Advancing our industry through evidence-based research

Research summary overview

Our Research Grant Program actively supports 35 research projects in a variety of fields at universities across Canada. Each research project is linked to at least one of Egg Farmers of Canada's research priorities. Below is an introduction to these research projects as well as their status.

2019 EFC GRANT PROGRAM RESEARCH SUMMARY

PROJECT NAME	PAGE	RESEARCH PRIORITY AREA ADDRESSED								
		Animal care science	Food safety	Human nutrition and health	End of flock management	Non-food uses of eggs	Environment and sustainability	Bird nutrition and health	Public policy and economics	Research gaps identified by the Code of Practice
Developing an integrated method of preparing bioactive peptides from end of lay hens for functional food, nutraceutical and cosmetic applications	4			X						
Developing valuable egg components for niche market applications	4			X		X				
Adaptation to the pullet-rearing environment by providing lighting during embryo development	5	X								
Behaviour of pullets following the provision of lighting during embryo development	5	X								
Assessing methods for on-farm euthanasia of turkeys, chickens, breeders and layers	6				X					

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Development and assessment of vitamin-enriched granule extracts from egg yolk	6			X						
In ovo vaccination platform to reduce *Salmonella* and other food safety relevant bacteria in poultry	6		X							
Antihypertase activity of cooked egg yolk digest	6			X						
Use of a novel mobile anaerobic digestion vessel for laying hen mortality disposal	7				X					
Practical dietary strategies to reduce the carbon footprint and ammonia emission intensity of table egg production	7						X			
Implications of free run egg production on ammonia and particulate matter generation	8						X			
Toward an understanding of beautiful feather cover in laying hens	8	X								
An egg a night to keep glucose tight	8			X						
Nano-textured eggshell scaffolds for bone regeneration	9			X		X				
Precision feeding layers for improved uniformity, production and sustainability	9							X		
The role of shell protein in controlling bacterial movement through chicken eggs	9		X							
Investigating the influence of a range of exposure conditions during simulated transport on pullet and end of lay physiology, welfare and meat quality	9				X					
Effect of finishing space allowance in standard and enriched colony housing on performance, health and welfare of layer pullets	10	X								
Understanding feather pecking in laying hens: the gut-microbiome-brain connection	10	X								
Development of strategies for control of avian influenza virus transmission	10							X		
Egg production for a complete cycle feeding of dietary seaweed	10		X							
Investigating the role of limestone particle size on skeletal development and performance of pullets reared in conventional and aviary housing systems and subsequent performance, bone health, calcium, metabolism and welfare hens housed in enriched housing	10							X		
Prevalence of focal duodenal necrosis in Saskatchewan layer flocks and its effect on egg production	11							X		
Determining the impact of gizzard size on feed efficiency, gut health and the incidence of focal duodenal necrosis in pullets and layers fed diets with different calcium sources and levels	11							X		

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The role of omega-3 fatty acids in bone development in pullets: investigating epigenomic response to breeder and perinatal nutrition	12							X		
Eggshell membrane nano-particles for biomedical applications	12					X				
Cuticle proteins in diverse lines of chickens	12		X							
How much omega-3 fatty acids do hens require for optimal health and productivity?	12							X		
Circular economy: application to egg production in Canada	12						X		X	
A novel non-antibiotic strategy for controlling avian pathogenic *Escherichia coli* in laying hens	13							X		X
Importance of eggshell cuticle quality for reducing bacterial adherence in table eggs	13		X							
Assessment of the impact of Canadian infectious bronchitis virus variants on egg production and fertility in chickens	13							X		X
Determination of the metabolic triggers responsible for sexual maturation in laying hens and their relation to rearing environment and nutrition	13							X		X
Egg yolk lecithin supplementation to improve pulmonary health: implications for healthy individuals and individuals with Chronic Obstructive Pulmonary Disease	13			X						
Develop new application of egg protein ovotransferrin as a functional food ingredient on bone health	14			X		X				
Accelerating speed to market of an egg derived natural health product: clinical efficacy and safety assessment of egg peptides in the management of high blood pressure	14			X		X				
Precision pullet rearing strategies for optimal reproductive body condition	14							X		X
A novel egg white-based biomaterial for 3D tissue engineering	14			X		X				
Modified eggshell membrane formulations as a novel supplement to maintain gut health	14			X		X				
Optimization of vaccination strategies for table egg layers controlling egg production problems induced by currently circulating infectious bronchitis virus variants	15							X		X
The fermentation of end of lay hen hydrolysate to produce pathogen-free microbiological-rich plant nutrient solutions	15				X					
The beneficial effect of egg-derived phosphatidylcholine on the obesity-related immune dysfunction	15			X						

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Get cracking for diabetes: an egg-based breakfast for improving blood glucose control in type 2 diabetes	15			X						
Animal implant studies with nano-textured eggshell-based constructs for bone regeneration	15			X		X				
Use of 3D kinematics and genomics to evaluate perching biomechanics in commercial and heritage strains of enriched-housed pullets and laying hens	15	X								X
Mining the chicken gastrointestinal microbiome for novel anti-infective probiotics to reduce the incidence of bacterial infections	16							X		
Impact of alternative housing systems on layer health and egg production	16	X						X		
Egg as a strategy to maintain retina health in diabetes	16			X						
Eggs as nutrient-rich source of protein to enhance activity-related health in older persons: The EVEN-P pilot trial	16			X						

Completed research 2018–2019

Developing an integrated method of preparing bioactive peptides from end of lay hens for functional food, nutraceutical and cosmetic applications

Dr. Jianping Wu, University of Alberta

Objective

End of lay hens are a valuable source of muscle and collagen proteins that can be further processed into their respective bioactive peptides. The overarching objective of this study was to develop an integrated method to extract bioactive peptides from end of lay hens for use as value-added ingredients in products in the functional food, nutraceutical and cosmetic industries.

Results

The study found that bioactive peptides could significantly reduce blood pressure in hypertensive rats and could exert anti-inflammatory and anti-oxidative responses in human skin cells, suggesting their potential applications in anti-hypertension, skin health and wound healing. Developing bioactive peptides from end of lay hens provide the Canadian egg industry with a sustainable, alternative use for end of lay hens.

Developing valuable egg components for niche market applications

Dr. Jianping Wu, University of Alberta

Objective

In addition to serving as an excellent source of high-quality protein, eggs are widely recognized as a versatile and functional food ingredient with many applications due to its foaming, emulsifying and gelling properties. The aim of this study was to develop

functional bioactive peptides from egg whites and then fractionate egg yolk components for other functional food, nutraceutical, nutritional, aquaculture, cosmetic and pharmaceutical industries.

Results

This study further demonstrated additional beneficial properties of egg peptides against metabolic syndrome. Egg white hydrolysate improved insulin sensitivity and glucose tolerance and reduced systemic inflammation. Extracted plasma proteins also showed immunomodulatory properties in cells and extracted granule proteins demonstrated emulsifying and foaming properties that could be useful for food preparation.

Adaptation to the pullet-rearing environment by providing lighting during embryo development

Dr. Bruce Rathgeber, Dalhousie University

Objective

The objective of this study was to determine the optimal photoperiod during incubation that would best enable newly hatched chicks to adapt to their rearing environment. Eggs were incubated with either no light; or white, red or blue LED lights with 12 hours of exposure for either the entire incubation period or for the first 18 days followed by 24 hours of darkness for the last three days.

Results

Of the wavelengths provided during incubation, red LED light reduced the total time taken to hatch, which narrowed the hatch window. The introduction of red LED light to incubation also improved chick quality and post-hatch early growth rate in addition to reducing the time to lay the first egg, causing an increase in egg production without negatively affecting the egg quality parameters. In conclusion, the introduction of red LED light as a photoperiod to hatching eggs during incubation was beneficial to production performance.

Behaviour of pullets following the provision of lighting during embryo development

Dr. Karen Schwean-Lardner, University of Saskatchewan

Objective

Assess the behaviour of chicks incubated with both light and dark periods from hatching, through brooding and rearing to determine if providing lighting during incubation has health and welfare benefits on chicks and laying hens. Red, white and blue LED lights were used in this study.

Results

The study found that while the light colour used in ovo had no impact on chick behaviour during the first four days of life, the lighting program used during the brooding phase did. Chicks given a longer dark period performed more active behaviours, were less lethargic and spent more time at the feeder and drinker. Lighting programs with longer dark periods during the first few days of life may result in improved ability for chicks to find water and feed.

Assessing methods for on-farm euthanasia of turkeys, chickens, breeders and layers

Dr. Tina Widowski, University of Guelph

Objective

Assess and compare the efficacy and humaneness of various on-farm euthanasia methods, including manual and mechanical cervical dislocation, non-penetrating captive bolt devices and gaseous methods, in turkeys, chickens, breeders and layers of different ages.

Results

Research suggests that mechanical cervical dislocation is less effective than manual cervical dislocation. Non-penetrating captive bolts were found to be fast, highly repeatable, and can be used as a single-step method that is effective in all age groups of layer hens. Non-penetrating captive bolts are one of the most humane options available. Based on aversion tests, the study concluded that euthanasia with CO_2 should target concentrations of less than 50%.

Development and assessment of vitamin-enriched granule extracts from egg yolk

Dr. James House, University of Manitoba

Objective

Eggs are a valuable source of nutrients and bioactivities, including the metabolically active form of folate (5-MTHF). Further enhancement of nutrients in the egg, particularly with respect to egg yolk, can be done by modifying the diets of laying hens. This study looked to optimize 5-MTHF extraction from egg yolk and determine the biological activity of folate-enriched egg yolk using both in vitro and in vivo systems.

Results

Researchers were successfully able to optimize 5-MTHF extraction from egg yolk. The results showed that egg yolk extracts enriched with 5-MTHF demonstrated high biological activity. Future work will provide an opportunity to study these extracts as sources of folate in fortified foods as well as supplements. This could potentially lead to a replacement of synthetic folic acid by egg yolk-derived 5-MTHF fractions, reducing concerns of too much synthetic folic acid in the human diet.

In ovo vaccination platform to reduce *Salmonella* and other food safety relevant bacteria in poultry

Dr. Wolfgang Koester, University of Saskatchewan

Objective

The objective of this study was to develop an in ovo delivery, subunit vaccine directed against *Salmonella* Enteritidis (SE) to prevent colonization and infection of poultry. The researchers conducted a proof of principle, experimental challenge trial with vaccinated birds using an oral infection chicken model to assess vaccine immunogenicity and efficacy.

Results

The researchers tested *Salmonella* bacterin and seven different subunit vaccine candidates in combination with a variety of adjuvants, and compared in ovo delivery with subcutaneous delivery. There were no significant differences to the relevant control groups regarding ceacal colonisation or systemic infection with *Salmonella*. None of the vaccinated groups provided a significant protection against a *Salmonella* challenge. The use of bacterial antigens formulated as subunit vaccines with different adjuvants remains a promising concept, which requires further research to elicit a meaningful immune response.

Antihypertase activity of cooked egg yolk digest

Dr. Jianping Wu, University of Alberta

Objective

Previous research completed by Dr. Wu's lab demonstrated that cooked egg generates bioactive peptides that can control blood pressure, reducing blood pressure in hypertensive rats. The objective of the study was to determine the ability of digested cooked egg yolk to lower blood pressure in spontaneously hypertensive rats and identify the egg yolk components responsible for the blood pressure lowering effects.

Results

Egg yolk digests, egg yolk lipids and oleic acid did not affect blood pressure. The results from this study suggest that egg yolk lipids act as a neutral component on blood pressure. The results also suggest that bioactive peptides derived from egg proteins are responsible for the blood pressure lowering activity of digested cooked egg.

Use of a novel mobile anaerobic digestion vessel for laying hen mortality disposal

Dr. Brandon Gilroyed, University of Guelph – Ridgetown

Objective

Design, build and test a biosecure, mobile, anaerobic digestion vessel that will dispose of poultry mortalities and produce a renewable biogas that could be used for heat and power production. This vessel design would facilitate convenient and rapid disposal of mortalities.

Results

Biogas production in the portable vessel system was lower than expected and several limitations would make the adoption of this strategy challenging to implement. While the vessel did not result in a feasible process for on-farm mortality management, it has led researchers in a promising direction of alkaline hydrolysis coupled with anaerobic digestion. Preliminary studies demonstrate that this is a practical and effective method to dispose of mortalities, eliminate pathogens and produce energy.

Practical dietary strategies to reduce the carbon footprint and ammonia emission intensity of table egg production

Dr. Eduardo Beltranena, Alberta Agriculture and Forestry

Objective

Evaluate the effectiveness of feed ingredients and dietary manipulation strategies in reducing ammonia emissions and carbon footprint associated with egg production, while also comparing production, egg quality and economic returns. The research aims to identify practical dietary strategies that will allow egg producers to reduce ammonia emissions by 25% and carbon footprint by 10%.

Results

Acidifying diets by substituting some limestone for gypsum resulted in as much as a 40% reduction in ammonia emission intensity and reduced ammonia emitted by over 25% with minimal impact on hen productivity or egg quality. Diets containing either excess digestible crude protein or low digestible crude protein increased ammonia emissions, which suggests that balancing essential amino acids may have a heightened importance in very low digestible crude protein diets. Several diet additives were tested and all resulted in similar hen productivity and egg quality and did not yield significant reductions in ammonia emissions when compared to a typical Western Canadian diet.

Implications of free run egg production on ammonia and particulate matter generation

Dr. Bill Van Heyst, University of Guelph

Objective

Measure and quantify the emission rates of ammonia and size fractionated particulate matter from free run barns on two commercial egg farms over the period of one year. The study also compared emission levels of ammonia and particulate matter from free run and conventional housing systems.

Results

There were significant differences between the two free run facilities regarding particulate matter emission factors, which were attributed to manure, litter, ventilation rates, temperatures and relative humidity. There was significant seasonal and diurnal variation in emissions of ammonia particulate matter in both free run systems. When compared to a conventional housing system, ammonia emission factors from the conventional housing system were lower than one free run system and higher than the other free run system. However, both free run systems had higher particulate matter emission factors.

Toward an understanding of beautiful feather cover in laying hens

Dr. Alexandra Harlander, University of Guelph

Objective

Develop a user-friendly feather cover scoring system and illustrated guide. Identify and quantify management, environmental and genetic associations with feather pecking and feather loss in enriched colonies and free run housing systems. The data collected through a survey of Canadian farms was analyzed and used to create a Canadian Feather Management Plan to help farmers with decisions relating to maintaining feather cover and managing feather pecking in their flocks.

Results

This project estimated the prevalence of feather damage in laying hens housed in enriched colonies as 21.9% and 25.9% in free run housing systems. Factors associated with higher feather damage prevalence in enriched colonies include flock age, brown-feathered birds, midnight feeding, lack of a scratch area. Flock age, all wire or slatted flooring system and limited manure removal increased the prevalence in free run systems. The study identified methods to prevent or reduce feather damage, including providing foraging opportunities, adjusting barn climate to maintain litter and air quality and avoiding the use of abnormal lighting cycles that may affect birds' ability to rest and escape active peckers. The researchers developed several illustrative guides and a management plan to assist farmers.

An egg a night to keep glucose tight

Dr. Jonathan Little, University of British Columbia – Okanagan

Objective

This research aims to help identify the potential benefit of eggs as a bedtime snack for people with type 2 diabetes and provide scientific evidence for an egg consumption strategy to improve glucose control.

Results

In the short term, consuming two eggs as a bedtime snack lowered fasting blood sugar and improved markers of insulin sensitivity when compared to eating yogurt as a bedtime snack. However, consuming eggs or yogurt as a bedtime snack did not appear superior to not having a bedtime snack. The research concluded that if patients with type 2 diabetes are to consume a bedtime snack, a low-carbohydrate higher-protein option such as eggs should be advised.

Nano-textured eggshell scaffolds for bone regeneration

Dr. Maxwell Hincke, University of Ottawa

Objective

Develop nano-textured eggshell surfaces from breaking plant eggshell waste to create eggshell scaffolds that can be used as a bone graft substitute in orthopedic reconstructive medical procedures to provide mechanical support and promote bone regeneration. The objective was to create high-value biomedical material from a low-value waste product.

Results

Inclusion of eggshell particles and nano-textured eggshell particles in a scaffold demonstrated appropriate bioporosity and biocompatibility and induced bone cell formation when tested with human stem cells. Not only did this research highlight the potential for egg shells as a bone regenerative material, it also indicated the potential for a high-value repurposing of eggshell industrial waste products.

Research in progress

Precision feeding layers for improved uniformity, production and sustainability

Dr. Martin Zuidhof, University of Alberta

Objective

Use precision feeding to improve the uniformity of free run pullets and laying hens by feeding through an optimal diet based on real-time body weight readings and reducing body size and frame size variation at the point of sexual maturity.

The role of shell protein in controlling bacterial movement through chicken eggs

Dr. Bruce Rathgeber, Dalhousie University

Objective

Assess the presence of antimicrobial proteins in eggshells from a wide range of genetic backgrounds to determine if the increased protection from *Salmonella* penetration in some chickens is related to increased presence of antibacterial proteins in the eggshell.

Investigating the influence of a range of exposure conditions during simulated transport on pullet and end of lay physiology, welfare and meat quality

Dr. Karen Schwean-Lardner, University of Saskatchewan

Objective

Investigate the response of pullets and end of lay hens to a range of exposure conditions, durations and feather covers during simulated transport. Data from this project will support the development of evidence-based transportation limits for pullets and end of lay hens in regulations and Codes of Practice.

Effect of finishing space allowance in standard and enriched colony systems on performance, health and welfare of layer pullets

Dr. Tina Widowski, University of Guelph

Objective

Determine the effects of finishing space allowance in conventional and enriched rearing systems on growth, feeding behaviour and welfare of growing pullets and their subsequent performance in the layer barn in both research and commercial barns. Data from this project will support the development of best practices for rearing and management of pullets.

Understanding feather pecking in laying hens: the gut-microbiome-brain connection

Dr. Alexandra Harlander, University of Guelph

Objective

Test if social stress induced by large, densely populated groups of laying hens in free run systems contributes to feather pecking or influences changes in gut microbiota, immune system, enteric nervous system or metabolic pathways. Assess whether changes in gut microbiota and their metabolites alter specific pathways, and if these mechanisms contribute to feather pecking. Following these results, researchers will develop probiotics to mitigate the gut flora changes associated with stress and feather pecking behaviour.

Development of strategies for control of avian influenza virus transmission

Dr. Shayan Sharif, University of Guelph

Objective

Develop vaccine formulations that can effectively control avian influenza (AI) virus shedding and can be administered in ovo or in feed, water or spray. The mucosal delivery vaccine platform that will be established in this research could be used for other types of poultry vaccines. This research will combine expertise in vaccine development and computer modelling to model the transmission of AI from vaccinated poultry to susceptible poultry, and create a decision support system for the management of AI.

Egg production for a complete cycle feeding of dietary seaweed

Dr. Bruce Rathgeber, Dalhousie University

Objective

Evaluate the use of dietary red seaweed in laying hen diets over an entire production cycle to confirm the safe, long-term use of red seaweed as a dietary ingredient. Determine if the established benefits of red seaweed supplementation on hen intestinal health and protection from pathogen colonization is sustained over the production cycle.

Investigating the role of limestone particle size on skeletal development and performance of pullets reared in conventional and aviary housing, and subsequent performance, bone heath, calcium, metabolism and welfare of hens in enriched housing

Dr. Elijah Kiarie, University of Guelph

Objective

Evaluate the effects of limestone particle size on calcium digestibility and metabolism in laying hens and pullets, and the performance and skeletal development of pullets reared in different housing

systems. This research will follow pullets through to the laying phase and assess the subsequent effects of limestone particle size on egg mass, quality and internal characteristics, bone health and welfare in hens housed in enriched colonies. This research explores nutritional means to enhance gut health and function, skeletal integrity and to optimize feed utilization in pullets and laying hens.

Prevalence of focal duodenal necrosis in Saskatchewan layer flocks and its effect on egg production

Dr. Henry Classen, University of Saskatchewan

Objective

Perform surveillance and data collection on eight laying hen flocks in Saskatchewan to determine the prevalence of focal duodenal necrosis (FDN), an intestinal condition of laying hens associated with decreased egg weight and egg production, and its effect on egg production. Identify factors associated with increased incidence of FDN and determine if clostridial organisms are associated with FDN lesions in the gut. This research serves to gain a better understanding of the scientific literature on FDN in laying hens, and direct further investigation into the etiology of FDN.

Determining the impact of gizzard size on feed efficiency, gut health and the incidence of focal duodenal necrosis in pullets and layers fed diets with different calcium sources and levels

Dr. Henry Classen, University of Saskatchewan

Objective

Investigate the incidence of focal duodenal necrosis (FDN) in pullet and layer flocks throughout production and to compare the effects of providing a pre-lay ration for one week versus four weeks on gastrointestinal and production parameters and FDN occurrence. Determine if calcium source and level has an impact on gizzard size, gut health, feed efficiency, production and the occurrence of FDN in pullets and laying hens.

The role of omega-3 fatty acids in bone development in pullets: investigating epigenomic response to breeder and perinatal nutrition

Dr. Elijah Kiarie, University of Guelph

Objective

Investigate the epigenetic, long-term effects of feeding breeder (parent stock) diets enriched with omega-3 fatty acids on embryonic bone development. Assess the subsequent effect on skeletal development and performance in pullets and laying hens, and on pullet behaviour when subjected to stressors.

Eggshell membrane nano-particles for biomedical applications

Dr. Maxwell Hincke, University of Ottawa

Objective

Produce and characterize eggshell membrane nano-particles. Evaluate their applications as therapeutic agents against cancer, microbial infection and inflammatory disease conditions, with an enhanced emphasis on skin applications such as cosmetics and skin cancer.

Cuticle proteins in diverse lines of chickens

Dr. Bruce Rathgeber, Dalhousie University

Objective

Determine the presence of antimicrobial proteins in the eggshell cuticle from a wide range of genetic backgrounds, from both commercial and heritage breeds. The study will also identify if the increased protection from *Salmonella* penetration in some chickens is related to increased presence of antibacterial proteins. The study will also assess if there is a relationship with the cuticle proteins and the shell matrix proteins that would allow for selection of overall complement of shell proteins based on the cuticle protein profile.

How much omega-3 fatty acids do hens require for optimal health and productivity?

Dr. James House, University of Manitoba

Objective

Define omega-3 requirements for optimal health and performance in pullets and laying hens. Identify whether the type and levels of the omega-3 fatty acids in the diet affect birds' health and productivity. Determine the optimal quantity and type of omega-3 fatty acids to enhance immunity in pullets and laying hens to overcome an immune challenge induced by lipopolysaccharide, an inflammation-causing component of the cell wall of gram-negative bacteria.

Circular economy: application to egg production in Canada

Dr. Maurice Doyon, Université Laval

Objective

Develop and evaluate quantifiable and objective circular economy indicators for egg production. Measure the strengths and weaknesses of poultry farms by production system to recommend ways of improving their circularity level. Indicators will be quantified on commercial farms.

A novel non-antibiotic strategy for controlling avian pathogenic *Escherichia coli* in laying hens

Dr. Dongyan Niu, University of Calgary

Objective

Evaluate the impact of plant tannins and bacteriophages to optimize the control of *Escherichia coli* in free run housing systems in lieu of using antibiotics.

Importance of eggshell cuticle quality for reducing bacterial adherence in table eggs

Dr. Maxwell Hincke, University of Ottawa

Objective

Identify the effect of hen age, strain and egg washing on eggshell quality and components of the eggshell cuticle. The study also looks to block bacterial adhesion and reduce pathogen contamination of table eggs in order to identify new targets for flock selection to improve cuticle quality.

Assessment of the impact of Canadian infectious bronchitis virus variants on egg production and fertility in chickens

Dr. Careem Faizal, University of Calgary

Objective

Determine the economic impact of variant Infectious Bronchitis Virus (IBV) strains on the reproductive health (egg production and quality) of laying hens. This project also aims to propose mitigation strategies against IBV and to evaluate vaccines capable of protecting laying hens.

Determination of the metabolic triggers responsible for sexual maturation in laying hens and their relation to rearing environment and nutrition

Dr. Gregoy Bedecarrats, University of Guelph

Objective

This study aims to determine the body weight and body composition thresholds responsible for initiating sexual maturation in two strains of laying hens reared in different environments. Researchers also aim to characterize the metabolic signals responsible for activating and inhibiting the reproductive axis and determine if this is impacted by different rearing environments and if this impacts skeletal integrity.

Egg yolk lecithin supplementation to improve pulmonary health: implications for healthy individuals and individuals with Chronic Obstructive Pulmonary Disease

Dr. Mathieu Morissette, Institut universitaire de cardiologie et de pneumologie de Québec – Université Laval

Objective

Investigate the impact of egg yolk lecithin supplementation on pulmonary health and circulating phosphatidylcholine levels and lung function in healthy individuals and individuals with chronic obstructive pulmonary disease (COPD).

Upcoming research projects

Develop new application of egg protein ovotransferrin as a functional food ingredient on bone health

Dr. Jianping Wu, University of Alberta

Objective

Develop a new application for ovotransferrin, a natural bioactive protein derived egg white protein, as a functional food ingredient for use in bone health products, as a long-term approach for the prevention and mitigation of osteoporosis and an alternative to standard treatments.

Accelerating speed to market of an egg derived natural health product: clinical efficacy and safety assessment of egg peptides in the management of high blood pressure

Dr. Jianping Wu, University of Alberta

Objective

Conduct a clinical trial to assess the safety and efficacy of an egg-derived peptide in the management of blood pressure through a randomized, placebo controlled trial. Assess the impact of the egg peptide product in subjects' 24 hour systolic, diastolic and mean ambulatory blood pressure for six weeks.

Precision pullet rearing strategies for optimal reproductive body condition

Dr. Martin Zuidhof, University of Alberta

Objective

Optimize nutritional management for free run pullets and hens. Understand the metabolic and physiological interactions that govern sexual maturation and lifetime egg production using precision feeding.

A novel egg white-based biomaterial for 3D tissue engineering

Dr. Simon Tran, McGill University

Objective

Characterize the use of egg white alginate as a novel scaffold to grow a number of different organoids including salivary glands. Egg white alginate is an inexpensive, easily accessible and promising alternative to gold standard scaffolds.

Modified eggshell membrane formulations as a novel supplement to maintain gut health

Dr. Maxwell Hincke, University of Ottawa

Objective

Determine the appropriate eggshell membrane format, particle size and method of preparation to formulate a capsule-based oral supplement, which can be marketed for positive impact on human gut health.

Optimization of vaccination strategies for table egg layers controlling egg production problems induced by currently circulating infectious bronchitis virus variants

Dr. Faizal Careem, University of Calgary

Objective

Optimize vaccination strategies against false layer syndrome, shell-less egg syndrome and other egg production abnormalities induced by select IBV variants isolated from laying hens raised in Eastern and Western Canada using currently available IBV vaccines in Canada.

The fermentation of end of lay hen hydrolysate to produce pathogen-free microbiological-rich plant nutrient solutions

Mr. Marc Legault, Alberta Agriculture and Forestry

Objective

Demonstrate the value-added potential for end of lay hens by fermenting end of lay hen hydrolysate to produce an organic plant nutrient solution. Crops will be grown using this solution through commercial greenhouse techniques where crop productivity and soil health will be investigated.

The beneficial effect of egg-derived phosphatidylcholine on the obesity-related immune dysfunction

Dr. Caroline Richard, University of Alberta

Objective

Understand the direct and indirect mechanisms by which egg phosphatidylcholine can counteract the negative effect of a high-fat diet and obesity on the function of T cells (cells that play a role in immune response).

Get cracking for diabetes: an egg-based breakfast for improving blood glucose control in type 2 diabetes

Dr. Jonathan Little, University of British Columbia, Okanagan

Objective

Determine if consuming an egg-based breakfast can improve glucose control and cardio metabolic health in people with type 2 diabetes when compared to a standard low-fat breakfast.

Animal implant studies with nano-textured eggshell-based constructs for bone regeneration

Dr. Maxwell Hincke, University of Ottawa

Objective

Evaluating biocompatibility, mineralization, and integration of nano-textured eggshell-based constructs for bone replacement when implanted into rats. This study is a continuation of Dr. Hincke's project entitled, *Nano-textured eggshell scaffolds for bone regeneration*.

Use of 3D kinematics and genomics to evaluate perching biomechanics in commercial and heritage strains of enriched-housed pullets and laying hens

Dr. Clover Bench, University of Alberta

Objective

Assess the biomechanics of perching behaviour in pullets and laying hens using 3D kinematics to determine optimal phenotypes associated with specific genomic markers, stronger bones and better keel and foot health for hens housed in enriched colonies.

Mining the chicken gastrointestinal microbiome for novel anti-infective probiotics to reduce the incidence of bacterial infections

Dr. Jennifer Ronholm, McGill University

Objective

To discover anti-infective novel probiotics that reduce the incidence of pathogenic gram-negative bacteria in the intestine of laying hens, with the aim to eliminate or reduce the need and use of antibiotics.

Impact of alternative housing systems on layer health and egg production

Dr. Martine Boulianne, University of Montreal

Objective

Data will be collected from commercial farms to understand the effect of enriched colonies and aviaries on laying hens' health, welfare, air and litter quality and production parameters such as egg production, feed consumption and mortalities.

Egg as a strategy to maintain retina health in diabetes

Dr. Miyoung Suh, University of Manitoba

Objective

Investigate the effect of lutein and omega-3 DHA-enriched egg consumption on retina health in individuals with diabetes. The results of this study will contribute to the development of prevention strategies for eye health in diabetic individuals.

Eggs as nutrient-rich source of protein to enhance activity-related health in older persons: the EVEN-P pilot trial

Dr. Stuart Phillips, McMaster University

Objective

Assess if older adults who consume higher than recommended dietary protein (mainly by consuming eggs) have increased muscle mass when coupled with exercise and increased consumption of nutrients important for healthy aging and no difference in blood lipid concentrations.

Visit **eggfarmers.ca** or contact us at **research@eggs.ca** for more information about Egg Farmers of Canada or our research program.

EGG FARMERS OF CANADA