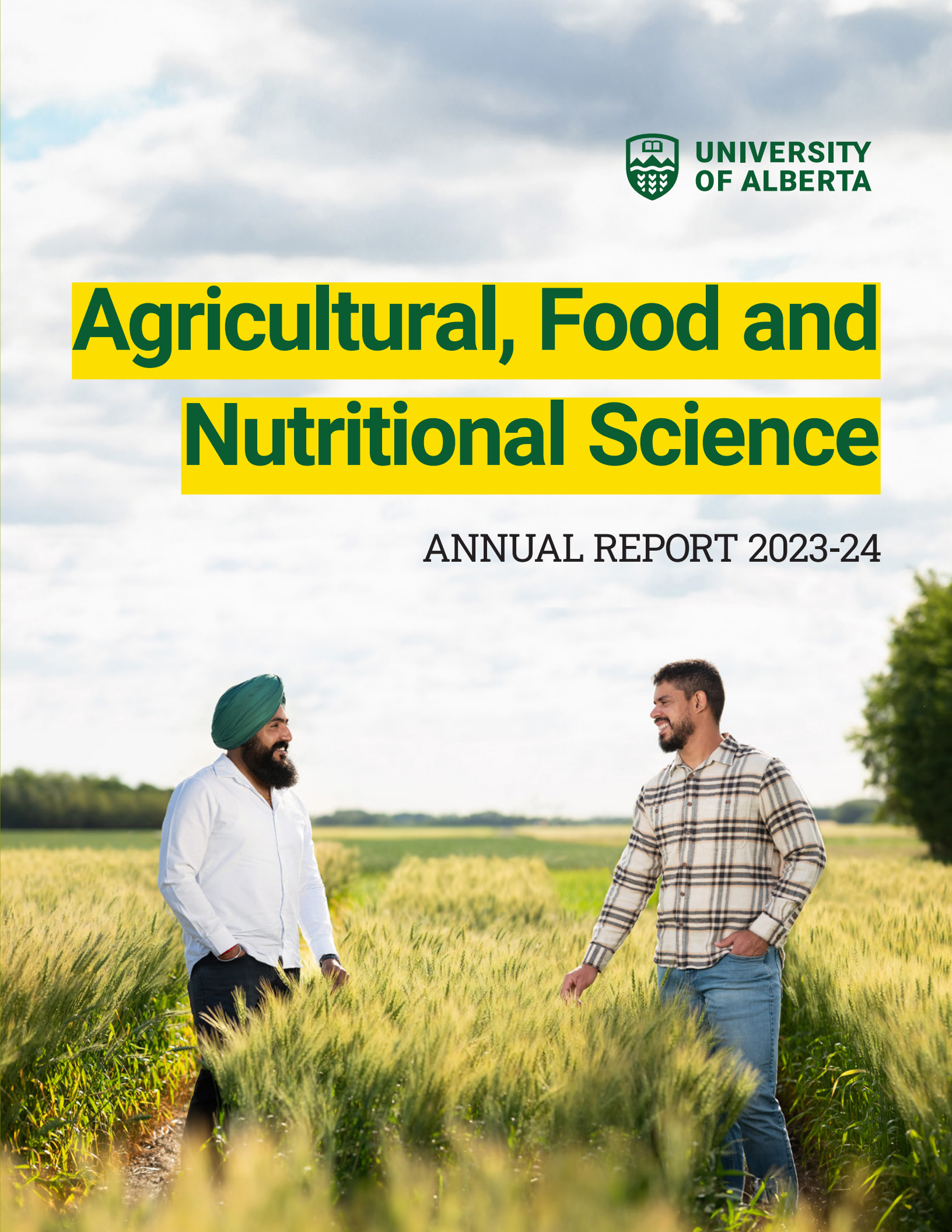
UNIVERSITY OF ALBERTA

Agricultural, Food and Nutritional Science

ANNUAL REPORT 2023-24



The University of Alberta respectfully acknowledges that we are located on Treaty 6 territory, a traditional gathering place for diverse Indigenous peoples including the Cree, Blackfoot, Métis, Nakota Sioux, Iroquois, Dene, Ojibway/Saulteaux/Anishinaabe, Inuit, and many others whose histories, languages and cultures continue to influence our vibrant community.

Pictured on the cover [L to R]: Gurcharn Brar + Erick Santos check out a wheat trial at the St. Albert Research Station. Photo: Dawn Graves

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Photo: U of A

Message from the Chair

Welcome to another Department of Agricultural, Food and Nutritional Science (AFNS) annual report!

Members of the department have accomplished so much in the past year, overcoming the constant force of change. We have touched the lives of so many students, launching them into successful careers in dietetics, nutrition, food science, animal science, crop science and animal health. Our researchers have made remarkable progress in industry-focused research that helps with animal health and dairy and poultry productivity, achieved improvements in food and water quality, made incredible strides in addressing important endocrine and immunological diseases using nutrition and cemented our leadership in crop and forage production.

You will also see in the pages of this annual report how we are changing. As the well-known faces in the department are joined by new ones, we say farewell to our colleagues who are retiring and segueing into the next phase of their careers. We take the opportunity in this publication to celebrate their achievements and the many lives that they have positively impacted and influenced as professors and instructors. We also welcome our newest faculty members and recognize the excitement surrounding their knowledge and research plans.

The many awards listed in this report are testimony to the excellence of this department and its people. It truly has been an honour to lead such an innovative department, and I have been inspired by the exceptional staff, teachers, students and researchers that have made it so successful. We owe our collective success to a we-not-me spirit and a go-the-extra mile attitude that has resulted in the accumulation of many awards, innovations and scientific publications over the year, as you will see in the pages of this annual report.

I hope that you will enjoy this retrospective of the past year because it has been a joy for me to recount these successes and see the difference that staff and students within the department make everyday. Thank you for taking the opportunity to get to know our department a little better by viewing this publication. We invite you to join us on this journey as a partner in change that betters the lives of people and their animals.

To find out more about getting involved, contact us via email: afns-chair@ualberta.ca.

Heather Bruce
Professor and Department Chair

ANIMAL SCIENCE

Photo: Getty Images

FACULTY

JUDD AIKEN | Prion Disease
BURIM AMETAJ | Ruminant Nutritional Immunology
DAN BARREDA | Immunology
URMILA BASU | Manager, Lab and Genomics and Proteomics Unit
CLOVER BENCH | Applied Ethology/ Animal Behaviour
HEATHER BRUCE | Carcass and Meat Science
MICHAEL DYCK | Reproductive Physiology/ Biotechnology
CAROLYN FITZSIMMONS | Beef Genomics
CHRISTINA OSBORNE | Director Animal Care
LELUO GUAN | Functional Genomics and Microbiology
DOUG KORVER | Poultry Nutrition
ANNE LAARMAN | NSERC Industrial Research Chair in Dairy Nutrition
CHANGXI LI | Bovine Genomics
MASAHITO OBA | Dairy Nutrition and Physiology
GRAHAM PLASTOW | Animal Genomics
GLEISE M. SILVA | Ruminant Nutrition
PAUL STOTHARD | Bioinformatics
RICHARD UWIERA | Veterinary Pathology
CRAIG WILKINSON | University Veterinarian
BENJAMIN WILLING | Canada Research Chair, Microbiology of Nutrigenomics
JAY WILLIS | Manager, Research Stations
RUURD ZIJLSTRA | Ingredient Evaluation and Carbohydrate Nutrition
MARTIN ZUIDHOF | Poultry Science/Bioeconomic Modeling

Promising probiotic for dairy cattle headed to marketplace

BY BEV BETOWSKI

A probiotic developed by immunobiologist Burim Ametaj is the first of its kind to have widespread benefits for dairy cows, and is starting to make its way into the marketplace.

Ametaj, who studies nutritional immunology in ruminant animals, says the probiotic supplies a cow's microbiome – the collection of microorganisms living inside its reproductive tract and elsewhere in its body – with beneficial bacteria.

"The presence of more good bacteria helps prevent reproductive health issues from developing," he says.

Research conducted at the U of A's Dairy Research and Technology Centre and commercial dairy farms suggests the probiotic greatly reduces the risk of reproductive issues like post-calving uterine infections and milk fever.

Under the trade name ProPreg™, the probiotic is now being marketed by a Canadian startup, Healthy Cow Corporation, as a way to help maintain a healthy reproductive microbiome in cows.

Valerie Carney. Photo: U of A

"We're also about community outreach, technology transfer and student mentoring."

Partnership with industry hatches a new beginning

BY CAITLIN CRAWSHAW

The Poultry Innovation Partnership (PIP) hatched nearly 40 years ago when the Department of AFNS partnered with the poultry industry and government to establish a much-needed provincial research centre at the U of A South Campus.

Formerly known as the Poultry Research Centre, PIP was renamed at the start of the pandemic to emphasize collaboration with its partners and convey the full scope of its work. "We are about much more than research," says PIP lead and principal investigator Valerie Carney.

The acronym is a poultry pun – "When chicks are trying to break out of an egg, they 'pip,' " she explains – and signifies a new beginning for the decades-old organization. Carney, whose research focuses on poultry genetics (particularly, broiler chickens), began working with PIP as an AFNS graduate student and, years later, worked with organizations as a government researcher. She joined the Department of AFNS as an adjunct professor in 2012 and became full-time faculty during the pandemic. Last year, she took over PIP leadership after former lead, AFNS professor Martin Zuidhof, decided to prioritize his research program on poultry systems modelling and precision feeding.

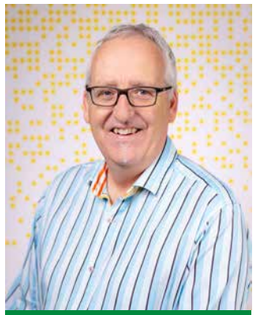
Like Carney, Zuidhof worked with PIP from the government side before coming to the U of A in 2008 and becoming PIP lead in 2011. And like his successor, he was trained at PIP as a graduate student working in the lab of professor Frank Robinson, who was a “driving force” in the creation of the organization.

“One of the things we do here is train leaders for tomorrow,” says Zuidhof, who now serves as PIP’s academic lead.

Since its early days, PIP has supported research of benefit to poultry producers, food processors and manufacturers, and the functional food and nutraceutical industries. Current research areas include nutrition and health management (including precision feeding and gut health), environmental sustainability, behaviour and welfare, byproduct utilization, and poultry breeding.

In addition to supporting graduate students, PIP provides hands-on experience for undergraduate students through the Poultry Passport Program, which Carney spearheaded. The organization also provides community outreach in a number of ways, including its flock of heritage chickens – a “living museum of historical lines,” she says – through which members of the public can sponsor hens in exchange for fresh eggs.

“There are all sorts of cool opportunities that wouldn’t happen if it weren’t for the vision of the people at PIP,” says Carney.



Martin Zuidhof. Photo: U of A

“Valerie and I are the leaders of today, who were trained by leaders of yesterday to one day take on leadership roles.”

Student volunteers assist with chicks at a feed station in the Poultry Research Centre. Photo: Dawn Graves

DNA technology helps breed cattle to benefit earth and beef industry

BY ANNA SCHMIDT

At Livestock Gentec, researchers begin each project the same way – with a road trip. They head out of the city, gathering at farm gates and kitchen tables to ask Canadian livestock producers one question: “What keeps you up at night?”

“Then we look for answers. And if there aren’t answers, we ask, ‘Is there an opportunity to research and develop new solutions?’ ” says Graham Plastow, a Gentec researcher and professor emeritus in the AFNS department.

Gentec is an ASTech-award-winning Alberta Innovates centre based at the U of A that builds bridges between academia and industry. Founded in 2010 as a partnership between the university and Agriculture and Agri-Food Canada, Gentec applies researchers’ expertise in genomics to help producers “see under the hide” of their animals and breed for desired genes that increase profitability and sustainability.

Now, thanks to Alberta-based Results Driven Agriculture Research (RDAR), Gentec is tackling one of Canadian beef producers’ most insomnia-inducing obstacles: paying for DNA testing to improve the breeding efficiency of their herds. In June, RDAR, through the Sustainable Canadian Agricultural Partnership, a program which is funded by the governments of Alberta and Canada, delivered $2.2 million to Gentec for a project to cover 50 per cent of the cost for producers who sign up for genotyping.

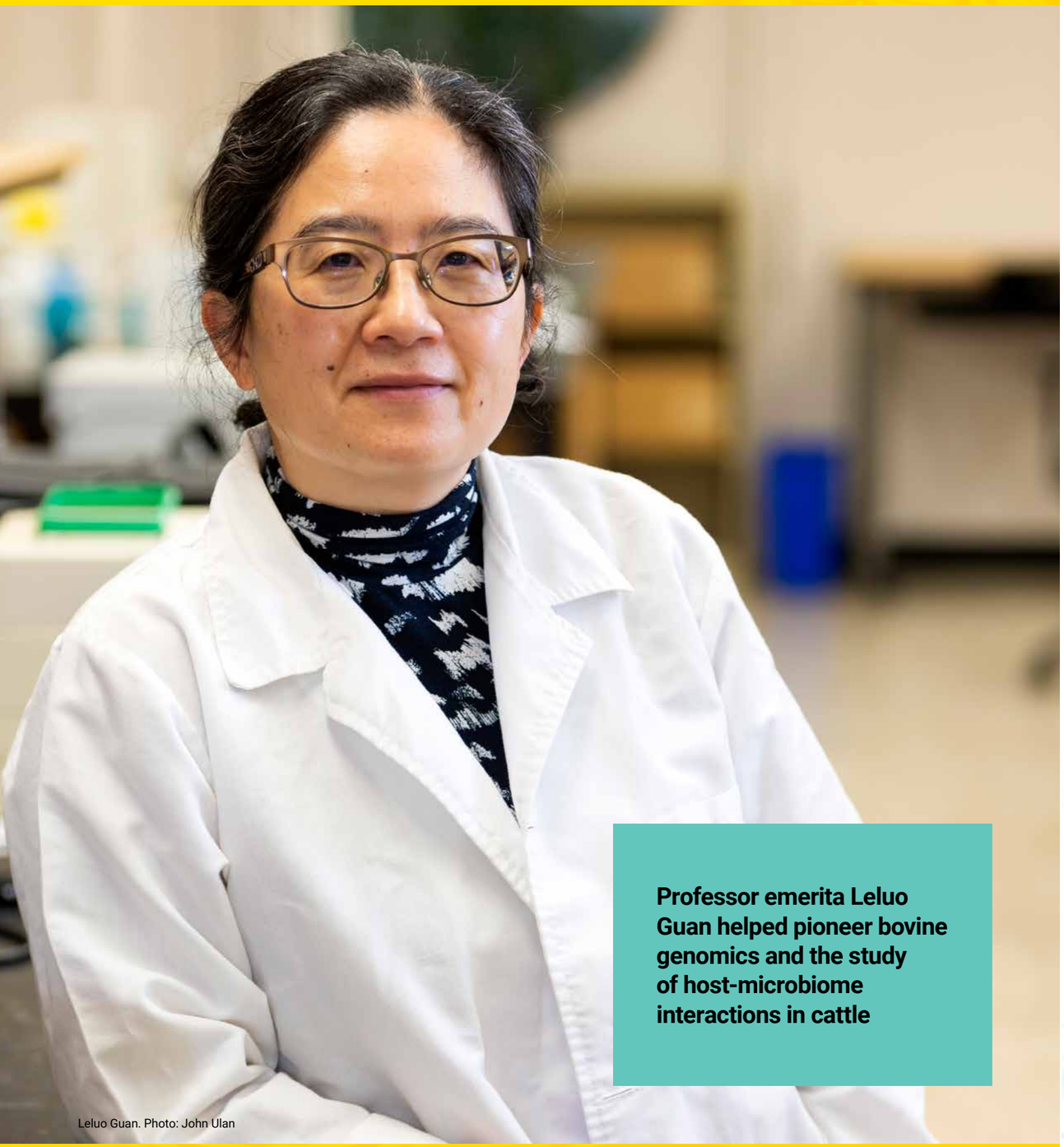
“Through the incentivized process, we can demonstrate that these genomic tools add a lot of value for the producer and the beef industry,” says John Basarab, Gentec CEO and principal investigator on the project.

Over the next four years, Gentec will test the DNA of 40,000 cattle and provide producers with clear reports that rank the animals on desirable traits such as fertility, lifetime productivity, feed efficiency and carcass quality. This will allow producers to breed cattle that eat less and produce less methane, reducing greenhouse gas emissions while maximizing profits and sustainability.

“Sustainability means that producers can exist over the long term, producing protein for Canada and the world, and doing it efficiently,” says Basarab. “Food security is a growing and serious issue. People are paying more than they can afford. … If you use genetic selection properly, you’re able to produce more with less.”

Producers will report their results to Gentec, allowing researchers to improve the accuracy of their genomic tools to support the beef industry into the future.

“Because of our collaborations, because of the trust, because of our reputation around the world, we’re able to work with the very best people,” says Plastow. “Industry feels a part of it. They own the research. They own the solution.”



Professor emerita Leluo Guan helped pioneer bovine genomics and the study of host-microbiome interactions in cattle

Leluo Guan. Photo: John Ulan

Unconventional career path leads to groundbreaking research in bovine health

BY CAITLIN CRAWSHAW

Professor emerita Leluo Guan is an internationally respected researcher in bovine genomics and microbiomics, but she didn't set out to work in animal research.

In fact, Guan's academic career took a rather serpentine path, crossing multiple disciplines and continents. After studying microbiology as an undergraduate student in China, she headed to Japan to earn graduate degrees in pharmaceutical science, with a focus on biochemistry. "My PhD looked at how cancer drugs affect cell biology and cell biochemistry," she says. From there, she pivoted to private industry, studying marine bacteria for the Japanese marine biotechnology industry.

When she and her husband decided to move to Canada in 2001, Guan made another career shift. Her experience working with bacteria landed her a position as a research assistant for a poultry researcher in the Department of AFNS. There, she established a method of studying lactobacilli bacteria in broiler chickens.

Guan pivoted to bovine health in 2004 when AFNS professor Stephen Moore asked her to lead a Genome Canada-funded project to sequence a portion of the bovine genome. At first, she hesitated as genome sequencing – which maps all of the genes in an organism's DNA – was in its early days. "Today, gene sequencing is easy, but back then, it was very difficult," she says. "But because I had training in molecular biology and biochemistry, I decided to give it a try."

It was a groundbreaking project that helped Guan secure an academic appointment at the department two years later. By that time, the bovine genome project had wrapped up and Guan had begun working with Moore on research exploring how microbiome impacts feed efficiency in cattle.

"At the time, no one believed it had an effect," she says. In fact, after finishing her first paper on the subject, she encountered so much skepticism from peer reviewers that she wondered if the paper would ultimately get published.

But Guan persevered, confident that she had stumbled across an important new area of research. From the start of her career, she had sought a niche area that would allow her to leverage her interdisciplinary education and research experience.

Over time, Guan established herself as a leader in this area, particularly in the realm of host-biome interactions. "The microbes living inside an animal's body impact aspects of health, like immunity, but it isn't a one-way interaction," she explains. Just as the microbiome can support or hinder immunity, an animal's immune system can support or hinder the microbes within its microbiome.

During her career at the U of A, Guan received more than $25 million in funding and produced more than 300 papers. She also earned numerous awards for her pioneering research, including a Canadian Society of Animal Science Fellowship, Global Research Alliance Senior Scientist Award, American Dairy Science Association Zoetis Physiology Award, and Killam Professorship.

On top of this, Guan mentored and trained 141 graduate students and other highly qualified personnel (HQP), and held leadership roles within the department and faculty.

Now a professor emeritus, Guan continues to supervise several PhD students and conduct research at the U of A. Last year, she accepted a new academic appointment at the University of British Columbia and now holds a Canada Research Chair in Functional Genomics and Animal Microbiome.

Guan attributes much of her ongoing success to the unconventional path she took to bovine health research.

"Coming from a non-animal science background, I've always seen things a bit differently," she says. "It's given me an advantage, in some ways, because I look at things from a different angle.

FOOD SCIENCE AND BIORESOURCE TECHNOLOGY

FACULTY

MARLENY ARANDA-SALDAÑA | Bio/Food Engineering Processing

DAVID BRESSLER | Fermentation and Bio/Food Engineering

HEATHER BRUCE | Carcass and Meat Science

LINGYUN CHEN | Canada Research Chair, Plant Protein Chemistry and Technology

JONATHAN CURTIS | Lipids and Analytical Chemistry

MICHAEL GÄNZLE | Canada Research Chair, Microbiology and Probiotics

ROOPESH MOHANDAS SYAMALADEVI | Food Safety and Engineering

FERAL TEMELLI | Food Process Engineering

AMAN ULLAH | Utilization of Lipids and Polymer/Material Chemistry

THAVA VASANTHAN | Grain Science and Technology

WENDY WISMER | Sensory and Consumer Science

JIANPING WU | Food Protein Chemistry

Turning chicken feathers into water filters

BY BEV BETOWSKI

Chicken feathers are a throwaway byproduct of the poultry industry, but new research suggests they may hold the key to low-cost, sustainable water filters.

Muhammad Zubair, a postdoctoral fellow in AFNS, has found a way to improve how keratin in chicken feathers adsorbs, or sticks to, heavy metals found in surface, well or dugout water.

“Access to clean drinking water is a key to building a healthy and sustainable society, yet many countries, like in South Asia, have groundwater that is contaminated with heavy metals,” says Zubair, who conducted the research to earn a PhD in bioresource technology.

By adding two chemical agents – graphene oxide and nanochitosan – he discovered that the feathers can remove 99 per cent of eight heavy metals from contaminated water. Not only could the technology help industry (especially oil and gas) process wastewater here in Alberta, it could offer a cost-effective solution to the global problem of contaminated drinking water.

Researchers Muhammad Zubair (left) and Aman Ullah hold samples of the wastewater-filtering materials they developed from chicken feathers. Photo: Supplied

Boosting the protein content of faba beans

BY BEV BETOWSKI

Faba beans pack a high-protein punch, making them rich with promise as an alternative to meat and dairy sources. But the legume also has less desirable qualities, like compounds that cause flatulence and interfere with the body's nutrient absorption.

Research conducted in AFNS may have improved upon standard processes of extracting protein, starch and dietary fibre from the bean.

Brasathe Jeganathan, who conducted the work to earn a PhD in food science and technology, devised chemical-free extraction methods called dry and wet fractionation. Compared with conventional processes, her methods use less energy and water, and produce higher-quality protein – up to 94 per cent pure.

Jeganathan's research could make faba beans a viable, secure protein source for a growing global population.

Brasathe Jeganathan. Photo: Supplied

"By 2050 we are expected to feed 9.7 billion people, with demand expected to double for animal-based protein, but we can't completely rely on that as a sustainable source in the long run," she says. "Alternative plant sources such as faba beans have lower environmental footprints and can, at the same time, provide adequate protein."

The sky's the lipid

BY CAITLIN CRAWSHAW

Lipid-focused research by a professor emeritus spanned food science, bio-based industrial products, and human health

Before joining the AFNS Department in 2007 and later forming the Lipid Chemistry Group (LCG), Jonathan Curtis had a career that included both time working in industry and time at the National Research Council.

In industrial research, Curtis worked in the marine biosciences sector and led the development of food-grade oils, microencapsulated oils, and the development of new methods in lipid analysis. But as much as he liked the work, Curtis knew that joining AFNS to pursue further research in lipid science at the U of A presented a golden opportunity.

"The great thing about moving to academia was the opportunity to direct my research group into areas that I chose to pursue – within the realms of what could get funded," he says. Driven by intellectual curiosity, Curtis expanded the scope of his lipid research to include the development of bio-based materials and chemicals, food science, and analytical chemistry, with applications ranging from food and agriculture to industry and medical science.

One of Curtis's areas of focus was the development of bio-based polyols – chemicals used to make polyurethane, an ingredient in many building materials – from seed crops like canola, flax, and camelina. He and his team created a canola-based polyol that was used to create an environmentally friendly sprayfoam insulation called BioFoam™. Curtis collaborated with several Canadian companies to bring the product to market but eventually high production costs made it unfeasible. Another company has been formed to make one of the LCG patented polyols for use in applications such as adhesives, foams and cosmetics, although they have yet to get the product to market, he says.

But for Curtis, commercialization isn't the benchmark of success. "Even if those particular technologies don't get commercialized, we published papers and exchanged ideas, and a lot of people were trained in the process," he says. "So, I think there's a lot of collective knowledge from what we did."

By the time he retired last year, Curtis had published 183 peer-reviewed journal articles and 7 book chapters, and secured six patents. Even so, he has enjoyed mentoring and teaching more than anything else. "My career success depended on the wonderful people I worked with," Curtis says. "One of the greatest joys has been seeing those people develop."

Jonathan Curtis. Photo: Supplied

"It was the opportunity of a lifetime," he says. "Honestly, I had so much fun."

Researchers serve up a guide to help kick-start new fermented foods

BY BEV BETOWSKI

Fermentation isn't just for beer or sourdough bread anymore.

Michael Gänzle. Photo: Dawn Graves

"It will help these companies, large and small, keep a competitive edge."

A team of international researchers led by food microbiologist Michael Gänzle developed a framework that pulls together criteria for food scientists, helping food manufacturers best choose new bacterial cultures for fermenting new plant-based products.

Produced through beneficial activity of microbes like bacteria, moulds and yeasts, fermentation is growing in popularity and gaining recognition for its potential benefits, says Gänzle, including tackling the issue of food security.

Overall, the framework provides a broader perspective of microbes to select from that can help the food industry keep pace with consumer demand, and ultimately help feed a growing demand for a wider range of alternative fermented foods.

"Fermented foods offer a promising solution for their potential ability to benefit human health, and to leave a smaller environmental footprint than animal-based food production."

Rami Althnaibat conducts food science research in a lab in the Agri-Food Discovery Place. Photo: Dawn Graves

Serendipity led professor emerita to a successful career in food process engineering

BY CAITLIN CRAWSHAW

Before retiring earlier this year, Feral Temelli devoted more than 35 years to advancing the science of value-added food processing, but she didn't start out with the intention of becoming a food scientist.

Feral Temelli. Photo: Supplied

"I was one of the top students in my class and my professors encouraged me to continue on to graduate school," she says. As luck would have it, her university had recently expanded into food engineering, which piqued her interest and led her to specialize in this area.

As an undergraduate student in Türkiye, Temelli studied chemical engineering and considered a career in industry until former classmates shared their experiences in the field. Thankfully, she had other options.

Temelli says her master's program allowed her to discover a fascination with both food process engineering and academic research. Once again, she decided to continue her education, leaving Türkiye for the US to earn a doctorate in food science at the University of Florida.

As a PhD student, Temelli began exploring how supercritical carbon dioxide (SC-CO2) – that is, CO2 at temperature and pressure conditions above its critical point with properties in between those of a gas and a liquid – could replace petroleum-based solvents in food extraction processes, such as separation of orange peel oil components.

She continued to explore this technology when she joined the U of A's Department of Foods and Nutrition in 1988, which later became the Department of AFNS. Temelli's research program centred on the value-added processing of agricultural crops generally, but especially separation and conversion technologies (like grain fractionation and SC-CO2) in processing Alberta-grown grains such as barley, oats, wheat and faba beans.

One of the applications of the grain fractionation technology is the recovery of high-value components from grains, such as beta-glucan (a form of soluble fibre) from barley. Because beta-glucan has been shown to have a number of health benefits (like lowering cholesterol) it can be added to food products and dietary supplements. In 2014, one of Temelli's SC-CO2 technologies, focusing on the drying of water-soluble biopolymers like beta-glucan was licensed to the biopharmaceutical company Ceapro Inc.

Temelli has been as devoted to mentorship as research. In the course of her career, she has supported 121 trainees, including 19 master's and 25 PhD students, and earned awards for her efforts, including the Killam Award for Excellence in Mentoring (2020), the Graduate Student Association's (GSA) Graduate Student Supervisor Award (2019), and AFNS Graduate Student Mentor Award (2018).

Her dedication to teaching has also earned her accolades, including the AFNS Teacher of the Year Award on nine different occasions.

More than anything else, Temelli has enjoyed discussing new ideas with the next generation of researchers and supporting them on their journeys. It's also what she's most proud of.

"At the end of the day, their success is my pride and joy," she says.

Jean Buteau. Photo: John Ulan

HUMAN NUTRITION

FACULTY

HEIDI BATES | Director, Integrated Dietetic Internship

JEAN BUTEAU | Human Nutrition

CATHY CHAN | Human Nutrition

ANNA FARMER | Community Nutrition

CATHERINE FIELD | Canada Research Chair, Nutrition and Metabolism

RENÉ JACOBS | Human Nutrition

DIANA MAGER | Clinical Nutrition

VERA MAZURAK | Nutrition and Metabolism

CARLA PRADO | Canada Research Chair in Integrative Nutrition, Body Composition, and Energy Metabolism

SPENCER PROCTOR | Metabolic and Cardiovascular Diseases

CAROLINE RICHARD | Canada Research Chair, Nutritional Immunology

SABINA VALENTINE | Assistant Lecturer in Human Nutrition

DONNA VINE | Human Nutrition

BENJAMIN WILLING | Canada Research Chair, Microbiology of Nutrigenomics

NOREEN WILLOWS | Community Nutrition

Could a pill cure diabetes?

BY BEV BETOWSKI

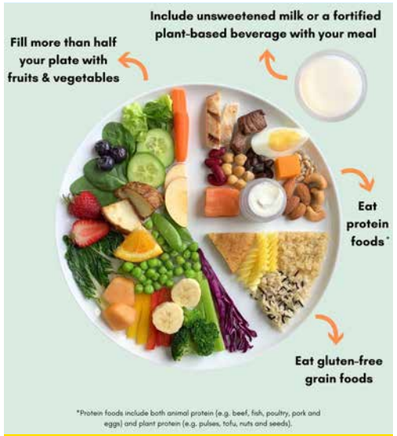
The discovery of a gene in crucial insulin-producing cells is a step toward creating a set of drugs that could effectively cure diabetes.

The research, if proven effective in human clinical trials, could be “one of the most significant discoveries in the field of diabetes,” says lead researcher Jean Buteau, a professor of human nutrition and member of the U of A Alberta Diabetes Institute.

The team’s work characterized the Lyn kinase gene and the molecule that targets it. The gene regulates beta cells, insulin-producing cells located in the pancreas. If beta cells fail, blood glucose levels rise, causing diabetes.

Triggering the gene through a pill containing the molecule could protect surviving beta cells and even regenerate those destroyed by the immune system, Buteau explains.

“It would pave the way for a new class of medications for diabetes treatment, especially in Type 1 diabetes, where options are extremely limited. Our hope is that it could lead to better glucose control, less insulin use, and ideally, diabetes remission.”



An excerpt from the Gluten-Free Food Guide for Children & Youth. Photo: © 2023 Diana Mager and CONQUER Research team, Pro00133076

"We wanted to develop a comprehensive resource for families on how to start building a gluten-free diet, to take off some of the burden of worrying about whether their child is eating healthy."

Gluten-free food guide puts good nutrition on the plate for kids

BY BEV BETOWSKI

Nutrition researcher and registered dietitian Diana Mager, pediatrics professor Justine Turner and their Conquer Studies colleagues created a gluten-free food guide specifically for children and youths with celiac disease to help parents meet their children's nutritional needs.

A disorder that causes the body to overreact to gluten in food such as barley, rye and wheat, celiac disease damages the lining of the intestines, preventing proper absorption of nutrients crucial to good health.

The 40-page document, available for free online, offers recipes – including vegetarian, vegan and lactose-intolerant options – and tips on grocery shopping, eating on a budget and healthy school lunches and snacks.

It's a science-based alternative to online searches that often result in myths for nutrition information, Mager notes.

Making strides to improve women's health

On International Women's Day, professor and researcher Donna Vine was recognized by the Royal Alexandra Hospital Foundation for her dedication to women's health, particularly the study of Polycystic Ovary Syndrome (PCOS). It's the most common hormonal disorder among women and adolescents of reproductive age, and it leads to other health risks and negative long-term health outcomes. For example, her research program, PCOS Together, found that women with PCOS in Alberta are at 2 and 3 times higher risk for developing diabetes and cardiovascular disease. The research team investigates interventions like nutrition and lifestyle changes to better understand the disorder and improve the health of women facing it. Their work is funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Learn more by watching her feature on YouTube titled, "What is researcher Dr. Donna Vine doing to change healthcare for women?"

Anissa Armet and Carla Prado (L to R) demonstrate the use of a Airdisplacement Plethysmography (BodPod) in the Human Nutrition Research Unit. Photo: John Ulan

PLANT BIOSYSTEMS

Professor Habibur Rahman (left) and research associate Berisso Kebede Demo are working to improve the genetic diversity of hybrid canola. Photo: Bev Betkowski

FACULTY

EDWARD BORK | Mattheis Chair in Rangeland Ecology and Management

GURCHARN SINGH BRAR | Wheat Breeding, Cereal Genetics & Genomics

CAMERON CARLYLE | Rangeland Ecology

GUANQUN (GAVIN) CHEN | Canada Research Chair, Plant Lipid Biotechnology

LINDA GORIM | Western Grains Research Foundation Chair in Cropping Systems

SHEAU-FANG HWANG | Canola Breeding and Research

NAT KAV | Biochemistry and Biotechnology

BOYD MORI | NSERC Industrial Research Chair in Agricultural Entomology

JOCELYN OZGA | Plant Physiology and Horticultural Science

HABIBUR RAHMAN | Canola Breeding and Research

MALINDA THILAKARATHNA | Plant-Microbial Interactions

ERICK SANTOS | Agronomy, Forages and Grasslands

STEPHEN STRELKOV | Plant Pathology

New canola research aims to boost yield, profitability

BY BEV BETOWSKI

By sifting through the genes of broccoli, cauliflower, cabbage and kale, plant scientist Habibur Rahman and his team plan to pinpoint the best ones for breeding new lines of canola to produce hybrid cultivars with higher seed yield.

“This work is taking us to the next level of improved genetic diversity that will make hybrid canola stronger,” says Rahman.

Working with Bayer Crop Science, a research and funding partner on the new project, Rahman and his team will develop new canola lines to create hundreds of hybrids. They’ll then test them all in field trials across the prairie provinces for seed yield, as well as other traits such as days to flowering and maturity, disease resistance and oil content.

“It takes many years to develop superior hybrid canola cultivars, but the genetic research we are doing is important to maintaining the profitability of this crop at the farm level.”

Crop trials like this one led by Linda Gorim's research team contribute to sustainable agriculture and food security. Photo: Supplied.

Erick Santos (top) and Gurcharn Singh Brar. Photos: Dawn Graves

Budding Talent

BY CAITLIN CRAWSHAW

Department welcomes new faculty members Erick Santos and Gurcharn Singh Brar

Like the cycles of nature, the Department of Agricultural, Food, and Nutritional Science (AFNS) has both said goodbye to long-time faculty members and welcomed new talent over the last year.

Erick Santos, who hails from Brazil, joined the department as an assistant professor last September. With a PhD in agronomy from the University of Florida, Santos specializes in forage crops (those used for livestock grazing) and sustainable grazing management practices, particularly rotational grazing and crop-livestock systems as a way to improve nutrient cycling and soil health.

Santos arrived at the U of A in 2022 for a postdoctoral fellowship, working with AFNS professor Edward Bork, who specializes in rangeland ecology and management. Some of Bork's research takes place at the Breton Plots, a long-term agroecological experiment established 95 years ago near Breton, AB, which is one of the longest running agricultural soil experiments in North America.

"I came here specifically to work with the long-term data from the plots, especially looking at soil carbon data from the Breton plots, focusing on soil carbon at the sites and the benefits of adding forages to crop and the benefits of incorporating forages into crop rotations," he says.

Santos' current research focuses on evaluating the benefits of incorporating perennial forages into cropping systems; tracking on-farm changes in soil carbon and greenhouse gas emissions after introducing new legume species into pastures or implementing rotational grazing; and investigating how species diversity and functional groups in cover crops (annual forages) affect forage and soil responses.

For the forage agronomist, the U of A is an ideal place to work as Alberta boasts a strong beef and forage industry, and is home to the Breton Plots and the Kinsella and Mattheis Research Ranches. "It's an opportunity to grow in my career and make significant contributions to the industry and scientific community," he says.

Newcomer Gurcharn Singh Brar first set foot on the U of A campus in 2013 while visiting a friend doing their PhD.

Like Santos, Brar crossed the globe before joining AFNS. Brar is originally from the Punjab region of India, which grows much of the country's wheat. As an undergraduate student at Punjab Agricultural University, Brar became determined to combat wheat diseases and breed new wheat varieties. He ventured to Canada for graduate studies at the University of Saskatchewan where he did his MSc and PhD, completing a dissertation on breeding wheat for disease resistance. After finishing PhD in 2019, Brar joined the University of British Columbia, Vancouver in January 2020 as an assistant professor of plant science.

At UBC, Brar started a cereal genetics and pre-breeding program. Now at the U of A, Brar remains passionate about wheat breeding and genetics. At AFNS, he leads the wheat breeding program and most of his research is focused on developing high-yielding, premium-quality, disease-resistant wheat varieties. In addition to wheat breeding, Brar is internationally recognized for his work in cereal genetics and genomics.

While serious about his work, Brar maintains a good sense of humour: "I can't wait to name my wheat varieties. I have so many names in mind."

The ALES Mini-Internship Program (AMIP) sets students up to get first-hand learning experience on careers in agriculture, life and environmental sciences. Nearly 1,000 students have participated in this program since Frank Robinson started it in 2016. Offered twice a year during reading-week breaks, students spend time practicing, touring or shadowing workers at locations in and around Edmonton and across the province. They can use the opportunity to get experience in their dream career or try out an industry they haven't considered yet. These internships are often memorable, and can be life-changing.

STUDENTS GET HANDS-ON

BY SHELBY MACLEOD

As part of the ALES Mini-Internship Program, Animal Science undergraduate student Savannah shadowed the owner of the West Gimlet Yak Farm. Photo: University of Alberta.

Experiential learning challenges students to apply what they learn in simulated or real scenarios, allowing students to practice their skills, gain experience and prepare for their future careers. It's sought-after by students, who can select from a variety of programs to accommodate diverse interests, availability or course requirements. This form of learning is so beneficial that degree programs integrate them as curricular requirements, such as internships in the dietetics specialization that take place in hospital clinics, community centers and rural and Indigenous communities. Many alumni credit these learning opportunities well into their successful careers and even open their workplaces for students.

AFNS students stand out in competitions

Many disciplinary or industry associations welcome student participation in case competitions, where AFNS students shine against competitors from other institutions. Congratulations to two of many winning student teams:

- AFNS students took home first place at the 2023 Cereals & Grains Association Student Product Development Competition in Schaumburg, Illinois! Maria Robles Hernandez, Anna Widenmann, Zheng Zhao and Megane Beausejour participated as Team MAMZ'11s and beat out nine teams from around the world. Their winning idea was Ceres Sourdough Waffles, a frozen sourdough waffle made of buckwheat and up-cycled spent grain from a distillery.
- At the 77th Society for Range Management Annual Meeting in Sparks, Nevada, the 2024 U of A Range Team excelled with their plant taxonomy skills and rangeland ecology knowledge against competitors from across USA, Mexico and Canada. Sarah Johnson, Damon Bectell, Jordan Perron and Katy Sopotyk collectively won second place in the Undergraduate Range Management Exam and third place in the Plant Identification Exam, with individual awards for high scores going to Damon Bectell and Jordan Perron.

When asked to pick one of her favourite U of A memories, BSc Animal Science graduate Sierra Sayles picked the Dairy Challenge – a North American competition that invites students to make recommendations to improve a dairy operation with feedback from experienced judges. Each year, student participants prove their knowledge, meet industry experts and earn course credits as part of this event.

"I learned so much about dairy management best practices and the overall industry, gained invaluable consulting experience, improved my public speaking skills and made friends that I am so grateful for." — Sierra Sayles '24 BSc(AS)

APRIL 2023 - MARCH 2024

Awards

Faculty + Staff Awards

AFNS Graduate Student Mentor Award:
Marleny Aranda Saldana

Agriculture Club Teacher of the Year:
Boyd Mori

ALES Research and Innovation Award:
Boyd Mori

ALES Teacher of the Year:
Dan Barreda, Clover Bench, Michael Dyck, Boyd Mori, Paul Stothard, Stephen Strelkov, Malinda Thilakarathna, Thava Vasanthan, Wendy Wismer, Ruurd Zijlstra, Martin Zuidhof

ALES Tyrchniewicz Innovative Teaching Award:
Malinda Thilakarathna

American Feed Industry Association Poultry Nutrition Research Award:
Martin Zuidhof

C.D. Nelson Award in Plant Biology:
Gavin Chen

Canadian Academy of Health Sciences Fellows:
Carla Prado

Early-Career Agronomist Award by the Canadian Society of Agronomy (2023):
Gurcharn Singh Brar

ESC C. Gordon Hewitt Award:
Boyd Mori

Faculty Mobility for Partnership Building Program Scholarship:
Roopesh Syamaladevi

Fullbright Scholar Fellowship:
Gavin Chen

Highly Cited Researcher by Clarivate:
Michael Gaenzle, Carla Prado

IAFP Honorary Life Member:
Lynn McMullen

IHDCYH Talks Video (2nd):
Spencer Proctor

Institute of Food Technologists Fellows:
Jianping Wu

Killam Annual Professorship Award:
Marleny Aranda Saldana

Outstanding Associate Editor for the Canadian Journal of Plant Science (2023):
Malinda Thilakarathna

Outstanding Reviewer for the Canadian Journal of Plant Science (2023):
Linda Gorim

Outstanding Young Scientist Award by the Canadian Phytopathological Society (2023):
Gurcharn Singh Brar

Royal Society of Canada (Class of 2023):
Michael Gaenzle

UofA International Women's Day (PCOS Research):
Donna Vine

UofA Retirement Recognition:
Rhonda Bell, Walter Dixon, Leluo Guan, Graham Plastow, Feral Temelli

UofA Years of Service Award:
Sharon Sokolik (25), Feral Temelli (35)

Graduate Student Awards

3MT (UofA):
Zak Kaal (1st)

3MT People's Choice Award (French version):
Megane Beausejour

ADI Graduate Studentship Award:
Niusha Taheri

ADI Research Day - Oral (1st):
Tianna Rusnak

ADI Studentship Award:
Gala Araujo

AFNS Graduate Student Teaching Award:
MSc - Aaron Brinkman;
PhD - Jo Ann Chew,
Emanuele Goes, Emilee Storfie

AFNS Outstanding Thesis Research Award MSc:
Mashaer Matouri, Kallum McDonald; PhD:
Natalie Diether, Brasathe Jeganathan,
Kelly Picard

Alberta Barley Scholarship:
Lingjun Zhu

Alberta Diabetes Institute Trainee Travel Award:
Jenneffer Rayane Braga Tibaes

Alberta Graduate Excellence Scholarship:
Jenneffer Rayane Braga Tibaes, Jo Ann Chew, Jaqueline De Lima Munhoz, Claire Douglas, Madeline Lehmann, Srujana Mekala, Muhammed Salah Uddin, Valentine Udeh, Hailey Van Allen, Emad Yuzbashia

Alberta Graduate Excellence Scholarship Indigenous:
Alexis Blanchette-Arnold

Alberta Mycological Society Award:
Dilini Adihetty

Alberta Soil Science Workshop:
Oral - Michele Tran (1st), Chathuranga De Silva (3rd); Poster - Keshav Bhattarai (2nd), Tianyi Zhao (3rd); Travel Award - Keshav Bhattarai, Michele Tran

Alberta Wheat Commission Graduate Research Scholarship in Crop Science:
Keshav Bhattarai

ALES Graduate Research Symposium 2023:
Oral - Ananya Sarkar (1st), Carina Lopez (2nd); Poster – Peter Isesele (1st), Tianyi Zhao (3rd)

ALES Graduate Research Symposium 2024:
Oral - Sarah Parsons (1st), Poster - Yuanyuan Lou (People's Choice), Caroline Wade (3rd)

Ali Navabi Canadian Society of Agronomy Travel Award:
Natalie LaForest

AltaLink Master's Scholarship in Rangeland Disturbance Ecology:
Michele Tran

American Society for Nutrition - Emerging Leaders in Nutrition Science:
Poster - Jenneffer Rayane Braga Tibaes (1st)

Anthony Fellowship in Human Nutrition:
Peter Isesele

Aviagen Graduate Scholarship:
Jo Ann Chew

Bern & Donna Kotelko Travel Award in Bioresource Excellence:
Zak Kaal

Canada Graduate Scholarship - MSc (NSERC):
Megane Beausejour, Haley Wolgien

Canadian Nutrition Society-Trainee Award:
Poster – Ren Wang (3rd)

Canadian Poultry Research Council Scholarship Award:
Camila Rodrigues de Freitas

Canadian Society of Microbiologists Travel Award:
Anna Widenmann

Canadian Society of Agronomy: Poster -
Fernando Guerrero-Zurita (2nd)

Canadian Wheat Symposium Travel Award:
Kristen Guelly

CBHEPA Broiler Breeder Research Grant:
Camila Rodrigues de Freitas

Cereals and Grains Association Product Development Competition: Team - 1st place - Megane Beausejour, Maria Robles Hernandez, Anna Widenmann, Zheng, Zhao

Copeland Graduate Travel Award in Poultry Research:
Jo Ann Chew,
Camila Rodrigues de Freitas

Dr Catherine Field Graduate Scholarship in Agricultural, Life and Environmental Sciences:
Anissa Armet

Dr Elizabeth A Donald MSc Fellowship in Human Nutrition:
Stanley Woo

Dr Michael E. Stiles Graduate Scholarship in Applied Microbiology:
Anissa Armet

Dr Nick Hussar Graduate Scholarship in Animal Science or Human Nutrition:
Ana Paula Pagano

Elizabeth Russell MacEachran Scholarship:
Anissa Armet, Amber Hager

FGPS Graduate Student Engagement Scholarship:
Dagem Haddis

Flight 302 Legacy Award:
Zak Kaal

Frank Aherne Graduate Scholarship in Swine Research:
Lingjun Zhu

Graduate Student Engagement Scholarship:
Jedida Chirchir, Rubiel Merino Restrepo, Etseoghena Obi

GSA Graduate Student Research Assistant Award:
Emad Yuzbashi

GSA Graduate Student Service Award:
Pauline Chan

GSA Graduate Student Teaching Assistant Award:
Emanuele Goes

Harry J Hargrave Memorial Graduate Scholarship in Animal Science:
Amir Behrouzi, Matheus Paez Martins Narciso

Henry Kroeger Memorial Graduate Scholarship:
Caroline Wade

IFT-EFFoST International Nonthermal Processing Workshop - Travel & Poster Award -
Miguel Franco Londono (3rd)

Izaak Walton Killam Memorial Scholarship:
Matthew Oryschak, Ana Paula Pagano

J Macgregor Smith Graduate Scholarship:
Kiran Khurshid, Peineng Zhu

MacAllister Scholarship in Agriculture:
Jo Ann Chew

Margaret (Peg) Brown Award in Environmental Studies and Wildlife Resources:
Anabel Dombro

Poultry Science Association Travel Award:
Emily DePaoli

Poultry Service Industry Workshop Award:
Oral - Etseoghena Obi (1st)

Professor JB McQuitty Graduate Scholarship:
Bernardo Araujo Souto

Robert Simonet Graduate Scholarship:
MSc - Madeline Lehmann;
PhD - Xiaoyu Wang

Robert Simonet Travel Award:
MSc – Danna Rotariu

Rogers Sugar Graduate Scholarship:
Udaya Subedi

Ron Spence Graduate Award in AI4 Society:
Anissa Armet

Ruminant Animal Digestive and Metabolism Graduate Scholarship:
Sang Weon Na

Shirley E Redmond Graduate Scholarship in Human Nutrition:
Hailey Van Allen

SM Blair Scholarship:
Kaniskha Senevirathna

UofA Graduate Recruitment Scholarship:
Dolapo Adepoju, Sonja Allen, Alexis Blanchette-Arnold, Dauren Kaliaskar, Niusha Taheri, Prithviraj V, Caroline Wade, Navoda Wadumesthrige, Megan (Yiqi) Wang

UofA Graduate Student Teaching Award:
Anissa Armet, Bingxin Hai, Camila Marcolla

Walter H Johns Graduate Fellowship:
Megane Beausejour, Haley Wolgien

WCHRI Graduate Studentship Award:
Rita (Zhiqian) Jiang, Niusha Taheri

Western Grains Research Foundation Endowment Fund Graduate Scholarship:
Udaya Subedi

Western Grains Research Foundation Graduate Scholarship:
MSc – Sumedha Vaishnavi Nallanthighal, Tianyi Zhao; PhD – Emilee Storfie

Women in STEM Scholarship:
Jo Ann Chew, Kirra Kent, Natalie LaForest

Zenia Hawrysh Scholarship in Food Science:
MSc – Maria Robles Hernandez;
PhD – Yifu Chu

Students perform food science experiments in a Nutrition and Food Sciences Lab. Photo: John Ulan

Partners + Funders

Acadian Seaplants Limited

ADISSEO

Agriculture and Agri-Food Canada

Agriculture Funding Consortium:
- Alberta Canola
- Alberta Chicken Producers
- Alberta Crop Industry Development Fund
- Alberta Grains
- Alberta Innovates-Bio Solutions
- Alberta Milk
- Alberta Pulse Growers Commission
- Egg Farmers of Alberta
- Western Grains Research Foundation

Alberta Agriculture and Forestry

Alberta Beef Producers

Alberta Hatching Egg Producers

Alberta Health Services

Alberta Innovates

Alberta Pork

Alberta Turkey Producers

Alltech Canada Inc

Almased Wellness GmbH

Barley Council of Canada

BC Dairy Association

BC Peace River Grain Industry Development Council

Beef Cattle Research Council

Biena Inc.

Bioindustrial Innovation Canada

Burnbrae Farms Ltd.

Canada Foundation for Innovation

Canada Malting Company Limited

Canada Research Chairs

Canadian Beef Breed Council

Canadian Celiac Association

Canadian Field Crop Research Alliance

Canadian Foundation for Dietetic Research

Canadian Institutes of Health Research

Canadian Poultry Research Council

Canadian Swine Research and Development Cluster

Canola Council of Canada

Canterra Seeds

Ceapro Inc.

Climate Change and Emissions Management Corporation

Dairy Farmers of Canada

Dairy Farmers of Manitoba

Edmonton International Airport

Egg Farmers of Alberta

Egg Farmers of Canada

Elmira Pet Products Ltd.

Engage Agro Corporation

FMC Corporation

Forge Hydrocarbons Corporation

FP Genetics

Genesus Inc.

Genome Alberta

Genome Canada

Genome Prairie

Heart & Stroke Foundation of Canada

Hypor LP

Ingredion Inc.

Kaslo Sourdough

Kellogg Company

Kaiser Foundation Research Institute

Kidney Foundation of Canada

Lallemand Animal Nutrition

Lilydale Inc. – A Sofina Foods Company

Maple Leaf Foods Inc.

Mitacs Inc.

Monsanto Fund

Networks of Centres of Excellence-GlycoNet

National Pork Board

Natural Sciences and Engineering

Results Driven Agriculture Research (RDAR)

Research Council of Canada

New Leaf Essentials (West) Ltd.

Organic Federation of Canada

Peavey Industries LP

PIC USA Inc.

PolicyWise for Children & Families

Prairie Oat Growers Association

Red Bow Ranching Ltd.

Sacco Systems Srl

Saskatchewan Milk Marketing Board

Saskatchewan Pulse Growers

Saskatchewan Stockgrowers Foundation

Saskatchewan Wheat Development Commission

Saskatchewan Barley Development Commission

SeCan Association

Social Sciences and Humanities Research

South of the Divide Conservation Action Program

Sunterra Farms Ltd.

The Hanor Company of Wisconsin, LLC

The W. Garfield Weston Foundation

Trojan Technologies Inc.

University Hospital Foundation

Université de Montréal

University of Calgary

University of California, Los Angeles

University of Guelph

University of Saskatchewan

University - Iowa State

Valent

Western Economic Diversification Canada

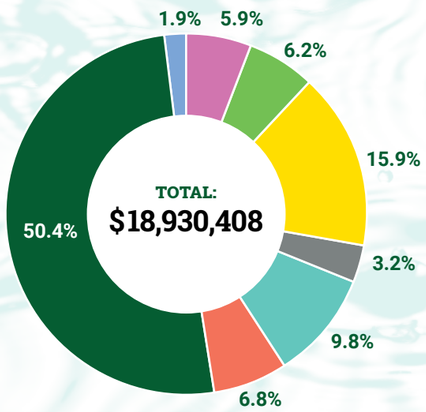
Westgen

Facts + Figures

ENROLMENT

Undergraduate Students

PROGRAM OR MAJOR	NUMBER OF STUDENTS
Bachelor of Science in Agriculture	**171**
Agricultural and Resource Economics Major	16
Animal Science Major	88
Crop Science Major	45
Sustainable Agricultural Systems Major	22
Bachelor of Science in Agricultural/Food Business Management	**36**
Agriculture Business Management	26
Food Business Management	10
Bachelor of Science in Animal Health	**304**
Companion and Performance Animals Major	265
Food Animals Major	39
Bachelor of Science in Nutrition and Food Science - General Program	**282**
Food Marketing Minor	7
Food Safety & Quality Minor	7
Global Health Minor	3
Human Ecology Minor	2
Nutrition Communication & Education Minor	2
Physical Activity Minor	7
Bachelor of Science in Nutrition and Food Science - Dietetics Specialization	**133**
Bachelor of Science in Nutrition and Food Science - Food Science and Technology Specialization	**53**
Bachelor of Science Honors Honors in Food Science	**3**
Bachelor of Science Honors Nutrition	**9**
TOTAL	**991**



RESEARCH

AFNS Research Funding

Government of Alberta	$1,115,560
Government of Canada (not Tri-agency)	$1,170,476
NSERC	$3,002,404
CIHR	$613,120
Municipal, Provincial and Foreign	$1,848,560
Business	$1,280,062
Not for profit and Individuals	$9,535,156
Endowments	$365,069

Graduate Students

PROGRAM	NUMBER OF STUDENTS
Animal Science	56
Bioresource & Food Engineering	8
Bioresource Technology	23
Course Based MAg	4
Course Based MSc	10
Food Safety & Quality	20
Food Science & Technology	52
Meat Quality	2
Nutrition & Metabolism	33
Plant Science	69
Rangeland & Wildlife Resources	9
Visiting Graduate Students	8
TOTAL	**294**

This year's class of graduate students come from

37

different countries!

CONVOCATION

Congratulations to students who crossed the stage this year with a degree in one of our programs, including **136** Bachelor of Science (BSc) recipients, **48** Master of Science (MSc) recipients and **19** Doctorate (PhD) recipients.

Bachelor of Science Graduates

PROGRAM	GRADUATES IN FALL 2023	GRADUATES IN SPRING 2024
BSc in Agricultural/Food Business Management	0	7
Bachelor of Science in Agriculture	2	27
Bachelor of Science in Animal Health	1	26
Bachelor of Science in Nutrition and Food Science	5	68

Masters of Science Graduates

Fall 2023	Spring 2024
23 GRADUATES	25 GRADUATES

Doctorate Graduates

Fall 2023	Spring 2024
10 PHDS	9 PHDS

FEATURED

Publications

This year, AFNS faculty collectively published over 250 publications!

See more publications listed on the department's selected publications webpage.

Bruce, H. (2024). Contribution of intramuscular connective tissue and its structural components on meat tenderness-revisited: a review. *Critical Reviews in Food Science and Nutrition, 64* (25): 9280-9310.

Chen, G. (2023). Protein interactomes for plant lipid biosynthesis and their biotechnological applications. *Plant Biotechnology Journal, 21* (9): 1734-1744.

Field, C. (2024). Maternal smoking during pregnancy increases the risk of gut microbiome-associated childhood overweight and obesity. *Gut Microbes, 16* (1): 2323234.

Gaenzle, M. (2024). Starter Culture Development and Innovation for Novel Fermented Foods. *Annual Review of Food Science and Technology, 15* (1): 211-239.

Hwang, S.-F., Strelkov, S. (2024). The Host Range of Fusarium proliferatum in Western Canada. *Pathogens, 13* (5): 407.

Prado, C. (2024). Sarcopenic obesity in older adults: a clinical overview. *Nature Reviews Endocrinology, 20*, 261–277.

Richard, C. (2023). Consumption of kefir made with traditional microorganisms resulted in greater improvements in LDL cholesterol and plasma markers of inflammation in males when compared to a commercial kefir: a randomized pilot study. *Applied Physiology, Nutrition and Metabolism, 48* (9): 668-677.

Thilakarathna, M. (2023). Effects of Drought Stress on Red Clover-Grass Mixed Stands Compared to Grass Monoculture Stands in Nitrogen-Deficient Systems. *Nitrogen, 4* (4), 382-396.

Ullah, A. (2023). Recent advances in chitosan-based materials; The synthesis, modifications and biomedical applications. *Carbohydrate Polymers, 321*, 121318.

Wu, J. (2023). Cruciferin improves stress resistance and simulated gastrointestinal survival of probiotic Limosilactobacillus reuteri in the model encapsulation system. *Food Hydrocolloids for Health, 3*, 100118.

Leading with Purpose.

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