



2016 ANNUAL REPORT



APRIL 1, 2015 TO MARCH 31, 2016

The Poultry Research Centre is a partnership of the poultry industry, Government of Alberta and University of Alberta to foster a healthy Canadian poultry enterprise. Excellence in research and innovation, knowledge management, technology transfer and mentoring tomorrow's poultry professionals are the Centre's hallmark.

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Chair's Report

It was an honour at the end of last year to be elected as the Advisory Board Chair. In my short time with the PRC board I have been excited about the strategic framework that has been developed and accepted by the advisory board. There was great engagement and effort through the fall from PRC members and stakeholders to make sure that strategic framework reflected the priorities of the PRC into the future while providing comfort and value to all members. This plan seems to have met the goal of being forward thinking and visionary but still is rooted in the realities that we face today. The process was very open, transparent and inclusive and my hope is that this process has created a strong foundation for the PRC in the next few years. The challenge facing the PRC in the next few years will be successfully implementing this plan and with the help of our funding partners I am confident that we can partner to achieve excellence in research and innovation, knowledge management, technology transfer and mentoring tomorrow's poultry professionals!

I thank you for your support and commitment to improving the poultry industry and look forward to serving the board in the coming year.

David Hyink
Chair, Advisory Board
April 2016

Academic Leader's Report

The last fiscal year brought much vision and insight into the PRC's future. Under the guidance of Pam Mavrolas, we completed the PRC's strategic framework, our guide for the next 5 to 7 years. The framework is ambitious and successful implementation will require the thoughtful engagement of all stakeholders.

Once again, I am proud to serve as the academic leader of the PRC. This year we received over \$1.7M in project funding. In 30 projects, we continued to prepare 40 graduate students and 20 research support personnel for meaningful leadership roles in the poultry industry. These future leaders were engaged in production, nutrition, food safety, and product development work that provides opportunities and contributes to solutions faced by industry. A total of 9 students – 4 MSc and 5 PhD students – graduated this year. The 7 teaching awards earned by PRC instructors is a testament to their dedication to excellence, and to the quality of training students are receiving. Our graduate students won over 30 awards, and brought in more than \$100,000 dollars to provide opportunities to travel to scientific conferences and support their programs of study.

This year, Peavey Industries officially joined as a member of the PRC. A clear mutual benefit underlies this partnership. Peavey enjoys the benefits of being connected to the PRC's popular Heritage Chicken Program, and the PRC benefits from Peavey Mart's marketing of heritage chicks. I am pleased and proud to report that the Department of AFNS is providing critical financial support that sets a visionary tone.

The PRC is poised to move forward with its new strategic framework. Together, I look forward to engaging with stakeholders and funders to tackle integrated challenges that will benefit the whole poultry industry. One such example could be the development of an antibiotic-free production strategy. This is the type of challenge that requires knowledge from people with expertise in production, nutrition, immunology, microbiology, processing, animal welfare, design, economics, veterinary medicine, and consumer perception – to name a few. The PRC brings together the right expertise and connections to appropriately define the challenge and develop innovative solutions. Dr. Carney, a valuable Alberta Government PRC member, is currently developing a technology transfer funding proposal that will bring together the minds and resources needed to provide both routine and innovative solutions for our members.

Thank you for your support and encouragement over the last year! I urge you to read about our collective accomplishments and continue to dream about how by working together you can boost your success. In the next year as we all consider our commitments for the next PRC contract, I look forward to hearing your ideas about how we can foster a healthy Canadian poultry enterprise through excellence in research and innovation, knowledge transfer, and mentoring the poultry professionals of the future!

Martin Zuidhof
Academic Leader

Technology Transfer



A NEW APPROACH TO TECH TRANSFER

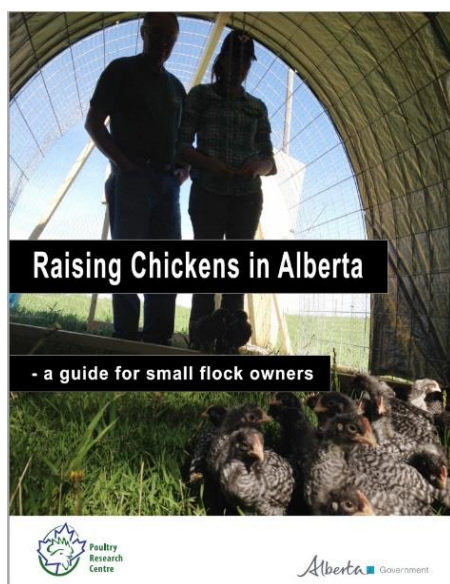


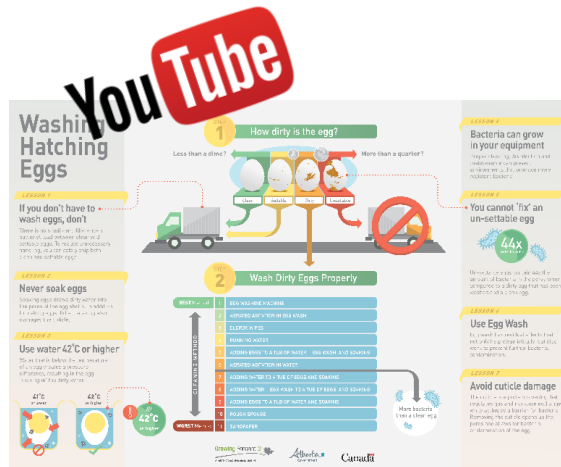
Flock Talks are discussions forums that bring together topic specialists and producers to discuss practical solutions and strategies for real-world challenges. This informal event incorporates specialist to producer and producer to producer learning opportunities.

In 2015, we tested a new delivery method for this event through the use of a tele-forum with the Alberta Turkey Producers. This collaborative effort between ATP, Sofina Foods and Alberta Agriculture and Forestry delivered practical information about turkey brooding and light programs to producers in Alberta and Saskatchewan.

A second Flock Talk was presented to Alberta Egg Farmers in Lethbridge and covered effective feeding strategies for laying hens.

An interest in maintaining small flocks in Alberta has increased. In response, the University of Alberta has developed a manual to support small flock owners in providing the best conditions to maintain bird health and production. This initiative was further supported by two one-day workshops that provided small flock owners with practical information and management strategies. The workshops were an excellent way to connect with this group and deliver messages to support the health of the Alberta poultry industry.





Washing hatching eggs can be a contentious issue within the hatching egg industry. Alberta Agriculture and Forestry (AF) investigated which washing methods most effectively reduce microbial loads on hatching eggs and presented the results at the fall 2014 Chick N Chat meetings of the Alberta Hatching Egg Producers (AHEP). At the 2015 AGM of the Alberta Hatching Egg Producers, AF distributed barn-ready posters that summarized the best washing practices identified in the study and recently released YouTube videos demonstrating proper procedures for washing hatching eggs.



To make a lasting resource of the informative presentations delivered at the 2015 Western Poultry Conference, each speaker was recorded. Short videos on transportation, gut health, lighting, water quality and husbandry were produced and housed on the Western Poultry Conference website (www.westernpoultryconference.ca) and the Agriculture and Forestry YouTube channel (www.agriculture.alberta.ca). These videos extend the reach of the conference to all poultry producers in Alberta and beyond.



The 2nd annual Western Poultry Conference hosted over 350 attendees who learned about the aftermath and prevention of Avian Influenza outbreaks, ventilation, public trust and social license, camelina as a feed ingredient and raising poultry without antibiotics. Reviews were positive.

Dr. Valerie Carney
Technology Transfer Liaison
April 2016

Highly Qualified Personnel

HQP – High Quality Personnel – is one of the most important outcomes for the PRC. We have the opportunity to train the people that will enter the poultry sector, as leaders in research, business and education, as well as highly trained and capable workers on the front lines. Although we can't teach our HQP everything they will need to know, we train them in the fundamentals, and equip them with the tools to adapt to an ever-changing world.

In addition to the two dedicated poultry courses, AN SC 463 (Poultry Nutrition; 18 students, Korver) and 471/571 (Applied Poultry Research; 26 + 3 grad students, Zuidhof), PRC members taught undergraduate courses with 5 to 50% of the content being relevant to poultry, with enrolments of 33 to 160 students. In total, PRC team members teach 528 undergraduate and 25 graduate students. We are able to give our undergraduate students exposure to the bigger picture, covering topics such as nutrition, production, food safety, food animal behaviour and biomaterials.

We also take advantage of opportunities to work more closely with individuals or small groups of students. PRC members participated in two undergraduate independent study courses (use of antimicrobials to inhibit *Salmonella* on poultry, McMullen; cold weather broiler transportation, Korver), and there were also 2 Capstone (group projects) led by PRC staff.

PRC team members are an important part of the graduate and undergraduate teaching program at the University of Alberta. Our faculty teach courses at the graduate and undergraduate level. Although there are few poultry-specific courses (AN SC 471 – Applied Poultry Science and AN SC 463 – Poultry Nutrition), our faculty teach introductory and upper-year courses that often have poultry-relevant material included. The opportunity to teach at the introductory level ensures that students interested (or who become interested) in poultry are steered towards appropriate upper-level poultry courses. Courses cover such topics as poultry management, nutrition, metabolism, welfare, behaviour, products, food safety and food product development. In addition to teaching at the University of Alberta, members of the PRC also deliver lecture content and practical experience to students at the University of Calgary faculty of Veterinary Medicine. In 2015, four of our faculty – Clover Bench, Doug Korver, Lynn McMullen and Martin Zuidhof were awarded Faculty of Agricultural, Life and Environmental Sciences "Teacher of the Year" honours.

In addition to undergraduate and graduate teaching, training of HQP remains an important focus for the PRC. In 2015/2016, PRC faculty supervised approximately 40 graduate students, 4 visiting scholars, 13 research technicians, 6 Research Associates, 7 post-doctoral fellows, and 5 undergraduate research assistants. Our students won presentation awards at international scientific meetings, as well as numerous scholarships.

As in previous years, members of the PRC (including technicians, researchers, extension specialists and students) were on hand for the 2015 poultry industry Annual General Meetings held in Red Deer. A large number of posters highlighting student and other projects were displayed, giving our students and staff

opportunities to meet directly with producers and talk about the exciting work being done at the PRC, and the relevance of that work to the Poultry industry in Alberta.

The Poultry Research Centre Student Club was active again this year. Now in its third year of operation, the PRCSC continues to be an excellent opportunity for University of Alberta students to gain experience in poultry handling, poultry science and the poultry industry. Activities in the past year included a turkey farm tour, and assisting local producers with broiler-breeder pullet vaccination and pullet transfers.

Dr. Doug Korver

Teaching and Learning Liaison

Commercialization

Egg contains many bioactives, representing value added opportunities. Working with Agnes Kulinski, Business Development Director of PRC, and Afinity Life Sciences, Dr. Wu and his team have moved his innovative egg research, egg phosvitin peptides and ovotransferrin peptides technologies with potential uses in bone health and blood pressure reduction, respectively, one step closer to commercialization. According to Health Canada, an estimated 1.4 million Canadians are believed to have osteoporosis, one in four women and one in eight men over 50 years of age, while hypertension afflicts ~22% of Canadian adults and 80% of the Canadian population over the age of 65. Dr. Wu, along with Agnes Kulinski, has consulted and discussed with various stakeholders, to understand how to move these technologies forward to capture these opportunities. To commercialize these egg technologies as natural health products, it is imperative to perform clinical trials to provide evidence of safety and efficacy. Egg Farmers of Alberta has committed to contribute to \$75,825 in the clinical study. Afinity Life Sciences is now helping Wu prepare clinical study of egg peptides-based natural health products to secure research grants for the clinical trials within one year and to complete clinical trials within another two years.

Precision feeding clearly allows us to feed the right birds at the right times. Zuidhof's team has consistently achieved very low coefficients of variation in body weight, equivalent to 100% flock uniformity. They have not had the resources to conduct a study to gauge the lifetime productivity of such highly uniform breeders. With support from AI-Bio, Dr. Zuidhof's team has begun a study to determine the impact of precision feeding on egg and chick production in broiler parent stocks. This study will be complete by the summer of 2017. Continuing commercialization conversations with potential equipment manufacturers depends on this important study.

Drs. Jianping Wu and Martin Zuidhof

April 2016

Awards (2015)

FACULTY AWARDS (N = 8)

Name	Award
Clover Bench	ALES Teaching Wall of Fame
Doug Korver	ALES Teaching Wall of Fame
Agnes Kulinski	University of Alberta Community Connections Award - Community Leader
Lynn McMullen	ALES Teaching Wall of Fame
Frank Robinson	ALES Teaching Wall of Fame
Martin Zuidhof	ALES Teaching Wall of Fame
Martin Zuidhof	NACTA Certificate of Merit for Teaching
Martin Zuidhof	NACTA Educator Award

GRADUATE STUDENT AWARDS (N = 33; VALUE = \$114,800)

Name	Supervisor	Award
Jesse Hunter	Bench	Queen Elizabeth II (MSc) Scholarship
Jesse Hunter	Bench	Lloyd Johnson Scholarship
Koonphol Pongmanee	Korver	FGSR, University of Alberta - 2015 Graduate Student Teaching Award
Koonphol Pongmanee	Korver	Laird McElroy Travel Award in Animal Science
Felipe Silva	Korver	Don and Mary Ann Copeland Graduate Travel Award
Muhammad Arshad	Ullah	NSERC - LRIGS PDF award
Manpreet Kaur	Ullah	GSA Professional Development Award
Ali Akbari	Wu	Fisher Scientific Graduate Scholarship
Nandika Bandara	Wu	American Oil Chemist Society (AOCS) Honoured Student Award
Nandika Bandara	Wu	First place in Graduate student poster competition (AOCS)
Nandika Bandara	Wu	Graduate Student Teaching award – AFNS
Nandika Bandara	Wu	Graduate Student Teaching award – ALES
Nandika Bandara	Wu	Dr. Bruce Jeffery Canola Travel Award
Nandika Bandara	Wu	Queen Elizabeth II Graduate Scholarship – Doctoral level
Nandika Bandara	Wu	Mitacs Accelerate Graduate Student Internship
Nandika Bandara	Wu	J B McQuitty Graduate Scholarship for Bio-resource Engineering
Nandika Bandara	Wu	J Macgregor Smith Graduate Scholarship for Agricultural and Food Engineering
Nandika Bandara	Wu	Elizabeth Russel MacEachran Graduate Scholarship for Food Science

Nandika Bandara	Wu	WITHYCOMBE-CHARALAMBOUS Graduate Student Symposium Travel Award
Nandika Bandara	Wu	Karl C Ivarson Agricultural Scholarship
Hongbing Fan	Wu	China Scholarship Council PhD Scholarship
Selene Gonzalez Toledo	Wu	Conacyt Scholarship from Mexican Government
Yuchen Gu	Wu	AFNS Winter Differential Award
Forough Jahandideh	Wu	GSA Research Assistant Award
Chamila Nimalaratne	Wu	AFNS Graduate Student Research Award
Yussef O. Esparza	Wu	Mitacs Accelerate Graduate Student Internship
Jiandong Ren	Wu	Fisher Scientific Graduate Scholarship
Paulo Carneiro	Zuidhof	Poultry Service Industry Workshop Scholarship
Paulo Carneiro	Zuidhof	GSA Travel award
Teryn Gilmet	Zuidhof	ALES Graduate Student Teaching Award
Teryn Gilmet	Zuidhof	NACTA Graduate Student Teaching Award
Josh Perryman	Zuidhof	PSA Student Research Paper certificate of excellence
Sasha van der Klein	Zuidhof	CPRC Postgraduate Scholarship

GRADUATIONS (N = 9)

Student	Supervisor	Degree	Focus
Sandeep Nain	Korver	MSc	Omega-3 fatty acid enrichment of eggs
Andrea Balutis	McMullen	MSc	
Yuchen Gu	Wu	PhD	Structure and function study of food protein derived ACE inhibitory peptides
Kaustav Majumder	Wu	PhD	Antihypertensive peptides from egg white proteins
Chamila Nimalaratne	Wu & Schieber	PhD	Antioxidants in egg yolk after cooking, storage and digestion
Teryn Gilmet	Zuidhof & Bench	MSc	Precision feeding behaviour
Wenlin Yu	Wu & Field	PhD	Immunomodulatory peptides from spent hen muscle protein
Yuliya Hrynets	Betti	PhD	Maillard Reaction and Protein Functionality
Daylin Hincampie Martinez	Betti	MSc	Maillard reaction products with antimicrobial activity

Research Highlights

DR. CLOVER BENCH

Dr. Clover Bench is an Assistant Professor of Applied Ethology in the Department of Agricultural, Food, and Nutritional Science in the Faculty of ALES. Her research interests include both behaviour and welfare and focus on five main themes: 1) Stress and disease behaviour, 2) behaviour ontogeny, 3) behaviour genetics, 4) housing design and management, and 5) science-based welfare standards. Dr. Bench's recent and on-going research in poultry ethology has included the behaviour and welfare of broiler breeders fed using automated precision feeding systems, on-farm management practices that impact the prevalence of foot pad dermatitis on Alberta broiler farms, how housing type impacts laying hen welfare assessments and bone strength, perching behaviour in broilers, and the development of automated systems to assess stress and disease in poultry.

In addition to research, Dr. Bench teaches undergraduate courses in livestock behaviour, writes columns in industry newsletters and magazines related to livestock behaviour and welfare, and supervises a full research team of graduate students, technicians, and post-docs dedicated to collaborating with Alberta's livestock industry to promote animal care.

DR. EDUARDO BELTRANENA

This past fiscal year, we initially focused on summarizing, analyzing and reporting 3 years' worth of research regarding feeding camelina cake to laying hens. Our data was submitted by the University of Saskatchewan (main grant holder) to the Canadian Food Inspection Agency last fall. Camelina cake is now listed in Schedule IV of the Feed Act for feeding broilers at 12% dietary inclusion. We expect CFIA will list it for layers this spring likely at a higher inclusion level (15 or 20%). We have also submitted limited efficacy data to CFIA confirming omega-3 enrichment of table eggs. We expect this efficacy data will be the foundation for health claim for enrichment of eggs. During the summer time, we shifted our focus to conducting 2 broiler experiments feeding high dietary inclusion of canola meal. The first one aimed to narrow down the AME value of canola meal using an empiric approach. The second experiment utilized canola meal to reduce the dietary energy content of grower and finisher broiler diets. The results of both experiments will allow us to do more precise formulation of diets including canola and reduce dietary energy, which will result in increased feed intake but lower diet cost. The impact of this research will be greater profitability for broiler growers. We also funded a new feed bin, auger and motor for the pullet barn at PRC and contributed to replacing the gator mini-truck that is used to move materials and supplies inside the PRC compound.

DR. MIRKO BETTI

Dr. Mirko Betti leads a research program focusing on maximizing the utilization of meat processing by-products. The major goal of my program is the extraction, purification and bioconversion of protein and polysaccharides to create functional and bioactive food ingredients and natural health products. His major

areas of expertise are protein chemistry and functionality, non-enzymatic browning of food - caramelization and the Maillard reaction, and chemistry of muscle foods.

Dr. Betti gives a significant contribution in both undergraduate and graduate teaching. For instance, he is the instructor of NUFS 425 capstone course “Methods and Applications in Nutritional Product Development”. Main goal of the course is to integrate and apply knowledge and tools obtained through the Nutrition and Food Science Program to new concepts in nutrition, food technology and product development. The students are helped to build upon existing tools and concepts they have learned previously, and now apply them to novel ideas by developing food product prototypes. Students in this course are encouraged to search and find an industry manager mentor who can advise them on how to better understand and respond to market needs. Therefore, the students are exposed to double supervision: one from Dr. Betti, the academic supervisor and the other from the “industry mentor”.

Dr. Betti has National and International collaborations with the Food Industry. He actively collaborates with Maple Leaf Foods and the Tessenderlo Chemie, a Multinational company with main Department in Belgium.

DR. DOUG KORVER

Dr. Korver’s research program allows him to reach a large number of undergraduate students, giving them a strong basis in animal nutrition in general, and poultry nutrition specifically. He taught two undergraduate courses with a combined total of 94 students, as well as a 3-hour lecture on poultry nutrition at the University of Calgary College of Veterinary Medicine. Dr. Korver also supervised an AN SC 499 Capstone project (4 students) and an undergraduate student in an independent study project (AN SC 400). Dr. Korver published 1 paper in a peer-reviewed poultry journal, and had 11 presentations at scientific meetings (7 of which were presented by his graduate students). He supervises 2 MSc Students and 3 PhD students. Dr. Korver made scientific and industry presentations in 7 countries and continues to develop his international reputation as a scientific and poultry industry conference speaker. His extensive international speaking engagements bring value to the PRC by increasing international exposure, and allowing him to recruit excellent international students.

Current projects have shifted focus towards on-farm research. Projects underway include a field trial with a commercial layer operation in Colombia. An on-farm project investigating broiler barn sanitation methods has recently been funded, and is scheduled to start in Spring, 2016. In addition, an application is under development to investigate the effects of hatching egg shell quality on broiler chick quality. This work will involve work at the U of A, as well as in a commercial hatchery and broiler processing plant.

DR. LYNN MCMULLEN

Food safety issues continue to challenge the industry and alternative strategies to control foodborne pathogens in raw and cooked meat products are needed. Research on novel technologies that target foodborne pathogens such as *Salmonella*, *Escherichia coli* and *Listeria monocytogenes* is on-going in my research group. We have investigated the survival of *L. monocytogenes* in poultry products subjected to high pressure processing. Poultry processors have asked us to investigate how they can assure their customers

that the products that have been subjected to a high pressure process will not contain any *L. monocytogenes* that could grow during the long storage of these products. To date, we have not been able to achieve this but further research on this will provide insight as to why these organisms seem to survive in very low numbers in processed meats subjected to high pressure processing but new funding from ALMA will allow us to continue this research. Other research on *Campylobacter* in raw poultry products continues with Dr. B. Jeon who is an Assistant Professor in the School of Public Health. Some strains of *Campylobacter* spp. in poultry are highly aerotolerant which may allow them to survive so well on poultry meat products. We hope to be able to use our knowledge about hypotolerance to develop systems that will reduce numbers of *Campylobacter* spp. on poultry products.

DR. JIANPING WU

This year, research at Dr. Wu's lab generated 15 peer-reviewed papers, 2 book chapters, and 14 conference presentations (8 invited). Dr. Wu wants to thank his fellow students and staff for their hard work and dedication. He is very proud of his students for 14 various awards received as a testimony of the excellence in academic, research and leadership. Congratulations to Chamila Nimalaratne and Yuchen Gu for their successful PhD defense!

DR. MARTIN ZUIDHOF

This year, significant progress was made with precision feeding. In several experiments, unprecedented levels of flock uniformity were achieved. Two new broiler breeder projects are underway to answer basic questions about how this dramatically different way of thinking about feeding broiler breeders can be implemented in practice. These projects are both key steps in the journey toward commercializing the technology.

Precision feeding has been generating a lot of excitement around the world. I've been invited to speak at several conferences. Realistically, precision feeding is still several years from being a practical option for hatching egg producers. Therefore, I focus my message on solutions that are relevant to farmers today. I always end with a teaser about precision feeding. There has been a lot of excitement about the high level of uniformity we have achieved with the system. Even more exciting for many in the audience is the amazing new perspective on the birds that have had by collecting very high resolution data on body weight and feed intakes. My research group has launched precision feeding projects in both layers and broilers. Ongoing development is underway to facilitate providing not just the right quantity, but the right formulation tailored to the needs of individual animals. The value of the technology as a research tool is starting to be realized.

A highlight for me this year was taking several of my students to the Poultry Science Annual Meeting in Kentucky. My students' presentations on precision feeding garnered a lot of interest and discussion, and the icing on the cake was celebrating an award of excellence won by Josh Perryman, an undergraduate competing head-to-head with MSc and PhD students! It has been a gratifying year.

The PRC Advisory Board and Committees

Board Member	Representing	Position (end)	Committees
David Hyink	Alberta Chicken Producers	Chair (2017) Platform Partner	
Jenna Griffin	Egg Farmers of Alberta	Vice Chair (2017) Platform Partner	HCP Steering*
Martin Zuidhof	University of Alberta	Academic Leader	Engagement Governance
Clover Bench	University of Alberta	Ex Officio Research (2018)	
Valerie Carney	Livestock Research Branch Alberta Agriculture and Forestry	Ex Officio Technology Transfer (2018)	Engagement HCP Steering
Doug Korver	University of Alberta	Ex Officio Education (2018)	
Ruurd Zijlstra	University of Alberta	Platform Partner	
Susan Novak	Alberta Livestock and Meat Agency	Platform Partner	Governance (chair)
Wes Johnson	Alberta Agriculture and Forestry	Platform Partner	Engagement Governance
Cora Scheele	Alberta Hatching Egg Producers	Platform Partner	Engagement
Sunny Mak	Sofina Foods	Platform Partner	
Kathleen Long	Maple Leaf Foods	Platform Partner	
Helen Anne Hudson	Burnbrae Farms	Individual (2016)	Engagement HCP Steering
Karen Diepeveen	Egg Farmers of Canada	Platform Partner	Governance
Colleen Begeman	Alberta Turkey Producers	Platform Partner	

Committee Member	Affiliation	Position	Committees
Agnes Kulinski	University of Alberta	Business director	HCP Steering
Mirko Betti	University of Alberta		Engagement

* Heritage Chicken Program Steering Committee

PRC Operations Personnel

Staff member	Affiliation	Role
Lyle Bouvier	University of Alberta	Poultry Unit Manager
Agnes Kulinski	University of Alberta	Business Development
Giles Hinse	University of Alberta	Poultry Unit Technician
Shawn Rankin	University of Alberta	Poultry Unit Technician
Rachelle Davidson	University of Alberta	Poultry Unit Technician
Chris Ouellette	University of Alberta	Instrumentation Technician
Dana Penrice	University of Alberta	PRC Coordinator
Dr. Valerie Carney	Alberta Agriculture and Forestry	Technology Transfer Liaison
Dr. Robert Renema	Alberta Chicken Producers	Technology Transfer Liaison
Dr. Clover Bench	University of Alberta	Research Liaison
Dr. Doug Korver	University of Alberta	Teaching and Learning Liaison
Dr. Martin Zuidhof	University of Alberta	Academic Leader

Researchers

Name	Position (% FTE, if less than 100%)	Specialty	Student ¹			Technician	PDF	Research Associate
			Grad	U/G	Visiting			
Eduardo Beltranena	Research Scientist Adjunct Professor (33%)	Monogastric feeds & feeding				2		1
Clover Bench	Assistant Professor	Behaviour & welfare	1.5			2		
Mirko Betti	Associate Professor	Chemistry/ Muscle food biochemistry	10				2	1
Valerie Carney	Research & extension specialist Adjunct Professor	Applied poultry research				1		1
Ellen Goddard	Professor	Agricultural marketing & business						
Douglas Korver	Professor	Poultry nutrition	5			1		1
Lynn McMullen	Professor (10%)	Food microbiology	5			3	2	
Aman Ullah	Assistant Professor	Poultry by-products	1		2			
Wendy Wismer	Associate Professor (10%)	Sensory & consumer science	1					
Jianping Wu	Associate Professor	High value egg utilization	12		4	2	1	1
Martin Zuidhof	Associate Professor	Poultry systems modeling	4.5			1		1
			40	0	6	12	5	6

Graduate Students (N = 40)

Student	Team	Degree	Focus
Jesse Hunter	Bench & Korver	MSc	Footpad dermatitis in broilers
Lihui (Mavis) Du	Betti	PhD	Gelatin and collagen peptides
Mengmeng Feng	Betti	PhD	Functionalization of collagen peptides
Pu Khoon Hong	Betti	PhD	Maillard reaction and taste active compounds
Henan Wang	Betti	PhD	Glycosaminoglycans and "the Meat Factor"
Lu Xinxao	Betti	MSc	Novel uses of Transglutaminase in food
Abiodun Bello	Korver	PhD	Phytase in laying hen and broiler diets
Misaki Cho	Korver	PhD	Vitamin D metabolites in broiler breeders
Seyed Fatemi	Korver	MSc	Vitamin D metabolites and broiler growth
Koonpohl Pongmanee	Korver	PhD	Phytase in laying hen diets
Felipe Silva	Korver	MSc	Vitamin D metabolites in commercial laying hen diets
Andrea Balutius	McMullen	MSc	
Christine (Xiaoji) Liu	McMullen	PhD	
Danielle Robocon	McMullen	PhD	
Katie Satchwell	McMullen	PhD	Antimicrobials for food safety
R Ahmadi	Ullah	MSc	
L Jin	Ullah	MSc	
Manpreet Kaur	Ullah	MSc	
R Kaur	Ullah	MSc	
Yanet Rodriguez Herrero	Ullah	MSC	
M Safder	Ullah	PhD	
Wujun Zhao	Ullah	PhD	
M Zubair	Ullah	MSc	
Jorge Grock Pereira	Ullah & Siddique	MSc	
Sogol Teflski	Wismer	MSc	
Ali Akbari	Wu	PhD	Canola proteins and potential applications for delivery of bioactive compounds
Nandika Bandara	Wu	PhD	Value addition to agricultural byproducts and waste proteins through biomimetics and nanotechnology
Shreyak Chaplot	Wu	MSc	Effect of spent hen collagen peptide on skin health and anti-aging
Yussef Esparza	Wu	PhD	Feather keratin biomaterials
Hongbing Fan	Wu	PhD	Antihypertensive peptides from spent hen muscle protein

Student	Team	Degree	Focus
Forough Jahandideh	Wu	MSc	Beneficial effects of egg white peptides on metabolic syndrome
Qiyi Li	Wu	MSc	Production optimization and sensory evaluation of egg white protein hydrolysate with ACE inhibitory activity
Jiandong Ren	Wu	PhD	The beneficial effects of egg yolk phosvitin on bone health and dental health
Nan Shang	Wu	PhD	Egg protein and bone health
Xiaohong Sun	Wu	PhD	Ovomucin as value added ingredient or antiadhesive agent
Selene Gonzalez Toledo	Wu	PhD	Value added egg yolk products
Liao Wang	Wu	PhD	Mechanisms of food protein derived antihypertensive peptides
Paulo Carneiro	Zuidhof	MSc	Precision feeding & efficiency
Sheila Hadinia	Zuidhof	PhD	Precision feeding & energy partitioning
Sasha van der Klein	Zuidhof	PhD	Precision feeding & epigenetics

Visiting Students and Scholars (N=7)

Visitor	Team	Program
Jasmine Hafso	Jasmine	Summer Research Student
Kendra McQuaig	Kendra	Summer Research Student
Niteesha Divulapally	Niteesha	Visiting Research Students
Zheng Li	Zheng	PhD Visiting Student
Rossawan Intarasirisawat	Rossawan	PhD Visiting Student
Wang Liang	Wang	PhD Visiting Student
Juan You	Juan	PhD Visiting Student

Technical Support

TECHNICIANS (N = 13)

Name	Role	Team
Cristina Neva	Research Technician	Beltranena
Dharma Shrestha	Research Assistant	Beltranena
Emmanuel Opoku Yeboah	Research Technician	Bench
Caitlyn Erickson	Research Technician	Bench
Jessica Josephson	Research Technician	Carney
Kerry Nadeau	Research Technician	Korver
Ken Fahner	MSPRU Manager	McMullen
Patrick Ward	Research Technician	McMullen
Lynnette Allemand	Research Assistant	Ullah
Shokoofeh Marasi	Research Assistant	Ullah
Faria Shakoor	Research Technician	Ullah
Marina Offengenden	Research Technician	Wu
Sareh Panahi	Research Technician	Wu

POST DOCTORAL FELLOWS (N = 14)

Name	Team	Focus
Satyanarayana Bejani	Betti	Valorization of Poultry processing by-products
Zied Khiari	Betti	Valorization of Poultry processing by-products
Muhammad Khosa	Wu	Value added egg science
Abhihek Bhattacharjee	Betti	Cell culture and glycation
Zied Zhiari	Betti	Valorization of Poultry processing by-products
Abhihek Bhattacharjee	Betti	Cell culture and Maillard reaction
Yuliya Hrynets	Betti	Maillard Reaction
Myoungjin Son	Wu	Beneficial effects of egg white protein peptides on insulin resistance and type 2 diabetes
Hui Hong	Wu	Protein assembly
Chalamaiah Meram	Wu	novel applications for egg yolk in food and non-food uses
Qingbiao Xu	Wu	Bioactive peptide absorption and screen bitter acceptors antagonist
Petr Miller	McMullen	Food microbiology
Januana Teixeira	McMullen	Food microbiology
Muhammad Arshad	Ullah	Biomaterials

RESEARCH ASSOCIATES (N = 8)

Name	Team
Jennifer Saunders-Blades	Korver
Zahra Dehghani	Beltranena
Matt Oryschak	Beltranena
Maurice Ndagijimana	Betti
Brenda Schneider	Carney
Subhadeep Chakrabarti	Wu
Jiapei Wang	Wu
Mark Khosa	Ullah

Research Projects (\$1,793,425 received in 2015)

FEED AND NUTRITION

\$216,321

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
Sask ADF	Camelina cake for layers	56,000	Beltranena	2015-2016	205,745
Canola Cluster	Canola meal for broilers/layers	61,729	Beltranena	2014-2015	214,964
ALMA	Dietary 25-OH Vitamin D3 and broiler immune and muscle gene expression	-	Korver	2012-2015	246,517
United Arab Emirates University	Fungally-degraded date pits as a chicken feed	23,000	Korver	2015	25,000
DSM Nutritional Products	HyD Layer Field Trial -- Colombia	14,332	Korver	2014-2016	50,162
DuPont (Danisco Animal Nutrition)	Phytase in Laying Hen and Broiler diets – proprietary	-	Korver	2014-2015	56,663
DuPont (Danisco Animal Nutrition)	Phytase in Laying Hen and Broiler diets – student project	-	Korver	2014-2015	122,342
ALMA	Prebiotics in Laying Hen Diets	-	Korver	2013-2015	110,140
EFA	Prebiotics in Laying Hen Diets	-	Korver	2013-2015	10,000
Canadian Biosystems	Prebiotics in Laying Hen Diets	5,000	Korver	2013-2015	5,000
ICC	Prebiotics in Laying Hen Diets	12,992	Korver	2013-2015	12,992
ADM Alliance Animal Nutrition	Prebiotics in Laying Hen Diets	6,545	Korver	2013-2015	6,545
AB Vista	Pullet Phytase	36,724	Korver	2014-2015	86,723

BACTERIOLOGY / FOOD SAFETY**\$61,000**

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
NSERC	Bacteriocins for food safety	31,000	McMullen	2012-2017	155,000
ALMA/AI-BIO	Impact of high pressure on Listeria	30,000	McMullen & Gänzle	2013-2016	276,725

MANAGEMENT AND PHYSIOLOGY**\$50,000**

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
NSERC	Bone metabolism & Inflammation in Fowl	25,000	Korver	2013-2018	125,000
NSERC	Broiler cold weather transportation	25,000	Korver	2016	25,000

METABOLISM AND REPRODUCTION**\$0**

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
ALMA	SDA Flax	-	Korver	2013-2015	94,964
CPRC	SDA Flax	-	Korver	2013-2015	25,000

MEAT AND EGG PRODUCTS AND PROCESSES

\$1,148,420

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
ALMA & AI Bio solutions	Aminosugars as possible curing agent	125,500	Betti & Pietrasik	2015-2017	251,000
NSERC DG	Antioxidant peptides in inflammatory and endothelial function	40,000	Wu	2013-2018	200,000
EFC/PIC/NSERC CRD/Burnbrae	Antioxidants in Laying Hen Eggs	119,113	Wu	2013-2015	315,520
Egg Farmers of Canada/NSERC	Bioactive peptides from spent hens	87,550	Wu	2014-2018	502,959
Agriculture Funding Consortium Council/Canadian Poultry Research Council/NSERC CRD	Biopolymer-based nanocomposites from poultry byproducts for packaging applications	70,000	Ullah	2013-2016	283,456
ALMA	Design of novel antimicrobial agents	100,000	Gaenzle, McMullen & Betti	2013-2016	300,000
ALMA	Enzymatic modification of egg lecithin and canola lecithin for functional food development	71,500	Curtis	2014-2016	143,000
ALMA & ACP	Functionalization of collagen peptides	67,000	Betti & Pietrasik	2013-2016	203,000
ALMA & ACP	Gelatin: new ideas for an old molecule	103,330	Betti & Pietrasik	2014-2017	310,000
AI-Bio	Omega-3 nutritional egg yolk	69,750	Wu	2014-2016	138,500
NSERC CRD/Michael Foods Ltd.	Phosvitin phosphopeptides and residual egg yolk applications	168,677	Wu	2015-2019	659,884
Agriculture Funding Consortium	Pilot preparation and application of formaldehyde-free wood adhesive from Alberta renewable materials	100,000	Wu	2013-2015	200,000
NSERC	Understanding "The Meat Factor"	26,000	Betti	2014-2019	130,000

POULTRY SYSTEMS**\$256,000**

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
ALMA	Precision feeding for layers	171,000	M. Zuidhof	2015-2018	190,000
EFA	Precision feeding for layers	13,500	M. Zuidhof	2015-2018	13,500
EFC	Precision feeding for layers	61,500	M. Zuidhof	2015-2018	61,500
AITF	Precision feeding system (micro voucher for patent)	10,000	M. Fedorak & M. Zuidhof	2015-2016	10,000

BEHAVIOUR AND WELFARE**\$61,684**

Granting Body	Title	Received in 2015	Applicant	Planned Duration	Total grant
AAFC Agri-innovation (Poultry Cluster)	Improving foot pad quality in commercial broilers	52,785	Bench	2014-2016	113,046
ALMA/ACP	Improving foot pad quality in commercial broilers	-	Bench	2014-2016	145,832
ALMA/EFA	Effect of commercial housing type on laying hen welfare and bone characteristics in Alberta	8,899	Bench	2014-2016	108,000

Facility Usage

RESEARCH FACILITIES

Facility	Overall	Broiler & Turkey Trials	Breeder Trials	Layer Trials	Unit Operations
----- Utilization Rate (%) -----					
Brooder house (48 floor pens)	58	7.5	11.5		39
Breeder hen cages (288 individual cages)	42		42		
Breeder male cages (60 individual cages)	0				
Nutrition house (32 pens)	56	56			
Specht pullet cages (64 group cages)	13	13			
Environmental chambers	51	14	37		
Test house - Floor pens (rare breeds)	100				100
Test House - Conventional cages	100				100
Test House - Colony cages	100				100
Broiler Processing Plant (3 days per use)	4	2			1
Hatchery					
Setter use AVN	9			8	1
Hatcher use AVN	9			8	1
Setter use BIG J	3				3
Hatcher use BIG J	3				3

NON-RESEARCH FACILITIES

Facility	Description	Utilization
Lilydale Room	Combined producer meetings	1
	Processors	
	PRC alumni, exec group & educational institutions	52 days
	U of A, safety, animal care, animal handling, HACCP	3 days
	Industry related workshops (swine, dairy, AAF, etc.)	7 days
	Student presentations & community learning	24 days
Alberta Turkey Producers Computer Lab	Used by graduate students, undergraduate students, technicians and researchers	10 person h/d

Evidence of Productivity (2015)

ARTICLES PUBLISHED IN REFEREED JOURNALS (N=25)

- Akabari, A. and Wu, J. 2015. An integrated method of isolating napin and cruciferin from defatted canola meal. *LWT-Food Science and Technology* 64(1), 308-315.
- Aluko, R. E., Girgiha, A. T., He, R., Malomoa, S., Li, H., Offengendenb, M., Wu, J. 2015. Structural and functional characterization of yellow field pea seed (*Pisum sativum* L.) protein-derived antihypertensive peptides. *Food Research International* 77(1), 10-16.
- Chakrabarti, S., & Wu, J. 2015. Milk-derived Tripeptides IPP (Ile-Pro- Pro) and VPP (Val-Pro- Pro) Promote Adipocyte Differentiation and Inhibit Inflammation in 3T3-F442A Cells. *Plos One* DOI: 10.1371/journal.pone.0117492.
- Fulton, J. E., A. R. Lund, A. M. McCarron, K. N. Pinegar, D. R. Korver, H. L. Classen, S. Aggrey, C. Utterbach, N. B. Anthony, and M. E. Berres. 2016. MHC variability in heritage breeds of chickens. *Poult. Sci.* 00:1-7. <http://dx.doi.org/10.3382/ps/pev363>
- Hong, P.K., M. Ndagijimana and M. Betti. 2016. Glucosamine-induced glycation of hydrolyzed meat proteins in the presence or absence of transglutaminase: Chemical modifications and taste enhancing activity. *Food Chemistry* 197:1143-1152. PMID:26675851.
- Hrynets, Y., M. Ndagijimana and M. Betti. 2015. Rapid myoglobin aggregation through glucosamineinduced α -dicarbonyl formation. *PLoS One* 10:e0139022. PMID:26406447
- Hrynets, Y., M. Ndagijimana and M. Betti. 2015. Studies on the formation of Maillard and caramelization products from glucosamine incubated at 37°C. *Journal of Agricultural and Food Chemistry* 63:6249-61 PMID:26114422.
- Liu, X., Kopparapu, N-K., Shi, X., Deng, Y., Zheng, X., Wu, J. 2015. Purification and Biochemical Characterization of a Novel Fibrinolytic Enzyme from Culture Supernatant of *Cordyceps militaris*. *Journal of Agricultural and Food Chemistry*. 3 (8), 2215-2224.
- Liu, X., P. Miller and L.M. McMullen. 2015. Microbiota of regular and sodium reduced ready-to- eat meat products obtained from the retail market. *Can. J. of Microbiol.* 61:150-154.
- Majumder, K. and Wu, J. 2015. Antihypertensive Peptides from Food Proteins and their Underlying Mechanisms of Action: a Review. *International Journal of Molecular Science*. (Invited paper) 2015, 16, 256-283
- Majumder, K., Chakrabarti, S., Morton, J. S., Panahi, S., Kaufman, S., Davidge, S. T. & Wu, J. (2015) Egg-derived ACE inhibitory peptide IRW increases ACE-2 but decreases anti-inflammatory genes expression in mesenteric artery of spontaneously hypertensive rats. *Molecular Nutrition and Food Research*, DOI:10.1002/mnfr.201500050.

- Majumder, K., Chakrabarti, S., Morton, J. S., Panahi, S., Kaufman, S., Davidge, S. T. & Wu, J. 2015. Egg-derived ACE-inhibitory peptides IQW and LKP Reduce Blood Pressure in Spontaneously Hypertensive Rats. *Journal of Functional Foods* 13(3):50–60.
- Navidghasemizad, S., Temelli, F., & Wu, J. 2015. Phase Separation Behavior of Egg Yolk Suspensions after Anionic Polysaccharides Addition. *Carbohydrate Polymers* 117, 297-303.
- Nimalaratne, C., Bandara, N. and Wu, J. 2015. Purification and Characterization of Antioxidant Peptides from Enzymatically Hydrolysed Chicken Egg White. *Food Chemistry*. 188(1): 467-472.
- Nimalaratne, C., Lopes-Lutz, D., Schieber, A. & Wu, J. 2015. An isocratic fast liquid chromatographic method for quantifying xanthophylls and their stereoisomers. *Journal of Separation Science*. doi: 10.1002/jssc.201500656
- Nimalaratne, C., Savard, P., Gauthier, S. F., Schieber, A. & Wu, J. 2015. Bioaccessibility and digestive stability study of carotenoids in cooked eggs using a dynamic in vitro gastrointestinal model. *Journal of Agricultural and Food Chemistry*. 63 (11), 2956-2962
- Nimalaratne, C., Wu, J. 2015. Hen egg as an antioxidant food commodity: a review. *Nutrient* 7(10), 8274-8293
- Oh E, L.M. McMullen, B. Jeon. 2015. High Prevalence of hyper-aerotolerant *Campylobacter jejuni* in retail poultry with potential implication in human infection. *Front. Microbiol.* 6:1263. doi: 10.3389/fmicb.2015.01263
- Oh, E., L.M. McMullen, B. Jeon. 2015. Impact of oxidative stress defense on bacterial survival and morphological change in *Campylobacter jejuni* under aerobic conditions. *Front. Microbiol.* 6:295. doi:10.3389/fmicb.2015.00295
- Pishnamazi, A., R. A. Renema, D. C. Paul, I. I. Wenger, and M. J. Zuidhof. 2015. Effects of environmental temperature and dietary energy on energy partitioning coefficients of female broiler breeders. *J. Anim. Sci.* 93:4734-4741.
- Ren, J. & Wu, J. 2015. Preparation and characterization of phosphopeptides derived from egg yolk phosvitin. *Journal of Functional Foods* 18, 190-197.
- Ren, J. & Wu, J. 2015. Thermal-aided phosvitin extraction. *Journal of the Science of Food and Agriculture*. doi: 10.1002/jsfa.7073
- Woyengo, T. A., R. Patterson, B. A. Slominski, E. Beltranena, and R. T. Zijlstra. 2016. Nutritive value of cold-pressed camelina cake with or without supplementation of multi-enzyme in broiler chickens. *Poultry Sci.* Accepted manuscript PS-15-05330R2.
- Yi, J., Zhu, R., Wu, J., Wu, J., Tan, Z. 2015. Ameliorative effect of betulinic acid on oxidative damage and apoptosis in the splenocytes of dexamethasone treated mice. *International Immunopharmacology* 27, 85-94.
- Zuidhof, M. J., D. E. Holm, R. A. Renema, M. A. Jalal, and F. E. Robinson. 2015. Effects of broiler breeder management on pullet body weight and carcass uniformity. *Poult. Sci.* 94:1389-1397.

PROCEEDINGS (N=4)

- Korver, D. R. Nutritional immunomodulation: implications for nutritionists and producers. Keynote Address, World's Poultry Science Association – South Africa Branch, Pretoria, South Africa. October 15, 2015. Electronic Conference Proceedings: 13 pages.
- Zuidhof, M. J. 2015. Nutrition of the pullet. Management and Nutrition of the Breeder symposium, XVII AMENA Congress. Puerto Vallarta, Mexico. October 20-23, 2015. 7 pp.
- Zuidhof, M. J. 2015. Factors that influence energy requirements of broiler breeders. European Symposium on Poultry Nutrition, Prague, Czech Republic. August 24-27, 2015. 11 pp.
- Zuidhof, M. J. 2015. Improving broiler performance through breeder nutritional management. VIII Seminario Internacional AMEVEA 2015. Lima, Peru. May 6-8, 2015. 10 pp.
- Zuidhof, M. J. 2015. Innovations in managing broiler breeder feeding. Poultry Service Industry Workshop. Banff, AB. October 6-8, 2015. 10 pp.

PRESENTATIONS AND ABSTRACTS (N = 66)

- Akbari, A. and Wu, J. 2015. Canola protein nanoparticles: a promising delivery system for encapsulation of bioactive compounds. The 14th International Rapeseed Congress, July 5-9, 2015, Saskatoon, SK, Canada
- Akbari, A. and Wu, J. 2015. Evaluation of ovomucin nanoparticle as a potential mucosal drug delivery system. 2015 Canadian Society for Pharmaceutical Sciences. May 26-28, Toronto, ON, Canada
- Bandara N, Wu J. 2015. Whole spent hen protein extraction and adhesive formulations. Egg Farmers of Canada on-site visit. 17th June 2015. University of Alberta, Edmonton, Canada
- Bandara, N., Esparza, Y. and Wu, J. 2015. Effect of Graphene Oxide Preparation Conditions on Functionality of Canola Protein – Graphene Oxide Hybrid Wood Adhesive. AOCS Annual Meeting, May 3-6, 2015, Orlando, Florida, USA.
- Bello, A., Y. Dersjant-Li, P. Plumstead, and D. R. Korver. 2015. Effects of an Escherichia coli phytase on long-term performance and egg qualities of white egg layers. Poult. Sci. 94(E-Suppl. 1):30. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 28, 2015.
- Beltranena, E. 2015. Why is feed grain quality odd this year? Standard Nutrition and IVS Fall Producer Meetings, Drumheller, AB Nov. 04, Lethbridge, AB Nov. 05.
- Beltranena, E., and M. A. Oryschak. 2015. Optimizing canola meal feeding to broiler chickens and egg layers. Feedstuffs Magazine/Canola Council of Canada webinar presented May 04.
- Bhattacharjee, A. and M. Betti. 2015. Understanding the bioavailability of glycated collagen peptides in human intestinal Caco-2 cells culture. The 11th International Symposium on Biocatalysis and

- Agricultural Biotechnology (11th ISBAB), September 13-16, Banff, Alberta, Canada. (Invited oral presentation)
- Calloway, T. (USDA, United States), D. Korver (U of A), L. de Lange (Schothorst Feed Research, the Netherlands), T. Niewold U of Leuven, Belgium). Curbing Antibiotic Use in Chickens: What Strategies are Working? FeedNavigator.com webinar. Roundtable discussion recorded June 23, 2015, broadcast June 30 with live questions
- Carneiro, P.R.O., S. H. Hadinia, T. E. Gilmet, and M. J. Zuidhof. 2015. Effect of Precision Broiler Breeder Feeding System on uniformity and water intake. Red Deer, AB. February 24, 2015.
- Carneiro, P.R.O., S. H. Hadinia, T. E. Gilmet, and M. J. Zuidhof. 2015. Effect of precision feeding on broiler breeder uniformity and efficiency. Poultry Sci. 94(Suppl. 1):2.
- Chakrabarti, S., Wu,, J. Effects of phosvitin and its phosphopeptides on osteoblastic cells. Michael Foods Inc. on-site visit. Sept 2, 2015, Edmonton.
- Cho, M., J. L. Saunders-Blades, and D. R. Korver. 2015. The effects and transfer of canthaxanthin and 25-hydroxyvitamin D3 from the hen to the broiler chick. Poult. Sci. 94(E-Suppl. 1):39. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 28, 2015.
- Dehghani, Z., M. A. Oryschak, and E. Beltranena. 2015. High feed inclusion levels of canola meal and cake on egg layer production performance and egg quality. Prairie Poultry Meeting, May 29. University of Saskatchewan, Saskatoon, SK.
- Dehghani, Z., M. A. Oryschak, and E. Beltranena. 2015. Replacement of soybean meal with canola meal at two dietary energy densities on layer production performance and egg quality. Prairie Poultry Meeting, May 28. University of Saskatchewan, Saskatoon, SK.
- Du, L. and M. Betti. Cryprotective property of chicken collagen hydrolysate on isolated actomyosin. The American Meat Science Association (AMSA) 68 RMC, June 14-17, University of Nebraska-Lincoln, Lincoln, Nebraska.
- Esparza, Y., Ullah, A., Wu, J. 2015. The effect of different keratin sources on the physical and biological properties of gel biomaterials. 6th International Conference on Mechanics of Biomaterials and Tissues, 2015, Hawaii, USA (oral presentation).
- Esparza, Y., Wu, J. 2015. Feather plastic and tissue engineering. Egg Farmers of Canada on-site visit. June 17, 2015, Edmonton.
- Fatemi, S. A., C. Fitzsimmons, M. J. Zuidhof, F. Paradis, and D. R. Korver. 2015. Effects of dietary 25-hydroxycholecalciferol on breast muscle gene expression of broiler chickens raised on reused litter. Poult. Sci. 94(E-Suppl. 1):39. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 28, 2015.

- Fatemi, S. A., M. J. Zuidhof, and D. R. Korver. 2015. Effects of dietary 25-hydroxycholecalciferol on gut morphology and immunity of broilers on reused litter. *Poult. Sci.* 94(E-Suppl. 1):98. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 30, 2015.
- Fulton, J. E., H. L. Classen, and D. R. Korver. 2015. Major histocompatibility complex variation in heritage chicken breeds. *Poult. Sci.* 94(E-Suppl. 1):50. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 28, 2015.
- Gilmet, T., Bench, C.J., Carneiro, P.R., Hadinia, S., Zuidhof, M.J. 2015. Feeding and foraging behaviors in precision fed broiler breeders. *Prairie Poultry Meeting*, Canada, Saskatchewan, Saskatoon. May 28-29.
- Gilmet, T. E., C. J. Bench, and M. J. Zuidhof. 2015. Feeding and foraging behaviours in precision fed broiler breeders. Poster presentation to Alberta Poultry Industry Meeting. Red Deer, AB. February 24, 2015.
- Gilmet, T. E., C. J. Bench, P.R.O. Carneiro, S. H. Hadinia, and M. J. Zuidhof. 2015. Feeding and foraging behaviors in precision fed broiler breeders. *Poultry Sci.* 94(Suppl. 1):61.
- Gilmet, T., C. J. Bench, and M. J. Zuidhof. 2015. A new alternative in broiler breeder feeding management. Alberta Farm Animal Care Livestock Care Conference. Calgary, Alberta, Canada. March 26-27, 2015.
- Gilmet, T., C. J. Bench, and M. J. Zuidhof. 2015. A new alternative in broiler breeder feeding management. Alberta Poultry Industry Annual General Meeting, Canada, Alberta, Red Deer. February 24, 2015.
- Hadinia, S. H., P.R.O. Carneiro, and M. J. Zuidhof. 2015. Comparison of metabolizable energy intake in precision broiler breeder feeding system and conventional system. Poster presentation to Alberta Poultry Industry Meeting. Red Deer, AB. February 24, 2015.
- Hadinia, S. H., P.R.O. Carneiro, T. E. Gilmet, D. R. Korver, C. Fitzsimmons and M. J. Zuidhof. 2015. Modeling metabolizable energy intake of broiler breeders in conventional and precision feeding systems. *Poultry Sci.* 94(Suppl. 1):28.
- Hincampie Martinez, D.J., M. Ndagijimana, M. Gaenzle and M. Betti. 2015. Glucosamine derived antimicrobial compounds against heat resistant *E. coli* AW 1.7 isolated from beef. The American Meat Science Association (AMSA) 68 RMC, June 14-17, University of Nebraska-Lincoln, Lincoln, Nebraska.
- Hong, P.K., M. Ndagijimana and M. Betti. 2015. Salty and savory enhancing properties of hydrolyzed meat protein glycated with glucosamine. The American Meat Science Association (AMSA) 68 RMC, June 14-17, University of Nebraska-Lincoln, Lincoln, Nebraska. (Poster)
- Hunter, J., Bench, C.J. 2015. Foot pad dermatitis in broiler chickens. *Prairie Poultry Meeting*, Canada, Alberta, Saskatoon. May 28-29.

- J. Asomaning, E. Lewis, J. Wu, R.L. Jacobs, C.J. Field and J.M. Curtis. 2015. The development of a choline rich cereal based functional food incorporating egg lecithin. AOCS Annual Meeting, May 3-6, 2015, Orlando, Florida, USA.
- Jahendideh, F., Wu, J. 2015. Egg bioactive peptides and metabolic syndrome. Egg Farmers of Canada on-site visit. June 17, 2015, Edmonton.
- Korver, D. R. 2015. Bone development in broilers and layers. Feed First and University of Pretoria: Industry Seminar. Pretoria, South Africa. October 13, 2015
- Korver, D. R. 2015. Interactions: Immunity and Nutrition. III Symposium on Emerging Issues in Poultry Nutrition and Meat Production, North Carolina State University, Raleigh, NC, USA. August 13, 2015.
- Korver, D. R., B. L. Schneider, V. L. Carney. 2015. Managing egg size in layers. Atlantic Poultry Conference, Greenwich, NS. February 13, 2015.
- Korver, D. R., S. C. Ricke, P. Rubinelli and A. Bodie. 2015. Control of human pathogens with prebiotics. Atlantic Poultry Conference, Greenwich, NS. February 12, 2015.
- Korver, D. R., S. C. Ricke, P. Rubinelli and A. Bodie. 2015. Implications of changing immune function through diet. ICC Seminar - VIV Bangkok, Thailand. March 10, 2015.
- Li, H., M. Betti, and M. Gänzle. 2015. Effects of antimicrobials on the pressure resistance of *Escherichia coli*. The International Non-thermal Processing Workshop. November 12-13, Athens (Greece).
- Liao, W., Guan, L., Davidge, S., Wu, J. 2015. Transcriptome analysis of rat mesenteric arteries treated with ovotransferrin derived tripeptide IQW. 2015 Annual Conference & Exhibition for Functional Foods, Nutraceuticals, Natural Health Products and Dietary Supplements, September 20-23, Wuxi, China.
- Nain, S., Robert A. Renema, Chris Kazala, Randall J. Weselake, and Douglas R. Korver. 2015. Stearidonic acid-enriched flax oil or regular flax oil in combination with canola, corn, or fish oil for egg bioactive lipid enrichment. *Poult. Sci.* 94(E-Suppl. 1):7. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 27, 2015.
- Oryschak, M. A., and E. Beltranena. 2016. Feeding canola meal to table egg layers. Flocktalk Lethbridge, AB, Feb 04, AM, PM.
- Perryman, J. D., C. O. Ouellette, T. Liddell, and M. J. Zuidhof. 2015. Effects of stocking pressure on precision feeding success factors in broiler breeder pullets. *Poultry Sci.* 94(Suppl. 1):1.
- Pongmanee, K. and D. R. Korver. 2015. Effect of phytase in low phosphorus diets on performance, shell quality, and bone-breaking strength in pullets and layers. *Poult. Sci.* 94(E-Suppl. 1):30. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 28, 2015.

- Ren, J., Wu, J. 2015. The beneficial effects of phosvitin phosphopeptides on bone and dental health . Egg Farmers of Canada on-site visit. June 17, 2015, Edmonton.
- Ren, J., Wu, J. Phosvitin extraction from egg yolk and its potential as functional food ingredient for improving bone health. Michael Foods Inc. on-site visit. Sept 2, 2015, Edmonton.
- Renema, R. A., D. R. Korver, J. Saunders-Blades, P. Klita, P. Groenewegen, and A. E. Sefton. 2015. Does pelleting Allzyme SSF feed affect broiler growth response? Poult. Sci. 94(E-Suppl. 1):133. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 30, 2015.
- Robinson, F. E., M. J. Zuidhof, D. C. Penrice and S. Townend. 2015. Hosting an in-class “Rural Café”: Employing agricultural speed dating to build ag fluency. NACTA annual meeting. Athens, GA. June 16-20, 2015.
- Rubinelli, P. M., S. I. Lee, S. H. Park, D. Korver, and S. C. Ricke. 2015. Effect of different prebiotics on a *Salmonella* Enteritidis marker strain in rooster in vitro cecal incubations and on in vivo microbiota from layer hen cecal contents. Poult. Sci. 94(E-Suppl. 1):155. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 30, 2015.
- Satchwell, K., S. Cochrane, J.C. Vederas and L.M. McMullen. 2015. Tridecaptin A 1: a novel antimicrobial to inhibit foodborne pathogens. International Association of Food Protection Annual Conference, July 25-29, 2015, Portland OR.
- Silva, F. A., R. Delgado, O. Ortiz, C. A. Lozano, D. Aldana, M. J. Zuidhof, and D. R. Korver. 2015. Effects of 25-OH-D3 on growth and early laying performance of brown egg layers. Poult. Sci. 94(E-Suppl. 1):39. 2015 Poultry Science Association Annual Meeting, Louisville, KY, July 28, 2015.
- Silva, F., R. Delgado, O. Ortiz, C. A. Lozano, D. Aldana, M. J. Zuidhof, and D. R. Korver. 2015. Effects of 25-OH-D3 on growth and early laying performance of brown egg layers. Poultry Sci. 94(Suppl. 1):110.
- Sun, X., Gänzle, M., Wu, J. Feb 2015. “Ovomucin: potential prebiotics from egg white.” Poster presentation, Alberta Poultry Industry Conference, Red deer, Alberta.
- Sun, X., Wu, J. 2015. Ovomucin as a functional food ingredient. Egg Farmers of Canada on-site visit. June 17, 2015, Edmonton.
- Toledo, S., Wu, J. 2015. Omega-3 enriched egg products. Egg Farmers of Canada on-site visit. June 17, 2015, Edmonton.
- Wang, J., Wu, J. 2015. Phosvitin-depleted mayonnaise. Michael Foods Inc. on-site visit. Sept 2, 2015, Edmonton.
- Wu, J. 2015. Anti-inflammatory bioactive peptides from egg ovotransferrin. 2nd International Symposium of Food Science and Human Wellness. July 25-25, Zhuzhou, Hunan, China.
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PATENT APPLICATIONS (N = 0)

Financial Summary 2015-2016

Income 2015 - 2016

Actuals as of March 31, 2016

Industry	Cash	In-Kind	Total
Alberta Turkey Producers	29,749.00		29,749.00
Alberta Hatching Egg Producers	33,845.00		33,845.00
Alberta Chicken Producers	95,730.00		95,730.00
Egg Farmers of Alberta	37,044.00		37,044.00
Egg Farmers of Canada	15,000.00		15,000.00
Burnbrae Farms	8,500.00		8,500.00
Maple Leaf	15,000.00		15,000.00
Lilydale	15,000.00		15,000.00
Poultry Health Services		35,000.00	35,000.00
Sub-total	249,868.00	35,000.00	284,868.00
Opening balance	43,077.02		43,077.02
TOTAL INDUSTRY	292,945.02	35,000.00	327,945.02

AF	43,000.00	337,600.00	380,600.00
Opening balance	27,027.96		27,027.96
TOTAL AF	70,027.96	337,600.00	407,627.96

ALMA	0.00		0.00
AI-Bio	100,000.00		100,000.00
Sub-total	100,000.00		100,000.00
Opening balance	29,110.87		29,110.87
TOTAL ALMA/AI-Bio	129,110.87		129,110.87

U of A			
U of A/AFNS	188,289.10	1,552,480.00	1,740,769.10
Royalty	25,000.00		25,000.00
Poultry Unit (Internal revenue)	148,956.79		148,956.79
Poultry Unit (External revenue)	210,078.04		210,078.04
Sub-total	572,323.93	1,552,480.00	2,124,803.93
Opening balance	177,151.00		177,151.00
Total U of A	749,474.93	1,552,480.00	2,301,954.93

	Cash	In-Kind	Total
Total Income	1,241,558.78	1,925,080.00	3,166,638.78

Expenses 2015 - 2016**Actuals as of March 31, 2016**

	Cash	In-Kind	Total
Salaries and benefits*	621,858.10		621,858.10
Supplies	249,287.15		249,287.15
Travel	2,892.14		2,892.14
Equipment	56,762.07		56,762.07
Overhead	7,279.09		7,279.09
Total Expenses	938,078.55	1,925,080.00	2,863,158.55

Revenue/Expense Summary 2015 - 2016**Actuals as of March 31, 2016**

	Cash	In-Kind	Total
Total Income (incl. carryover)	1,241,558.78	1,925,080.00	3,166,638.78
Total Expenses	938,078.55	1,925,080.00	2,863,158.55
Total carryover to 2015/2016	303,480.23	0.00	303,480.23

Notes:

In the 2015-16 fiscal year, AFNS contributed \$171,840 toward the salary and benefits of academics usually paid from the PRC which is not shown in this report.

Budget 2016-2017

Income 2016 -2017 (Budget)

Industry	Cash	In-Kind	Total
Alberta Turkey Producers	30,642.00		30,642.00
Alberta Hatching Egg Producers	34,861.00		34,861.00
Alberta Chicken Producers	97,650.00		97,650.00
Egg Farmers of Alberta	38,896.00		38,896.00
Egg Farmers of Canada	15,000.00		15,000.00
Burnbrae Farms	8,500.00		8,500.00
Lilydale	15,000.00		15,000.00
Maple Leaf	15,000.00		15,000.00
Poultry Health Services		35,000.00	35,000.00
Sub-total	255,549.00	35,000.00	290,549.00
Opening balance	115,710.64		115,710.64
TOTAL INDUSTRY	371,259.64	35,000.00	406,259.64

AF	43,000.00	337,600.00	380,600.00
Opening balance	0		0
TOTAL AF	43,000.00	337,600.00	380,600.00

ALMA	0.00		0.00
AI-Bio	100,000.00		100,000.00
Sub-total	100,000.00		100,000.00
Opening balance	49,366.07		49,366.07
TOTAL ALMA/AI-Bio	149,366.07		149,366.07

U of A			
U of A/AFNS	205,000.00	1,552,480.00	1,757,480.00
Poultry Unit (Internal revenue)	65,000.00		65,000.00
Poultry Unit (External revenue)	180,000.00		180,000.00
Sub-total	450,000.00	1,552,480.00	1,002,480.00
Opening balance	138,403.52		138,403.52
Total U of A	588,403.52	1,552,480.00	2,140,883.52

	Cash	In-Kind	Total
Total Income	1,152,029.23	1,925,080.00	3,077,109.23

Expenses 2016 - 2017 (Budget)

	Cash	In-Kind	Total
Salaries and benefits	800,000.00		800,000.00
Supplies	275,000.00		275,000.00
Travel	10,000.00		10,000.00
Equipment	30,000.00		30,000.00
Overhead	5,000.00		5,000.00
Total Expenses	1,120,000.00	1,925,080.00	3,045,080.00

**Revenue/Expense Summary 2016 - 2017
(Budget)**

	Cash	In-Kind	Total
Total Income (incl. carryover)	1,152,029.23	1,925,080.00	3,077,109.23
Total Expenses	1,120,000.00	1,925,080.00	3,045,080.00
Total carryover to 2016/17	32,029.23	0.00	32,029.23

Poultry Unit Report 2015-2016

Income 2015 – 2016

Actuals as of March 31, 2016

	Total
U of A/AFNS	188,289.10
Poultry Unit (Internal revenue)	148,956.79
Poultry Unit (External revenue)	210,078.04
Sub-total	547,323.93
Opening balance	177,151.00
Total Income	724,474.93

Expenses 2015 – 2016

Actuals as of March 31, 2016

	Total
Salaries and benefits	323,754.30
Supplies	205,645.04
Equipment	56,672.07
Total Expenses*	586,071.41

Income/Expense Summary 2015 - 2016

Actuals as of March 31, 2016

Total Income	724,474.93
Total Expenses	586,071.41
Carryover/surplus to 2015/16	138,403.52

Poultry Unit Budget 2016-2017

Income 2016 - 2017 (budget)

	Total
U of A/AFNS	205,000.00
Poultry Unit (Internal revenue)	65,000.00
Poultry Unit (External revenue)	180,000.00
Sub-total	450,000.00
Opening balance	138,403.52
Total Income	588,403.52

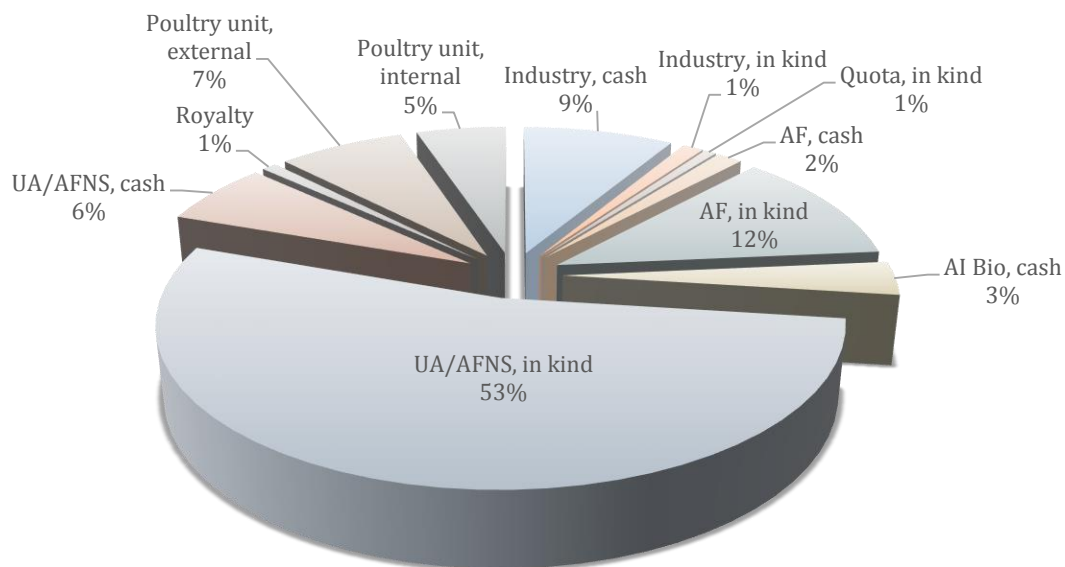
Expenses 2016 - 2017 (budget)

	Total
Salaries and benefits	300,000.00
Supplies	240,000.00
Equipment	30,000.00
Total Expenses*	570,000.00

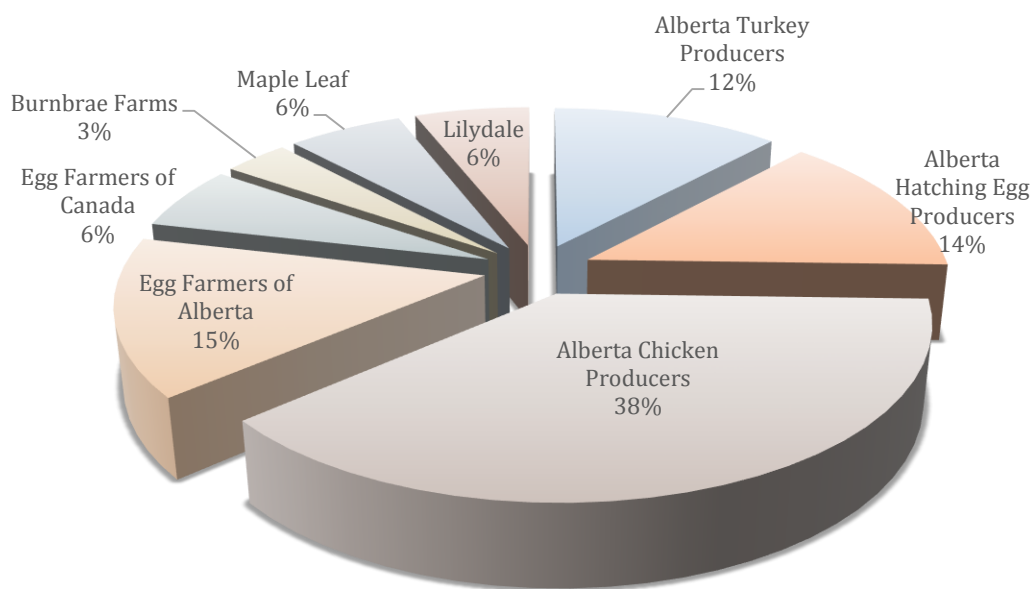
Income/Expense Summary 2016 - 2017 (budget)

Total Income	588,403.52
Total Expenses	560,000.00
Carryover (surplus) to 2016/17	18,403.52

PRC funding: All sources received in 2015-2016 (\$3,166,639)



PRC funding: Industry cash sources received in 2015-2016 (\$220,119)



Acronyms and Abbreviations Used

<i>Abbreviation</i>	<i>Definition</i>
<i>AF</i>	Alberta Agriculture and Forestry
<i>AFNS</i>	Department of Agricultural, Food and Nutritional Science
<i>AHEP</i>	Alberta Hatching Egg Producers
<i>AI-Bio</i>	Alberta Innovates Bio Solutions
<i>ALES</i>	Faculty of Agricultural, Life and Environmental Sciences
<i>AN SC</i>	Animal Science
<i>ATP</i>	Alberta Turkey Producers
<i>HCP</i>	Heritage Chicken Program
<i>HQP</i>	Highly Qualified Personnel
<i>MSc</i>	Master of Science
<i>PhD</i>	Doctor of Philosophy
<i>PRC</i>	Poultry Research Centre
<i>PRCSC</i>	Poultry Research Centre Student Club
<i>NACTA</i>	North American Colleges and Teachers of Agriculture
<i>FGSR</i>	Faculty of Graduate Studies and Research
<i>GSA</i>	Graduate Students Association
<i>NSERC</i>	National Science and Engineering Research Council
<i>PDF</i>	Post-doctoral fellow
<i>PSA</i>	Poultry Science Association
<i>CPRC</i>	Canadian Poultry Research Council
<i>CFIA</i>	Canadian Food Inspection Agency
<i>NUFS</i>	Nutrition and Food Science
<i>ALMA</i>	Alberta Livestock and Meat Agency
<i>U/G</i>	Undergraduate
<i>MSPRU</i>	Meat Safety/Processing Research Unit
<i>Sask ADF</i>	Saskatchewan Agriculture Development Fund
<i>U of A or UA</i>	University of Alberta
<i>EFA</i>	Egg Farmers of Alberta
<i>NSERC DG</i>	NSERC Discovery Grant
<i>NSERC CRD</i>	NSERC Collaborative Research and Development grant
<i>PIC</i>	Poultry Industry Council
<i>ACP</i>	Alberta Chicken Producers
<i>EFC</i>	Egg Farmers of Canada
<i>AITF</i>	Alberta Innovates Technology Futures

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