunogenicity of a novel toxin in fatal Clostridium perfringens intestinal infections of foals	Prescott, J.
027239	1-Jan-14	31-Dec-16	Tier II	Infrastructure support for Artic Charr aquaculture research	Ferguson, M.
027240	1-May-13	30-Apr-16	Tier II	Development of flight and locomotion for hens in aviaries	Harlander, A.
027241	1-May-13	1-Apr-18	Tier II	Maize breeding and genetics – field and lab capacity	Lee, E.
027242	15-May-13	April 31, 2014	Tier II	Use of Supplements for Enhancing the Production of Forage Finished Beef.	Mandell, I.
027243	13-May-13	31-Aug-13	Tier II	Efficacy of NSAID Analgesia and Topical Anesthesia for Castration of Neonatal Pigs	Turner, P. V.
027244	7-Jun-13	25-Aug-13	Tier II	Characterization of estrous cycle in dairy cows and assessment of pregnancy through infrared imaging	Miller, S.
027245	1-May-13	31-Dec-14	Tier II	Effect of allogenic umbilical cord blood mesenchymal stromal cells on induced synovitis in horses	Koenig, J.
200178	1-Jul-10	30-Apr-13	Tier II	Alternative methods to control swine enteric bacterial disease	Friendship, B
200319	1-May-10	30-Apr-13	Tier II	Effects of stressor hormones on reproductive success, and early embryo development of rainbow trout	Leatherland, J.
200324	1-May-10	1-May-13	Tier II	Video imaging for real-time performance monitoring of growing-finishing pigs	de Lange, K.
200325	1-Jun-10	31-May-13	Tier II	Effects of Method of Forage Finishing and Cattle Breed on Growth Performance, Carcass Characteristics, Eating Quality, and Nutrient Composition of Forage Finished Beef Relative to a Grain Finished Product	Mandell, I.

200328	1-May-10	30-Apr-13	Tier II	Maize breeding and genetics-field and lab capacity	Lee, E.
200329	1-May-10	30-Apr-13	Tier II	Management and physiology of turfgrass systems with an emphasis on reduced inputs, environmentally sustainable production and human health	Lyons, E.
200331	1-May-10	30-Apr-13	Tier II	Development of novel methods for the diagnosis and control of poultry coccidiosis	Barta, J.
200332	1-Jan-10	31-Dec-13	Tier II	Breed-specific gene expression profiles and DNA methylation patterns in calves infected with Mycobacterium avium subsp. paratuberculosis (MAP)	Karrow, N.
200333	1-May-10	30-Apr-13	Tier II	Development of disease and insect resistant soybean varieties for food grade, functional food and specialty oil markets in Ontario	Rajcan, I.
200346	3-Aug-10	30-Apr-13	Tier II	Vegetable crop management strategies and variety development for improved product quality and farm profitability	Zandstra, J.

VETERINARY CLINICAL EDUCATION PROGRAM
Selected Performance Indicators and Accomplishments

Program Objective: Support the Ontario economy by training professionals skilled in maintaining the health and welfare of animals and their interrelationships with people and the environment



Veterinary Clinical Education Program

Performance Indicators

Data collection and establishment of baselines for each Performance Indicator (PI) was completed with the assistance of OMAF/MRA. The following table summarizes the VCEP Program's performance according to the five (5) PIs in the Agreement.

Key Outcome	**Maintain AVMA/CVMA accreditation.**	
Performance Indicator VCEP1	Level of accreditation achieved - Maintain AVMA/CVMA accreditation	
	Metric	Review of accreditation reports in order to assess performance and maintenance of accreditation.
	Baseline:	AVMA/CVMA Full Accreditation
	Target:	2010-2013: maintain AVMA/CVMA Accreditation
	Results (2012/13):	On March 29, 2013, OVC was granted a continuation of its full accreditation based on a vote by the AVMA/CVMA Council on Education. These two organizations represent the highest standard of achievement for veterinary medical education in the world. The accreditation process focuses on the Doctor of Veterinary Medicine program and the institutional resources, infrastructure and personnel that support it. Graduation from a fully accredited institution permits graduates to take the national licensure examination for professional practice in Canada and the USA. OVC is required to submit an annual update report documenting any changes the College has made that would impact any of the 11 accreditation standards. One of the standards relates to the financial viability of the College. The Council expressed concern about our on-going budget challenges and wants regular updates on our financial status and plans to resolve any budgetary gaps.

Key Outcome	Attracts and retains highly qualified clinical faculty from around the world as a source of new knowledge.	
Performance Indicator VCEP2	An appropriate number of high quality faculty.	
	Metric	Number of faculty provided by U of G OMAF/MRA Partnership Funding
	Baseline:	Baseline established as the number of faculty positions supported through the Agreement in 2009/10, at 12.4 faculty FTEs.
	Target:	2009-2010: maintain 2008 level 2010-2013: baseline level likely to decline due to flatlined budget.
	Results (2012/13):	VCEP funding of $1.9M contributed to the support of **11 faculty**, which is 9.5% of the total OVC 115 faculty FTE (see table below for details). **Following a recent internal review of VCEP funding allocations, the value of the $1.9M allocated to faculty salary and benefits has been adjusted down from 12.4 to 11.0 FTE. The University has contributed MTCU funding (1.40 FTE) in order to offset the salary inflation and benefit increases above the VCEP allocation.**

OVC Faculty FTE [1] (Base funded in 2012-2013)

Department	Discipline		Assistant Professor	Associate Professor	Professor	Total
Pathobiology	Anatomic Pathology		2	1	2	*5*
	Avian Pathology					
	Bacteriology			1	2	*3*
	Clinical Pathology			1	2	*3*
	Comparative Pathology		1		1	*2*
	Immunology		1		2	*3*
	Laboratory Animal Science				1	*1*
	Parasitology			1.00	1	*2*
	Public Health (incl CPHAZ)				1	*1*
	Virology		1		1	*2*
	Wildlife/Zoo Pathology				1	*1*
		Sub-total	**5.00**	**4.00**	**14.00**	***23.00***
Clinical Studies	Anesthesiology		1	3		*4*
	Cancer		1			*1*
	Cardiology			1		*1*
	Companion Animal Medicine		2		1	*3*
	Companion Animal Surgery		2	2	1	*5*
	Dermatology		1			*1*
	Emergency and Critical Care		1	1		*2*
	Large Animal Medicine		1	1	2	*4*
	Large Animal Surgery		2	2	1	*5*
	Neurology		2	1		*3*
	Nutrition		1			*1*
	Oncology				1	*1*
	Ophthalmology			1		*1*

	Radiology		2	1		***3***
		Sub Total	**16.00**	**13.00**	**6.00**	***35.00***
Population Medicine	Animal Welfare		1			*1*
	Communications		1			*1*
	Epidemiology			2	2	*4*
	Equine Health Management			1		*1*
	Farm Health Ethology		1			*1*
	Public Health (incl. CPHAZ)			1	2	*3*
	Ruminant Health Management			1	2	*3*
	Swine Health Management			1	1	*2*
	Theriogenology		3			*3*
	Statistician			1		*1*
	Poultry Health Management			1		***1***
	Ecohealth (4 Year CL)		**1**			***1***
Biomedical Sciences	Anatomy		.6		1	*1.6*
	Cellular/Molecular Biology		2.35	2.25	2	*6.6*
	Neurology		.6	.15	1	*1.75*
	Oncology		.5		2	*2.5*
	Pharmacology/Toxicology		.35	1.35		*1.7*
	Reproductive Biology		.5	.5	1	*2.0*
	Physiology		1.1	1.5		*2.6*
		Sub-total	**6.00**	**5.75**	**7.00**	***18.75***
	TOTAL		**34**	**30.75**	**34**	**98.75**
Notes						

1. In 2012-13 VCEP funding contributed $1.9 M which provided support equivalent to 11 faculty which is 9.5% of the total OVC 115 faculty FTE.
2. Includes position of Dean of the College
Vacancies: Biomedical Sciences (2); Clinical Studies (7); Pathobiology (1); Population Medicine (4)

Key Outcome	Provide a comprehensive training program for undergraduate veterinary students.	
Performance Indicator VCEP3	Readiness of graduates for employment (Provide a comprehensive training program for undergraduate veterinary students)	
	Metric	% level of students and employers satisfaction regarding readiness for employment.
	Baseline:	Baseline for agreement will be the results for the 2007/08 graduating class (2008/09 data were not used due to technical collection errors.)
	Target:	2010-2013: maintain percentages from 2007/08 annual student and employer surveys
	Results (2012/13):	Of graduates who responded (n = 69), **98% were satisfied** (i.e. rated their performance as Superior, Very Good, or Good) with their overall performance/competence to do the job for which they were hired. Of the employers who responded (n = 43), **100% were satisfied** (i.e. rated the new graduate as Superior, Very Good, or Good) with their employee's overall performance/competence to do the job for which they were hired. **2011/12 Results:** Of graduates who responded 100% were satisfied Of the employers who responded 96% were satisfied **2010/11 Results:** Of graduates who responded 100% were satisfied Of the employers who responded 95% were satisfied **2009/10 Results:** Of graduates who responded 98% were satisfied Of the employers who responded 92% were satisfied **2007/08 Results:** Of graduates who responded, 97% were satisfied Of the employers who responded 95% were satisfied

Key Outcome	**Provide a comprehensive training program for undergraduate veterinary students.**	
Performance Indicator VCEP4	Graduating students' performance in the North American Veterinary Licensing Exam (NAVLE).	
	Metric	% of VCEP students who pass the North American Veterinary Licensing Exam (NAVLE), compared to the % average of other North American institutions.
	Baseline:	Baseline is the 2008/09 pass rate for NAVLE students.
	Target:	2010-2013: That OVC students continue to meet or exceed the mean pass rate for all students writing the NAVLE exam.
	Results (2012/13):	

	Dec 2012 & Apr20 13		**Dec 2008 & Apr 2009**	
	OVC	**ALL**	**OVC**	**All**
Number Taking Exam	105	3665	106	3009
Number Passing	104	3533	104	2908
Percent Passing	99	96	98	97

Key Outcome	**Graduate individuals highly qualified in relevant post-graduate specialties.**	
Performance Indicator VCEP5	Number of students starting and completing post-graduate studies each year by area related to OMAF/MRA priorities.	
	Metric	Number of VCEP funded and non-VCEP funded students working on projects related to OMAF/MRA priorities. The metric would include both students beginning and completing post-graduate studies.

	Baseline:	Baseline is 15.1 DVSc students.
	Target:	2010-2013: maintain funding for 15.1 DVSc students working in areas of priority to OMAF/MRA.
	Results (2012/13):	See DVSc enrolment Table below

TOTAL ENROLMENT NUMBER OF DVSC STUDENTS

WITH SUPPORT FROM VCEP FUNDING [1]

May 1, 2012 to April 30, 2013

		Total Number of Students Enrolled in 2012-13 (Headcount) [2]			
Department	**Discipline**	**Continuing**	**New**	**Graduating**	**Total # Enrolled**
Pathobiology	Anatomic Pathology	1	2	2	**5**
	Clinical Pathology	1	1	0	**2**
	Avian Exotic	0	0	0	**0**
	Laboratory Animal Science	1	0	0	**1**
	Oncology	0	0	0	**0**
	Sub-total	**3**	**3**	**2**	**8**
Clinicial Studies	Anesthesiology	1	0	1	**2**
	Companion Animal Surgery		1	1	1
	Companion Animal Medicine		2	0	1
	Large Animal Medicine	1	1	1	**3**
	Large Animal Surgery	1	1	1	**3**
	Emergency and Critical Care		0	1	0
	Neurology	0	1	1	**2**
	Cardiology	0	0	1	**1**
	Ophthalmology	1	0	0	**1**
	Oncology	0	1	0	**1**

	Radiology		1	0	0	**1**
		Sub-total	**8**	**6**	**7**	**21**
Population Medicine	Health Management		3	0	1	**4**
	Theriogenology		3	0	0	**3**
		Sub-total	**6**	**0**	**1**	**7**
Biomedical Sciences	N/A	**Sub-total**	0	0	0	**0**
		OVC Total	**17**	**9**	**10**	**36**

Notes

1. VCEP funding is $506k, which is 54% of the $928k base budget which supports the College funded DVSc positions.

2. The enrolment numbers are based on headcount not FTE. "In-program" students are enrolled for the full fiscal year. Students entering and exiting the program are enrolled for part of the year

3. The total number of base funded positions = 29 of which VCEP supports the equivalent of 15.12

4. Funding for one DVSc position was allocated to a PhD student doing bovine research that had already completed a food animal residency program.

NEW INITIATIVES

Knowledge Translation and Transfer (KTT) Program and Partnership Communications

Communications

Through the negotiation of the OMAF/MRA - U of G Agreement, the Ministry and University agreed that there needed to be a new focus on Knowledge Translation and Transfer (KTT) to improve the dissemination and commercialization of research advances to the broad diversity of client groups (direct users of the research results). It was also agreed that an enhanced emphasis on communications to the other stakeholders and the public at large (general beneficiaries of the application of research results) was needed to help ensure that Ontario taxpayers hear about the value of the research funded by the provincial government under the Partnership.

KTT Program

The KTT initiative established under the OMAF/MRA - U of G Partnership Agreement in 2008 is designed to accelerate the transformation of knowledge into use. This program includes long-established practices in extension and technology transfer, building and expanding on them. Over the past year, significant progress has been made in the continued development and delivery of the program. Achievements made during the 2012/13 fiscal year are described below.

The **U of G Knowledge Mobilization Program Managers** continued to provide for the delivery of the KTT program throughout the 2012/13 time period through oversight of the KTT funding program including project reporting and program evaluation. The U of G KTT staff also continued to plan and deliver on research and knowledge exchange activities by hosting 'knowledge exchange' events for several research themes. During the 2012/13 time period, a staffing change in the KTT program occurred as a result of a re-classification of a permanent base-funded position dedicated to the management of both the Knowledge Mobilization and the Communications programs for the OMAF/MRA – U of G Partnership Agreement. Dr. Bronwynne Wilton was the successful candidate for this position which had a start date in December 2012. This new position will ensure integration of the Communications and KTT initiatives for the Partnership as well as on-going sustainability to the programs.

The **'Agri-Food and Rural Link'** brand name continued to be implemented in terms of branding the KTT program primarily through the use of this logo on materials associated with the KTT funded projects. The **Agri-Food and Rural Link** name and logo continue to be used as a Twitter feed which currently has over 1,050 followers. The Twitter feed allows for rapid dissemination of Partnership funded research stories such as the SPARK videos.

U of G KTT staff launched the new Partnership website in September 2012. Four key websites were redeveloped: Partnership, KTT, Research Program and HQP. Some key website analytics are as follows:

- Hits since launch: 17,405
- Pageviews: 67,362
- Average visit duration: 3:18

The KTT staff continue to work with KTT researchers to integrate project information and resources into the KTT website. The new Research Management System (RMS) processes research and KTT applications and reporting for both programs. The new Partnership website integrates the research and KTT project information in the RMS through a public-facing search tool on the website. The Research Link is the branding for our user-friendly search tool that goes into the RMS to get real-time research and KTT project information and results. Records dating back to as early as 1994 have been migrated from the Oasis database to the new RMS. Not only does this provide a strong archival tool, but website users can access projects and their results from 1994 to the present through the Research Link. U of G and OMAF/MRA staff work together to approve projects that can be accessed through the Research Link. Overall, the four websites serve as a portal for agri-food information and can expand with changing technology and research outputs.

The Agri-Food and Rural Link **KTT Funding Program** which was launched in May 2010 continued to be active in 2012/13 with more emphasis on project reporting and program evaluation. A final and annual report template was implemented for the Research Management System (RMS) and all project Principle Investigators (PI's) reported on progress to date in May 2012. A 4th call for proposals funded 15 new KTT projects that were focused on innovative KTT methods and tools, and increasing the capacity for KTT within the agri-food and rural sectors. There are currently 20 completed KTT projects and 48 active projects. The projects span across the research themes and OMAF/MRA priorities. See page 169 for a complete listing of KTT projects.

Overall administration of the project funding program was provided by the U of G KTT staff. U of G KTT staff have also been sharing the successes learned from this funding program, which is unique in Canada, with broader audiences at conferences such as the second Canadian Knowledge Mobilization Conference in Mississauga and the ACE-NETC Conference in Indianapolis, USA. U of G KTT staff also participate as KTT experts on the research review committees and as observers at the Theme Advisory Group meetings.

A **KTT Casebook** which will provide an important resource for future KTT projects as well as a vehicle for further dissemination of the program results and successes is in the final stages of editorial review with an expected release date of August 2013. This KTT Casebook will provide an important overview of the lessons learned through the KTT program.

Agri-Food and Rural Link has developed and enhanced **networks and exchange of knowledge** between a variety of internal and external stakeholders through individual networking and by co-hosting and organizing research highlight days and events including:

- **Food for Health Research Day (June 2012)**
    - Provided an opportunity for OMAF/MRA, U of G and other stakeholders to learn about the Food for Health research theme and current research
    - One of the objectives of the day was to help connect researchers, industry and government to provide a starting point for future collaborations.
    - Provided an opportunity for 13 students to attend a plain language training session and then produce and present a plain language poster at the event.

- **Food for Health Plain Language Poster Display and One-Minute Pitches at the Royal Agricultural Winter Fair (November, 2012)**

- Provided the opportunity for graduate students working on Food for Health research to learn plain language writing skills through a plain language training and the development of a poster about their research.
- Provided plain language examples of current 'Food for Health' research being conducted at the U of G to visitors attending the Royal Agricultural Winter Fair.
- Students also had the opportunity to practice their verbal research communication skills by giving one-minute pitch to highlight the take home message of their research project.

- **Food and Health: Research to Policy Perspectives (June 2012)**
  - This event was collaboratively organized by members of the KTT CoP (described further below) and was intended to provide a forum for researchers, industry representatives, and government staff to discuss methods and techniques to enhance the research to policy process. Provided the opportunity for attendees to network and build opportunities for partnership and collaboration.
  - Provided graduate students conducting research on the science to policy interface with an opportunity to create a plain language poster about their research. Students also presented a 3-minute pitch highlighting the most important aspects of their research findings.

- **Environmental Sustainability Research Expo (January 2013)**
  - Provided the opportunity for researchers and external stakeholders to share current research knowledge in the area of environmental sustainability in the agricultural landscape.
  - Provided the opportunity for attendees to network and build opportunities for partnership and collaboration.
  - Provided graduate students with an opportunity to learn how to create plain language posters and how to do an effective one-minute pitch about their research projects.

  - A new research display was created for this event incorporating short messages about the impact of current research within the theme and QR codes linking the projects to the research summaries on the Partnership website.

- **Ontario Biomass Producers Co-op Biomass Forum (January 2013)**
  - U of G KTT staff partnered with the Forum organizers to provide an opportunity for students conducting biomass or related research at the Forum through a plain language poster presentation.

- **Green Rural Opportunities/ Canadian Biogas Conference (March 2013)**
  - Provided an opportunity for graduate students to prepare a plain language poster based on their bioeconomy research, as well as present their poster in the conference expo area.
  - Through this collaboration with the Green Rural Opportunities conference, students were provided with admission to the conference and were able to attend the conference workshops and sessions.

- **3rd Annual Knowledge Exchange Day: Building your KTT Toolbox (April 2013)**
    - The 3rd Annual Knowledge Exchange Day provided participants with the opportunity to hear about extension and knowledge mobilization initiatives in other countries from international guest speakers. There were also six workshops focused on sharing practical tools and tips to further accelerate the translation and transfer of research knowledge into use.
    - Provided a networking opportunity for OMAF/MRA staff, researchers from U of G, and external stakeholders to share knowledge and expertise
    - Provided an opportunity for HQP students to highlight their work through a Poster Competition

- **KTT Community of Practice (CoP)**
    - This community of practice provides an opportunity for researchers and staff from a variety of departments at U of G, OMAF/MRA, and agencies around Guelph such as Public Health Agency of Canada, Centre for Public Health and Zoonoses, and the Institute for Community Engaged Scholarship to interact and to share knowledge and best practices for effective KTT.
    - This CoP meets monthly with the exception of the summer months to discuss KTT research, best practices, projects, and ideas. Meetings are usually held at 1 Stone Rd with a variety of people leading the discussion depending on the topic. The CoP is also supported with a listserv which is used to share key information, news about upcoming events and meeting reminders.
    - In addition to 'Food and Health: Research to Policy Perspectives' event held in June 2012 (described above), recent monthly meetings have included discussions about KTT theory and practice, community engaged scholarship, how to use marketing principles to increase the impact of KTT work, and the Science to Policy Handbook developed by Scott McEwen and Andrijiana Rajic's KTT project.

Vineland Research and Innovation Centre – Contributions to the KTT Program

Through the OMAF/MRA-U of G KTT program, a 0.5 FTE is employed at Vineland Research and Innovation Centre (VRIC) as a **Horticulture Technology Scout**. Michael Kauzlaric has been actively searching for opportunities for the Canadian horticultural Industry through evaluating/assessing Canadian technologies, gaining an understanding of the needs of the industry, bringing technologies into Canada, establishing relationships between Canadian/International companies and extending Canadian technologies to the global marketplace. To date, over 15 separate technologies have been identified as having potential for the Canadian horticultural industry.
The 4 Targeted Areas for Scouting are:

1. **Robotics and Automation** – Labour-Saving Technologies
2. **Market intelligence** – Identifying global competitors and potential collaborators for the development and commercialization of Canadian technologies
3. **Packaging Concepts –** Presentation and Quality Acceptance
4. **Production** – Innovative technologies and practices for orchard, field and greenhouse production
5. **Horticultural Cultivars** – New potentials, new markets or utilization of existing cultivars

The Horticulture Technology Scout has been active in pursuing in-licensing agreements that will ultimately benefit the Canadian horticultural industry.

The Horticulture Technology Scout has also been active in reaching out to the domestic horticulture industry through interaction with growers and associations. The list below outlines activities that have been undertaken as a result of this position:

- Actively showcasing fruit varieties from U of G and AAFC program to both Canadian and global tree fruit players (breeders, nurseries, growers & packers, variety management companies, etc)
- Offering weekly and annual twilight meetings for growers to view new selections in U of G and AAFC's breeding programs, as well as Vineland's own breeding programs
- Engagement with produce distributors, showcasing locally produced vegetables as an alternative to imports
- Arranged many site visits to Ontario production facilities to identify areas where new automation technologies could lead to reduced operational and labour costs
- Vineland completed a report for the AAFC Horticulture Value-Chain Roundtable Labour Working Group entitled: "*State of the Industry: A Review of Labour-Saving Technologies for Horticulture*".
- On-going communication with Canadian retailers (eg. Loblaw, Longo's, etc) to provide feedback to breeding programs, associations and marketing boards on what consumer markets are demanding and future predicted trends

The Horticulture Technology Scout has actively participated in the following committees and events in 2012/13:

- Interpoma – Bolzano – November 2012
- Fruit Logistica- Berlin- February 6,7,8, 2013
- Ontario Food Terminal- Monthly visits
- Associated International Group of Nurseries AGM- Washington State, June 17-21, 2013
- Canadian Produce Marketing Association – April 17-19, 2013
- Ontario Fruit and Vegetable Growers Association –February 20,21, 2013
- Member of Niagara Peninsula Fruit and Vegetable Grower's Association – monthly meetings
- Founder and member of the Tender Fruit Evaluation Committee – weekly meetings
- Member of the Innovation Sub-Committee of the Labour Working Group (Horticulture Value Chain) Round Table – monthly meetings

Communications

Communications are a key element of the Knowledge Translation and Transfer program and activities are guided by the Partnership Communications Plan. The objectives of the communications plan include expanding and enhancing stakeholders' awareness of activities, events, accomplishments and outputs of the various Partnership programs (Research, the Veterinary Clinical Education Program, the Agriculture and Food Laboratory, and the Animal Health Laboratory). By raising awareness of current research and related initiatives, stakeholders in the Ontario agri-food and rural sectors can become more actively engaged in the research to innovation continuum. Communications activities will continue to be integrated into knowledge translation and transfer programming.

Several communications initiatives, outlined below, have continued and grown throughout 2012/13 in accordance with the plan.

News@ (close to) Noon

News@ (close to) Noon is a speaker series, held approximately every six weeks except during summer months. It alternates venues between 1 Stone Road, and the University of Guelph Campus.

Five presentations were made in 2012/2013

- Topics were:
    - From science to policy: the experience of an HQP work semester at the Chicken Farmers of Ontario. (presentation by Michael Eregae)
    - Preserving and publishing research data: the Agri-Environmental Research Data Repository. (presentation by Wayne Johnston, Carol Perry, and Carrie Brenton)
    - Vineland's World Crop Program: Serving Ontario's ethnic vegetable market. (presentation by Michael Brownridge and Glen Filson)
    - Feasibility and opportunities associated with increasing the use of local food in Ontario's health care system. (presentation by Paulette Padanyi)
    - Roboguts: understanding gut bacterial communities in disease and health. (presentation by Emma Allen Vercoe)

Up to 40 people attended each event; in some cases attendees included industry representatives. While the presentations have all been interesting, attendance at these events appears to be becoming lower, especially when events are held on campus. This speaker series may have more impact if it is always held at 1 Stone Rd. and if each session is targeted to specific policy and/or program priorities to stimulate relationship-building between researchers and government/industry staff.

The Buzz

The Buzz is an electronic community news vehicle for and about the OMAF/MRA - U of G Partnership. The Buzz contains articles up to 250 words long about research, KTT, research stations, infrastructure, news and coming events related directly to any of the programs supported through the Partnership.

- In 2012/13, there were three new issues of the Buzz
- The Buzz is directly distributed to 3,115 people including U of G personnel (administrators then forward to their departmental faculty and staff), external stakeholders, and all OMAF/MRA staff.
- Out of the total distribution list, approximately 600 people are external to both U of G and OMAF/MRA. This is an increase from 33 people during the last reporting cycle. It is anticipated that external circulation will continue to be expanded in the coming year.

SPARK

Between May 2012 and May 2013, the combined efforts of students in Students Promoting Awareness of Research Knowledge (SPARK), and the agricultural communication classes, both based at the U of G, produced an extensive list of published and broadcast news stories about a variety of OMAF/MRA-sponsored projects. This listing can be found in Appendix A.

These stories have appeared in a number of different publications, and cover the spectrum of the University's many different agricultural research institutions and sites, including the regional campuses and the research stations, as well as the colleges on the main Guelph campus.

The primary vehicles for publication are the Ontario farm media, the U of G *Research* magazine and the University of Guelph main website and research website. Students contribute SPARK*AIR radio pieces which profile agricultural research at the U of G. The SPARK*AIR program continued this year, and more details about this program are below.

In total, 64 print stories were published by SPARK about the Partnership. As well, Director of Research Communications at the U of G, Owen Roberts, writes weekly columns called Urban Cowboy, which are published in both the *Guelph Mercury* and the *Woolwich Observer*. In 2012/13, Owen wrote Urban columns relating to the Partnership for *The Grower, Real Agriculture and FCC Express.*

SPARK*AIR – Partnership sponsored video stories

Building on the success of the first two seasons of Partnership video stories, the Partnership continued funding the SPARK*AIR program including funding for:

- SPARK salaries
- Marketing through Farms.com
- Purchase of a new equipment

SPARK*AIR features news-like video stories about research coming out of the OMAF/MRA - U of G Partnership. The students produce the videos from the beginning to end by setting up the interview, creating the story based on the researcher's information, reporting the story on camera and being the videographer, collecting appropriate shots and finally editing all the clips into an informative three-minute story.

A total of 21 videos were posted to our YouTube channel in 2012/13. The listing of titles is provided in Appendix A.

In the past, SPARK AIR has partnered with commercial agricultural information provider www.farms.com . However, perhaps due to staffing changes at Farms.com, our videos did not get the play or marketing we had come to expect. We are currently searching out other options for our video outputs. In the meantime we continue to be asked to make videos for researchers as part of their KTT activities.

The SPARK program continues to raise the profile of agri-food research, the Partnership, the University and the Ministry.

Yearbook

One of the key communications initiatives is to create a 'reader friendly' annual publication, featuring highlights and key accomplishments of the Partnership programs, for a broader and more general audience than would normally view the Agreement Annual Report. This resulted in the fourth 32-page special issue of *Research* magazine, focusing on the Partnership called the "2012-2013 Agri-food Yearbook".

- Presented in sections about AHL, AFL, seven research themes, VCEP and new initiatives HQP and KTT
- Printed and delivered in January 2013, including to readers of Ontario Farmer.
- The Yearbook will also be included as a schedule within this OMAF/MRA - U of G Partnership “Annual Report”

Affiliated Researcher Program

This program was launched in June 2008. It gives full access to the U of G Library system – including remote access – to OMAF/MRA staff who work on delivering the OMAF/MRA - U of G Agreement programs. There are currently 93 affiliated researchers.

Affiliated researcher terms are for two years, which meant starting in July 2010; renewal forms were sent out for people to renew. From this process, 63 accounts were renewed, 8 accounts were cancelled; most of those due to people leaving the Ministry or changing positions, 3 accounts were suspended as individuals were on parental leave and 10 new accounts were opened in 2012/13.

Knowledge Translation and Transfer (KTT) Projects 2012-2013

Project #	Start Date	End Date	Primary Theme	Project Title	Project Leader
299501	1-Aug-10	30-Apr-13	EM	Measuring the impact of a participatory approach to accelerating the adoption of practices and procedures to control Johne's Disease (JD) on Ontario dairy farms	**Kelton, D.**
299502	1-Sep-10	30-Jun-12	ARP	Doing Democracy with Circles: Workshops for Public Sector Professionals	**Caldwell, W.**
299503	1-Sep-10	31-Aug-12	ARP	Best Practices in Rural Economic Development and Planning: A Learning Series for Municipal Councillors and Practitioners	**Caldwell, W.**
299504	1-Sep-10	30-Aug-13	ES	Application of learning alliances to enhancing economic and environmental sustainability of food processors through efficient use of resources	**Farahbakhsh, K.**
299505	1-Sep-10	31-Aug-12	PS	Animal Welfare and Food Animal Production – Training and education for leaders in Ontario's food animal sectors	**Widowski, T.**
299506	1-Oct-10	31-Mar-12	EM	Increasing poultry biosecurity by developing an instructional DVD with practical on-farm examples and promoting participation in interactive poultry biosecurity seminars	**Guerin, M.**
299507	1-Oct-10	30-Apr-13	PS	**CALF-ETERIA**: Using **CALF** health and productivity as a template for an **E**valuation of **T**ranslation and **E**xtension of **R**esearch **I**nformation for **A**griculture	**Leslie, K.**
299508	1-Sep-10	30-Apr-11	ARP	Policy Education Program (PEP)	**Ker, A.**
299509	1-Aug-10	1-Aug-13	FFH	Agri-food for Healthy Aging (A-HA): Building connections and advancing knowledge within the agri-food, nutrition and health sectors	**Duncan, A.**
299510	1-Sep-10	31-Aug-13	Open	Development and Assessment of Quality Milk Courses for Ontario Dairy Sheep and Dairy Goat Producers	**Menzies, P.**
299511	7-Sep-10	8-Aug-11	PDEVC	Enhancing BUS*4550/4560, Interdisciplinary Product Development Course	**Lang, M.**
299512	1-Nov-10	30-Apr-13	PS	Enhancing the KTT of Field Crop Production information to Ontario growers.	**Tardif, F.**
299513	1-Sep-10	31-Dec-12	PS	Exploring the effectiveness of mobile web browsing, open data, and social media technology to improve communication with clients	**LeBoeuf, J.**
299514	1-Jan-11	31-Dec-13	EM	Developing capacity for knowledge translation and transfer in agri-food public health in Canada	**McEwen, S./Rajic, A.**

299515	1-Sep-10	30-Jun-13	ARP	Young Workers in Ontario's Rural Labour Market: Current Realities and Strategic Options for Employees and Employers	**Mann, S.**
299516	1-Aug-10	31-Jul-11	ARP	Human Resource Management Practices in the Agri-sector: A Tool for Rural Employers	**Mann, S.**
299517	1-Sep-10	28-Feb-11	PS	Market survey to enable enhancement of the existing KTT by Equine Guelph to Ontario's extensive equine industry	**Ecker, G.**
299520	1-Jan-11	30-Sep-13	ARP	The Ontario Rural Landowners Stewardship Guide: Extending Its Application Across Rural Ontario - Review, Refinement and Promotion	**Caldwell, W.**
299521	1-Jan-11	23-Dec-12	FFH	Creating Awareness about the Demand for Locally Produced Ethno-cultural Vegetables: discovering barriers and opportunities to this niche market's entry	**Filson, G.**
299522	1-Jan-11	30-Apr-13	ES	Cover crop decision-making tools	**Van Eerd, L.**
299523	1-Jan-11	31-Dec-12	PS	Knowledge Transfer of the High Immune Response Technology to the Dairy Industry and the Dairy Support Industry as a Best Management Practice to Improve Animal Health	**Mallard, B.**
299524	1-Jan-11	31-Dec-12	EM	Enhancement of the Food Safety Network at the University of Guelph	**Hill, A.**
299525	1-May-11	28-Feb-13	PS	Developing Educational Resources for Specialty Crop Production in Ontario	**McDonald, M.R.**
299526	1-Apr-11	31-Mar-13	Bioecon	Bioeconomy Seminar Series and Innovative Outreach Program for Wider Dissipation of Knowledge	**Mohanty, A.**
299527	30-Apr-11	30-Apr-13	PS	Enhanced effectiveness of animal research KTT	**de Lange, K.**
299528	1-Nov-10	14-Mar-11	Open	Celebrating partnership: Delivery of a Community-University Tradeshow	**Hawkins, L.**
299529	1-Feb-11	31-Sep-2012	PS	Assisting Animal Welfare - Development of a Decision Tree Tool to Assist in Poultry Management	**Guerin, M.**
299530	1-Dec-10	30-Jun-11	ARP	Delivering High Skills Programs in Agriculture, Horticulture, Food and Environment: Professional Development Workshop Series for secondary school educators.	**Schmidt, J.**
299531	1-Jan-11	31-Dec-13	PDEVC	Building Regional Food Hubs in Ontario through effective knowledge translation and transfer: Creating resilient Ontario communities	**Landman, K.**
299532	3-Jan-11	29-Apr-11	Open	Web-based KTT Infrastructure	**Remillard, P.**
299533	1-Feb-11	31-Aug-11	FFH	Delivery of Functionality International Conference IV: Ontario-Agri-Food Industry Showcase to the World	**Marangoni, A.**
299534	1-Apr-11	31-Aug-12	ES	Best Management Practices for Pollination & Pollinators: Promoting & Sustaining a Crucial Ecosystem Service	**Kevan, P.**

299535	1-Apr-11	31-Dec-13	PS	Maintaining sustainable sport opportunities in rural communities by communicating new research in turfgrass management on IPM and pesticide free turfgrass management.	**Lyons, E.**
299536	1-Apr-11	31-Mar-13	ES	Best Management Practices for Manure and Organic Waste Treatment Technologies: Use of Videos, Workshops and Research Notes to Enhance Adoption of Technologies	**Crolla, A.**
299537	1-May-11	31-Dec-13	FFH	Development of consolidated and comprehensive 'Food for Health' content for the Agri-Food and Rural Link KTT website	**Paliyath, G.**
299538	1-May-11	30-Apr-13	ARP	Planning for Agriculture: KTT to Engage Municipalities, Farmers and the Public	**Caldwell, W.**
299539	7-Jul-11	31-Dec-13	Open	CME KTT Outreach Seminar Series	**Lang, M.**
299540	1-May-11	31-Dec-12	PS	Development of an Ontario Dairy Cattle Welfare Symposium	**Leslie, K.**
299541	1-Apr-11	30-Apr-13	PS	Advisory and Outreach for Apiculture in Ontario	**Guzman-Novoa, E.**
299543	30-Apr-11	30-Apr-13	Open	Establishment of an Ontario site for CgFARAD at the University of Guelph for the translation and transfer of food animal drug residue avoidance and toxicant exposure knowledge	**Johnson, R.**
299544	1-Sep-10	31-Mar-11	ES	Understanding knowledge mobilization: Connecting science with policy and industry assocations	**Allen, E.**
299545	1-May-11	30-Apr-13	PS	A dynamic action threshold decision-making tool for soybean growers	**Hallet, R.**
299546	1-May-11	7-Jun-13	PS	Ontario Agri-Environmental Research Data Repository	**Johnston, W.**
299547	1-May-11	30-Jun-13	Open	Clear Language Research Summaries: Process, Training, Outputs and Dissemination	**Hawkins, L.**
299548	1-May-11	31-Aug-13	ES	Application of Participatory Model Building (PMB)to enhance knowledge translation in pollution prevention in the food processing sector	**Farahbahksh, K.**
299549	1-Apr-11	30-Apr-13	Open	Bridging the gap between science and policy in the agri-food sector through knowledge synthesis and translation (KST) support tools	**McEwen, S ./ Rajic, A.**
299550	31-Mar-11	31-Mar-13	ES	Evaluating the Role of Knowledge Translation & Transfer to Enhance Farm Organization Capacity to Participate More Effectively in Collaborative Decision Making	**Fitzgibbon, J.**
299551	1-Jun-11	1-Dec-11	Open	SPARK Research Articles and Research Videos to Support the KTT Program	**Roberts, O.**
299552	1-Jul-11	31-Dec-12	Open	Open Access and Copyright Issues Related to KTT for the OMAFRA-UoG Partnership	**Hambly, H/ Phillips C**
299553	1-Jul-11	30-Apr-13	PS	“Report on Research” – Implementation of an Extension Program based on Equine Industry Needs and Priorities using a multimedia approach through social media channels	**Thomason, J./ Ecker, G.**

299554	1-Feb-12	30-Apr-13	Open	The IP Academy	**Skimson, E.**
299557	1-Sep-12	31-Dec-13	ARP	Animal Welfare for Decision Makers	**Widowski, T.**
299558	1-Sep-12	31-Dec-13	ARP	Sourcebook of Best Practices in KTT/Extension with a Focus on Performance Measurement/Evaluation	**Hambly, H.**
299559	1-Sep-12	30-Sep-013	ES	Innovative Video and Web-based Knowledge Transfer Techniques for Beneficial Greenhouse Gases Management Practices for Ontario Dairy Farms	**Wagner-Riddle, C.**
299560	1-Sep-12	31/08/2013	ARP	Social Media for Engaging Stakeholders, Mapping and Mobilizing Rural Assets in the Headwaters Region (Dufferin County, Town of Caledon & Town of Erin)	**Fitzsimons, J.**
299561	3-Jul-012	31-Aug-13	PS	Design, Development and Evaluation of a mobile animal health and welfare diagnostic App "Preventing Heat Stress in Livestock and Poultry"	**Mahmoud, Q.**
299562	1-Oct-12	31-Oct-13	PS	Undergraduate Student Experiential Learning Program	**Robinson, A.**
299563	1-Sep-12	30-Jun-13	FFH	Research-Practice Design Charrette: Strengthening a program agenda for connecting children and youth to good food	**Hawkins, L.**
299564	1-Oct-12	30-Aug-13	PS	Honey & Pollen Plants for Ontario's Beekeepers: An Annotated Electronic Floral Calendar	**Kevan, P.**
299565	9-Sep-12	30-Jun-13	Open	Enhancing Best Practices through a Social Media Community of Practice for Farmers interested in Value Added Opportunities	**von Massow, M.**
299566	1-Nov-12	31-Dec-13	ARP	The Application of Innovative Web-Based Engagement for Community Projects	**Caldwell, W.**
299567	10-Sep-12	30-Apr-13	PS	The next steps for the Equine Guelph KTT program to reach the grassroots and associations of the equine industry	**Ecker, G./ Thomason, J.**
299568	30-Jul-12	30-Jun-13	PS	The development and evaluation of the effectiveness of different KTT methods to transfer research knowledge of animal welfare and on-farm food safety to Ontario pork producers	**Friendship, R.**
299569	21-Sep-12	30-Jun-13	ARP	'Nourishing Ontario': Community Food Project/Hub toolkit website, typology development and information dissemination project	**Landman, K.**
299570	1-Jun-12	31-Aug-13	EM	Developing Dialogue and Resources to Raise Awareness and Education Concerning Livestock Emergencies and Humane Euthanasia Methods	**Kelton, D.**
299571	1-Oct-12	31-Aug-13	EM	Enhancing the provincial response to an agricultural emergency through training in Incident Command System (ICS) for livestock and poultry industry organizations	**Kelton, D.**
299572	1-Nov-12	1-Nov-13	PS	Fostering proactive coccidiosis control management in the poultry industry by developing a self-guided, interactive training module and promoting on-farm usage	**Barta, J.**

Highly Qualified Personnel Program (HQP)

The Highly Qualified Personnel (HQP) Graduate Program provides scholarships to Masters and Doctoral students to enhance “market-readiness” by providing experiential learning opportunities beyond that normally available to graduate students working on their respective programs within the Agri-Food system.

The scholarships are offered to students that meet the eligibility criteria for entry into the various graduate programs at the University of Guelph. In 2012/13 there were two final competitions for HQP scholarships within this first 5-year funding window. Over the first 5 years of the program, HQP scholarships have been awarded to three Masters by Coursework students, 52 Masters by thesis students, 50 Doctoral students and one DVSc student. The early recipients of the HQP scholarships have now graduated, while 79 students still remain to complete their degree programs over the next 1 or 2 years.

The only academic course requirement for support within the OMAF/MRA HQP program is enrollment in a specifically tailored graduate course, UNIV 6050. This new HQP course is designed to expose students to various aspects of business practices, commercialization and the impact of Agri-food industries on other societal issues.

All HQP students must also participate in at least one semester of job shadowing/work experience. Of these placements, 51 students have selected private companies, 10 students have been involved with OMAF/MRA personnel at various locations, while the other students chose work placements with local, provincial or federal government agencies

A major initiative this past year has been to realign the HQP website to conform to other initiatives within the OMAF/MRA-UofG program. The new website will be used for applications for students entering the HQP program from Fall 2013 onwards. The budget projections for completion of the first 5-year HQP program are within initially established guidelines.

Animal Health Laboratory:

AHSI concluded on April 30, 2013. A wrap-up presentation of completed projects was performed on November 8, 2012. A publication showcasing all AHSI projects was produced in winter/2013.

To view each publication see:
http://www.uoguelph.ca/omafra_partnership/en/partnershipprograms/ASHI.asp

New test development projects:

AHSI Project 09-02: (Completed): Determination of the prevalence of anthelmintic resistance in Ontario sheep flocks with indicators of gastrointestinal parasitism (Project Lead: Dr. Andrew Peregrine)

AHSI Project 09-05: (Completed): Development and assessment of a diagnostic ELISA for *Clostridium perfringens* Cpb2 toxin, with special reference to swine and cattle (Project Lead: Dr. John Prescott)

AHSI Project 09-08: (Completed): Mycoplasma speciation by molecular biology assays (Project Lead: Dr. Hugh Cai)

AHSI Project 09-11: (Completed): Development of molecular typing method for the characterization of *Giardia duodenalis* (Project Lead: Dr. Hugh Cai)

AHSI Project 09-14: (Completed): DNA bar-coding of coccidial parasites of production animals: Development and field testing of a LightCycler-based quantitative test(Project Lead: Dr. John Barta)

AHSI Project 09-15: (Completed): Rapid detection and typing of *Haemophilusparasuis* (Project Lead: Dr. Hugh Cai)

AHSI Project 09-17: (Completed): Development of *in-situ* hybridization (ISH) for diagnosis of *Coxiellaburnetii*and *Toxoplasma gondii*in small ruminants(Project Lead: Dr. M. Hazlett)

AHSI Project 09-22: (Completed): Optimization and validation of real-time PCR to determine the prevalence of pathogenic and non-pathogenic *Brachyspira*spp in Ontario layer flocks and to identify risk factors associated with dirty egg syndrome (Project Lead: Dr. D. Slavic)

AHSI Project 09-25: (Completed): Validation of serum amyloid A (SAA) an acute phase protein as marker of inflammation in horses (Project Lead: Dr. B. Hoff)

AHSI Project 10-01: (Project cancelled): Using glycantyping to predict outcome in Ontario sow herds experiencing porcine reproductive and respiratory (PRRSV) outbreaks. (Project Lead: Dr. J. Alsop)

AHSI Project 10-02: Validating and implementing new real time PCR tests and ELISAs for mammalian viruses (Project Lead: Dr. S. Carman)

AHSI Project 10-03: (Completed): Molecular typing of *Coxiellaburnetii*identified in Ontario by multiple-locus variable number of tandem repeat analysis (MLVA) (Project Lead: Dr. Shu Chen)

AHSI Project 10-10: (Completed): LHV-4 in Ontario rabbits (Project Lead: Dr. P. Turner)

AHSI Project 11-02: (Completed): Avian *Chlamydophila* and *Coxiella* Infection in Ontario: Molecular Diagnosis Method Development (Project Lead: Dr. Hugh Cai)

AHSI Project 11-04: (Completed): Development of immunohistochemical tests for small ruminant lentiviruses (caprine arthritis-encephalitis virus, maedi-visna virus) (Project Lead: Dr. Josepha DeLay)

AHSI Project 11-05: (Completed): Validation of MALDI-TOF for bacterial speciation (Project Lead: Dr. Durda Slavic)

AHSI Project 11-06: (Completed): Comparison of four different sample types and three different culture methods for *Salmonella* spp. detection in poultry environmental samples(Project Lead: Dr. Durda Slavic)

AHSI Project 11-07: (Completed): Evaluation of Massively Parallel Sequencing for Detection and Characterization of Viruses (Project Lead: Dr. Davor Ojkic)

AHSI Project 11-09: (Completed): Genotyping of fowl adenoviruses and infectious bursal disease viruses from Ontario broiler breeder flocks (Project Lead: Dr. Davor Ojkic)

AHSI Project 11-10: (Completed): Development of Rapid Identification Assays for Veterinary *Mycoplasma* Using Matrix-Assisted Laser Desorption Ionization-Time of Flight Mass Spectrometry (Project Lead: Dr. Hugh Cai)

AHSI Project 11-12: (Completed): Equivalency for Strong Positive Serum ELISA Johne's Disease Test Results AND Interpretation of Repeated Testing for Johne's Disease in Ontario Dairy Herds(Project Lead: Dr. David Kelton)

Surveillance projects:

AHSI Project 09-01: (Completed): Disease surveillance in a selected group of hog producers with minimal exposure to veterinary diagnostic services (Project Lead: Dr. Tim Blackwell)

AHSI Project 09-03: (In progress): Enhanced surveillance for viral and bacterial pathogens in commercial broiler chicken flocks in Ontario (Project Lead: Dr. Michele Guerin)

AHSI Project 09-04: (Completed): Surveillance of disease agents of public health and agricultural significance in wildlife living on farms in Ontario (Project Lead: Dr. Claire Jardine)

AHSI Project 09-06: (Completed): A survey of risk factors associated with condemnation of sheep carcasses due to *Cysticercusovis* infection (Project Lead: Dr. Paula Menzies)

AHSI Project 09-07: (Completed): Integrating milk based cow and bulk tank test data, dairy cattle inventory data and GIS location data into the AHL surveillance capacity (Project Lead: Dr. David Kelton)

AHSI Project 09-09: (Completed): Investigation of infectious etiology of small ruminant abortion in Ontario with emphasis on *Chlamydophila* spp. and *Coxiellaburnetii* (Project Lead: Dr. Hugh Cai)

AHSI Project 09-10: (Completed): Epidemiological analysis of *Mycoplasma bovis* isolated from Canada in the past 30 years (Project Lead: Dr. Hugh Cai)

AHSI Project 09-13: (Completed): Refining the Ontario Swine Veterinarian-Based Surveillance (OSVS) system for real-time surveillance and integration with laboratory-based surveillance (Project Lead: Dr. Bob Friendship)

AHSI Project 09-16: (Completed): Is the treatment of exudative epidermitis in pigs becoming a problem because of the emergence of antimicrobial resistance? (Project Lead: Dr. R. Friendship)

AHSI Project 09-18: (Completed): Associations between the incidence of *Cryptosporidium parvum* and selenium status in neonatal dairy calves in Ontario(Project Lead: Dr. K. Leslie)

AHSI Project 09-19: (Completed): Surveillance for inclusion body hepatitis in broiler breeders (Project Lead: Dr. D. Ojkic)

AHSI Project 09-20: (Completed): The development and design of a surveillance system for antimicrobial resistance in agricultural animal pathogens in Ontario(Project Lead: Dr. D. Pearl)

AHSI Project 09-21: (Completed): Developing and implementing techniques to harvest additional surveillance information from existing AHL diagnostic laboratory data (Project Leads: Dr. C. Revie and Dr. J. Sanchez)

AHSI Project 09-23: (Completed): Ear tip necrosis in swine (Project Lead: Dr. R. Friendship)

AHSI Project 09-24: (Completed): Surveillance of antimicrobial resistant enteric bacteria in antimicrobial-free and conventional broilers in Ontario – a pilot study (Project Lead: Dr. M. Guerin)

AHSI Project 09-26: (Completed): Proposal to determine the prevalence of *Coxiellaburnetii* infection in sheep flocks and goat herds in Ontario and their farm workers (Project Lead: Dr. M. Guerin)

AHSI Project 09-27: (Completed): Surveillance for enteric parvoviruses in poultry – a pilot study (Project Lead: Dr. É. Nagy)

AHSI Project 09-28: (Completed): Risk-based surveillance of respiratory infections in growing pigs (Project Lead: Dr. Z. Poljak)

AHSI Project 09-29: (Completed): Identification of novel toxin gene(s) associated with type A *Clostridium perfringens*-associated haemorrhagic abomasitis of calves in Ontario (Project Lead: Dr. J. Prescott)

AHSI Project 09-30: (Completed): Genotyping and detection of *Leptospira spp*. in wildlife reservoir hosts in Ontario through comparison of immunohistochemical and polymerase chain reaction genotyping methods (Project Lead: Dr. K. Shearer)

AHSI Project 09-31: (Completed): Case series of pandemic H1N1 in Ontario turkey breeder flocks (Project Leads: Dr. M. Guerin and Dr. Z. Poljak).

AHSI Project 10-04: (Completed): Johne's Disease in Ontario's small ruminant dairy industries: Prevalence, potential risk factors, and performance comparison of serum, milk and fecal diagnostic methods (Project Lead: Dr. A. Jones)

AHSI Project 10-05: (Completed): Expanded data transfer from AHL to CAHSN: In support of improved notifiable disease reporting to CFIA, emergency preparedness, timely disease detection and data analysis (Project Lead: Dr. H. Kloeze)

AHSI Project 10-06: (Completed): Comprehensive evaluation of bacterial hazards in the upper respiratory tract of swine by terminal restriction fragment length polymorphism (T-RFLP) analysis (Project Lead: Dr. J. MacInnes)

AHSI Project 10-07: (Completed): Regional PRRS elimination trial (Project Lead: L. Moser)

AHSI Project 10-08: (Completed): Summer student assistantships, AHL Mammalian Virology and Bacteriology (Project Leads: Dr. D. Slavic and Dr. S. Carman)

AHSI Project 11-01: (Completed): Salmonella Enteritidis baseline study in Ontario commercial broilers (Project Lead: Dr. Michele Guerin)

AHSI Project 11-03: (Completed): Detection of *maedivisna* virus infection in sheep (Project Lead: Dr. Paula Menzies)

AHSI Project 11-08: (Completed): Contact network based disease spread model in Ontario (Project Lead: Dr. Javier Sanchez)

AHSI Project 11-11: (Completed): Diagnosis and surveillance of *chlamydia*-like organisms in Ontario rainbow trout (Project Lead: Dr. John Lumsden)

Farm-call surveillance project:

AHSI Project 09-12: (Completed): Veterinary Farm Call Syndromic Surveillance (Project Lead: Kathy Zurbrigg) is fulfilling the requirement for farm-call surveillance and was initiated in Q4 2008/09.

Emergency Plans

AHSI Project 10-09: (Completed): AHL necropsy laboratories emergency preparedness exercises and incident command system training(Project Lead: Dr. M. Spinato)

Emergency Preparedness

The Canadian/Ontario food animal industry must be constantly vigilant and prepared for an outbreak of a contagious animal disease. Hence all commodity groups have a shared responsibility to develop crisis management plans and exercise effective collaboration and communication strategies to ensure an effective response during a crisis.

On October 11, 2012 (Kemptville) and October 24, 2012 (Guelph), a foreign animal disease (FAD) simulation was held in the AHL post-mortem laboratories. There were two objectives of the exercises: 1) was to test and validate the standard operating procedures regarding management of an FAD investigation in the post-mortem laboratory; 2) evaluate joint coordination and communication among the AHL, University of Guelph, and the Canadian Food Inspection Agency. Both laboratories were involved with necropsy of sheep infected with suspected foot and mouth disease (lips and toes disease), collection of tissue samples, and communicating with CFIA staff who were involved with picking up samples to forward for confirmatory diagnosis. AHL staff conducted appropriate steps for disposing of infected carcasses, disinfection of contaminated facilities and decontamination of AHL staff. For further details see AHL8.

Veterinary Clinical Education Program

VCEP funding supports the following new initiatives which are critical components in the development of the OVC's Integrated Plan and maintenance of full accreditation status. (OVC 2012 – 2017 Integrated Plan: http://www.ovc.uoguelph.ca/plan/)

For OVC to remain a fully accredited veterinary college and to attract and to retain qualified food animal veterinarians and graduate students, state-of-the-art equipment and teaching facilities are critical. VCEP strategic funding has been a valuable resource to ensure the success of these efforts.

Veterinary Public Health

Presented below are two initiatives related to the area of veterinary public health that speak directly to the interests of OMAFRA and to OVC's priorities defined in OVC's Integrated Plan.

Centre for Public Health and Zoonoses (CPHAZ) http://www.ovc.uoguelph.ca/cphaz/

The Centre for Public Health and Zoonoses (CPHAZ) was established in 2006 in recognition of the strong tradition of research and education in public health at the University of Guelph. The CPHAZ is a virtual centre with approximately 50 faculty members from 13 departments in 6 colleges at the University of Guelph. The aim of the CPHAZ is to provide focus and leadership in research, education, and knowledge dissemination in public health at the human-animal-environmental interface. Members are actively engaged in collaborations with researchers in animal and human public health organizations at the federal, provincial, and local / regional level, as well as with commodity groups, NGOs, and others.

This new research laboratory facility provides infrastructure for research on zoonotic and foodborne diseases from the molecular level to the population level, and the space and equipment are available for short or long term use by CPHAZ members and collaborators. CPHAZ is exploring opportunities for co-housing scientists from other public health organizations within the laboratories.

Other key activities this year have included the Spring symposium, to showcase research and other public health activities in the Guelph community. This event is held every other year, and has continued to grow – this year there were over 190 attendees, from multiple universities and from local, provincial, and federal organizations involved in animal and human health. The Centre has also hosted a number of small workshops to network and to explore opportunities for future collaborations; this year, these included discussions on vector-borne diseases in Canada, emerging zoonoses, and collaborations with local public health initiatives.

Students are a key part of CPHAZ, with approximately 85 DVM and graduate student members. In response to student requests, regular informal meetings are hosted to allow students to meet scientists from local, provincial and federal animal and human public health organizations. This provides an opportunity for the students not only to network, but also to hear about different types of potential future employment.

Networking among CPHAZ members has resulted in new collaborative initiatives, which have attracted research funding. In the last five years, CPHAZ members have published over 550 papers on public health at the human-animal-environmental interface. The largest contributions

are to zoonotic disease research (approximately 200 publications) and food safety (approximately 150 publications). A key feature of the research is collaboration; in the past 5 years, CPHAZ members have co-published with over 200 groups / organizations. These consist of over 90 Canadian groups, including 28 government organizations (8 federal, 13 provincial, 7 local / regional), 20 Universities, 25 industry groups, 11 hospitals, 8 NGOs, and 5 research institutes. For the US and international, CPHAZ researchers have co-published with over 125 groups, including 16 government organizations, 76 Universities, 16 industry groups, 5 hospitals, 6 NGOs, and 8 research institutes. Recent research activities include diverse areas such as Rabies control, antibiotic resistance and prudent use of antibiotics, zoonotic and potentially zoonotic diseases such as MRSA and zoonotic influenza, and control of food safety pathogens from farm to fork.

OMAF/MRA – U of G Agreement funding to VCEP has provided critical support in the development of the Centre and growing it into an internationally recognized source of public health expertise. More detailed information on CPHAZ projects is available on the website at: http://www.ovc.uoguelph.ca/cphaz/

Masters in Public Health

The University of Guelph Master of Public Health (MPH) program just completed its fifth academic year. Given this time period, the MPH program decided to review its curriculum and assess student satisfaction.

The MPH program surveyed all graduates to assess their learning against the Public Health Agency of Canada Core Competencies for Public Health. On average graduates felt that they had an in-coming competency level of approximately 2 out of 5 and left the program with a competency level of 4 out of 5. Program satisfaction was rated at 4.5, out of 5, as well as the quality of instruction. 34 out of 35 respondents had found work or were continuing their education within 6 months of graduation.

Demand for the MPH program has been increasing each year. Please see the table below:

Admission Cycle	Number of Completed Applications Received	Number of Seats Available
September 2009	43	15
September 2010	113	20
September 2011	179	20
September 2012	203	20
September 2013	258	20

In November 2012, the MPH program held its 4th annual Public Health Forum where students report on their projects completed during their practicum placements. This year there were approximately 110 people register for the event, which is the most to date. Dr. George Pasut, Vice-President of Research for Public Health Ontario was the keynote speaker for this event.

The program has graduated 61 students including 6 DVMs to date. We have a projected 2013-2014 cohort that includes 20 full-time students, one part-time student, into international students. 2 of the 20 full-time students are DVMs.

Below are a sample positions and workplaces of our MPH graduates.

Where Our Graduates Work

- Analyst, Primary Care, Prevention and Cancer Control, Cancer Care Ontario
- Health Promoter in Tobacco Control and Communicable Disease Control, Hastings & Prince Edward Counties Health Unit
- Health Promotion Specialist, Wellington Dufferin Guelph Public Health
- Infection Control Services Coordinator, Credit Valley Hospital
- Policy Analyst, Health Information, Analysis and Research Division, First Nations and Inuit Health Branch, Health Canada
- Principal and Consultant, Appropriate Development
- Program Officer for the Ecosystems and Human Health Program, International Development Research Centre
- Project Coordinator, Infection Prevention and Control Core Competencies, Public Health Ontario
- Public Health Dietitian, Haldimand-Norfolk Health Unit
- Public Health Planner, Region of Waterloo Public Health
- Research Analyst, McMaster University

Where Our Graduates Continue to Study

- Certificate in Harm Reduction, York University.
- Faculty of Dentistry, University of Toronto
- Faculty of Law, Western University
- Faculty of Medicine, McMaster University
- Faculty of Medicine, University of Toronto
- PhD Program, Population Medicine, University of Guelph
- PhD Program, Department of Geography, McGill University

Where Our Students Complete Their Practicum Training

- AIDS Committee of Guelph
- Association of Local Public Health Agencies
- Cancer Care Ontario
- Chicken Farmers of Ontario
- Halton Region Health Department
- Health Canada
- Ontario Food and Nutrition Strategy
- Ontario Ministry of Health and Long-Term Care
- Peel Public Health
- Public Health Agency of Canada (various locations)
- Public Health Ontario
- Region of Waterloo Public Health
- Wellington-Dufferin-Guelph Public Health

Rural Veterinary Practitioner Development

Rural Veterinary Practice

The intent is to provide focused experiential learning opportunities for students interested in practicing in rural areas and prepare them to have sustainable careers.

The Bovine Education Trust, (http://www.ovc.uoguelph.ca/bovineeducationtrust/) a charitable endowment fund established as a partnership between the Ontario Association of Bovine Practitioners (OABP) and the Ontario Veterinary College (OVC), was developed to provide veterinary students with the real-life learning opportunities and on-the-job experience that they need to develop successful careers serving the dairy and beef industries. Support funding has been provided through the Veterinary Clinical Education Program in order to allow the OVC and the OABP to build up a sustainable endowment fund. In the 2012/13 academic year 8 students received funding to assist them in undertaking food animal related experiential opportunities ranging from specialized herd health practices to general clinical practice in rural communities.

During the 2012/13 academic year OVC continued to deliver an elective equine primary care rotation for final year students. Primary care experiential learning in cattle, small ruminants and swine are currently offered through our existing VCEP supported field service clinics. However, there is no established equine field service, hence the need to develop this experiential learning opportunity in order to ensure graduating students have the necessary primary care skills to be able to deliver veterinary services to rural horse owners. This was a one week hands-on rotation, offered three times during the year. The supervising faculty worked in conjunction with private equine practitioners to provide the students with practical hands-on learning opportunities.

The OVC food animal faculty continue to deliver a pilot program, where DVM students from years 1 -3 are scheduled to go on farm calls with the instructor and final year veterinary students. These students are mentored by both the faculty and senior students, providing them with exposure to food animal practice and hands-on clinical experience to augment their classroom and laboratory knowledge and skills.

The faculty have developed an enhanced Rural Community Practice stream and a comprehensive Food Animal stream for the final year of the DVM curriculum. This proposal is in the process of being approved by the University academic committees for implementation in September 2014.

OTHER REPORTING

Livestock Inventories

U of G regional campus or research station	Opening May 1, 2012	Sold	Died [1]	Transferred		Born or Acquired	Closing April 30, 2013
				in	out		
Alfred							
dairy	57	21	3	0	0	41	74
Kemptville							
dairy	90	46	5	0	0	58	97
New Liskeard							
beef	0	0	0	0	0	0	0
Ridgetown							
dairy	86	35	2	0	1	47	95
beef	36	15	0	1	0	14	36
swine	0	0	0	0	0	0	0
Guelph							
Arkell equine	67	23	1	0	3	9	49
Arkell poultry	8,294	1,684	8,304	988	133	11,073	10,234
Arkell swine	1,336	3,051	1,664	0	229	4,972	1,364
Alma aqua	47,161	6,840	26,380	0	11,952	40,883	42,872
Elora dairy	305	85	53	33	84	187	303
Elora beef	560	181	3	0	0	58	434
Ponsonby dairy	101	26	10	5	26	43	87
Ponsonby (GAF) [2]	25	135	50	252	112	105	85
Ponsonby sheep	343	172	15	0	35	215	336
Clinical Studies							
dairy	33	12	16	29	0	0	34

[1] These figures include animals that are born dead and those which are euthanized for humane, disease and research reasons.

[2] General Animal Facility

University of Guelph/OMAF/MRA Equipment Inventory & Library Resources

Summary of U of G / OMAF/MRA Equipment Inventories				
For Fiscal 2012/13				
Location Name	**Opening Balance ($'000)** (May 1, 2012)	**Acquisitions ($'000)** (during 12/13)	**Dispositions ($'000)** (during 12/13)	**Ending Balance ($'000)** (April 30, 2013)
Summary (totals of detailed data, below)				
All OMAF/MRA Program locations	**45,755,277**	**2,969,783**	**308,200**	**48,416,860**
Individual Locations				
Alfred Campus	882,227	0	0	882,227
Alma Aquaculture	424,665	0	0	424,665
Arkell Equine	26,000	0	0	26,000
Arkell Feedmill	832,000	0	0	832,000
Arkell Poultry	844,255	0	0	844,255
Arkell Swine	398,000	85,000	0	483,000
Elora Beef	1,378,814	91,390	0	1,470,204
Elora Dairy	836,221	0	0	836,221
Elora Plant Ag.	2,629,505	25,000	10,000	2,644,505
Emo	70,000	0	0	70,000
Guelph RSO	3,219,948	98,520	191,000	3,127,468
Guelph Turfgrass	138,669	42,722	0	181,391
Kemptville Campus	726,196	21,000	0	747,196
Bradford Muck Stn	139,000	16,000	0	155,000
NLARS	798,395	0	0	798,395
Plant Ag. – BDDC	1,938,359	1,048,387	0	2,986,746
Ponsonby Dairy	312,337	0	0	312,337
PGAF	70,500	0	0	70,500
Ponsonby Sheep	41,000	0	0	41,000
Ridgetown Campus	4,194,962	612,304	36,200	4,771,066
Simcoe	524,910	0	0	524,910
Thunder Bay	63,000	0	0	63,000
Woodstock	403,414	28,800	15,000	417,214
Vineland	1,797,500	0	0	1,797,500
Lab Services	23,065,400	900,660	56,000	23,910,060

Library Resources				
Location		Acquisitions	Dispositions	Replacement Value
Alfred		10,500	0	1,655,100
Kemptville		0	0	1,163,440
Ridgetown		6,938	0	1,274,972

Proof of Principle (POP) Program

OMAF/MRA's Proof-of-Principle (POP) Fund falls outside of the OMAF/MRA-U of G Agreement, however it is directed toward University inventions that fall within OMAF/MRA's research objectives, most of which have been developed through the Agreement funding. In 2012/13, the POP program was successful in strengthening the commercial potential of the following technologies.

Researcher: Prescott – Development of a vaccine for necrotizing enteritis of foals
Amount: $25,000
Status: In-progress
Result: Research continues

POP funding was provided to Dr. Prescott to support the early development of a commercial vaccine using his discovery of a new bacterial toxin (NetE) from *C perfringens* in the gut of horses. This funding enabled commercially aligned research that elucidates and defines the capability of this vaccine for necrotic enteritis of foals. Specifically, purified antigens were produced, neutralizing antibodies were demonstrated to be efficacious, antibody prevalence in the horse population was evaluated, and a clinical trial was completed to evaluate the immunogenicity of the putative vaccine (antigen made from the toxin). As well, diagnostic assays have been developed which should also result in a second commercial product for animal reference labs. Research continues, however the data generated to date has been used to significantly improve the quality of a PCT Patent Application for this vaccine. The Catalyst Centre has initiated discussions with several animal vaccine companies through meetings at Vet Health Global and they are evaluating the technology, patent and market opportunity. We are optimistic that we will license the technology over the next year.

Researcher: Kott – High rosmarinic acid mint to treat inflammation in horses
Amount: $18,500
Status: Complete
Result: Success - License

The purpose of the POP funds was to conduct an *in vitro* study using mint high in rosmarinic acid to prove that the mint has anti-inflammatory properties. The results were to be used to support further *in vivo* studies in horses and in humans, with the eventual aim of finding additional licensing partners for the mint. This project was successful, leading to a publication and to great interest among local companies in using the mint for horses.

The Catalyst Centre has entered into a license agreement for all uses with the company Ceapro, who is actively developing the commercial scale agronomics of the mint.

Researcher: Squires – Boar taint
Amount: $24,000
Status: Complete
Result: Success – Sponsored Research

The support of POP funding for this project has moved the technology closer to market. Industry interest and involvement continues to be strong. The current set of markers explains a large proportion of the genetic variation of both skatole and androstenone in boars. With regard to industrial support, JSR Genetics has entered an agreement to continue funding the project. In Canada, Ontario Swine Improvement Inc. has undertaken a project with the University to sample 900 Canadian pigs from three lines of pigs, extract DNA, validate markers in those lines, develop breeding selection methods and work to create the first line of 'low boar-taint' pigs. This is a $539,000 project leveraged in part due to the funding received from the POP program.

Researcher: Loewen – Tomatoes with early red colouring
Amount: $12,225
Status: Complete
Result: Research Continues

The funding from the OMAF/MRA POP grant was to determine the genetics of an advanced fruit colour trait in tomato, which would be useful in the production of tomato pastes. Based on results in the 2009 growing year, it is thought that the trait is controlled by at least two recessive genes. Further studies in 2010 have shed further light on this conclusion, possibly enabling the breeding of an early colouring line of tomatoes. This study has evolved into a PhD thesis for Steve Loewen, and results are still promising. As of June 2012, the inheritance of the trait has been determined and fully homozygous lines have been developed. The line is also one generation away from having 'near isogenic' lines suitable to determine the identity of the genes responsible so that a patent application can be filed. This result is expected by the end of the growing season in 2013. Success is expected to have a strong impact on the processing tomato industry worldwide.

Researcher: Mine - Phosphopeptide-based interventions
Amount: $25,000
Status: Complete
Result: Marketing continues

This was a project designed to support further *in vitro* work to prove that phosphoserine molecules derived from egg yolk can have a meaningful effect on oxidative stress. Results so far confirm that short dimer peptides indeed have an effect on oxidative stress, and the mechanism of action has been confirmed and validated. The *in vitro* cell model work was completed in fall 2012. The work confirmed that TNF alpha-induced inflammation was inhibited, as well as TNF-alpha induced insulin resistance.
A US patent for this technology was recently issued, increasing the value of this asset. The Catalyst Centre continues to promote this technology to relevant industry partners.

Researcher: Corredig – Soy cheese
Amount: $5,500
Status: Complete
Result: Scientific success – marketing continues

This was a small, $5,500 grant to help provide proof of concept that soy and dairy proteins could be co-fermented to produce viable cheese. This could lead to the development of products that taste like cheese, but are reduced cost and contain less saturated fat. The project was successful, leading to some positive examples of soft cheeses, in addition to the filing of a patent application. A non-confidential marketing summary has been produced and marketing is underway – it is hoped that this technology will find useful application in the fields of soft, processed, and spreadable cheeses.

Researcher: Lencki - 1,3-Diacylglycerols for hard fat applications
Amount: $45,000
Status: Complete
Result: Scientific success – marketing started

This project aims to produce 1,3-DAG fats that could behave in much the same way as cocoa butter, and perhaps be used as a healthier and less expensive alternative to cocoa butter. Applications include energy/protein supplements and confection products. In June 2012 the lab achieved a positive result, which was used as the basis of a PCT patent application filed in early August 2012. As of 2013, initial discussions are taking place with companies that may be able to help with process engineering and scale-up.

Schedule G (Business Continuity, Emergency Response and Surge Capacity Planning)

Agriculture and Food Laboratory

During the 2012/13 fiscal year, the AFL maintained the Emergency Surge Capacity process. Additional yearly milestones have not been defined.

These Business Continuity communication plans were utilized on five occasions in 2012/13.

In each case, OMAF/MRA was notified of an incident with the potential to impact receipt of OMAF/MRA samples or delivery of results to OMAF/MRA with established project requirements.

The following is a brief summary of those events:

- One event of University-wide closure due to inclement weather, enacting essential services protocol.
- Two incidents of instrumentation malfunctions requiring intervention.
- Two incidents of OMAF/MRA's transportation service provider incurring equipment malfunction and subsequent delay of sample delivery to the AFL.

The AFL will continue to work in partnership with OMAF/MRA to test and to implement continuous improvements to the Business Continuity, Emergency Response and Surge Capacity Planning documents and processes. Schedule "G" activities consolidate our organizations' efforts to address incidents and events of critical concern. The outcomes of these incidents and recovery activities influence our abilities to fulfill our collective mandate to protect the public health of Ontarians through food safety.

Animal Health Laboratory

During 2012/13 AHL completed Year 5 Milestone of Schedule G (see below) and in Performance Indicator 'AHL#8'.

Year 5 Milestone:

The University shall provide a plan that includes further enhancements to the plan in Year 4 in the areas of notification, a critical infrastructure component and horizontal integration component.
The parties shall test the plan through a Full Scenario Exercise.

The University shall update the plan for additional Emergency Surge Capacity based on lessons learned from the Table Top Exercise. The updated plan shall be tested as part of the business continuity Full Scenario Exercise.

Various scenarios were tested in a range of foreign animal disease simulations as detailed below, involving horizontal integration of OMAF/MRA, CFIA, the AHL, and various commodity sectors. As well, the surge capacity of the AHL was augmented and tested.

1. October 11, 2012 – An FAD Simulation exercise was held at AHL-Kemptville to test the protocols for handling and reporting a FAD suspect. The exercise involved small

ruminants affected with “lips and toes disease” (surrogate for foot-and-mouth disease). The exercise involved email and telephone communications to CFIA and OMAF/MRA according to the reporting protocol and SOP. All communications were clearly identified as “simulation”. October 24, 2012 - AHL Guelph Necropsy Laboratory FAD Emergency Exercise, Small Ruminant “lips and toes disease” Simulation was held, and followed the same criteria as the AHL-Kemptville exercise.

2. The FAD exercises were deemed a success in both of the AHL postmortem laboratories. Plans were formulated to address the recommendations of evaluators from CFIA and OMAF/MRA. The AHL will continue to conduct annual table-top or operational exercises to enhance and maintain its emergency preparedness status.
3. October 16, 2012, a Small Ruminant Foreign Animal Disease Workshop was held at the Springfield Golf and Country Club, Guelph, and attended by 41 participants from the AHL, OMAF/MRA, CFIA, and sheep and goat producers. The AHL contracted the Ontario Livestock and Poultry Council (OLPC) to organize and report on the simulation, including the facilitated session by Bryan Boyle on FAD Response Preparedness.
4. January 1, 2013 - Automated reporting via LabVantage of the 117 notifiable hazards listed in the Ontario Animal Health Act was developed, tested, and implemented, effective January 1, 2013, and has worked efficiently to alert OMAF/MRA of occurrences of these various hazards.
5. The AHL-OMAF/MRA-CFIA Animal Health Reporting Protocol flowchart is updated periodically and distributed to all involved staff.
6. February 21, 2013 - University of Guelph/Emergency first responders toured the AHL postmortem and TSE labs in PAHL building 89. The postmortem suite and TSE lab 1822 have been equipped with panic buttons and personal pendants linked to the central U of G police station for instant notification of any emergency encountered by a staff member who may be working alone.
7. March 5, 2013 – Incident Command System Workshop – organized by the Ontario Livestock and Poultry Council with the support of OMAF/MRA and the U of G – attended by Dr. Grant Maxie.
8. February 1, 2013 – In order to supplement emergency surge capacity the AHL purchased an ELISA automation system reconfiguration and software upgrade for ~$150K. This upgrade increases our throughput capacity for ELISA testing from 450 samples/5 plates per batch to 900 samples/10 plates per batch.
9. Planning meetings were held in the fall and winter of 2012/13 for a 2-day FAD simulation in the summer of 2013. Day 1 disease simulation will be a Poultry Foreign Animal Disease Workshop to be held on Thursday, June 13, 2013 in Guelph, which will involve the Feather Board Command Center (FBCC), the Ontario Ministry of Agriculture and Food (OMAF), the U of G’s Animal Health Lab (AHL) and the Canadian Food Inspection Agency (CFIA). The AHL contracted the Ontario Livestock and Poultry Council (OLPC) to organize and report on the simulation.
10. The simulation will involve role playing within an Incident Command System structure, e.g. Command, Information, Liaison, Finance, Operations, Planning, and Logistics.

The general objectives of the simulation will be to:

1. Increase awareness of how a foreign animal disease outbreak could unfold.
2. Understand the response activities needed for an animal disease emergency within the ICS structure.
3. Determine personnel and stakeholder groups’ roles and responsibilities when assisting and supporting an animal disease response.

4. Identify critical areas that may be impacted by an animal disease emergency.

A Day 2 table-top continuation of the simulation will be carried out a week later (June 21, 2012) with the FBCC objectives of:

1. Exercise inter-agency info-sharing agreements
2. Demonstrate coordinated mapping
3. Attempt control of inputs and product movement
4. Demonstrate functional Incident Command System
5. Procurement and delivery of ARMMI resources

The Catalyst Centre – Schedule N

The table below is a listing of relevant intellectual properties licensed and patented under the Agreement as of 2012/13.

Technologies by Inventor		
Inventor / Tech ID	**Technology Title**	**Status**
Raizada 20120308	Methods and compositions for modulating developmental gene expression in plants	Patented
Hill 20080825	Mixed soy and dairy gels formed with acid and rennet combined	Patented
Lencki 20100430	The Development of a Functional DAG Fat	Patented
Raizada 20101130	GlnLux: A Biosensor to Permit Discovery and Improvement of Nitrogen-Fixing Microbes and to Inexpensively Screen for Effective Interactions Between Nitrogen-Fixing Microbes and Crop Plants	Patented
Raizada 20120309	Nitrite transporter	Patented
Hall 20110906	Plant expression vectors for high-level recombinant protein production	Patented
Mohanty 20100923	Biofibre reinforced recycled composite resins	Patented
Mohanty 20121219	High HDT; High Impact PLA Formulations	Patented
Mohanty 20130306	Distillers' Grains - Based Biodegradable Formulations and Methods for Making Those	Patented
Prescott 20120416	A Novel Toxin (NetE) in Type A Clostridium Perfringens	Patented
Raizada 20120312	Promoter motifs responsive to nitrate and rehydration	Patented
Zheng 20120330	HydroMat Green Roof Production System	Patented
Hall 20110906	Plant expression vectors for high-level recombinant protein production	Patented
Hall 20130211	Plant expression vectors for high-level recombinant protein production	Licensed
Nagy	A non-pathogenic serotype 4 fowl adenovirus (FAdV-4) as vaccine against hydropericadium/hepatitis syndrome (HPS) of	Licensed

20130301	chickens.	
Mohanty 20120716	Lignin Based Blends and Composites/Hybrid Green Composites from Lignin	Licensed
Mohanty 20130114	Biofibre reinforced recycled composite resins	Licensed
Prescott 20121207	Protective immunogens against Clostridium perfringens-induced necrotic enteritis in chickens	Licensed
Holub 20120625	Custom Feed Supplement to Maximize Omega-3 Fatty Acids in Cow's Milk	Licensed
Forsberg 20121114	Transgenic animals expressing salivary phytase (Enviropig)	Licensed
Kott 20111120	CSPW lines - Cabbage seedpod weevil resistance population.	Licensed
Mallard 20121010	Method of identifying high immune response periparturient animals	Licensed
ZZ Barley 20120606a	GB096001	Licensed
ZZ Soybean 20120502b	Soybean for Tofu and Natto	Licensed
ZZ Soybean 20120502	OAC 10-20C	Licensed
ZZ Barley 20120606b	GB096002	Licensed
ZZ Wheat 20120925	UGRC19/2-T2	Licensed

APPENDIX A

SPARK Research Stories with OMAF/MRA Sponsorship 2012/13

SPARK research news articles can be accessed from:
http://www.uoguelph.ca/research/research-publications

General information on the University's research communications department can be found at:
http://www.uoguelph.ca/research/services-divisions/research-communications

All SPARK media materials acknowledge the support of the OMAF/MRA-U of G Partnership in funding of the subject material presented.

In Print

The University of Guelph *Research* magazine highlights the University's diverse research strengths in a concise news format. Published three times a year, each issue focuses on a specific area of research activity. *Research* is written and produced by SPARK, which also produces videos for the magazine's electronic version.

Summer 2012 Issue – The research of education

Learning gets deep working with sheep
Researcher: Paul Luimes

Catalyzing new connections for education technology
Researchers: Lori Jones and Haridoss Sarma

2012-13 – Agri-food Yearbook

Environmental Sustainability:
Personalizing on-farm green technology
Researcher: Bill Van Heyst

Managing ammonia with new sensor technology
Researcher: Mike Dixon

Bioeconomy:
Car plant: Soybeans can be used to make parts for the auto sector
Researchers: Manju Misra and Amar Mohanty

Big applications for small molecules
Researcher: John Dutcher

Here's a sweet deal
Researcher: Marcel Schlaf

Product Development:
Tobacco goes pink
Researcher: Chris Hall

Healthier starches for everyday diets
Researchers: Michael Emes and Ian Tetlow

Emergency Management:
Mite-killing fungi protect honeybees
Researcher: Ernesto Guzman

A BOLD approach to pest control
Researcher: Robert Hanner

Partners for Progress:
Robots get a grip on greenhouse produce
Researchers: Medhat Moussa and Hussein Abdullah

Two-stage weaning reduces calf stress, boosts productivity
Researcher: Derek Haley

Connecting the huge ethnic vegetable market with buyers
Researcher: Glen Filson

Breeding to beat the bottom line
Researcher: John Lumsden

More local food for Ontario hospitals
Researchers: Paulette Padanyi and Viknay Kanetkar

Agricultural and Rural Policy:
Mobilizing regional resources for rural development
Researcher: John Devlin

More bang for your muck
Researcher: Alfons Weersink

Production Systems:
A chicken-and-egg solution
Researcher: Tina Widowski

Helping tomatoes fight disease naturally
Researcher: Paul Goodwin

Don't wait for weeds
Researcher: Clarence Swanton

Food For Health:
Take out the trans
Researcher: Alejandro Marangoni

Drink to your health
Researcher: John Cant

Knowledge Translation and Transfer:
Learning by doing
Researcher: Andy Robinson

Education, outreach put calf care at forefront
Researcher: Ken Leslie

Fostering food hubs for the future
Researcher: Karen Landman

New user-friendly website makes research accessible
Source: Rich Moccia

Highly Qualified Personnel:
Program opens doors for bioproducts career
Featuring HQP student Sara Bonham

Laboratory Services:
Swine disease surveillance system engages producers
Researcher: Tim Blackwell

Fast and accurate Listeria indexing and tracking
Researcher: Shu Chen

VCEP:
Clinical rotations: they teach what textbooks can't
Featuring Todd Duffield

@Guelph

Serving Local Food in Hospitals Faces Obstacles
Researchers: Paulette Padanyi and Viknay Kanetkar
July 27, 2012

Grain Farmers of Ontario (GFO) – Grain Farmer Magazine

"Adopting Fusarium's tactics for disease-resistant corn"
Researcher: Peter Pauls
May/June 2012

"Environmentally stable nitrogen improves production profits"
Researcher: Ashraf Tubeileh
July/August 2012

"Weed stress lowers corn and soybean yield"

Researchers: Clarence Swanton, Lewis Lukens and Elizabeth Lee
September 2012

"Keep soil quality in mind if switching to biofuel production"
Researcher: Kari Dunfield
October 2012

"Big potential from tiny corn particles"
Researcher: John Dutcher
October 2012

"Managing financial risk and climate change"
Researcher: Alan Ker
November 2012

"A step toward more sustainable corn"
Researcher: Claudia Wagner Riddle
January 2013

"Bread study sprouts new information about diabetes"
Researchers: Terry Graham, Alison Duncan and Lindsay Robinson
February 2013

"Stem rust-resistant crops now in field trials"
Researcher: Lily Tamburic-Ilincic
February 2013

"Managing buckthorn helps reduce soybean aphid populations"
Researcher: Rebecca Hallett
March 2013

"Glyphosate-resistant Canada Fleabane won't take hold, researcher predicts"
Researcher: Rene Van Acker
March 2013

"New Ontario-sourced bioproducts developed at Guelph"
Researchers: Manju Misra et al
April 2013

"Bayfield's genes boost yields"
Researcher: Istvan Rajcan

April 2013

"Strong soy and corn stalks needed for bioprocessing"
Researcher: Peter Pauls
April 2013

Dairy Farmers of Ontario (DFO) – The Milk Producer Magazine

"Sorting out the issue: Researchers pick apart what factors contribute to cows sorting their feed"
Researcher: Trevor Devries
July, 2012

"Reaping the benefits: Producers looking to increase their sustainable production methods could consider anaerobic digesters"
Researcher: Alfons Weersink
August, 2012

"Healthy rumens: Novel cure can help speed up the healing process in your cows' rumens damaged by sub-acute ruminal acidosis"
Researcher: Brian McBride
September, 2012

"Wetland system filters milk centre wastewater"
Researcher: Chris Kinsley
November, 2012

"New treatment could cure common ketosis"
Researcher: Todd Duffield
January, 2012

"New clues in the calf clostridial abomasitis mystery"
Researcher: John Prescott
February, 2013

"Herd to Herd"
Researcher: Trevor Devries
April, 2013

Greenhouse Canada Magazine

"New technologies and knowledge target green roof industry"
Researcher: Youbin Zheng

September, 2012

Ontario Cattlemen's Association (OCA) – Ontario Beef Magazine

"Sustainable soy film surfaces"
Researchers: Shai Barbut, Massimo Marcone
August, 2012

"Understanding when cattle become road weary"
Researcher: Derek Hayley
October, 2012

"Dangerous pathogens may be spread by wildlife"
Researcher: David Pearl
May, 2013

Ontario Farmer Publications

Ontario Farmer
"Investigating how dry bean producers can better utilize nitrogen"
Researcher: Chris Gillard
January, 2013

"Chicken parvovirus detected in Ontario"
Researcher: Eva Nagy
March, 2013

Ontario Dairy Farmer
"Industry cooperation gives dairy cows added comfort"
Researcher: Derek Haley
December, 2012

"Costing information for on-farm dairy processing"
Researcher: Andreas Boecker
March 22, 2013

Ontario Beef Farmer
"New clues in the calf clostridial abomasitis mystery"
Researcher: John Prescott
February, 2013

Ontario Hog Farmer
"Athletic nutrition for nursing sows"
Researcher: Paul Luimes
January, 2013

"Researchers working to improve vaccines for Glässer's Disease"
Researcher: Patrick Boerlin
April, 2013

Owen Roberts

Owen Roberts's column in *The Grower (monthly newspaper of the Ontario Fruit and Vegetable Growers' Association):*
May 2012: "Timely report points to energy crops, not Big Oil"
June 2012: "Time for health care to wake up to local food"
July 2012: "Farm weekend one step to bridging producers and consumers"
September 2012: "Maritime farmer comes to apple research program's rescue"
April 2013: "Branded peaches first of new variety wave from Vineland"

Owen Roberts's "Urban Cowboy" column in the Guelph Mercury daily newspaper
October 22, 2012: "Extending road life and feeding the world"
March 25, 2013: "Customize local food for hospitals, say researchers"
April 29, 2013: "Video campaign says eat beans and save the environment"

Owen Roberts' "Field Notes" column in the Woolwich Observer weekly newspaper
October 20, 2012: "Extending road life and feeding the world"
March 23, 2013: "Customize local food for hospitals, say researchers"
April 27, 2013: "Video campaign says eat beans and save the environment"

Broadcast
SPARK*Air Video Broadcasts on YouTube
http://www.youtube.com/user/sPARKatU of G

Bacterial spot and speck
Researcher: Cheryl Trueman
May 25, 2012

Sugar particles from corn
Researcher: John Dutcher
May 31, 2012

Bug Blog and Aphid Advisor
Researcher: Tracey Baute
June 22, 2012

Mycotoxins
Researcher: Art Schaafsma
July 5, 2012

Hay in a day
Researcher: Mike Cowbrough
July 31, 2012

Equine Guelph
Researcher: Gayle Ecker
August 10, 2012

Q fever
Researcher: Paula Menzies
August 10, 2012

The benefits of cover crops
Researcher: Greg Stewart
August 31, 2012

Dairy focus farm groups
Researcher: Dave Kelton
August 31, 2012

Turfgrass outreach
Researcher: Eric Lyons
September 26, 2012

Sheep fecal sampling video (part of Animal Species video series produced for species coordinators)
Researcher: Laura Falzon
September 27, 2012

Aquaculture feed
Researcher: Dominique Bureau
September 28, 2012

Human resources for agri-businesses
Researcher: Sara Mann
November 7, 2012

Local food hubs
Researcher: Karen Landman
November 7, 2012

Animal welfare
Researcher: Tina Widowski
October 22, 2012

Udder health
Researcher: Paula Menzies

November 16, 2012

Environmental sustainability
Researchers: Richard Zytner, Bill Van Heyst, Kari Dunfield, Mike Dixon
January 21, 2013

Poultry research for healthier flocks (part of Animal Species video series produced for species coordinators)
Researchers: Eva Nagy, Shayan Sharif, Tina Widowski and Gregoy Bedecarrats
January 24, 2013

Innovative beef research (part of Animal Species video series produced for species coordinators)
Researchers: Jeff Caswell, Derek Haley and Steve Miller
March 7, 2013

Nutritional toolkit for healthy aging
Researcher: Alison Duncan
March 26, 2013

Soil management strategies
Researcher: John Lauzon
April 3, 2013

APPENDIX B

2012/13 Revisions to Agreement Performance Indicators (PIs)

Animal Health Laboratory Performance Indicator #2

Key Outcome	Performance Indicator AHL 2	Purpose	Measurement / Metric	Methodology	Potential Data Sources	Baseline Exists?	Resp.
Acts as a critical resource effectively contributing to animal health policy development and in ongoing program delivery for OMAFRA.	Diagnostic services offered by the AHL are appropriate to detect hazards present in Ontario and test results are provided within published turnaround times.	To monitor and assess how AHL diagnostic services reflect and address industry needs in terms of the range of *hazards* being encountered in farms across the province.	Ability of the lab to provide high quality diagnostic services for hazards, within published turnaround times.	a) This measure will track how many of the diseases indicated on the Animal Health Act - Regulation 277/12 hazards list* for which the AHL provides diagnostic services (either internally or contracted out). The denominator will be the number of diseases present on the hazards list*, and the numerator will the number of those diseases for which the AHL provides diagnostic services. b) This measure will report the proportion of time that the actual turnaround time meets the published turnaround time for procedures to diagnose diseases on the hazards list*. c) This measure will report the number of procedures run at the AHL for diseases on the hazards list and will be reported by commodity and geographic area. **(Report Only – no target to be set).**	• *Appendix A & B, Ontario Regulation 277/12, (Reporting of Hazards and Findings), Animal Health Act, 2009. • AHL Users Guide and Fee Schedule. • AHL Sapphire database. • OMAFRA Webi searches.	a) No b) No c) No	AHL

APPENDIX C

OMAF/MRA - U of G Audited Statement of Revenues and Expenses