



Canadian Poultry  
Research Council

Le Conseil De  
Recherches Avicoles  
Du Canada



DU Canada  
Recherches Avicoles  
Le Conseil De

# 2017 Annual Report

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## Contents

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<b>About the CPRC</b>	<b>3</b>
Mission Statement	3
CPRC Board	3
CPRC Staff	3
<b>Chapter 1: Structuring an organization that is stable and focused on results</b>	<b>5</b>
Board of Directors	5
Executive Committee	6
Research Peer Review Process	6
Staffing	6
Governance	6
<b>Chapter 2: Leveraging, optimizing poultry research investment in Canada</b>	<b>7</b>
Poultry Science Cluster 2	7
Research Sponsorship Program	7
Poultry Science Cluster I	8
<b>Chapter 3: Recognized nationally and internationally for efforts to encourage and support poultry research in Canada</b>	<b>9</b>
Scholarship	9
<b>Chapter 4: Helping to address the real poultry issues of the day</b>	<b>10</b>
Granting procedures	10
Research Programs	10
CPRC-supported projects	12
New research in 2017	19



<b>Chapter 5: Transferring knowledge to the users of poultry research</b>	<b>21</b>
Updates	21
Website	21
eBulletin	21
<b>Appendix – Acronyms used</b>	<b>22</b>
<b>2017 Financial Statements</b>	<b>23</b>

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## About the CPRC

The creation of the Canadian Poultry Research Council (CPRC) follows the recommendation of a report commissioned by the Canadian Agri-food Research Council and the Canada Branch of the World's Poultry Science Association. This report assessed the needs and resources of Canada's poultry sector with respect to research, education and technology transfer. It also documented the rapid erosion of both human and physical resources and the loss of federal funding for poultry research.

In response to the concerns and recommendations outlined, the five national poultry organizations met to discuss the need for a national organization devoted to addressing national poultry research concerns. In November 2001, the CPRC was formally established.

The CPRC members are:

- Canadian Hatching Egg Producers
- Canadian Poultry and Egg Processors Council
- Chicken Farmers of Canada
- Egg Farmers of Canada
- Turkey Farmers of Canada

Each Member elects annually a representative to serve on the CPRC Board of Directors.

## Mission Statement

CPRC's mission is to address its Members' needs through dynamic leadership in the creation and implementation of programs for poultry research in Canada, which may also include societal concerns.

This mission focuses on:

- The coordination and enhancement of a more efficient Canadian poultry research effort.
- Securing additional and matching funding.
- Facilitating the establishment of national poultry research priorities.

## CPRC Board

Timothy Keet (CFC), Chair

Helen Anne Hudson (EFC), Vice Chair

Erica Charlton (CPEPC)

Murray Klassen (CHEP)

Rachelle Brown (TFC)

## CPRC Staff

Bruce Roberts Ph.D., Executive Director

Sandra Quade, Research Administrator



## Message from the Chair

2017 was my second year as CPRC Chair and it has been another active year. CPRC had a new director appointed late in the year, Rachele Browne who replaced Brian Ricker for Turkey Farmers of Canada. I would like to express, on behalf of the CPRC Board of Directors and our Member Organizations, our appreciation to Brian for his membership on the CPRC Board.



At year-end, CPRC had 32 active projects and another three projects approved conditional upon the researchers securing the balance of project funding. CPRC continued preparation of a proposal for the next Science Cluster Program that is part of the Canadian Agricultural Partnership (CAP) program. Cluster funding applications were due February 1, 2018 for the CAP program that takes effect April 1, 2018. This will be the third Poultry Science Cluster if the program is renewed and our proposal accepted. Board, staff and many industry members put a lot of thought and effort into developing the proposed cluster. The second five-year cluster, which will be complete March 31, 2018, is delivering almost \$5.3 million of poultry research to our industry on issues including poultry health and welfare, the environment, biosecurity and antimicrobial reduction. The third cluster application submitted February 1<sup>st</sup> would more than double the next poultry science cluster if approved by Agriculture and Agri-Foods

CPRC also co-hosted a workshop on precision agriculture possibilities in the poultry sector. Forty invitees attended the workshop made up of researchers, producers, other industry members, government and a strong contingent from CPRC. Discussions were creative and sometimes animated as the broad range of participants expressed their opinions. A workshop report is presently being prepared and will be issued early this year. The CPRC Board will discuss next steps to identify industry opportunities that may be available.

I would like to thank the many people that made 2017 a successful year. These include the Executive Committee, CFC who provides office space and administration support at the Ottawa office, Drs. Fred Silversides and Nerine Joseph who continue to assist CPRC with technical administration of the Cluster and other projects. Thank you as well to the members of the Cluster Scientific Advisory Board for their invaluable time and support.

I would also like to thank our member organizations for their very strong support for CPRC's activities, both financially and through input from their Board representatives and the staff members who support them. It is this type of cooperative effort that that will help sustain and enhance a strong Canadian research program as we move forward into the future.

I am humbled by the talent that I am surrounded by and I am very thankful for everyone's ambition to improve our research needs.

Respectfully submitted,

Tim Keet, Chair



## Chapter 1: Structuring an organization that is stable and focused on results

### Board of Directors

The CPRC is governed by a Board of Directors representing each of the five member organizations.

**Timothy Keet** is CPRC's Chair representing the Chicken Farmers of Canada (CFC). Tim was raised on a mixed farm in Quebec. He knew early on in life his drive was to be a chicken producer, so that set the stage focusing his education towards animal and poultry science at the Macdonald Campus of McGill University under Dr. Roger Buckland in '81. Tim farmed in Quebec until 1988 then moved to Saskatchewan with wife Catherine and 4 kids (one more on the way). Tim raised broiler breeders for 11 years then changed to roasters. Tim's brothers have all been producers and now it's the next generation building up their farm sites including son and daughter-in-law (Ryan & Tatyana). Animal behaviour and welfare has always been a key interest in Tim's life. Tim is a director for Chicken Farmers of Saskatchewan and has been involved in poultry research through that organization.

**Dr. Helen Anne Hudson** is CPRC's Vice-Chair representing the Egg Farmers of Canada (EFC). Dr. Hudson earned both MSc and PhD degrees in poultry science from the University of Georgia. Her education and experience provide a strong background in laying hen rearing, housing and management. Dr. Hudson is Director of Corporate Social Responsibility for Burnbrae Farms, one of the major commercial egg producers in Canada. Dr. Hudson is actively involved with a number of organizations across Canada relating to poultry research. She is past-Chair of the Advisory Board for the Alberta Poultry Research Centre, serves on the Research Committee and HACCP Committee at EFC, is past-Chair of the Poultry Industry Council (PIC) in Guelph, Ontario and was a member of the Steering Committee for the Virtual Centre for Poultry Welfare at the University of Guelph.

**Erica Charlton** represents the Canadian Poultry and Egg Processors Council (CPEPC). Ms. Charlton has held the position of CPEPC Technical Director since 2006 and is responsible primarily for technical files for the poultry meat processing companies, and occasionally for the egg processor companies, as required. Ms. Charlton acts as industry/government liaison and is the processor industry's single point of contact on technical issues with CFIA and Health Canada. She is the staff lead on the Poultry Operations Technical Committee. Ms. Charlton's exposure to technical aspects of poultry meat inspection and food safety give her a unique perspective on issues relating to the CPRC.

**Murray Klassen** represents the Canadian Hatching Egg Producers (CHEP), and also chairs CHEP's Research Committee. Murray has produced broiler hatching eggs and grain for the last 15 years with his wife, Paulette, in Blumenort, Manitoba. He has served as CHEP's alternate Manitoba director since 2013. Prior to entering the broiler hatching egg industry, he produced table eggs and also worked managing pullet and fowl movement in the western provinces and northern Ontario. Murray has a keen interest in aviation. He manages an aircraft Approved Maintenance Organization (AMO), and owns a King Air 200 which is used to provide air ambulance service to the north.

**Rachelle Brown** represents Turkey Farmers of Canada (TFC). Rachelle and her husband Marty purchased the family farm, situated in Manitoba's Interlake Region, in 1996. Since then, they have expanded the farm to mostly hen production. Rachelle has been a director of the Manitoba Turkey Producers Board since 2007. She has served as vice-chair from 2011-2014 and now serves as Chair. She was appointed to Turkey Farmers of Canada in 2009 as alternate director and in 2014 as director.



Rachelle has been involved in poultry research since 2009 as chair of TFC's research committee. Rachelle and her husband have two children and recently became proud grand-parents. She has served on many volunteer boards in her community over the 25 years including her children's school, community centre, church, curling club, and food bank.

### **Board of Director Meetings**

The CPRC Board of Directors meets several times per year, in person and by conference call, to discuss existing and emerging issues relating to poultry research in Canada. Board meetings are also attended by staff representatives from each of the member organizations. This structure facilitates efficient communication between CPRC and its membership. Operational and financial decisions are subject to CPRC Board approval by majority vote. When required, consultations are first held between CPRC and its members to ensure that CPRC activities are within its mandate and performed in the best interests of the Canadian poultry sector as a whole.

### **Executive Committee**

CPRC's Board formed an Executive Committee (EC) in 2013 made up of the Chair, Vice-Chair and one other director (Erica Charlton in 2017) to provide support and oversight for CPRC's Executive Director. The EC conducts its meetings by conference call.

### **Research Peer Review Process**

CPRC conducts peer reviews of projects of sufficient importance to the CPRC Board after an internal review. The review process adheres to basic principles and guidelines established by the Natural Sciences and Engineering Council (NSERC) regarding potential for conflict of interest and confidentiality of information. The peer-review process is coordinated by Dr. Nerine Joseph and reviewers are sought globally based on expertise related to the research proposed.

### **Staffing**

CPRC is staffed by a full-time Executive Director (ED) and Research Administrator. CPRC office support is provided through an agreement with CFC, which oversees management of CPRC's accounting system, IT support and provides office space for staff. CPRC would like to take this opportunity to thank its members for their support in maintaining staff capacity.

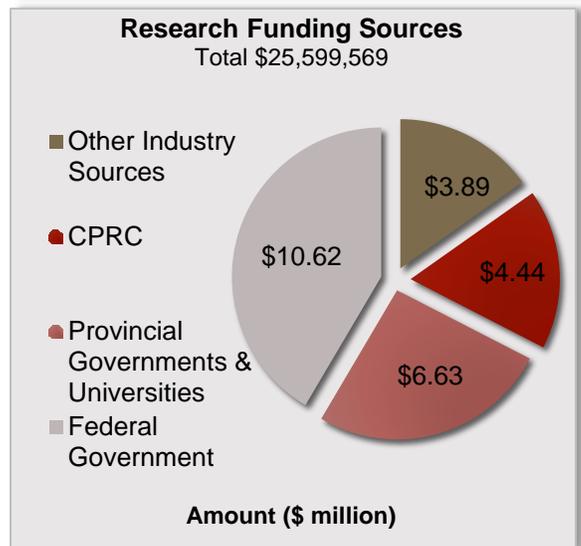
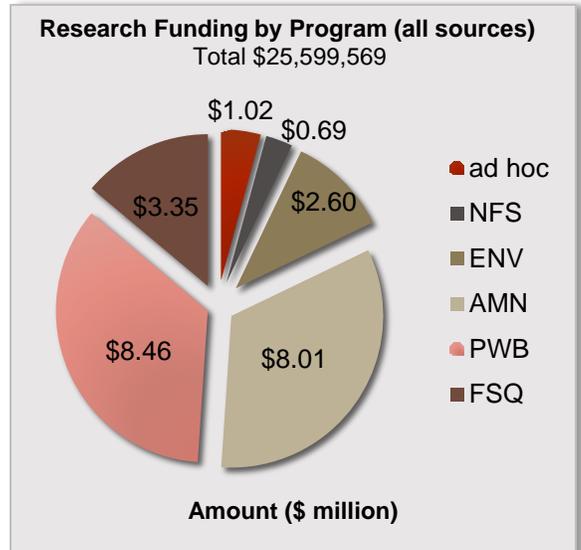
### **Governance**

The Government of Canada revised the federal legislation governing nationally registered Not-for-Profit Corporations. CPRC was required to ensure compliance with the new act and submit transition documents to Industry Canada. The process included a by-law review, the first since CPRC's inception in 2001. By-laws were amended, with legal advice, to improve efficiency and flexibility and were approved in 2014.



## Chapter 2: Leveraging, optimizing poultry research investment in Canada

One of CPRC’s main goals is to help build Canada’s capacity for poultry research. To the end of 2017, CPRC Members have committed more than \$4.4 million through our regular funding programs in support of 99 research projects at universities and federal government laboratories across Canada. Although CPRC’s contribution is significant, it only represents a fraction of the overall support for these projects; funds from other sources bring the total research program to more than \$25.5 million. That is to say, CPRC dollars have been matched or “leveraged” at a ratio of greater than 5:1. Helping secure matching dollars is a large part of CPRC’s funding process. Industry dollars (such as those from CPRC) are eligible for matching by a number of sources, such as the Natural Sciences and Engineering Research Council (NSERC) and AAFC. As a prerequisite for final approval of CPRC funding, a project must secure matching funds from these or other sources. Two projects with research budgets totaling more than \$1.6 million that received conditional approval in 2016 are expected to meet the funding condition in 2018. The second Poultry Science Cluster, discussed below, added more than \$5 million of research activity. The Cluster became active upon completion of agreements between AAFC and CPRC early in 2014. Cluster projects are included in the research project list in Chapter 4.



### Poultry Science Cluster 2

Minister of Agriculture, Gerry Ritz, notified CPRC in October 2013 of the approval of \$4 million to support the Cluster’s \$5.6 million budget with the balance of funds from industry and Ontario Ministry of Agriculture and Food. Industry is providing 26 percent of the funding for a ratio of almost 3:1. Funding supports 17 research activities involving 11 universities and 59 researchers, including international scientists.

### Research Sponsorship Program

The Research Sponsorship Program was initiated in 2012 with the support of Aviagen Group, which became the inaugural sponsor. Sponsor contributions will be used along with Member Organization annual funding to help meet the increasing demand for industry research funds to match government



program funding. A Research Sponsorship development plan is being designed to seek additional industry support. Details of the Research Sponsorship Program, sponsor benefits and an application can be found on our website at [www.cp-rc.ca/sponsorship.php](http://www.cp-rc.ca/sponsorship.php). CPRC's Board and Member Organizations thank Aviagen Group for its leadership in supporting Canadian poultry research.

### **Poultry Science Cluster I**

In November 2010, Member of Parliament Ed Fast (Abbotsford), on behalf of Agriculture Minister Gerry Ritz, officially announced that CPRC would receive up to \$1.8 million to lead a Poultry Research Cluster. The Cluster brings together expertise from across the country to tackle some important research issues for the industry. The first Poultry Science Cluster program was concluded March 31, 2013.

Activities within the Cluster were divided into three main themes:

1. The biology and control of gut-borne bacterial diseases in poultry
2. Biology and control of avian influenza in poultry
3. Innovative production technologies and practices for Canada's poultry sector

Among the outcomes are a better understanding of certain poultry diseases, novel means of their control, and recommendations on management practices that will further improve poultry health and welfare. Summaries of preliminary results are available on the CPRC website and will be featured in a series of factsheets in the coming year.



## Chapter 3: Recognized nationally and internationally for efforts to encourage and support poultry research in Canada

Recognition of effort is of strategic importance. Potential industry, academic, and government partners are much more likely to work with CPRC if they see it as an effective, constructive organization. CPRC continues to build a positive relationship with the Science & Technology Branch of AAFC. CPRC's activities are the subject of a regular feature in Canadian Poultry Magazine, whose readership includes virtually every registered poultry producer in Canada, as well as a large proportion of industry stakeholders. CPRC will continue to reach out to funding organizations, universities, and government branches through 2017 and beyond.

### Scholarship

The CPRC also directly promotes succession in our poultry research community with its scholarship program. The purpose of the program is to entice students to consider a career in poultry science. Specific program objectives are:

- To encourage and support graduate students to carry out research in an aspect of poultry science
- To build Canada's intellectual capacity in poultry science
- To promote graduate research in poultry science at Canadian universities

The CPRC offers a "Postgraduate Scholarship Supplement" of \$5,000 per year. To be eligible, a student must be studying (or planning to study) some aspect of poultry science and must hold a Natural Sciences and Engineering Research Council (NSERC) scholarship at the Masters or Doctoral level. Details on past winners are available at the "Scholarship" section of the CPRC website, where there is also a link to the NSERC website detailing eligibility criteria and application procedures.

In order to attract students from a wider pool, CPRC also accepts applications from non-NSERC scholars. Applications to the CPRC Postgraduate Scholarship, also set at \$5,000 per year, will be assessed using the same criteria as the Supplement above, but applicants will not be required to hold a NSERC scholarship. Only one Scholarship or Supplement will be awarded each year.

*Please note that CPRC did not issue a scholarship in 2017 and is restructuring the program for the future. The graduate student scholarship is an important part of CPRC's support for Canadian poultry research and the Board of Directors is reviewing enhancements to the program.*



## Chapter 4: Helping to address the real poultry issues of the day

### Granting procedures

Research grant procedures were changed in 2015 to simplify the process and make the timing of CPRC's review more effective for researchers. The system adopted in 2015 of receiving and reviewing research grant proposals uses a two-step process: 1) an industry review of Letter of Intent (LOI); and 2) a scientific review of methodology for a short list of LOIs identified in the first stage. In the LOI, the applicant is asked for an overview of the proposed research as well as an account of how the research will impact the poultry industry. They are asked to provide more details on research methodology than for the usual LOI to ensure sufficient information is provided for peer reviewers to express an opinion on the quality of the research plan.

The completed LOIs are evaluated by the CPRC Board and support staff with help from additional scientific expertise, if needed, and a short list of projects decided upon. Successful applications are sent for peer review (step two of the process).

The LOIs are peer reviewed as described in Chapter 1. Applicants then have an opportunity to address issues or concerns raised during the peer review before a final funding decision is made by the CPRC Board. This system allows CPRC to work with researchers to make changes to a proposed research project after the peer review so that it better addresses industry priorities.

With input from academe, government and industry, the CPRC will continually review its research priority list and, if necessary, adjust it to reflect existing and emerging issues of importance to its members. Provided they remain of high importance, the priority areas listed will be the subject of future Calls for Letters of Intent at regular intervals so as to promote continuity in existing research programs.

Proposals approved for CPRC support must secure matching funds from NSERC, AAFC or other non-industry sources before CPRC funds are released.

### Research Programs

Until the 2016 call, issued in December 2015, the CPRC has funded research projects in the following program areas:

1. **Avian Gut Microbiology:** The Avian Microbiology Network (AviMicroNet) is a communication network of researchers designed to encourage the investigation of the impact of gut microflora on the nutrition, feed conversion, pathogen carriage, and health of poultry in an antimicrobial-free environment. This effort has been put forth in response to growing pressures to reduce, or possibly eliminate, antimicrobial drugs from animal feeds.
2. **Environment:** The CPRC initiated a research program dedicated to environmental issues in the poultry industry. A number of projects have been supported, which touch on a wide variety of areas. These include the prevalence and effect of veterinary pharmaceutical residues in the environment, the direct injection of poultry litter on agricultural land, the environmental implications of phosphorus and calcium flows in poultry production, workplace exposure to environmental contaminants in commercial poultry barns, useful products from spent hens, and emissions from poultry operations.
3. **Food Safety and Poultry Health:** This program covers a wide range of topics with potentially far-reaching implications for the sector. Topics include: immunization of broiler chickens against necrotic enteritis, understanding the biology of avian influenza virus and finding better ways to control it, novel multivalent vaccines for avian health, and new ways to control enteric pathogens.



4. **Poultry Welfare and Behaviour:** Research within this program covers such topics as: impact of ammonia on the welfare of laying hens, improving transport conditions for broilers, alternative methods of euthanizing turkeys, effects of lighting programs on leg weakness in broilers, improving welfare for beak trimmed hens, maintaining leg and bone structure in turkeys, implications of toe-trimming turkeys, alternative feeding strategies for broiler breeders, and the impact of daylength on turkey welfare and productivity.
5. **Novel feedstuffs:** There is an emerging need for research on the use of feedstuffs alternative to current grains, prices of which are anticipated to remain high. Research is underway relating to: potential animal health benefits of feeding distillers dried grains with solubles (DDGS), nutritive value of cold-pressed meals from various grain sources, and the economic and nutritive impact of processing alternative ingredients in turkey diets.
6. **Ad hoc:** The CPRC also funds projects that are of significance to the Canadian poultry industry, but may not fit into the broad research programs listed above. Researchers may apply for funding for this category of research at any time throughout the year according to the CPRC policy on *ad hoc* proposals. Research topics funded under the *ad hoc* program include: nutritional studies on broiler breeders, cryopreservation of avian genetic material and alternative moulting procedures in turkeys.

The 2016 call was altered to provide a more comprehensive group of LOI research categories to reflect new and evolving research issues. The *Ad hoc* category was removed and research issues were grouped into three somewhat overlapping categories: 1) Food Safety, 2) Poultry Health and Welfare, and 3) Productivity and Sustainability. These categories encompass the five remaining sub-categories listed above but allow flexibility for CPRC to add additional sub-categories that may be of interest to the Canadian poultry industry.



## CPRC-supported projects

Individual projects within each of the above programs are listed below. Those marked one (1) are part of Poultry Science Cluster 1. Those marked two (2) are part of Poultry Science Cluster 2.

### **Avian Gut Microbiology**

AMN001

Identification of gut bacteria affected by dietary antibiotics and their roles in the gut immunity of broiler chickens.

*Joshua Gong, Agriculture Canada and Shayan Sharif, University of Guelph*

AMN002

Molecular epidemiology of necrotic enteritis.

*Patrick Boerlin, University of Guelph*

AMN003

Carbohydrase enzyme supplements as growth promoters and modulators of the intestinal microflora of the chicken: The prebiotic and probiotic effect of enzyme hydrolysis products.

*Bogdan Slominski, University of Manitoba*

AMN004

Understanding how *Campylobacter jejuni* colonizes poultry

*Brenda Allan, VIDO*

AMN023

The use of cyclic-di-GMP, a novel immunotherapeutic and antibacterial molecule in chickens

*Moussa Diarra, AAFC*

AMN024

Investigation into cell-cell signalling in *Clostridium perfringens* infection for developing a novel disease-control strategy

*Joshua Gong, AAFC*

AMN025

Engineered antibodies and phage products for food safety applications

*Christine Szymanski, University of Alberta*

AMN027

Elucidation of critical characteristics of *Clostridium perfringens* and pathogen-host-environment interactions defining susceptibility of poultry to necrotic enteritis

*Andrew Olkowski, University of Saskatchewan*

AMN030

Development of live-attenuated vaccines to prevent *Campylobacter* colonization in poultry

*Byeonghwa Jeon, Atlantic Veterinary College (now at University of Alberta)*

AMN043

Evaluation of vacuum post pellet applications of bioactives of broiler feed on efficacy and protected delivery

*Tom Scott, University of Saskatchewan*

AMN045

Formulation and delivery of immunostimulatory oligodeoxynucleotides containing CpG motifs (CpG-ODN) with carbon nanotubes (CNTs) against poultry diseases

*Susantha Gomis, University of Saskatchewan*



AMN046

Effect of two prebiotics on gut microflora in healthy and Salmonella challenged broilers  
*Xin Zhao, McGill University*

AMN047

Surveillance of antimicrobial resistant bacteria in antimicrobial-free and conventional broilers in Ontario – a pilot project  
*Michele Guerin, University of Guelph*

AMN048

Stimulation of innate immune system for the control of poultry respiratory viral infections  
*Faizal Careem, University of Calgary*

AMN053

Development of probiotic formulations with immune enhancing activities for chickens  
*Shayan Sharif, University of Guelph*

AMN059

The impact of reducing mycotoxins in poultry feed on the natural defense against disease  
*Natacha Hogan, University of Saskatchewan*

AMN060

Control of *Campylobacter jejuni* in chickens by vaccination  
*Shayan Sharif, University of Guelph*

<sup>2</sup>AMN065

Evaluation of butyrate glycerides for developing an alternative to dietary antimicrobials in poultry  
*Joshua Gong, Agriculture and Agri-Food Canada*

<sup>2</sup>AMN066

Alternative antimicrobials from chicken blood  
*Max Hincke, University of Ottawa*

<sup>2</sup>AMN067

Development of an enzyme/yeast-based prebiotic for poultry  
*Bogdan Slominski, University of Manitoba*

<sup>2</sup>AMN068

Non-antibiotic control of bacterial infection  
*Mohammed Arshud Dar, University of Saskatchewan*

AMN081

Delivery of immunostimulatory oligodeoxynucleotides containing CpG motifs to broiler chickens as an alternative to antibiotics  
*Susantha Gomis, University of Saskatchewan*

AMN086

Microbiome manipulations of the chicken GI tract as a route to maintain poultry health  
*John Parkinson, Hospital for Sick Children/University of Toronto*

AMN088

Induction of adaptive immunity against respiratory viruses using in ovo delivered innate immune stimulants  
*Mohamed Faizal Abdul Careem, University of Calgary*

AMN092

Farm-level surveillance of antimicrobial use and resistance in turkey flocks in Ontario, a pilot  
*Agnes Agunos, Public Health Agency of Canada and Patrick Boerlin, University of Guelph*



AMN095

Nutritional regulation of genes associated with avian B cell receptors involved in innate and adaptive immunity

*Juan Carlos Rodriguez-Lecompte, University of Prince Edward Island*

AMN097

Development of an immune complex vaccine to control variant infectious bursal disease virus (IBDV) infections in the broiler chicken industry in Canada

*Susantha Gomis, University of Saskatchewan*

AMN100

*An inexpensive plant-derived multicomponent vaccine for poultry coccidiosis and necrotic enteritis*

*Joel Alcantara, University of Calgary*

### **Environment**

ENV006

Distribution uniformity and emission reduction potential of a precision applicator for surface and sub-surface land application of poultry manure

*Claude Laguë, University of Saskatchewan (now at University of Ottawa)*

ENV007

Development of a dynamic model of Ca and P flows in layers

*James France, University of Guelph*

ENV008

Activity-specific workplace exposures of poultry barn workers

*Ambikaipakan Senthilselvan, University of Alberta*

ENV009

Reducing pollution from veterinary pharmaceuticals in agricultural runoff from poultry manure

*Shiv Prasher, McGill University*

ENV026

Protein-based biomaterials from spent hens

*Jianping Wu, University of Alberta*

ENV029

Assessment of concentrations and emissions of airborne pollutants at various poultry operations

*Bill Van Heyst, University of Guelph*

ENV049

Evaluation of phosphorus utilization by broilers using different approaches

*James France, University of Guelph*

ENV056

Biopolymer-based nanocomposites from poultry industry byproducts for packaging applications

*Aman Ullah, University of Alberta*

<sup>2</sup>ENV074

Evaluation of control strategies to reduce emissions of particulate matter and ammonia from poultry operations

*Bill Van Heyst, University of Guelph*

<sup>2</sup>ENV076

Determining the genetic relationships between feed efficiency, production traits and greenhouse gas (NH<sub>3</sub>, N<sub>2</sub>O, CO<sub>2</sub>, and CH<sub>4</sub>) emissions in turkeys.

*Ben Wood, Hybrid Turkeys (Hendrix Genetics)/University of Guelph*

<sup>2</sup>ENV077

Validation of a new LED light bulb designed for the egg-laying industry

*Grégory Bédécarrats, University of Guelph*



ENV082

Optimize and scale-up preparation of spent hen adhesive  
*Jianping Wu, University of Alberta*

ENV090

Assessment of an Air Treatment System for Enhanced Environmental and Biosecurity Measures on a Broiler Operation  
*Bill Van Heyst, University of Guelph*

### **Food Safety & Poultry Health**

FSQ011

Immunization of broiler chickens against necrotic enteritis  
*John Prescott, University of Guelph*

FSQ012

Immunology of T cell-mediated immune response to avian influenza virus in the chicken  
*Shayan Sharif, University of Guelph*

FSQ014

Development of second generation RNA interference constructs against avian influenza virus  
*Serguei Golovan, University of Guelph (now at Spartan Bioscience)*

FSQ015

Novel multivalent vaccines for avian health  
*Éva Nagy, University of Guelph*

<sup>1</sup>FSQ032

The pathogenesis and control of necrotic enteritis in broiler chickens  
*John Prescott, University of Guelph*

<sup>1</sup>FSQ033

Development of *Salmonella* Enteritidis vaccine for layers and breeding hens  
*Martine Boulianne, University of Montreal*

<sup>1</sup>FSQ034

Use of encapsulated essential oils for controlling enteric bacterial pathogens in chickens  
*Joshua Gong, Agriculture and Agri-Food Canada*

<sup>1</sup>FSQ035

Determining the molecular basis of adaptation of influenza viruses from their natural reservoir to domestic poultry  
*Yohannes Berhane, Canadian Food Inspection Agency*

<sup>1</sup>FSQ036

Study of transmission of avian influenza virus (AIV)  
*Jiewen Guan, Canadian Food Inspection Agency*

<sup>1</sup>FSQ037

Immune response to avian influenza virus (AIV)  
*Shayan Sharif, University of Guelph*

<sup>1</sup>FSQ038

Developing novel vaccines against AIV and exploring efficient delivery systems for these vaccines  
*Eva Nagy, University of Guelph*  
*Suresh Tikoo, VIDO*  
*Dele Ogunremi, Canadian Food Inspection Agency*



<sup>2</sup>FSQ061

Understanding and controlling necrotic enteritis in broiler chickens  
*John Prescott, University of Guelph*

<sup>2</sup>FSQ062

Assessment of *Clostridium perfringens* pili in vaccine development for controlling necrotic enteritis in chickens  
*Joshua Gong, Agriculture and Agri-Food Canada*

<sup>2</sup>FSQ063

Development of novel and rational vaccine formulations against avian influenza virus infection in chickens  
*Shayan Sharif, University of Guelph*

<sup>2</sup>FSQ064

Assessment and mitigation of contamination risks: critical knowledge to reduce diseases and increase biosecurity compliance  
*Jean-Pierre Vaillancourt, University of Montreal*

FSQ083

A novel necrotic enteritis vaccine strategy: type IV pilus of *Clostridium perfringens*  
*Martine Boulianne, University of Montreal*

FSQ099

Broiler breeder national survey on foodborne pathogen prevalence, antimicrobial resistance, and antimicrobial use  
*Martine Boulianne, University of Montreal and Agnes Agunos, Public Health Agency of Canada*

**Poultry Welfare & Behaviour**

PWB017

Engineering, animal welfare and meat quality considerations of broiler transportation in a heated and ventilated vehicle  
*Trever Crowe, University of Saskatchewan*

PWB018

Improving welfare for beak trimmed hens through reducing variability and technology transfer  
*Hank Classen, University of Saskatchewan*

PWB019

Effect of lighting programs on leg weakness and bird welfare in modern commercial broilers  
*Hank Classen, University of Saskatchewan*

PWB020

Evaluation of alternative methods of euthanasia for cull turkeys  
*Tina Widowski, University of Guelph*

PWB021

Impact of ammonia on welfare of laying hens, and implications for the environment  
*Steve Leeson, University of Guelph*

<sup>1</sup>PWB039

Maintaining leg and bone structure in commercial poultry  
*Doug Korver, University of Alberta*

<sup>1</sup>PWB040

Assessing the behaviour and welfare of broiler breeders using alternative feeding strategies  
*Stephanie Torrey, Agriculture and Agri-Food Canada*



<sup>1</sup>PWB041

Implications of toe clipping on the welfare of commercial turkeys  
*Hank Classen, University of Saskatchewan*

PWB050

Investigating methods of assessing bird wetness as a means to determine fitness for transport  
*Trever Crowe, University of Saskatchewan*

PWB051

Daylength and its impact on turkey welfare and productivity  
*Hank Classen, University of Saskatchewan*

PWB052

Identification of risk factors during broiler transportation that influence injury and mortality  
*Michael Cockram, University of Prince Edward Island*

PWB054

Is feather pecking in turkeys related to genetics and activity levels?  
*Ben Wood, University of Guelph/Hybrid Turkeys*

<sup>2</sup>PWB069

Epigenetic transfer of behaviour and stress susceptibility in the laying hen: Influence of rearing and housing of different strains of parent stock on offspring phenotype  
*Tina Widowski, University of Guelph*

<sup>4</sup>PWB070

Development of flight and locomotion in laying hens  
*Alexandra Harlander-Matauschek, University of Guelph*

<sup>2</sup>PWB071

Improving foot pad quality in commercial broilers: benchmarking and practical strategies  
*Clover Bench, University of Alberta*

<sup>4</sup>PWB072

Study of the impact of various stocking densities on the performance, health and welfare of turkey broilers and heavy turkeys  
*Karen Schween-Lardner, University of Saskatchewan*

<sup>2</sup>PWB073

The influence of extreme temperature on turkey physiology, welfare, and meat quality  
*Trever Crowe, University of Saskatchewan*

<sup>2</sup>PWB075

Impact of ammonia on the welfare of poultry  
*Alexandra Harlander-Matauschek, University of Guelph*

PWB078

Optimizing Lighting for Precision Broiler Breeder Feeding  
*Martin Zuidhof, University of Alberta and Grégoy Bédécarrats, University of Guelph*

PWB079

Assessing methods for on-farm euthanasia of turkeys, chickens, breeders, and layers  
*Tina Widowski, University of Guelph*

PWB080

Alternative feeding strategies for broiler breeders  
*Tina Widowski, University of Guelph*



PWB084

Does infrared beak treatment impact young pullets – behaviour, water consumption, and ability to peck?

*Karen Schwean-Lardner, University of Saskatchewan*

PWB089

Evaluation of Rapid Diagnostic Assay for Avian Influenza to the Point of Care Setting

*Suresh Neethirajan, University of Guelph*

PWB091

Determining the potential conservation and regeneration of chicken and turkey breeds using adult gonadal tissue

*Carl Lessard, Agriculture and Agri-Food Canada*

PWB094

Investigating optimal feed structure for promoting pullet gut and skeletal development for enhanced layers productivity

*Elijah Kiarie, University of Guelph*

PWB098

Effect of barn sanitation on innate immunity, performance, microbiological and processing traits of commercial broilers

*Doug Korver, University of Alberta*

### **Novel Feedstuffs**

NFS028

Distillers dried grains with solubles (DDGS) as a potential source of immunostimulatory and growth promoting activity for poultry

*Bogdan Slominski, University of Manitoba*

NFS042

Nutritive evaluation of cold-pressed meals for broiler chickens

*Derek Anderson, Nova Scotia Agricultural College*

NFS044

The economic advantages of processing on feed value of alternative ingredients for turkeys

*Tom Scott, University of Saskatchewan*

### **Ad hoc**

UAB005

The impact of timing of protein intake and growth patterns on reproductive efficiency in broiler breeder females.

*Frank Robinson, University of Alberta*

AGA010

Cryopreservation of Canada's remaining avian germplasm

*Fred Silversides, Agriculture and Agri-Food Canada*

CTM022

Use of dietary thyroxine as an alternative molting procedure in turkey breeder hens

*Grégory Bédécarrats, University of Guelph*

AGA031

Cryogenic storage and efficient recovery of avian genetic material

*Fred Silversides, Agriculture and Agri-Food Canada*

UAB055

Effect of incubator temperature and breeder flock age in two broiler strains on embryonic overheating

*Doug Korver, University of Alberta*



UAB057

Establishing a production system for long-chain w-3 PUFA Enrichment of table eggs using a novel high-stearidonic acid flax

*Doug Korver, University of Alberta*

UAB085

Lifetime productivity of precision- and conventionally-fed broiler breeders

*Martin Zuidhof, University of Alberta*

## New research in 2017

### **Avian Gut Microbiology**

#### **AMN097**

*Dr. Susantha Gomis, University of Saskatchewan*

Infectious Bursal Disease Virus (IBDV) causes IBD, a major immunosuppressive disease among young chickens. Immunosuppressive agents such as IBDV can decrease flock performance, contribute to secondary infections and increase the incidence of carcass condemnations. The most severe consequence of an IBDV infection is the functional impairment of the bursa of Fabricius (BF), a specialized organ necessary for B cell development in birds (part of the immune system). IBDV is very resistant to most disinfectants and environmental factors and persists for months in contaminated barns, water, feed and droppings. Infectious bursal disease (IBD) is one of the most important avian-acquired immunosuppressive diseases, and has led to significant economic losses to the poultry industry worldwide. Subtypes of IBDV infections that occur in broilers from parents immunized with vaccines containing “standard or classic” IBDV strains are designated as “variants”. This research responds directly to the urgent need to develop a novel vaccine to control “variant” IBDV. This vaccine will improve the poultry industry’s competitiveness, food safety and poultry health. Overall, this research will minimize secondary bacterial infections, poor weight gain, high FCR, increased mortality, which will improve the competitiveness and profitability of the Canadian poultry industry.

#### **AMN100**

*Dr. Joenel Alcantara, University of Calgary*

The Canadian poultry industry faces flock loss due to infection by pathological agents resulting in production losses, increased mortality, reduced welfare of birds, and increased contamination of poultry products for human consumption. Enteric diseases are among the most devastating diseases and include coccidiosis and necrotic enteritis (NE). The current trend is to reduce the use of antibiotic and anti-parasitic drugs due to the emergence of drug-resistant strains and consumer concerns about these drugs entering the food chain. Vaccination provides a practical method to control these enteric diseases. The majority of licensed coccidiosis vaccines consist of live, attenuated organisms. However, this type of vaccine has inherent problems as *Eimeria* species do not propagate well *in vitro* and cell cultures are prone to contamination. The primary objective of this project is to develop a plant-derived multi-competent vaccine against coccidiosis and necrotic enteritis to counter the challenges associated with present approach to vaccine propagation.

### **Food Safety and Poultry Health**

#### **FSQ099**

*Dr. Martine Boulianne, University of Montreal and Dr. Agnes Agunos, Public Health Agency of Canada*



The current estimated annual incidence of campylobacteriosis in Canada is 447.23 cases per 100,000 people and the incidence of non-typhoidal salmonellosis (e.g., *S. Enteritidis*, *S. Heidelberg*, *S. Typhimurium*) is 269.26, making campylobacteriosis and salmonellosis the 3<sup>rd</sup> and 4<sup>th</sup> leading causes of enteric diseases, respectively. It is estimated that each year there are 4,000 hospitalizations and 105 deaths associated with domestically acquired foodborne illness; non-typhoidal *Salmonella* and *Campylobacter* were the key pathogens associated with these hospitalizations/deaths. The objectives of this research are 1) to investigate the national prevalence of *Salmonellae*, *Campylobacter*, and generic *E. coli* in broiler breeder flocks at slaughter, 2) to determine the AMR profile of *Salmonellae*, *Campylobacter* and generic *E. coli* derived from the cecal content of broiler breeders at slaughter and 3) to describe AMU in broiler breeders in the 4 months prior to their slaughter. This information will aid the Canadian poultry industry in addressing these concerns.

### ***Poultry Welfare and Behaviour***

#### ***PWB098***

*Dr. Doug Korver, University of Alberta*

Canadian broiler producers may "dry-clean" barns after a flock, with full disinfection and sanitation once per year. Little information is available on the impact of dry cleaning on barn microbial loads and the subsequent effects on broiler health, carcass microbial loads, inflammatory response, processing traits and economics. With current pressures to reduce the use of antibiotics in food animal production, the lack of available data on the potential risks and benefits of this cleaning approach is an important knowledge gap. The objectives of this research are to quantify the impact of barn dry cleaning on productivity, health, microbiology, carcass traits and the economics of broiler production. Canadian broiler producers will thus be able to make rational decisions regarding the most appropriate barn sanitation method to use on their farms. The research will support and enhance productivity, health, food safety and profitability for the Canadian poultry industry, and provide context for decisions regarding reduced antimicrobial use.



## Chapter 5: Transferring knowledge to the users of poultry research

### Updates

CPRC prints a bi-monthly feature in Canadian Poultry magazine. The articles provide updates on recent CPRC activities and often include summaries of completed research projects. The summaries are written in simple language and explain how the projects fit into overall research programs, and how the research relates to the farm. Research results are also provided to the CPRC member organizations who then relay the information directly to their respective members. Results are, of course, published in peer-reviewed scientific journals and shared worldwide throughout the scientific community.

### Website

The CPRC website provides comprehensive information on CPRC and Canadian poultry research. Status reports are provided for all CPRC-supported research, as well as news, updates and events. The “Links” section provides a quick stop to find a variety of sites relating to poultry research.

### eBulletin

An electronic bulletin is periodically emailed to stakeholders across the country as a quick update on research results and CPRC activities.





## Appendix – Acronyms used

AAFC	Agriculture and Agri-Food Canada
AIP	AgriInnovation Program
AviMicroNet	Avian Gut Microbiology Network
CFC	Chicken Farmers of Canada
CHEP	Canadian Hatching Egg Producers
CPEPC	Canadian Poultry and Egg Processors Council
CPRC	Canadian Poultry Research Council
EFC	Egg Farmers of Canada
LOI	Letter of Intent
NSERC	Natural Sciences and Engineering Council
PIC	Poultry Industry Council
SAC	Scientific Advisory Committee
TFC	Turkey Farmers of Canada