



Our
knowledge
is your
Advantage



2011-2012 Annual Report





mission statement

To serve the community through excellence in teaching and research in:

- efficient and sustainable agricultural production
- value added processing
- food safety
- human health

in order to improve the health and quality of life.

leaders' foreword



John Kennelly and
Erasmus Okine

It is with tremendous pride and enthusiasm that we address you once again as the Chair of the Department of Agricultural, Food and Nutritional Science and as Dean of the Faculty of Agricultural, Life & Environmental Sciences.

Despite continuing budget pressures, 2011-2012 has been a period of great success, innovation and advancement within the department of AFNS. The stories highlighted in this report demonstrate the leadership role the department continues to play in addressing issues of provincial, national and international importance.

This year the department attracted an impressive \$34 million in research funding targeted at important questions across agriculture, food and nutrition. Adding value and reducing waste in the agricultural sector, developing plastics and new products from renewable oil sources, enhancing the health and quality

of livestock, while finding new methods of preventing disease through nutritional means, are just a few examples of how our department has had a real and ongoing impact on the global community.

Over the year, the department has also maintained its commitment to top quality teaching. Our report this year highlights the wonderful achievements of many individual academics, as well as our new Animal Health program, the only one of its kind in Canada, and the Integrated Dietetic Internship, an internationally recognized program training the next generation of Registered Dietitians.

We look forward to the coming year as we build on a strong foundation of excellence and innovation. With funding from federal, provincial and industry partners the department will add academic capacity in human nutrition, gut health, nutrigenomics, rangeland ecology,

ethology, lipid utilization, and food and bioresource technology. Our strong academic base along with connections across campus, government and industry, ensures that when it comes to achieving the highest quality of research and teaching, AFNS can deliver.

We appreciate the opportunity to share the innovations, discoveries and highlights with our partners and stakeholders. We hope you will enjoy reading the stories that showcase some of the successes from the last year and look forward to working with all our partners as we continue to build a great department.

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Internship program growing to meet demand for professional dietitians

With Albertans' growing awareness of their diets' ability to prevent negative health issues, the Dietetic Internship Program is expanding to fill the impending shortage of professional dietitians in the province.

The program, originally called the Co-ordinated Dietetic Internship, was formed in 1989 under the leadership of Maureen McKay, a Registered Dietitian and 30 year employee of the University of Alberta. In its first year, the class had only six students.

McKay, who retired from the department of AFNS in 2011, spearheaded efforts to reshape the program from traditional, hospital-based learning to a more interactive experience for students that would have them working in a wide variety of dietetic roles across the province, and to partner with similar provincial programs and health organizations.

Today, the Integrated Dietetic Internship is the second largest program of its kind in

Canada and is the only one approved by the College of Dietitians of Alberta (CDA). The program trains over 50 new dietitians a year and plans to increase their intake by 10% annually starting in 2013 in order to meet the rising demand in the field. During their 44 weeks of placement, the interns function as emerging colleagues on the health team and work alongside dietitian preceptors, physicians, nurses, physical therapists, pharmacists and other specialists. The interns gain valuable skills in communication, professionalism and dietetic practice. Additionally, they engage in supervised practice and have the opportunity to learn their craft under the supervision of a registered dietitian.

"Current health workforce projections suggest that job opportunities will continue to grow in the coming decade," said program director Heidi Bates, herself an AFNS alumnus. "This is primarily due to an

increased recognition of the importance of nutrition in the management of chronic conditions such as diabetes, kidney disease, stroke, cardiovascular disease and obesity."

Bates attributes much of the program's continued success and growth to the collaborative efforts between the U of A and its industry partners, such as Alberta Health Services (AHS), whose team of volunteers donated approximately 76,000 hours of their time last year to the training and development of students.

"The last five years have seen significant growth of our Internship program and the development of valuable community partnerships with AHS and the College of Dietitians of Alberta, which have proven invaluable," she said. "We provide a very high level of training that makes our interns valued employees who contribute to the health and well-being of Alberta in a wide variety of ways."

Liver function research nets myriad of awards for young scientist

At the age of only 37, Rene Jacobs is having a significant impact on the world of dietary nutrition. His work over the past 10 years is showing fascinating results in preventing and reversing the effects of non-alcoholic liver disease, and the industry is taking notice.

Topping off an astounding list of recognitions that dates back to 2003, in the last two years, Jacobs has been awarded the Stewart Whitman New Investigator Award, the Deuel Young Investigator Award, the Canadian Institutes of Health Research New Investigator Salary Award, and in 2012 alone, the International Life Science Institute North American Future leader Award and the prestigious American Society for Nutrition E.L.R. Stokstad Award, and has also earned nearly three quarters of a million dollars in grants from various institutions and donors.

"I have a bunch of areas of study," he said, "but one of the fields in which I have enjoyed significant success this year is looking at liver disease."

"We've had some very exciting results that show how natural dietary nutrients like creatine can improve liver function, which can have significant impact in preventing the onset of early liver disease, and also how others, such as choline, can influence later stage, more serious liver diseases. They're both in a theme of dietary supplementation, but looking at it from much different angles."

After receiving his B.Sc. and Ph.D. in biochemistry from the Memorial University of Newfoundland, Jacobs joined the University of Alberta as a Postdoctoral Fellow with the Group on Cell Biology of Lipids. Since 2009 he has been working as an assistant professor with the department. His work in dietary studies has gained attention from academic institutions across the continent.

When asked what the impact of his research will be on global health in the future, Jacobs admits that the nature of his work is unpredictable, but remains determined to pursue studies that he feels will lead to the development of better health care techniques, as well as inspiring the next generation of health researchers.

"Impact moves slower than research most of the time," he said, "which is unfortunate, but it helps other people develop their own research, and sooner or later, the results are

definitely going to be felt. We don't know what the impact of our research will be in 10 or 20 years, so we have to keep working at it and discovering new things."

"Whether the awards have had an impact on me," he laughs, "I guess we'll see when I apply for more grants."



L to R: Karen Kelly, Rene Jacobs, Robin da Silva

agricultural sustainability



Historic land donation results in creation of Rangeland Institute, appointment of new chair.

This year saw the creation of the Mattheis Chair in Rangeland Ecology and Management in recognition of the monumental land donation from Ruth and Edwin Mattheis in 2010.

After the donation of their 12,300 acre ranch, estimated to be worth over \$12 million, U of A alumni Ruth and Edwin Mattheis said they were happy in the knowledge that it would remain a working ranch and would contribute to the preservation of rangelands for generations to come.

"We didn't want to see the land subdivided, we didn't want to sell it, we wanted to see it preserved," said Ruth Mattheis. "The land was donated to

the University of Alberta because of its agriculture faculty."

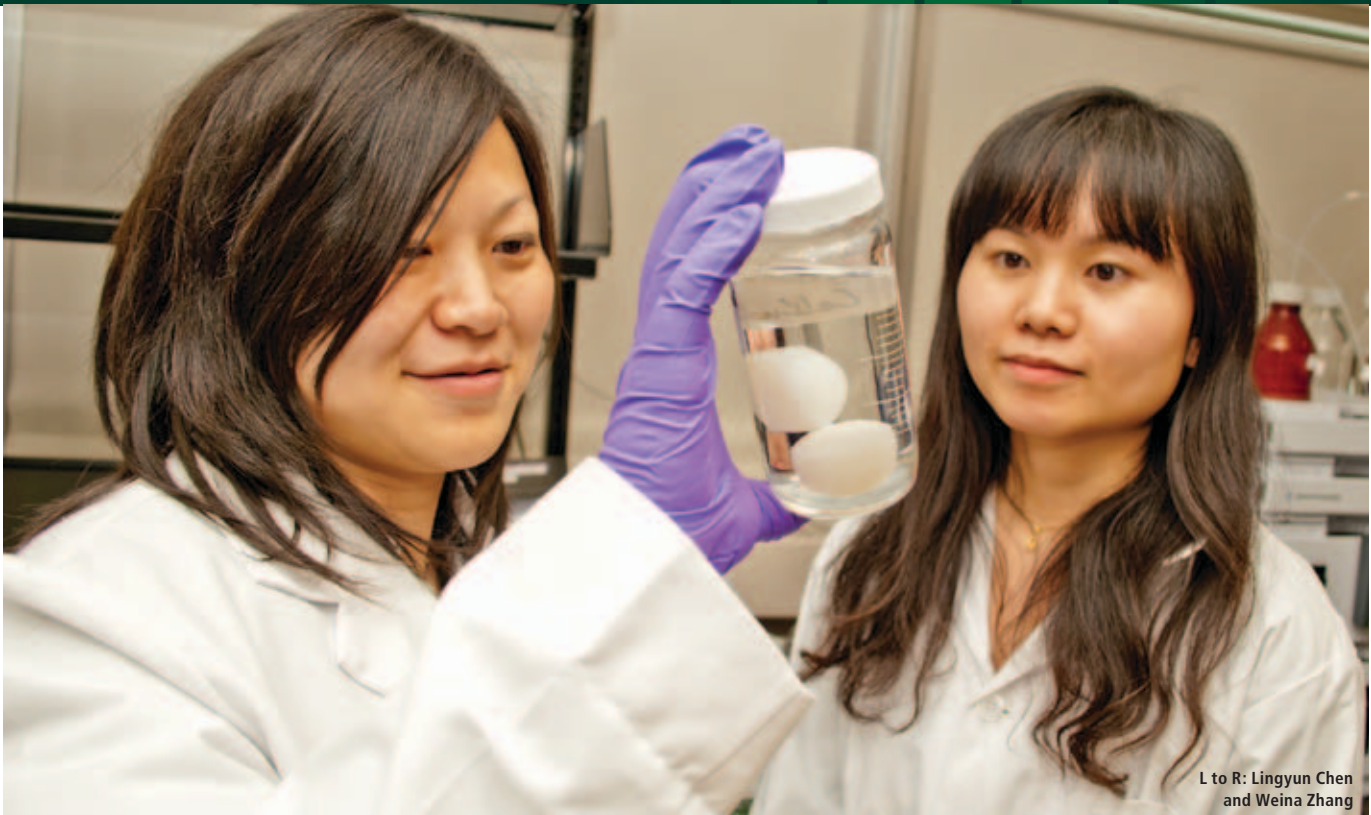
Edward Bork, a professor with AFNS, was named to the position shortly after its creation, and with good reason. With his extensive history in both the study and teaching of rangeland preservation and performance, Bork is a natural fit. He brings a wealth of knowledge and experience in the field to the new position and will serve as the head of the newly formed Alberta Rangelands Research Institute.

As chair, Bork will spearhead the development of the institute and establish a research, teaching and extension program in various aspects of applied ecology, grazing management, livestock husbandry

and production economics for the mixed-grass prairie region.

The couple said that they originally began thinking about donating the land after attending a range management conference in 2007 and heard a presentation by Bork about the impact of climate change on grasslands. Edwin said he was impressed by the usefulness of research being done at the university.

"The ecological goods and services from both private and public rangelands are assets that every Albertan benefits from if managed properly," said Bork. "All of society benefits from these services, and amazingly, we don't typically pay anything for them."



L to R: Lingyun Chen and Weina Zhang

Researchers find new uses for barley protein in cosmetic and food industries

Canadian barley might be making a move from your plate to your vanity, as researchers have discovered some innovative new uses for the ancient food grain.

Lingyun Chen, Assistant Professor in plant protein chemistry and technology, along with her team of researchers, have not only developed a cost effective method of extracting the protein from the raw grain, but have also come up with a number of original applications for its use.

“When we analyzed the barley protein, we found some very interesting properties,” said Chen. “One of the most interesting being that it serves as a very good emulsifier and encapsulation material, which we realized could have benefits for the personal-care or food industries.”

Chen says barley protein has the ability to replace many existing emulsifying agents in a variety of food and cosmetic products, and can also be used to encapsulate many nutraceuticals, concealing their

occasionally unpleasant taste and odour, and protecting them from deterioration before being absorbed into the intestine.

Many “personal-care” products, such as skin creams, hair conditioners and ointments, rely on emulsifiers in their formulation. These have traditionally been derived from animal products or, more recently, completely synthesized. Given emergent market trends towards natural, sustainable and organic products, Chen feels that these new applications of this ancient grain are exactly what consumers are looking for.

In addition to barley protein’s potential applications in the personal care industry, Chen’s team also found numerous similarities to ingredients currently being used in retail food products.

“The barley protein has similar capacity to lecithin, which is a soy-based emulsifying agent commonly used in the food industry,” said Chen, “but lecithin is very expensive. The production cost with barley is much lower.”

Adding value to one of Alberta’s largest grain crops presented a special challenge for researchers, as a limited amount of study had been done on barley protein to date.

Chen’s research has already led to a number of patented technologies which have resulted in a \$4.4 million investment from the federal government to test and commercialize new products. Additional support is also being provided through the Alberta Barley Commission and Alberta Innovates Bio Solutions.

“Result-oriented research is what the agriculture industry needs,” said Matt Sawyer, Chair of the Alberta Barley Commission. “This kind of producer investment highlights the value of renewable agricultural products while raising awareness and creating value for Alberta barley farmers.”

Dr. Chen’s position as the Alberta Barley Cereal Protein Chair is co-funded by the Alberta Barley Commission and the Alberta Crop Industry Development Fund.



Martin Zuidhof

Poultry Research Centre celebrates 25 years of innovation

In 1985, Frank Robinson saw a job advertisement for a poultry researcher at the University of Alberta. He was encouraged to apply for the position by a friend, and the rest, as the saying goes, is history.

In the early days of the Poultry Research Centre, the team had only an office with a phone and start-up funds were scarce, but this slowly improved. The poultry industry, along with government and funding agencies, have since made substantial investments in the centre that have enabled a transformation from its humble, single-office origins into a world-class research facility that has since provided Alberta's poultry industry with a multitude of positive changes in efficiency, productivity, quality and competitiveness.

PRC board of directors chair Don Copeland noted that the PRC's success was in part due to the fact that the researchers recognized that "research for research sake is pointless. It must be shared with industry and producers." Due to Frank Robinson's work, Copeland says, "broiler breeder management has changed throughout the world."

Today, the PRC is home to numerous poultry researchers, supports 41 graduate students, 16 post-doctoral fellows/research associates, 22 additional technical and support staff, and has expanded its focus from primarily production-related science to include a vast scope of value-added research, meat science, and animal welfare.

Amazing teachers, successful students

When Cibele Torres moved from the Universidade Federal do Rio Grande do Sul, nearly 10,000 Km northwest to the University of Alberta, she had no idea what to expect. She was alone in a new country and separated from the friends and professors that had encouraged and inspired her throughout her academic career.

However, upon meeting Doug Korver, her new supervisor, she immediately knew she had made the right decision.

"The first question that he asked me was, 'Do you have something in mind that you would like to work on, because I don't want you working on something that doesn't interest you,'" said Torres.

"So I told him that I had some ideas and asked if I could just write them down, give them to him and then we could discuss it and see what comes up."

What came up were two innovative techniques for determining the density and calcification of bones in chicken embryos. One method involves staining the embryos to estimate bone development, while the other involves the administration of various mineral combinations in the mother hen's diet to increase bone strength.

Those techniques won Torres both the Lloyd Johnston Graduate Scholarship in Poultry Science and the Copeland Graduate Travel Prize in Poultry research. She used the \$1000 prize from the latter to travel to St. Louis to discuss her studies with industry partners Novus International, who supplied the enriched feed for her research.



L to R: Cibele Torres and Doug Korver



Lose the sodium, keep the flavour

In the quest to lower sodium consumption in the North American diet, a team of researchers recently received \$340,000 to conduct sensory and taste trials of a salt flavour enhancement product it created with a new, cleaner and more efficient technology.

The team, led by Mirko Betti and also including Michael Gänzle, Andreas Schieber and Maurice Ndagijimana, took proteins from low value parts of poultry, fish and vegetables and created molecules that have kokumi characteristics.

“Because kokumi amplifies the taste of the salt, it allows foods to have much less salt and be better for you, without sacrificing the flavour. Done right, most consumers wouldn’t know the difference,” says Betti.

What makes Betti’s kokumi unique is the way in which he manufactured it. The team broke the proteins from the various sources into their component fragments as is usually done. It then selected specific fragments and mixed them with sugars but instead of using the typical heat transfer process to create the kokumi molecules, it used a fermentation process, thereby drastically reducing the unwanted by-products and making the process much more cost-effective.

Plans are now underway to use the funding to conduct sensory trials to fine tune the technology.

From plumage to profit

Where others in the poultry industry may see a hindrance, Jianping Wu has created an opportunity.

Wu and his team are streamlining a technique to convert the keratin protein from poultry feathers into high quality, water-resistant thermoplastics; a process that could add millions of dollars in annual revenue to the poultry industry, help reduce reliance on fossil fuels and stop unthinkable amounts of waste from ending up in landfills.

The plastics are made by pulverizing the feathers into a fine powder and then adding chemicals that join the keratin molecules into chains. The resulting mixture is then heated, extruded, and can be formed into any number of products.

“What we’ve made, we can use it for a number of applications,” said Wu. “We can make everything from packaging film to golf tees. We have had a lot of discussion as

far as the medical applications as well.”

In addition to not using petroleum and natural gas, two of the major components in the production of contemporary thermoplastics, the plastics created from keratin are also completely biodegradable.

Thermoplastics are common things in today’s everyday life. Variants like nylon, polyethylene, and PVC are everywhere, from clothes to car seats to our plastic product bottles. They are technically recyclable because they can be melted down and re-formed into new shapes, but often they’re disposed of by consumers who toss them in the trash. Biodegradable variants exist, but they are often still made from oil, and are therefore not exactly eco-friendly.

“The best application we’ve seen so far would be plastic grocery bags,” said Wu. “The common bags available today won’t decompose for hundreds of years,

and there are over 500 billion of them being produced annually worldwide. In a perfect composting situation, ours could be fully degraded within a year.”



Dean receives highest honour from Agricultural Institute of Canada

John Kennelly, Dean of the Faculty of Agricultural, Life & Environmental Sciences (ALES) was presented a fellowship from the Agricultural Institute of Canada on October 21, 2011 for his extensive contributions and tireless efforts to improve and develop the science of Canadian agriculture.

David Chanasyk, himself an AIC Fellow, made the announcement of Kennelly's fellowship during a special presentation at the Faculty of ALES Award ceremony. The presentation marks the first time since 2008 that the organization has awarded its highest honour.

In addition to his teaching and research, Kennelly has held various administrative

positions within the faculty and the university beginning in 1993 when he served as associate dean of academic programs. In 1997, he became Chair of AFNS and took over as dean in 2004. Meanwhile, he also served as Special Advisor to the Vice President (Research) as the U of A representative on the IFASA Working Group.

"He is a credible and passionate advocate for agriculture who understands and has championed the connections between agriculture and the environment and human health," said Frances Rodenburg, Manager of Administration and Communications for the AIC.

"He has inspired students to pursue



agriculture as a career, which is very important because in many areas of Canada, the number of students pursuing agriculture is declining. The U of A has been very successful in that area and in attracting graduate students."

Top marks in teaching and research



Daniel Barreda, Assistant Professor in Animal Immunology, was recruited to the U of A in 2006 in a joint appointment between the Faculties of Science and ALES. Today his program sits at the interface between animal nutrition, bioconversions, and public health. His team continues to expand a pool of high-resolution technologies that evaluate physiological changes in animal health. These can help answer health-related questions for commercial animal species that include swine, beef and dairy cattle, poultry and fish.

With over \$4M in research and infrastructure support, patents pending on validation technologies for animal health products, master agreements with industry leaders like DSM Ltd and a recently renovated laboratory that supports the activities of 11 trainees, things continue to move very rapidly for Barreda.

"We are currently examining broader issues associated with animal performance and health, as well as the impact of evolving agricultural practices on the environment," he said.

This formula appears to be paying off. Barreda recently received the "Faculty of ALES Research and Innovation Award", a "Teaching Award of Merit" from the North American Colleges and Teachers of Agriculture, an "Inspirational Instructor Award" from the Interdepartmental Science Students' Society, and the "Provost's Award for Early Achievement of Excellence in Undergraduate Teaching", the most prestigious award in undergraduate teaching at the Assistant Professor level in the University of Alberta.

"Students want to learn how fundamental concepts translate into real everyday solutions," he added. "It is really easy to build on the research that is taking place at the U of A to create engaging teaching environments".

Value-adding technology for waste beef products scores ASTech award

One man's trash is another man's treasure, as the old saying goes. That adage rings especially true for David Bressler, after developing a procedure that converts the throwaway parts of beef carcasses into heavy duty plastics that can be used in everything from car components to cellophane; a procedure that helped earn him the 2011 ASTech award for biotechnology.

By finding a way to convert these animal byproducts into plastics for industrial use, Bressler and his team hope to divert tonnes

of protein waste from landfills across North America, shift to using renewable resources instead of petrochemicals to make plastics, and boost flagging profit levels in the cattle industry.

Beef producers took an economic hit when byproducts such as blood and bone were regulated out of the rendering process after BSE was found in Canada, for fear the material contained deadly prions—infected proteins that cause BSE, more commonly known as mad cow disease.

"If we can get more fundamental value back into the rendering process, it will help the livestock industry more than any government policy," Bressler said.

The University of Alberta is uniquely positioned to develop these technologies as the only post-secondary facility to be approved by the Canada Food Inspection Agency to conduct research involving turning high-risk proteins into safe, sustainable materials.

The new plastics from Bressler's lab are currently being tested by The Woodbridge Group, a car parts manufacturer. Current funding is focused on research that further experiments with the product to see if the plastics can be mixed with renewable fibres such as hemp. If successful, the resulting bio-composite material could be used in high-strength materials such as building structural supports.

The bio-friendly plastics, though still in the development stage, are poised to become an innovative addition to the manufacturing industry, Bressler believes. "The plastic industry is under pressure to increase the renewable content in its products. As a result, this project offers the opportunity to do just that, and at the same time help send value back to rural Alberta and the beef sector."



David Bressler

PHOTO COURTESY OF THE ASTECH FOUNDATION



L to R: Justice Asomaning, Paolo Mussone and David Bressler

Experiential learning a highlight for students of new Animal Health program

The newly formed Animal Health program has proven to be a remarkable success, both in the classroom and in the community. Students are quickly seeing the value of the program's hands-on approach to teaching and learning, and with majors in Companion and Performance Animals, Food Animals, as well as Food Safety and Quality, they are afforded a broad range of areas in which to study.

For students who hope to move on to veterinary school, the program provides the perfect opportunity to fulfill admission requirements for one of western Canada's two veterinary programs.

"The degree program has helped us open some new opportunities and experiences for students interested in careers related to animal health," said Craig Wilkinson, Director of Animal Care, "and broadened it beyond livestock to include companion animals."

"We continue to be proud of the experiential learning that our Animal Science program offers, with opportunities to learn about and work with livestock. But this new program also allows us to expose them to companion animal issues and experience, and health and welfare-related experience for all animals."

L to R: Leah Quanstrom and Clover Bench



Animal Behaviour students team up with Valley Zoo in reconstruction efforts

For the second straight year, students from the Animal Science 378 course are bringing their education out of the classroom and into the field in a collaborative project with the Edmonton Valley Zoo.

Clover Bench, Contract Assistant Professor of Applied Ethology, spearheaded the project in which students are asked to study the behaviours of a particular animal and design a new enclosure based on its natural behaviours.

The results of the project are then shared with zoo officials in order to make the most of their \$50 million renovation budget recently approved by the city council.

"This is one of those projects where students really see the impact that they can have as professionals before they even complete the course," said Bench. "It benefits everyone involved. The students apply their knowledge in a real-world scenario, and the animals get well-researched enclosures specifically designed for their behavioural needs."

Students are given specifications in terms of space, timelines and budget when beginning the project. They are then separated into groups of five or six, with each group being assigned a different animal to study.

They must then use their knowledge of animal behaviours to design what they see as the ideal enclosure for the animals based on their behaviour patterns.

This year, as the Valley Zoo begins its transformation from its current fairy-tale theme to a representation of the native northern Alberta wildlife, the students worked with many indigenous species, such as arctic foxes and river otters, as well as more exotic animals like spider monkeys and raptors.

Dr. Milton Ness, head veterinarian with the Valley Zoo, said the partnership has yielded some inspiring results over the past two years, and is looking forward to continued participation from the Animal Behaviour students.

"Our collaboration with the University of Alberta allows students to better understand the complexity and care which goes into proper zoo enclosure design," he said.

"Having students work on design projects for the Edmonton Valley Zoo gives us a real insight and appreciation for what others expect of the enclosures and aids me in making recommendations for new exhibits as they are developed."

Students develop partnership with Edmonton Humane Society

The first two graduates of the recently implemented Animal Health program teamed up with the Edmonton Humane Society to help pet owners provide better care for their animals.

Rebecca Proulx and Alicia Glasier designed 13 new pamphlets for the EHS designed to educate pet owners on caring for their animals, as part of their senior capstone course.

The pamphlets cover a wide range of topics, from basic care of cats, dogs, birds, rabbits and ferrets, to the roles and intentions of the EHS, and the basic details of the Animal Protection Act.

"We visited the Humane Society to try and assess how we could help and after riding along with the protection officers, we saw that they had trouble getting into people's houses," said Glasier. "The residents won't often answer

the door because they have this misconception that the officers are dogcatchers and that they've come to take their animals away, so we thought we might design some materials to leave with the pet owners to help them consider what behaviours they needed to change."

According to Craig Wilkinson, Chair of the BSc in Animal Health program committee at the University of Alberta, getting a first-hand view of the shelter, the cases and the people involved in them will help students appreciate the numerous factors involved in animal welfare.

"It's important for students in animal health to understand the material presented in their courses," he said, "but it's also essential that they have a real feet-on-the-ground understanding of the complexity involved in animal welfare cases."



L to R: Alicia Glasier and Rebecca Proulx



Burim Ametaj

Innovative procedure improves health of dairy cows

A study designed to increase fertility rates in dairy cows has yielded some surprising benefits.

Burim Ametaj and Michael Gänzle originally set out to determine whether administrations of probiotics directly into the reproductive tract of dairy cows could help reduce the occurrence of a postpartum uterine infection known as metritis, which can result in infertility.

"24 per cent of all cows that are culled in Canada are due to infertility reasons," said Ametaj, "so it's an enormous problem for the dairy industry. If a cow doesn't give birth to a calf every year it won't be able to produce milk. We knew that probiotics had other health benefits, so we identified and isolated three lactic acid bacteria from the reproductive tract of healthy cows, increased their numbers in the lab, and

treated 80 cows at the Dairy Research and Technology Centre dairy farm."

40 cows were given an intra-vaginal infusion of lactic acid bacteria and the remaining 40 served as a control group. As researchers had hypothesized, the overall likelihood of pregnancy in the test animals rose 25 per cent while incidences of metritis fell by over 30 per cent.

What was surprising to the researchers, however, was that milk production from the test animals surpassed that of the control group by over 10,000 litres over the course of 50 days, and the total percentage of cows culled due to diseases other than metritis fell from 17.5 to 4.9 per cent.

"The uterus is very important to a cow's overall health," Ametaj said. "Even diseases that would appear to have nothing to do with the reproductive system were

affected. Laminitis, which affects the feet of the animal, was over 25 per cent lower in the cows who received the treatment."

In addition to being economical, relatively simple to perform and highly effective in maintaining animal health, the procedure does not render milk produced during its administration unmarketable for human consumption, unlike antibiotics which have been banned in Canadian milk.

"It's a very green technology," he continued. "It's beneficial to both the animals and the environment, which, in the end, is better for all of us."

Ametaj and his team are building on their findings with a large-scale study consisting of nearly three times as many animals at the department's 12,000 acre Kinsella Research Ranch.

New \$3.5M Delta Genomics industry service lab celebrates grand opening

The \$3.5 M investment from Western Economic Diversification for a new service laboratory took form on October 28th, 2011, as the newly developed *Delta Genomics* laboratory celebrated its grand opening.

The new facility was designed to streamline the delivery process for products developed by Livestock Gentec, an agricultural genomics program at the University of Alberta headed by AFNS

researcher Graham Plastow.

Edmonton-Centre MP Laurie Hawn attended the event and spoke enthusiastically about the opportunities that the new facility presents to the agricultural sector and the livestock industry.

"This new centre will provide a wide variety of services in the area of genomics that will help provide high quality livestock products for consumers and great employment opportunities," he said. "The Delta Genomics Centre provides the livestock industry with a biobanking, genotyping and sequencing service that enables them to produce more efficient and healthier animals."

The Delta Genomics Centre will operate on a not-for-profit, fee-for-service basis, helping the Canadian livestock industry become more sustainable, profitable and competitive.



L to R: Graham Plastow, Hon. Laurie Hawn and Steven Moore

International collaboration results in mapping of entire cattle genome

The zebu, *Bos indicus*, one of two species of cattle, has joined an exclusive club that counts among its few dozen members the domestic dog, giant panda, and human beings.

In an article published in the *Journal of Heredity*, a team of AFNS researchers in collaboration with Brazilian scientists from Genoa Biotechnology describe the use of cutting-edge technologies to assemble the complete genome of a Nellore bull, one of the common breeds of the species. These hardy breeds are known for their heat tolerance, disease resistance and high quality meat.

"Consumers will benefit from cheaper and healthier products on supermarket shelves," said Stephen Moore, former Director of the Bovine Genome Program

at the University of Alberta and current Director of the bovine genome program at the University of Queensland, Australia, and an investigator on the Nellore genome project.

Using "next generation sequencing," the investigators generated billions of short sections of DNA sequences, and then found areas of overlap to string the short sections together into an assembled genome. "Next generation sequencing can deliver DNA data thousands of times faster than previous methods," explained co-author João Meidanis of Scylla Bioinformatics. Assembling, mapping, and analyzing the zebu genome took less than a year, while the



first human genome took nearly a decade.

Now that the DNA map is complete, researchers can delve deeper into the zebu's genetic code in order to undertake selective breeding. A few genetic markers, sequences of DNA that have been mapped to specific locations and associated with particular traits, have been identified for taurine cattle.

research outcomes

Taking research and development to the next level

After Jonathan Curtis and his Lipid Chemistry Group developed a method for producing polyol, a material used in the production of polyurethane, from canola and other vegetable oils, the team patented their findings and got to work engaging industry leaders in the hopes of producing their new products on a commercial level.

“A key deliverable will be to demonstrate that production can be cost effective in order to convince industry that there is a strong case for commercialization,” he said in a 2010 interview.

Two years later, Curtis has clearly convinced producers that his methods are sound as his group has now teamed up with Consolidated Coatings Ltd., a Vancouver based producer of stains, coatings and sealants, in order to produce polyol-based products on a commercial level.

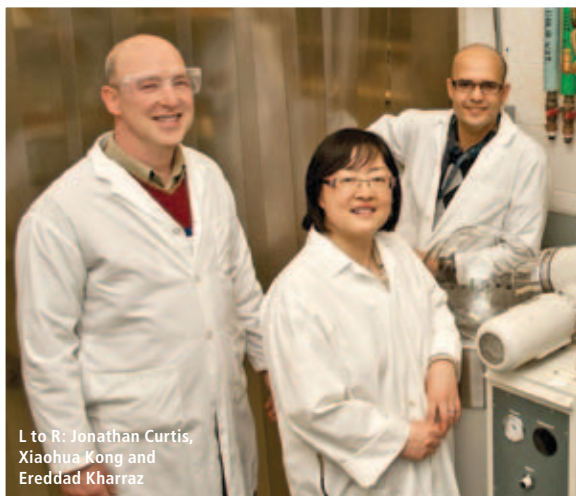
Traditionally, polyol has been made using non-renewable fossil fuels. Curtis’ technique not only relies on a renewable source of oil, but also produces less carbon dioxide than the conventional method. Estimates show that the polyol manufacturing process produces 36% less global warming emissions, a 61% reduction in non-renewable energy use and a 23% reduction in the total energy demand, all relative to polyols produced from petrochemicals.

“Despite the need to reduce our dependence on non-renewable energy

sources, many commercial companies tend to rely on traditional practices simply because they’re familiar,” said Curtis. “They don’t always recognize that new techniques like the ones we are developing can not only be more environmentally responsible, but also more economically viable than contemporary methods.”

Representatives for the company say they are excited to be working with Curtis and the Lipid Chemistry Group, and are looking forward to the opportunities that the collaboration presents.

“Consolidated Coatings has always believed in creating better products through research and development,” said the company’s communications director. “We’re constantly evaluating new methods of manufacturing and finding new materials in our processes that contribute to sustainable development. We use this approach because it makes good sense to care about our environment.”



L to R: Jonathan Curtis, Xiaohua Kong and Ereddad Kharraz



Partnership with MS Swaminathan Foundation aims to alleviate malnutrition and poverty in India

Research is quickly turning to practice in an interdisciplinary project between the U of A and the MS Swaminathan Research Foundation that aims to ease the levels of poverty and malnutrition in three agricultural areas of India.

Nat Kav, the principal investigator of the project, together with co-principal investigator Brent Swallow from the

Department of Resource Economics and Environmental Sociology, has assembled a diverse team of academics from the University of Alberta. Together, they are helping to analyze the dietary, economic and agronomic environment of a selection of agro-biodiversity hotspots in order to assess and remedy the abundant farming of cash crops, such as cassava, that are

providing little in the way of nutrition, mining the soil of nutrients and becoming increasingly susceptible to disease.

Kav and his team have completed an exhaustive survey of over 4000 households in order to establish a baseline of information on

everything from nutritional requirements to economic needs and are working with local farmers in order to test and demonstrate the benefits of growing a variety of crops.

"We're showing them the benefits of intercropping crops like millet and legumes with cash crops like cassava," he said.

With the support of organizations such as the Canadian International Development Agency and the International Development Research Centre, who have provided \$4.9M in funding over 3 and a half years, Kav says he feels the project has taken a tremendous stride in the right direction.

"Obviously we're not going to alleviate poverty and malnutrition in 3 and a half years. But we have the opportunity to develop credible research data that would allow us to say to policy makers, 'These are the practices that you should be encouraging,' and when implemented, they could make a world of difference."



Clean drinking water using agricultural by-products

Aman Ullah, a Post-Doctoral Fellow with the department of AFNS, has won a \$100,000 grant from Grand Challenges Canada (GCC) to pursue his idea that could potentially improve the quality of life for millions of people.

Working in collaboration with Jianping Wu, a fellow poultry researcher and professor, Ullah is developing inexpensive filters made from the modified protein in poultry feathers to remove arsenic from drinking water.

The global implications of these filters could be monumental. An affordable, reusable filter made from a readily available, domestic waste product could help improve water quality in several

developing countries affected by arsenic contamination.

"For millions of people in developing countries, groundwater is the only source of drinking water," he said. "When their water source is contaminated, they have no choice other than drinking it."

Although there are currently methods available for reducing the levels of metals in water, the vast majority are too expensive to be implemented in developing countries.

"This method is bold and innovative



Aman Ullah

because of the availability of cheap raw materials in the form of poultry feathers, and simple, one-step modification to transform the protein into biodegradable, reusable and environmentally friendly filters," said Ullah.

AFNS Outstanding Award recipients



AFNS Outstanding Achievement Award Recipients

Outstanding support of AFNS administration - Kelly Elkow

Since joining the Livestock Gentec group in January of 2010, Kelly has consistently proven to be knowledgeable, reliable and extraordinarily helpful. She acts as an excellent ambassador for the team and interfaces seamlessly with the department, faculty and the Research Services Office.

AFNS Booster award - Ken Mathewson

In his short time with the department, Ken has already made a strong mark in the field of communications. His efforts have been very constructive and have helped foster a stronger image of our department as a leader in research, teaching and community service. He is helpful, professional and competent in his interactions with others in AFNS.



AFNS Teaching Award Recipients

Outstanding support of AFNS teaching activities - Suzanna Dunn

Suzanna's work as a teaching assistant for Animal Science 310 has earned her high praise from students and staff members alike. Her desire to see her students succeed is apparent in her promotion of an open learning environment where students feel comfortable asking questions and engaging in discussion.

Outstanding support for AFNS research activities (South Campus) - Klaus Strenzke

Klaus is to his co-workers and students the "go-to" person for questions on technical field research and wheat breeding. He is always eager to show students and guests every aspect of crop research at South Campus. Co-workers say he is fun, outgoing and a great ambassador for his program.

Outstanding support for AFNS research activities (North Campus) - Robin Miles

Robin started with the Phytola group as Lab Manager in 2008 and took on the additional role of Dr. Weselake's Administrative Assistant in 2011. She does an amazing job of keeping everyone organized and making sure that people have everything they need to be productive. Co-workers describe her as "the combination of efficiency, technical competence, and genuine compassion".



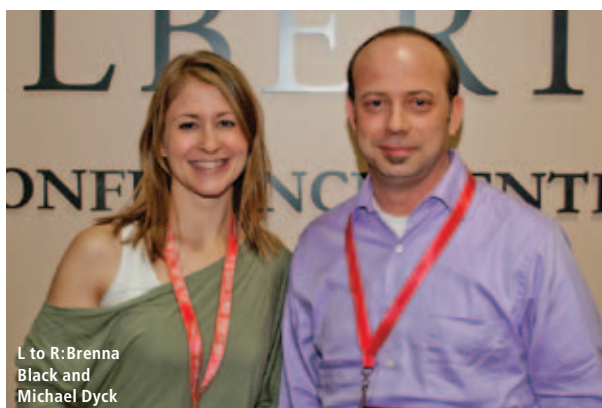
AFNS Graduate Student Award Recipients



L to R: Heidi Bates and Leah Gravells

AFNS Distinguished service partnership award - Leah Gravells

As the former Executive Director of Nutrition Services at Alberta Health Services, Leah's contributions to AFNS have been immeasurable. Her efforts have been instrumental in guiding the collaboration between the U of A and its industry partners. Her colleagues and friends wish her all the best in her retirement.



L to R: Brenna Black and Michael Dyck

AFNS Graduate student teaching award - Brenna Black

Brenna's extensive knowledge and positive attitude have made her a favourite with students and professors alike. She consistently makes time for students both in and out of the classroom and is widely regarded for her approachability and dedication to her work.

AFNS Graduate student mentor award - Michael Dyck

Despite his notoriously busy schedule, Michael always goes the extra mile to ensure the success of his students. His willingness to help with grant proposals, advise on course selection and answer questions in a timely manner have earned him a reputation as one of the most devoted educators in the department.

IN MEMORIAM

Jack Welch

It was with tremendous sadness that the department learned of the passing of Kinsella Research Ranch foreman Jack Welch on February 16th, 2012 at the age of 61.

Colleagues delivered a touching eulogy in which they remembered Jack as a gentle, kind and talented individual who loved his family, his cows, his horses and his work. A born rancher, he would typically start work hours before his official start time and finish hours late.

"Jack loved this (calving) routine," they said. "Over his career he gathered a plethora of stories of good cows, wild



Jack Welch and grandson

cows, and narrow misses. Only a cow person knows, and can understand, why he loved cows and ranching. Jack was waiting for his 41st Kinsella Research Ranch calving

season when he left us for another place. The cows and calves at Kinsella will miss his quiet demeanour and gentle hands, and so will we."

donors

2011-2012 Granting Agencies

AB Vista - a Division of AB Agri Ltd

Agriculture & Agri Food Canada

Agriculture & Food Council

Alberta Advanced Education & Technology

Alberta Agriculture & Rural Development

Agriculture Funding Consortium includes:

- Alberta Crop Industry Development Fund (ACIDF)
- Alberta Innovates Bio Solutions
- Alberta Livestock and Meat Agency (ALMA)
- AVAC Ltd (AVAC)
- Alberta Barley Commission (ABC)
- Alberta Canola Producers Commission (ACPC)
- Alberta Chicken Producers (ACP)
- Alberta Milk (AM)
- Alberta Pork (AP)
- Alberta Pulse Growers Commission (APGC)
- Egg Farmers of Alberta
- Western Grains Research Foundation (WGRF)

Alberta Beef Producers

Alberta Cancer Foundation

Alberta Canola Producers Commission

Alberta Centre for Child, Family & Community Research

Alberta Conservation Association

Alberta Hatching Egg Producers

Alberta Prion Research Institute

Alberta Vista Feed Ingredients

Alberta-Pacific Forest Industry Inc.

Alberta Turkey Producers

Aspen Rhoads

BASF Canada Inc.

Bayer Crop Science Inc.

BeckerUnderwood

BioNeutra Inc

Bioniche Life Sciences Inc.

Burnbrae Farms Ltd.

Canadian Institute of Health Research (CIHR)

Canadian Cattlemen's Association

Canadian Foundation for Dietetic Research

Canadian Foundation for Innovation (CFI)

Canadian Hatching Egg Producers

Canadian Lipoprotein Conference

Canadian Liver Foundation

Canadian Poultry Research Council

Canadian Research Chair

Canadian Swine Health Board

Canadian Swine Research and Development Cluster

Can-Oat Milling

Canola Council Canada

Capital Health

Cargill, Incorporated

Chemtura Canada Co

Cree Board Health Social Services of James Bay

Dairy Farmers of Canada

Danisco (UK) Ltd

Dow AgroSciences Canada Inc

DSM Nutritional Products AG

DSM Nutritional Products LTD

Egg Farmers of Canada

E.I. duPont Canada Company

EmbryoGENE Research Network

Evonik Degussa GmbH

Genome Alberta

Genome Prairie

Grand Challenges Canada

Health Canada

Heart & Stroke Foundation of Alberta, NWT & Nunavut

International Camellia Society

International College of Nutrition

International Development Research Centre

L'Alliance Boviteq Inc.

Lilydale Foods

Linnaeus Plant Sciences Inc.

MapleLeaf Food Inc.

National Institute of Health (US)

North American Branch of the International Life Sciences Institute

NSERC

Nutreco Canada Agresearch

Ontario Pork

PIC North America

Pioneer Hi-Bred Production Ltd.

Poultry Industry Council

Prion Net Canada

Public Health Agency of Canada

Rosstown Farms Ltd

Sanimax

Sask Pulse Growers

SM Blair Scholarship Research Allowance

Sparks Farm Supplies

Syngenta

University of Alberta - VP (Research)

University of Alberta - Internal

University of Calgary

University of Laval

University of Saskatchewan

University of Waterloo

University of Wisconsin

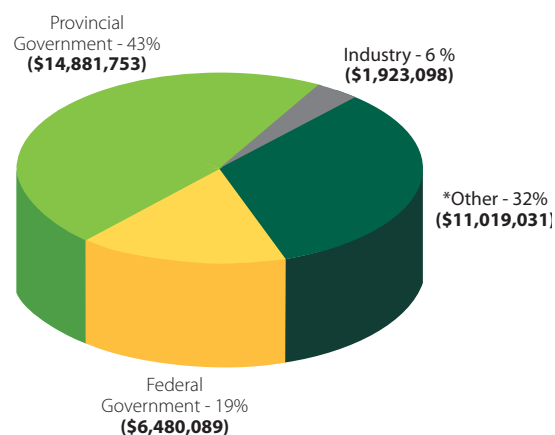
Viterra Inc.

Western Economic Diversification

Western Grains Research Foundation

Worldwide Universities Network

Research Funding \$34,303,972



*Includes – Not For Profit and Individuals, Endowment Spending Allocation & Sales and Investment Income

Operating Budget \$12,671,084

Distribution of Operating Budget

- 58% Academic & Teaching Support
- 11% Administrative & Computing Support
- 13% Central Laboratories
- 18% Research Stations

Academic Staff

- 63 Professors (Including AAFC and ARD academic affiliates/cross and joint appointments)
- 33 Adjunct Professors
- 55 Postdoctoral fellows
- 27 Research Associates
- 16 Visiting Scientists

276 Refereed publications

494 Extension publications/presentations

Undergraduates enrolled in degree programs

BSc Agriculture (includes Pre-Vet Medicine)	185
BSc Agricultural/Food Business Management	53
BSc Nutrition & Food Science	541
BSc Animal Health	103
Total	882

Graduate Student Enrolment

Masters	117
Doctoral	123
Visiting	2
Total	242

60 New graduate students started in 2011/12

62 Graduate students convocated in 2011/12

Central Laboratories

- Agri-Food Materials Science Unit
- Agricultural Genomics Science Unit
- Food Science facilities
- Nutrition & Metabolism facilities
- Human Nutrition Research facilities
- Plant Growth facilities

Off-campus Research Facilities

- Agri-Food Discovery Place
- Alberta Poultry Research Centre
- Crops & Land Resources Unit
- Dairy Research & Technology Centre
- Land W McElroy Metabolism & Environment Research Unit
- Swine Research & Technology Centre
- Enclosed Composting Facility
- Feedmill
- Ministik Field Station
- University of Alberta Kinsella Research Ranch
- St. Albert Research Station
- Mattheis Research Station

Technology Transfer

Source: TEC Edmonton

- 21 Reports of Invention
- 8 Number of new inventions for which we applied for patent protection
- 24 Number of technologies from previous years in which we, or our industry partners, invested in this fiscal year
- 20 Material Transfer Agreements
- 4 Options to License

professors

Dr. Judd Aiken
Prion Disease

Divakar Ambrose
Dairy Reproduction & Management

Dr. Daniel Barreda
Immunology

Dr. Rhonda Bell
Human Nutrition

Dr. Miodrag (Mike) Belosevic
Comparative Immunology and Infectious Diseases

Dr. Heather Bruce
Carcass & Meat Science

Dr. Linda Casey
Pediatric Nutrition

Dr. Cathy Chan
Human Nutrition

Dr. Walter Dixon
Molecular Biology

Dr. Lloyd Dosdall
Agricultural Entomology

Dr. Michael Dyck
Reproductive Physiology/Biotechnology

Dr. George Foxcroft
Swine Reproductive Physiology

Dr. Michael Gänzle
Microbiology & Probiotics

Laki Goonewardene
Beef Science

Dr. René Jacobs
Human Nutrition

Dr. Jane King
Physiology of Forage Crops

Dr. Nat Kav
Biochemistry & Biotechnology

Dr. Burim Ametaj
Ruminant Nutritional Immunology

Dr. Marleny Aranda Saldana
Food/Bio Engineering Processing

Dr. Lorne Babiuk
Virology & Infectious Diseases

Dr. Mirko Betti
Muscle Food Chemistry & Processing

Dr. Edward Bork
Rangeland Ecology & Management

Dr. David Bressler
Fermentation & Bio/Food Engineering

Dr. Lingyun Chen
Plant Protein Chemistry and Technology

Dr. Tom Clandinin
Human Nutrition

Dr. Jonathan Curtis
Lipids, Analytical Chemistry

Dr. Anna Farmer
Community Nutrition

Dr. Catherine Field
Nutrition and Metabolism

Dr. Carolyn Fitzsimmons
Beef Genomics

Dr. Leah Gramlich
Clinical Nutrition


Dr. Leluo Guan
Functional Genomics & Microbiology

Dr. Linda Hall
Environ. Biosafety & Integrated Weed Management

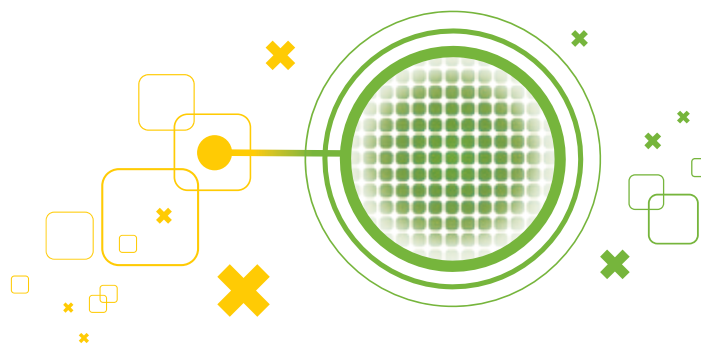
Dr. John Kennelly
Dairy Cattle Nutrition & Metabolism

Dr. Douglas Korver
Poultry Nutrition

professors



Dr. Diana Mager Clinical Nutrition	Dr. Jerry Leonard Bioresource Engineering
Dr. Vera Mazurak Nutrition & Metabolism	Dr. Changxi Li Bovine Genomics
Dr. Linda McCargar Clinical Nutrition	Dr. Tom McFadden Dairy Science
Dr. M. Anne Naeth Applied Ecology, Land Reclamation & Restoration Ecology	Dr. Lynn McMullen Food Microbiology
Dr. Masahito Oba Dairy Nutrition and Physiology	Dr. Stephen Moore Bovine Genomics
Dr. Erasmus Okine Ruminant Nutrition and Metabolism	Dr. Jocelyn Ozga Plant Physiology & Horticultural Science
Dr. Habibur Rahman Canola Breeding & Research	Dr. Lech Ozimek Dairy Processing Technology & Food Product Development
Dr. Robert Renema Value-Added Poultry Science	Dr. Spencer Proctor Metabolic and Cardiovascular Diseases
Dr. Frank Robinson Poultry Management/Physiology	Dr. Andreas Schieber Functional Foods and Nutraceuticals
Dr. Stephen Strelkov Plant Pathology	Dr. Dean Spaner Plant Breeding/Organic Agriculture
Dr. Feral Temelli Food Process Engineering	Dr. Paul Stothard Bioinformatics
Dr. Thavaratnam Vasanthan Grain Science & Technology	Dr. Donna Vine Human Nutrition
Dr. Christian Willenborg Field Crop Agronomy and Weed Science	Dr. Zhiquan Wang Beef Quantitative/Statistical Genetics
Dr. Noreen Willows Community Nutrition	Dr. Randall Weselake Agricultural Lipid Biotechnology
Dr. Wendy Wismer Sensory & Consumer Science	Dr. Jianping Wu Food Protein Chemistry
Dr. Martin Zuidhof Poultry Science, Bioeconomic Modeling	Dr. Rong-Cai Yang Statistical Genomics and Quantitative Genetics
	Dr. Ruurd Zijlstra Ingredient Evaluation & Carbohydrate Nutrition



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