Aknowledge

COLLEGE OF AGRICULTURE AND BIORESOURCES 12|11

Planted in Ecology

Finding the roots of Saskatchewan ecosystems in the Athabasca Sand Dunes

Healthy Food for a Hungry World

U of S oat breeder aims to make the "ideal whole grain" even better

Staying Out Front

Studying abroad has a big impact on what happens when the sabbatical is over and the scholar returns home

Lightbulb Moment

For U of S grad Brent Zettl, a term paper introduced a world of opportunity

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College of Agriculture and Bioresources

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Inside this issue

On the cover
William River Dunes, Athabasca Sand Dunes Provincial Park in Northern Saskatchewan
Photo by Digit Guedo

Thank you to all alumni who participated in the *Agknowledge* readership survey. Your input is appreciated! Congratulations to the winner of the iPod Touch – Richard Block.

Agknowledge

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Dean's message

CELEBRATING 100 YEARS OF AGBIO

It's always so much fun to welcome you to *Agknowledge*, particularly this year. We have had a most exciting year that has included acquiring the needed millions of dollars to fund a new dairy research and teaching facility, as well as the funds needed to completely refurbish the phytotron, which is the controlled environment facility that enables our plant, soil and environmental scientists to replicate the conditions anywhere in the world. We also welcomed our biggest incoming class in the last five years. We are particularly proud of our new post-graduate diploma in Aboriginal Agriculture and Land Management. It is an innovative program that allows graduates from other degree programs to acquire the basic knowledge and experience needed to gain employment in various agricultural enterprises. This program is supported with external funding from the Sprott Foundation and also from the university. While the program is targeted primarily at Aboriginal students, we are thinking of using modifications of this approach to meet the needs and interests of other students as well.

That's what keeps agriculture and bioresources growing and vibrant – that willingness to always explore new territory and develop new approaches to meet the needs of our industry and our world. Next year, 2012, marks 100 years of students graduating from our college with advanced education in agriculture. In the beginning, our grads were needed to give waves of immigrants tools and skills that would help them successfully farm in the Canadian Prairies. We are still doing that today, but the crops are much more diverse in type and end use, the buyers are found around the world, the economics, entrepreneurial models and rules are much more complex, and environmental vigilance is paramount. As well, the growing world population needs our grads to be the very best they can be to meet the urgent global need for sufficient nutritious safe food and also bio-based products to replace those currently produced from non-renewable resources. We will do our best to equip our students to meet these challenges, often by teaching them how to grow, adapt, learn and change.

We have no doubt our students can meet these challenges, head on, with an Agro attitude of getting it done with a smile and a pack of friends to help. For the past 100 years, agbio grads have proudly worked and played hard, and we are proud to share a number of the college's recent accomplishments in these pages. Think about joining our celebration events next year and in the meantime, enjoy *Agknowledge*!

Sincerely,
Dean Mary Buhr

Faculty renewal

WELCOMING NEW FACULTY TO THE COLLEGE

CHRISTIAN WILLENBORG

Academic Background:
BSA, University of Saskatchewan, 2002
MSc, University of Saskatchewan, 2004
PhD, University of Manitoba, 2009

Focus of Work: Weed science with research directed at enhancing our understanding of weed biology and weed control in field crops.

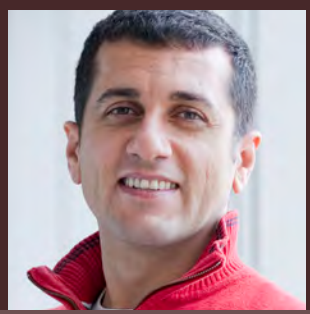
Passion: I have always had a passion for both basic and applied science, and the role that each has to play in weed science. My goal is to combine these to develop a dynamic and intriguing weed science program that also engages the next generation of scientists through teaching and mentoring.

ERIC MICHEELS

Academic Background:
BSc in Agribusiness, University of Wisconsin – River Falls, 2001
MSc in Agricultural Economics, University of Illinois, 2004
PhD in Agricultural Economics, University of Illinois, 2010

Focus of Work: Human capital resources agricultural producers use to become aware of and respond to opportunities to create value -added products.

Passion: My passion is to apply innovative theories to interesting research questions that have a practical application to performance for farms and agribusiness firms, and to engage students in thought-provoking discussions that enable them to apply theoretical concepts to real-world issues currently impacting the food and agribusiness sector.



METIN CAKIR

Academic Background:
BSc in Economics, Middle East Technical University
MSc in Resource Economics and Policy, University of Maine
PhD in Agricultural Economics, Purdue University

Focus of Work: Industrial organization of food and agricultural markets, and marketing. My current research involves consumer demand analysis of food products, analysis of imperfect competition in dairy, beef and pork markets, and analysis of contract design in livestock markets.

Passion: Learning, teaching and contributing to the economic knowledge as it applies to industrial organization of food and agriculture is my passion in my professional work. My research goal is providing economists, practitioners and policy makers with economic information that is unknown yet is essential for a full understanding of contemporary economic and policy problems within the food and agricultural markets.

RANDY KUTCHER

Academic Background:
BSc in Agriculture, University of Manitoba, 1981
MSc in Plant Pathology, University of Manitoba, 1990
PhD in Plant Pathology, University of Saskatchewan, 1994

Focus of Work: Cereal and flax pathology with a focus on development of disease resistant germplasm and other integrated pest management strategies to manage field crop diseases.

Passion: My goals are to contribute to the improvement of disease resistant cereal and flax varieties for Saskatchewan producers. I look forward to sharing my experience and knowledge of plant diseases and their management with my students.

STUDENT SPOTLIGHT

Global traveller

For this plant sciences student, it was a long way from Fannystelle to Saskatoon ... but a short hop to Europe

By Glenn Cheater

It's no exaggeration to say the College of Agriculture and Bioresources opened up the world to Kara Nadeau.

The recent plant sciences graduate has studied in California, Sweden and, most recently, Switzerland. Her first big trip—from home to university—was the most nerve-wracking but also whetted her appetite for new places and meeting new people.

"Moving to Saskatoon from my family's farm in Fannystelle (Manitoba) was quite a change," says Nadeau. "But the college was so welcoming. There were lots of ag events and it really got the first-year students involved quickly. You could meet students from upper years and make all of these connections."

Making connections and seeing what doors open as a result has become a theme in the outgoing young scientist's life. She quickly became involved in the Agricultural Students' Association (becoming academic VP in her second year) and jumped at the chance to study abroad.

"Sometimes we don't realize how interconnected agriculture is worldwide," says Nadeau, who hopes to pursue graduate studies at the U of S next fall.

"To have an understanding of how agriculture is done in other countries is a great benefit. As much as agriculture is a big world, it's also a small place. You connect with one person and that leads to connections with others."

Her recent four-month internship at the plant breeding division of Agroscope government research station came about after a conversation with one of her professors, Dr. Kirstin Bett.

"I was telling her how much I enjoyed Sweden and she told me about this research station in Switzerland that she had attended 20 years ago. We contacted her old boss and he was still here, and that's how I got accepted."

But it wasn't just the chance to see new places that excited Nadeau. It was also the opportunity to be involved in high-level research.

"In Switzerland, I've been doing plant breeding with soybeans, wheat and triticale," she said.

"The best part was I actually bred my own soybean variety. That's not something that someone who has just earned a bachelor's degree gets to do very often. I also got a chance to select soybean, wheat and triticale lines in the field, so I've learned a lot about plant science."

Agroscope conducts research in many areas and Nadeau was able to work in other areas.

> **"TO HAVE AN UNDERSTANDING OF HOW AGRICULTURE IS DONE IN OTHER COUNTRIES IS A GREAT BENEFIT"**

"I also harvested apples, pears, red currants and raspberries, and I spent two weeks in the viticulture section, taking in samples of grapes and learning about winemaking. So while plant breeding is my main focus and why I came here, I'm grateful for the chance to work at other research stations and get a better understanding of agriculture in Switzerland and Europe generally."

Nadeau lived in a house on the research station, which is located near the small picturesque city of Nyon on Lake Geneva. French is spoken in that part of multilingual Switzerland, which suited Nadeau, whose family is francophone. Still, she says, talking about science in French was a challenge. She returned home in early October but, not surprisingly, she wasn't planning to stay for long.

"After working on the family farm, I hope to travel to Australia and New Zealand at the end of December so I can see more farms and experience other types of agriculture systems on that side of the world."

While not everyone will have her opportunity to study abroad, Nadeau says it's important to have a global view. Canadians have to compete on a world stage and quickly adapt to changing conditions, so they need to constantly look at practices in other countries, she says.

She gives high marks to the College of Agriculture and Bioresources and her professors for making it possible for her to study in U.S. and Europe.

"I'm just so grateful to U of S for giving me such a global experience," she says.

Student excellence

ENTRANCE AWARDS

AGBIO Renewable Entrance Scholarships
Tracy Fehr, Rosthern
Sarah Johnson, Churchbridge
Shannon Palmer, Port Alberni BC
Moira Petruic, Avonlea
Britteny Schwanke, Wapella
Lukas Smith, Radisson

AGBIO Renewable Transfer Scholarship
Ruth Kost, Saskatoon

AGBIO Entrance Scholarships
Jennifer Barrett, Wapella
Kailyn Beaulac, Prince Albert
Megan Bjerland, Rose Valley
Erin Cathcart, Neepawa MB
Elizabeth Edmondson, Saskatoon
Natasha Englot, Abernethy
Dallas Funke, Briercrest
Amanda Gabruch, Consul
Caitlin Guy, Regina
Traci Henderson, Gainsborough
Jessica Hextall, Grenfell
Marshall Holliday, Weyburn
Emily Horan, Saskatoon
Tell Kieper, Radisson
Zachary Kurtenbach, Deloraine MB
Kirste McCrea, Saskatoon
Carolyn Murray, Saskatoon
Jordan Wiens, Herschel
Dakota Wightman, Davidson
Cordell Young, Bredenbury

Elizabeth Edmonson

Arnold and Emily Robinson Scholarship
Jesse Bond, Marengo

Beatrice Murray Entrance Scholarship
Taylor Wilyman, Saskatoon

Canadian Wheat Board Diploma Entrance Award
William Dodd, Lanigan
Glen Crosson, Welwyn
Breanna Fradette, Radville

Douglas Christie Ferguson Fund Scholarship
Katerina Brown, Calgary AB
Beverly Chard, Dewdney BC
Rebekah Esau, Saskatoon

Jim Anderson Scholarship in Agriculture
Whitney Cyca, Lemberg
Austin Sentes, Raymore
Jason Fleischacker, Fulda

Robert and Maude Hale
Danica Lucyshyn, Saskatoon

Saskatchewan Chicken Industry Development Fund Award in Agriculture
Eric Ehalt, Humboldt
Courtney Stroeder, Tilley AB

Gwinyai Chibisa

CONTINUING STUDENT AWARDS

AGBIO Renewable Entrance Scholarships, Second Year
Melanie Hawrysh, Borden
Steven Tetreault, Leoville

AGBIO Renewable Entrance Scholarships, Third Year
Kaitlyn Schurmann, Abbotsford BC
Blake Weiseth, Shaunavon

AGBIO Renewable Entrance Scholarships, Fourth Year
Lindsay Griffith, Bangor
Sarah Hardy, Grenfell
Angela Japp, Eston
Alyssa Krone, Saskatoon
Kristin Krone, Saskatoon

AGBIO Renewable Transfer Scholarships, Fourth Year
Jason Boutet, Saskatoon
Kendra Purton, Yorkton

Adeline and William Haberman Memorial Scholarship
Blake Weiseth, Shaunavon

Albert and Beatrice Trew Memorial Scholarship
Katherine Schutzman, Regina
Vanessa Vandertweel, Gronlid

Animal Nutrition Association of Canada
Angela Japp, Eston
Christine Rosser, Ponteix

Briane Schmitt

STUDENT EXCELLENCE

- **BASF Canada Scholarship in Plant Sciences**
  Andrea DeRoo, Moosomin
  Curtis Wiens, Herschel

- **Bayer Crop Science: InVigor Canola Scholarship**
  Kelsey Dale, Plunkett
  Anita Fewings, Pierson MB

- **Bert Hargrave Scholarship**
  Alex Neumann, Regina Beach

- **Bert Salloum Scholarship in Agriculture Economics**
  Conrad Nagel, Mossbank

- **Brent Ganzer Memorial Scholarship**
  Travis Brisebois, Kincaid

- **Canadian Prairie Lily Society John Bond Scholarship**
  Lisa Taylor, Saskatoon

- **Canadian Prairie Lily Society T.A. (Andy) Dingwall Scholarship**
  Carmen Danyluk, Kamsack

- **Canadian Society of Animal Science Book Prize**
  Alex Neumann, Regina Beach

- **Canadian Wheat Board Undergraduate Awards Programs**
  Dustin Brons, Lake Lenore
  Jodi Christopher, Swift Current
  Justine DeNure, Maple Ridge BC
  Katelyn Holba, Goodsoil
  Brendan Kessel, Balgonie
  Mandy Lajeunesse, Prince Albert
  Conrad Nagel, Mossbank
  Breanna Perrin, Rosthern
  Ashley Pilon, Hudson Bay
  Natalie Preston, Vauxhall AB
  Justin Shepherd, Moosomin
  Shaun Vey, Wakaw
  Blake Weiseth, Shaunavon

- **Carlson Scholarship in Renewable Resource Management**
  Kendra Purton, Saskatoon

- **Dairy Farmers of Saskatchewan Undergraduate Scholarship**
  Erin Cuthbert, Ladysmith BC

- **David J. Welch Memorial Prize**
  Tess Strand, Preeceville

- **Dow Agrosciences Scholarship in Agriculture**
  Travis Brisebois, Kincaid
  Katherine Schutzman, Regina

- **Elmer Laird Memorial Scholarship for Organic Agriculture**
  Shanna George, Saskatoon

- **Ewald M. & Donna I. Kitsch Scholarship in Crop Science**
  Lindsay Griffith, Bangor

- **FCC Business Planning Award 1st Place**
  Eric Buyer, Three Hills AB
  Robert Lowe, Nanton AB
  Tyson Lowe, Nanton AB
  Brittney Schurmann, Abbotsford BC

- **FCC Business Planning Award 2nd Place**
  Eric Boon, Lucky Lake
  Amanda Halstead, Nokomis
  Neil Maisonneuve, Donnelly AB
  Jenna Monchuk, Lanigan

- **FCC Business Planning Award 3rd Place**
  Brody Haugan, Orion AB
  David Savage, Saskatoon
  Ryan Schroeder, Calgary
  Matthew Swaby, Saskatoon

- **FCC Business Planning Award 4th Place**
  Rhett Duke, Kipling
  Brad Meiklejohn, Langham
  Tyler Shymanski, Choiceland

- **F.J. Fear Scholarship in Soil Science**
  Janelle Healey, Prince Albert

- **Frank and Freda Riecken Scholarship in Soil Science**
  Blake Weiseth, Shaunavon

- **Gillian Hughes Memorial Travel Fellowship**
  James Woodhouse, Dalmeny

- **Harvey Scholarship**
  Andrew Florence, North Battleford
  Lindsay Griffith, Bangor
  Alyssa Krone, Saskatoon
  Kristin Krone, Saskatoon
  Alex Neumann, Regina Beach
  Kaitlyn Schurmann, Abbotsford BC
  Alexis Tindall, Saskatoon

- **James Donald Hardin Scholarship**
  Jeremy Doerksen, Garrick
  Justin Serhan, Carrot River
  Tess Strand, Preeceville

Curtis deGooijer

Christine Young

Youg Liu

- **Jickling Agricultural Scholarship**
  Blake Weiseth, Shaunavon
- **John and Laura Morris Scholarship**
  Lauron Ovinge, Scandia AB
- **John Mitchell Memorial Scholarship**
  Brendan Kessel, Balgonie
- **Kelly Aulie Memorial Scholarship**
  Risa Iwasiuk, High Prairie AB
- **Larry Janzen Memorial Scholarship**
  Curtis deGooijer, Kelliher
- **Molson Canada Book Prize**
  Matthew Bernard, Trossachs
  Jae Hee Kim, North York ON
- **Port Metro Vancouver Scholarship**
  Mark Sigouin, Zenon Park
- **Pat Toderian Scholarship**
  Justine DeNure, Maple Ridge BC
  Alex Neumann, Saskatoon
- **R.K. Baker Prize for Excellence in Poultry Science**
  Marchall McDonald, Brookdale MB
- **Robert and Maude Hale Scholarship**
  Danica Lucyshyn, Saskatoon
- **Rossnagel Scholarship for Academic Improvement**
  Tess Blomme, Shaunavon
- **Russell Fisher Scholarship**
  Samantha Sentes, Raymore
- **Saskatchewan Institute of Agrologists Diploma Scholarship**
  Bennett Bayes, Trochu AB

Brittney Schurmann

- **Saskatchewan Institute of Agrologists Scholarship**
  Seraina Giovanoli, Switzerland
  Angela Japp, Eston
  Steven Tetreault, Leoville
- **SaskPower Shand Greenhouse Education Prize**
  Jasmine Fraser, Weyburn
- **Syngenta Achievement Award**
  Vanessa Vandertweel, Gronlid
- **University of Saskatchewan Scholarships**
  Kerrie Andreas, Sheho
  Heidi Dube, Warman
  Amanda Guy, Saskatoon
  Kendra Purton, Saskatoon
  Danielle Schindelka, Raymore
  Patricia Tomchuk, Martensville
- **University Undergraduate Scholarship**
  Seraina Giovanoli, Switzerland
  Angela Japp, Eston
  Gwen Kipfer, Saskatoon
  Jeremy Kiss, Saskatoon
  Kathleen Madsen, Grandora
  Michelle Nordick, Saskatoon
  Amy Patterson, Ponoka AB
  Katherine Patzwald, Lemberg
  Christian Scott, Lake Lenore
  Kathryn Stolle, Christopher Lake
  Tess Strand, Preeceville
  Jesse Vargo, Kipling
  Brittany Wheler, Moose Jaw
  Devon Wilson, Tugaske
  Jacilyn Yaremko, Yorkton

Justin Serhan

- **W.J. Copeland Scholarship in Crop Science**
  Lindsay Griffith, Bangor
- **William G. Barclay Scholarship**
  Christine Young, Bredenbury

GRADUATION AWARDS

- **The Fulton Family and Saskatchewan Institute of Agrologists Award**
  Brodie Haugan, Orion AB
- **Norman H. Horace Pearce Prize in Animal and Poultry Science**
  Cindy Lukianchuk, Erickson MB
- **Molson Canada Award of Excellence**
  Chang Chang, China
- **P.M. and Y.Y. Huang Distinguished Award in Soil Science**
  Courtney Phillips, Saskatoon
- **Saskatchewan Horticulture Association Prize**
  Kaila Hamilton, Radisson
- **Saskatchewan Institute of Agrologists Gold Medal**
  Courtney Phillips, Saskatoon
- **Scott Prize**
  Megan Keis, Abbotsford BC
- **Frank Sosulski Graduation Prize in Plant Sciences**
  Claire Kincaid, Wawanesa MB
- **William Allen Memorial Prize in Agriculture Economics**
  Saule Burkitbayeva Kazakhstan

Chang Chang

POSTGRADUATE AWARDS

- **Alexander and Jean Auckland Postgraduate Award**
  Aaron Betts
- **John Baerg Award**
  Brian Wallace
- **John Blake Memorial Postgraduate Scholarship**
  Maria Martinez
  Ifeanyi Mordi
- **Class of '43 60th Anniversary Award**
  Gourango Kar
- **Canadian Wheat Board Graduate Fellowship**
  Mohammad Torshizi
  Kirby Milsen
- **Canadian Wheat Board Fellowship in Agriculture Economics**
  Bijon Brown
  Haoyu Li
- **Dairy Farmers of Saskatchewan Scholarship**
  Arjan Jonker
- **Canadian Dairy Commission Scholarship**
  Shelicia Forbes-Brown
  Ricky Lam
- **Dollie Hantelman Postgraduate Scholarship**
  Marcos Zenobi
- **Elmer Laird Memorial Scholarship for Organic Agriculture**
  Dilshan Benaragama
- **F. V. MacHardy Graduate Fellowship in Grasslands Management**
  Candace Piper
- **O.M. Elviss Postgraduate Scholarship**
  Maria Martinez
- **Maurice Hanson Sr. Postgraduate Award**
  Brian Wallace
- **L.H. Hantelman Postgraduate Scholarship**
  Hema Duddu
  Yang Lin
  Prabhath Lokuruge
  Ehsan Sari
  Marcos Zenobi
- **S.N. Horner Postgraduate Scholarship**
  Kirby Nilsen
  Kaitlin Strobbe
- **Paulden F. and Dorathea I. Knowles Postgraduate Scholarship**
  Eric Gerbrandt
  Yong Liu
  Candace Piper
- **Norman and Kathleen Lean Postgraduate Scholarship**
  Zaharias Matheos
- **Roderick Alan McLean Memorial Award**
  Angelena Syrovy
- **Molson Canada Scholarship**
  Nicole Avramenko
- **Harris and Lauretta and Raymond Earl Parr Memorial Scholarship in Agriculture**
  Douglas Akhimienhonan
  Tanvi Basu
  Manu Gangola
  Frank Ge
  Hannan Konschuh
  Ifeanyi Mordi
  Candace Piper
  Md Noabur Rahman
  Jing Wang
  Siping Zhang
- **Barbara and Frank Pavelich Postgraduate Scholarship**
  Melissa Arcand
- **Martin Pedersen and Family Postgraduate Scholarship**
  Maria Martinez
- **Purdy Postgraduate Scholarship**
  Federico Anez-Osuma
  Kirby Nilsen
- **Putnam Family Memorial Award**
  Bijon Brown
- **Dr. Robert E. Redmann Memorial Graduate Scholarship in Plant Sciences**
  Candace Piper
- **Saskatchewan Pulse Crop Development Board Dr. Alfred E. Slinkard Scholarship**
  Nicole Avramenko
- **Saskatchewan Pulse Crop Development Board Don Jaques Memorial Fellowship**
  Angelena Syrovy
- **Saskatchewan Institute of Agrologists Scholarship**
  Morgan Sather
- **Syngenta Scholarship in Sustainable Agriculture**
  Tanvi Basu
- **Rene Vandeveld Postgraduate Scholarship in Crop Science**
  Hema Duddu
  Eric Gerbrandt
  Yong Liu
  Prabhath Lokuruge
  Ehsan Sari
- **John Wickhorst Memorial Scholarship**
  Gwinyai Chibisa
- **C. Paul W. and Marianne M. Ziehlke Postgraduate Award**
  Srinivas Sura
  Angelina Syrovy

Graduate survey results

The College of Agriculture and Bioresources is committed to providing an exceptional learning experience by inspiring students and preparing graduates for leadership in the bioeconomy. To ensure that we are keeping this commitment to our students, the college contracted Insightrix Research, Inc. in the spring of 2011 to conduct a quantitative survey of three groups: graduates from the last five years (2006 through 2010), students graduating in the spring of 2011, and a range of employers of our graduates. A similar survey was conducted in 2006.

DEMOGRAPHICS

Of the 2006-10 grads, 85.9% grew up in Saskatchewan; the largest proportion (37.4%) grew up on a Saskatchewan farm. For the 2011 grads, 79.4% grew up in Saskatchewan, with 48.4% having grown up on a Saskatchewan farm.

More than three-quarters (79.3%) of 2006-10 grads had an agricultural background before enrolling in the college. This is very similar to the 2006 result of 81.1% and essentially the same number as the 2011 grads (79.4%)

EMPLOYMENT

The percentage of grads making their careers in Saskatchewan has increased through time. The large majority (81.6%) of 2006-10 grads work in Saskatchewan, a significantly larger proportion than in 2006's study (67.3%). The numbers are very similar for 2011 grads - (80.0%) of respondents' post-graduation jobs will be located in Saskatchewan; 12.5% will be in Alberta, 5.0% in British Columbia and the remaining 2.5% will be located in Manitoba.

Grads work in a wide variety of industries. Most commonly, respondents work in industries including primary production (13.1%), plant protection and/or fertilizer (10.6%), municipal, provincial or federal government (9.2%), grain handling/ transportation/marketing (9.2%), independent agri-retail (8.8%) and university or private industry research (7.4%). 12.4% of employed graduates are self-employed and close to three-quarters of those intended to become self-employed when entering their program.

The most common occupations of respondents include a farm owner/ operator/manager (13.2%), research assistant, technical or scientist (12.5%), agronomist (11.8%) and sales (8.7%).

Our grads have been very successful in finding employment in the agbio sector. Most 2006-10 grads who found paid employment following graduation were either invited to a job before graduation (49.7%) or found one within one month of graduation (28.3%). 81.4% of these respondents state that their main job is somewhat or very related to the training they received in their program. The success rate of finding employment is even higher for the 2011 grads - seven in 10 (70.6%) respondents had confirmed employment by March of their graduating year.

Employment prospects remain very strong for our current students – of the employers surveyed, 69.2% respondents expect their organization or department's workforce to increase. Three in 10 (28.8%) expect it to stay the same, while 1.9% expect it to decrease.

As well, there are great opportunities for summer employment for students in AgBio. Almost all (98.5%) of 2011 grads were employed in the summer during their program.

PROGRAM SATISFACTION

Overall, the large majority (83.4%) of our graduates are somewhat or very satisfied with their college programs. These results are consistent with the 2006 study.

The majority (64.4%) of respondents felt the college program they graduated from prepared them for their career at least somewhat well to very well.

Among the employers surveyed, overall satisfaction with graduates from the College of AgBio is high at 88.2%. This is very consistent with the 2006 survey.

Both graduates and employers identified several areas where improvement was needed in our programs and this information will be a key element as programs are reviewed and revised over the next five years.

Thank you to those who participated in the survey. Your feedback is appreciated and helps to improve the college. ■

Faculty and staff honours

JULY 1, 2010 – JUNE 30, 2011

BIORESOURCE POLICY, BUSINESS AND ECONOMICS

- Ken Belcher received the 2010-11 Agriculture Student Association Professor of the Year Award
- Rob Roy was the recipient of the 2011 University of Saskatchewan Students' Union Academic Advising Award
- William Kerr received "Distinguished Chair," July 1, 2011 - June 20, 2014
- Richard Gray was made a Fellow of the Canadian Agricultural Economics Society
- Richard Gray was awarded the Canadian Wheat Board Enhancement Chair in Canadian Grain Policy, 2011-2016

FOOD AND BIOPRODUCT SCIENCES

- Nicholas Low was awarded the 2011 Provost's College Award for Outstanding Teaching

SOIL SCIENCE

- Jeff Schoenau received the Saskatchewan Soil Conservation Association Award of Merit for his contribution to conservation
- Mike Grevers was awarded the 2010 J.W. George Ivany Internationalization Award
- Ken Van Rees received the Provost's Award for Outstanding Innovation in Learning

PLANT SCIENCES

- Ravi Chibbar was awarded a Fellowship of the ICC Academy by the International Association for Cereal Science and Technology (ICC) Vienna, Austria. The award was presented at the II Conferencia Latinoamericana Cereales, Santiago, Chile, April 2011
- Brian Rossnagel was inducted into the Saskatchewan Agricultural Hall of Fame
- Bruce Coulman received an Honorary Life Membership Award from the Canadian Seed Growers' Association
- Brian Fowler was recognized by the Alberta Winter Wheat Producers Commission, the Saskatchewan Winter Cereals Development Commission and Winter Cereals Manitoba for his outstanding contributions to the development of the winter wheat industry in Western Canada
- Rick Holm was given a Meritorious Services Award by the Canadian Weed Science Society in recognition of his contributions and long standing services to the Canadian Weed Science Society, November 2010
- Steve Shirtliffe was awarded the National association of College Teachers of Agriculture 2010 Teaching Award
- Krista Wilde was awarded the 2010 Dean's Teaching Award from the College of Agriculture and Bioresources
- Rick Sawatzky was awarded an Honorary Life membership into the Saskatchewan Fruit Growers Association in recognition of his outstanding accomplishments and contributions to the Saskatchewan fruit Industry, January 2011

Planted in ecology

By Kris Foster, Photos by Digit Guedo

Eric Lamb and his group of ecosystem researchers love the great outdoors. They have an even bigger love for understanding how those ecosystems work. This thirst for knowledge has led his team from the Athabasca Sand Dunes in Northern Saskatchewan to Swift Current in the south, with a few stops in between.

How ecosystems—whether natural and protected, or part of the human landscape—function and even thrive, is the question that drives the work of Eric Lamb and his research group in the College of Agriculture and Bioresources.

"We're plant community ecologists. We look at questions of what structures plant communities. Whether a protected site with natural vegetation, or a human dominated site, you will find specific patterns—like an abundance or rarity of certain plants—we want to know why that is," explained Lamb, assistant professor in the Department of Plant Sciences. "Then we can offer advice to grassland managers, park ecologists or conservation biologists and help inform their work."

If it sounds like a wide spectrum of research focus, that's because it is. "My lab covers the entire spectrum from fundamental questions about how plants interact with each other to more practical questions like how we can help a site that might be more degraded or how we can help with conservation."

In broad terms Lamb's lab—made up of seven people, including graduate students and research assistants—looks at four diverse areas of ecology: mechanisms like limiting resources (water, light and nutrients); the role of disturbances like fire, flooding, animal habitat and human influence; soil interaction; and conservation of species at risk.

How these areas play out in individual ecosystems and influence each other is what gets Lamb excited. "We are fascinated by understanding how these ecosystems work," he said. "We can learn from natural systems and if we can emulate them in the human dominated landscapes we will likely have more success in managing our landscapes. Park ecologists will have the most success maintaining ecosystems if their management is in sync with natural processes." ▶

Eric Lamb examines a large flowering specimen of Armeria martima, one of the rarest of the endemic species in the sand dunes.

This large grass, bromus pumpellianus, is a good example of the extensive root system that is needed to survive in the dune environment.

Saskatchewan, naturally

One natural area that has piqued Lamb's interest in particular is the Athabasca Sand Dunes, located in the northwest corner of Saskatchewan. The dune fields stretch for about 100km along the shore of Lake Athabasca with some dunes reaching as high as 30m. But beyond the unique properties that come with being site to the largest sand dunes in North America and the largest dunes this far north in the world, it is also home to 10 endemic species of plants unique to the area.

This combination of ecosystem and geology made it irresistible to Lamb. "In terms of size of the dunes, there is nothing comparable to it in all of North America. That combined with the endemic plants makes it a globally significant site. From a conservation perspective, because it is nationally and internationally important, we have a responsibility to ensure we are appropriately protecting it, especially as it becomes a popular eco-tourism destination. We wouldn't want to inadvertently cause damage by experiencing the site."

The group is currently assessing the system and creating a comprehensive picture. Through a complete survey of the land, they are estimating population sizes and distribution, evaluating threats and risks to the plants, and gaining an understanding of the challenges faced by the ecosystem.

Of the 10 endemic plants native to the dunes, seven are listed as "Species of Special Concern" under the Species at Risk Act (see sidebar for more information). "My research indicates that two or three of these special concern species should likely be considered threatened," explained Lamb.

However, there are no immediate and significant threats to any of the species there. "What we have found is mainly a good news story. There is no immediate threat to these plants, but they still need monitoring."

Lake Athabasca viewed from the northern edge of the Thompson Bay dunefield.

Understanding how these natural ecosystems work feeds into other aspects of Lamb's research, specifically how these natural and protected ecosystems function, and how other ecosystems, like grasslands and rangelands can emulate natural ecosystems and thrive through natural disturbances and survive human management.

To burn or not to burn

A little further south of the sand dunes, around Prince Albert, you'll find Lamb and Digit Guedo, one of his grad students, examining the fescue grasslands which are the transitional land between prairie plains and boreal forests to the north.

What Lamb and Guedo want to determine at this site is how ecosystems have become dependent on natural disturbances. "These ecosystems are dependent on natural disturbances like flooding, fire and animal grazing and wallowing," said Lamb. "The problem is us humans don't like disturbances, so we try to eliminate them by, for example, putting out fires and building dams. But these actions have consequences on plant communities that we are starting to understand."

Guedo has a site where, because of extensive experimentation, she has access to 35 years' worth of data and can examine the impact fire has on the ecosystem. The conservation of fescue grasslands is an important area of research because—for a number of reasons including fescue grasslands being converted for agricultural use and Aspen invasion—only six per cent of these natural fescue grasslands now remain in Saskatchewan.

"What we've seen is that in disrupting or suppressing natural events such as fire, we risk losing the grasslands to surrounding forests," explained Guedo who will complete her master's degree this winter. "Keeping these grasslands intact is crucial to plant and animal diversity and fire helps manage that diversity. It is conservation as opposed to preservation."

It is quite a thought adjustment because we are trained to think of fire as a destructive force. But these areas, Guedo pointed out "rely on recurring fire to exist and maintain a variety of habitats."

It is important to understand these cycles as a way to maintain and manage other ecosystems, said Lamb. "It is critical that coexistence occurs, because protected sites always exist in a matrix of human dominated sites. If we can maintain acceptable productivity with native plants and natural disturbance regimes, this can help us inform the restoration of human dominated sites and make them more sustainable and valuable as ecosystems."

Seed for thought

Moving further south yet, Lamb and his team are doing restorative research in the Swift Current area, where large areas of rangelands have been planted with non-native grasses that are valuable economically but can become weedy and invasive.

Keeping in mind the makeup and interactions that occur in healthy and natural ecosystems, Lamb's group is coming up with an optimal mix of seed to help restore heavily degraded land. "Many native species are suitable in these seeded pastures and prairie restoration projects," said Lamb.

"If we can get a site functioning more similar to natural ecosystems it will be more resilient against things like drought," he said. "Healthy and productive rangelands are important economic assets to our province. We are trying to take the basic principles of ecology to provide restorative ecologists with a seed mix that will restore degraded land."

But getting degraded sites to emulate natural sites is easier said than done. Lamb and graduate student Jenalee Mischkolz are attempting to create an optimal native plant mix using eight different species. This results in about two million different combinations, it really is like searching for a needle in a haystack, he explained.

"We can't physically plant two million different combinations to find the optimum one, so we are using competition theory, knowledge about plant traits and how they interact with each other and the soil, and running statistical programs to find the best ones." This gives them a good theoretical idea about which plants ▶

will be compatible in certain ecosystems and its associated limiting factors. In the end, however, all of this work is rooted in a fundamental curiosity.

"I am just really curious why certain systems are the way they are. We always try to find fundamental questions and linking those questions to answers that can be applied. You really need to dive into the details of a system before making practical recommendations. We want to span the gap between fundamental and applied and all areas of our research are important pieces of the puzzle."

NORTHERN EXPOSURE: ENDEMIC PLANTS IN THE ATHABASCA SAND DUNES

Family	Species	Common name	Species at Risk Act listing
Asteraceae	Achillea millefolium var. mega-cephala (Raup) Boivin	Large headed woolly yarrow	Species of Special Concern
	Tanacetum huronense Nutt. var. floccosum Raup	Floccose Tansy	Species of Special Concern
Caryophyllaceae	Stellaria arenicola Raup	Sand starwort; Sand stitchwort	Not at Risk
Cistaceae	Lechea intermedia Leggett ex. Britt. var. depauperata Hodgdon	Impoverished pinweed	Not Listed
Plumbaginaceae	Armeria maritima (P.Mill) Willd. ssp. Interior (Raup) Pors.	Athabasca thrift	Species of Special Concern
Poaceae	Deschampsia mackenzieana Raup	Mackenzie hairgrass	Species of Special Concern
Salicaceae	Salix brachycarpa Nutt. var. psammophila Raup	Sand-loving or Sand-dune short-capsuled willow	Species of Special Concern
	Salix silicicola Raup	Blanket-leaf or felt-leaf willow	Species of Special Concern
	Salix turnorii Raup	Turnor's willow	Species of Special Concern
	Salix tyrrellii Raup	Tyrrell's willow	Not at Risk

Crop Development Centre celebrates 40 years

The Crop Development Centre (CDC) got its start 40 years ago with seed money from the National Research Council and the Saskatchewan Department of Agriculture.

Forty years later, with around 120 employees, an annual budget exceeding $11-million, and more than 380 crop varieties developed, the CDC has become a crown jewel in the College of Agriculture and Bioresources.

"It is a very significant piece of the college and creates profile for the university because its work shows the impact we have on agriculture in the province," said Graham Scoles, associate dean of research and graduate studies in the college. "With our limited growing season, improving both the agronomic character and the quality of the crop has always been a priority for the CDC, and that really comes through in the varieties developed."

Looking back over the 40-year history, Dorothy Murrell, current CDC managing director, pointed to three CDC varieties that changed Saskatchewan's agriculture landscape:

- CDC Bethune, a flax variety released in 1998, is largely responsible for a three-fold increase in flax acreage in Saskatchewan;
- Harrington, a malting barley released in 1981, took over the world market and is among the CDC's most successful cereal varieties; and
- Laird, a lentil released in 1978, put lentils on the map in Saskatchewan and, according to the Saskatchewan Agriculture Hall of Fame, is the most widely grown variety in the world.

Though the landscape over the next 40 years will certainly change, Murrell can't see the CDC's primary goal changing too drastically. "Whenever we examine our strategic goals, the first one we agree upon is to keep doing what we do—provide genetic improvement to farmers. We all agree that our primary client is the farmer of Western Canada."

It is those farmers, said Scoles, who are crucial to the CDC's continued growth. "The centre is a great example of building strong relationships with producers throughout Saskatchewan. We are always looking for new opportunities to benefit Saskatchewan producers and keep them fully engaged with our work."

Healthy food for a hungry world

U OF S OAT BREEDER AIMS TO MAKE THE "IDEAL WHOLE GRAIN" EVEN BETTER

By Glenn Cheater

Even an oat breeder can't stop himself from laughing out loud when asked if oats are poised to become the next sexy superfood.

"No, I think most people would agree that oats are not a sexy food," says oat breeder Aaron Beattie, an assistant professor in the Department of Plant Sciences at the college.

"Oats are pretty unassuming. When you compare oatmeal to a sugary breakfast cereal, there's no question which one a kid would rather eat. And when you look at the growth in oat consumption, you find it's in things such as cereal bars and cookies – that is, products where oats aren't the standout ingredient."

But in fact, plain old oats are—from a nutritional viewpoint, at any rate —pretty special. Bruce Roskens is certainly a fan.

"Oats truly are the epitome of the ideal whole grain," says the senior manager for agricultural research and commodity development at Quaker Oats, which has supported the oat-breeding program at the University of Saskatchewan since 1975.

The company, now a division of PepsiCo, has been selling oats—and telling people that they're good for them—for 134 years. That message is now being spread around the world. Quaker has established a "global nutrition group" to develop food products that will meet the nutritional needs of consumers everywhere.

"That group is tasked with developing products for everywhere in the world, whether that's the wealthiest countries right down to subsistence farmers, and the driver behind all of those products is oats," says Dave Kendra, Quaker's senior manager of global oat agronomic research.

"A good example is India. The population is largely vegetarian and they need to get the majority of their caloric intake from protein and fat. Oats have fat and they also have some of the most nutritious proteins that you can find in the plant kingdom. So it's logical for us to develop products that contain oats."

> "OATS TRULY ARE THE EPITOME OF THE IDEAL WHOLE GRAIN"

Central to that mission is developing even-better-for-you oat varieties and ones farmers will want to grow. Just like consumers, farmers don't find oats all that sexy. Sure, they're good for rotations but it's the potential profits from crops such as canola, corn and soybeans that are grabbing the attention of farmers these days. Only about four million acres of oats destined for human consumption are grown in Canada. However, Saskatchewan is typically home to just over half those acres, nearly equal to what is grown in the entire U.S.

It's no coincidence the province is home to the university's Crop Development Centre (CDC), a leading developer of oat varieties over the past four decades, or that Quaker has been such a strong supporter of its work. ▶

"It's been a good relationship for both sides and I expect it will continue long into the future," says Beattie.

"As the production of oats (for human consumption) has declined in the U.S., I think other companies respect Quaker's strong relationship with the University of Saskatchewan. Of course, we look at the needs of all end-users and the needs of farmers who grow oats. But because of our relationship with Quaker, we're aware of what's important to them, so we're able to factor that in as well."

The assistant professor has taken over from the recently retired Brian Rossnagel, a long-time figure in both oat and barley breeding. Rossnagel was a grad student in 1975 when Quaker made its first grant, which was small but vital, he says.

"The reality is that if they hadn't have contributed that money, there would be no oat-breeding program in Saskatchewan," he says. "Oats were seen as a dying crop."

Rossnagel developed CDC varieties such as Calibre, Derby and CDC Dancer, which were adopted by farmers because they offered improved yields and disease resistance. But the relationship between Quaker and the U of S oat breeders proved fruitful in other ways. Rossnagel cites beta-glucan, a soluble fibre that slows the rise in blood glucose levels following a meal and has been shown to reduce blood cholesterol.

"In the 1970s beta-glucans were mentioned almost in passing in cereal chemistry classes," notes Rossnagel. "It was really the milling industry, primarily led by Quaker, who came and said, 'Look, if you guys can increase the percentage of beta-glucans in the oats that are grown in Saskatchewan, that would be good for us and that would make us better customers of your farmers.'"

For its part, Quaker has appreciated the university's strong focus on agronomics, says Roskens.

"I've been involved with the Crop Development Centre for more than 30 years and what stands out for me is its holistic approach," says Roskens. "It's not just about traits and genetics, but about the whole agronomic package. They're breeding varieties that meet farmers' needs and end-users' needs."

For millers, the number one factor is groat content. Groat is the internal part of the seed, the part that is made into oatmeal and other products. Higher groat content means, quite simply, more product from each bushel. When Rossnagel started in the oat-breeding business, groat accounted for about 70 per cent of the seed. Today it's at 80 per cent or higher. There have also been dramatic improvements in two other important factors, levels of beta-glucan and dietary fibre. So is there anything left for Rossnagel's successor to do? You bet, says Beattie.

"It really is an exciting time right now," says Beattie. "Until very recently, we didn't have a lot of the genomic and genetic resources that have been available in other crops such as canola, corn, soybean and even barley.

"This is allowing us to better understand how traits are controlled from a genetic point of view and to better measure them. So we can look at more traits and attempt to breed them into the crop."

Take, for example, something called the "fatty acid profile" of oats. Today, people want less saturated fat in their diets and more unsaturated ones, which are considered much healthier. But the latter are more easily oxidized, which creates spoilage and taste issues. So Beattie would like to develop varieties with a higher percentage of specific unsaturated fatty acids, such as olelic acid, that are oxidized to a lesser degree. Preliminary research is also being undertaken to look at ways to reduce levels of oxidizing enzymes, which are released when groats are damaged during harvesting, transport and processing.

"Another thing we see on the horizon is mineral content and the whole idea of biofortification – increasing the amount of minerals such as zinc, iron and magnesium," says Beattie. "Certain oat lines may take up these minerals more readily than others."

Both Beattie and Kendra agree it's a great time to be an oat breeder.

"This is probably one of the most exciting times to be working with oats," says Kendra, who has a PhD in plant pathology and was formerly a research leader with ARS, the principal in-house research agency of the U.S. Department of Agriculture.

"I've only been working with Pepsico/Quaker for a year and a half, but even in that short time we have made tremendous progress in understanding the molecular genetics of oats.

"So if, for example, we are trying to change the profile of fatty acids so they are more like olelic acid, or increasing the content of Vitamin E, we have tools that can cut the breeding time in half. Instead of 10 years, we're looking at five or less. We can also look at oat varieties that, for one reason or another, never really made it and fish for genes in those varieties. It's just unbelievably exciting."

Quaker's first grant to the College of Agriculture and Bioresources was only $5,000 (although Rossnagel points out that sum stretched much further in those days). Today the company contributes about $500,000 annually. Details of new three-year funding arrangement are just being finalized but both sides expect there will more such agreements in the future. Could the partnership last another 36 years?

"I sure hope so," says Beattie. "There are a lot of new things out there that are of interest and we now have an improved ability to pursue them. Of course, it's still a challenge to breed for the traits that have always been important, but now we have new ways to meet that challenge."

"I doubt there is any public-private partnership like this in Canada that has lasted as long as this one has," adds Rossnagel. "Quaker provided its first funding in 1975 and here we are heading into 2012. It's a unique thing and, I think, quite a remarkable one." ■

Staying out front

STUDYING ABROAD HAS A BIG IMPACT ON WHAT HAPPENS WHEN THE SABBATICAL IS OVER AND THE SCHOLAR RETURNS HOME

Ken Van Rees

By Glenn Cheater, Photos by David Stobbe

One of the roles of scientists is to make like Wayne Gretzky and be where the puck is going to be.

Both Ken Van Rees and Andrew Van Kessel are doing just that: Anticipating a future that hasn't arrived yet and helping society prepare for it. Their research, as you might expect from experts in agroforestry and intestinal microbial ecology, is specialized and complex. But the two professors are also very focused on the practical, doing their part to ensure that in the future, we are able to heat and light our homes, and put safe and affordable food on the dinner table.

The walled city of Orvieto, north of Rome, is famed for its ancient buildings and stunning views. But it was a conference on sustainable forestry and green energy—not sightseeing—that brought Ken Van Rees there on his sabbatical last year.

"The city is just fabulous and we had the conference there and then got on a bus and spent four or five days touring (willow and hybrid poplar) plantations in northern Italy," laugh Van Rees. "But yeah, I noticed other people seemed to be there for other stuff."

There's a direct connection between Saskatoon and agroforestry plantations in Europe. Just off 14th Street, Van Rees has been growing two hectares of willows since 2007.

All are clones, most from Ontario and Europe. On the far side of the Atlantic, from Italy to Scandinavia, tree plantations are seen as a key renewable energy source.

"The idea of using willow and other fast-growing trees for renewable energy has been around a long, long time but it really started to take off in Europe following the oil crisis in the 1970s," says Van Rees, a specialist in forest soils and the Agri-Food Innovation Chair in Agroforestry and Afforestation.

"Europe, particularly Scandinavia, is way ahead of us. It takes three or four years for one rotation and I've just finished my first one. But many plantations there have already completed six or more. So they're just so far ahead of us."

Researchers around the world are investigating the potential of willow and other tree species as a source of biomass that can be burned to create steam-generated electricity as well as ethanol and wood products such as fibreboard.

"It is working in Europe and gaining momentum in the United States," says Van Rees. "It's a positive alternative but there are a lot of questions to be answered, including the economic one: What is a tonne of willow or other biomass worth? But there are many others: We need the right clones for our environment in Saskatchewan. We need to get the cost of cuttings down. We need mechanical machinery such as planters and the harvesting system.

"So there is a lot of research that needs to be done. We also need to get farmers involved because they'll be the ones growing it and we need to develop an industry, whether we burn biomass for electricity, produce ethanol or for other uses."

Andrew Van Kessel with PhD students Ingo Starke (left) and Jing Wang.

A careful observer of Van Rees' plots (along with the one on 14th, there are test plots in Estevan, Prince Albert and Birch Hills) could have seen both the promise and challenges of growing willows on the Canadian Prairies.

"We've had so much water this year, that some of the clones we harvested on 14th Street this spring have grown nine feet and are the same height as the ones we cut down after three years of growth," notes Van Rees.

"It's just been amazing. But two years ago, we had complete dieback on some of our clones over the winter. So while we've been blessed in terms of moisture over the past couple of years, we have to be prepared for a whole host of conditions, whether that's the climate, or pests and diseases. We need a breeding program to deal with these issues, just as you do with any agricultural crop."

It is still early days in the development of a Western Canadian biomass industry, partly because there isn't the same sense of urgency here to develop alternative energy sources as there is in Europe.

"I'll be honest, it's a bit of a tough sell right now," says Van Rees. "But we've got the plantations and we're moving ahead. And we know that when oil heads past $100 or $110 a barrel, interest in renewable energy will take off. So we need to keep moving ahead."

Berlin is also a nice place to visit and Andrew Van Kessel, a specialist in nutritional physiology and intestinal microbial ecology, moved his family there in the summer of 2010 so he could spend an entire year doing research at the city's Freie Universität.

Thanks to Van Kessel, head of the Department of Animal and Poultry Science, the college has a close collaboration with Freie's Institute of Animal Nutrition in researching intestinal microbial ecology—the study of what happens inside the gut of pigs and other livestock.

"This research is driven by the desire to minimize the use of antibiotics as prophylactic tools," says Van Kessel. "But antibiotics are an extremely powerful tool and replacing them is not that simple."

Using antibiotics to prevent infections has allowed tremendous productivity gains in livestock production but has also raised fears of increased antibiotic resistance and residues in food. So what's the alternative?

"There's no one-shot solution that's going to put you into an antibiotic-free world," says Van Kessel. "There's no single feed additive that can achieve the same results."

That doesn't mean feed manufacturers aren't trying. A host of feed additives and ingredients promise healthier, fast-growing animals, through probiotics (live microbial feed supplements), prebiotics (which stimulates 'good' microbial activity), phytobiotics (bioactive plant products), dietary fibre and other means.

"There are a number of products out there but it's not easy to demonstrate efficacy," notes Van Kessel.

"Unlike with human food, which is largely built on marketing, livestock producers demand efficacy. At the end of the day,

I want my animals to grow faster or to see an appreciable decline in morbidities and mortalities. Some (feed additives) work well, others not so well, but the question is: How do they work?"

It's a simple question but there's no simple answer because the world inside the gut of an animal, livestock or human is astonishingly complex.

"There is a tremendous community of bacteria and other single-cell organisms inside the gastro-intestinal tract," notes Van Kessel. "There are 10 times more bacterial cells in your intestine than there are human cells in your body. When we talk about the number of types of bacteria, we commonly talk of thousands but nobody really knows. There are probably 400 or 500 dominant ones but even with our current sophisticated molecular techniques, we can only guess how many more there are in lower abundance."

So while feed salespeople can talk about boosting 'good' microbes through probiotics or prebiotics, in a recent paper, Van Kessel and two of his colleagues from Freie note there is no silver bullet when it comes to animal nutrition. Rather, they argued, the goal should be, through both nutrition and husbandry practices, to create "a well-balanced gut environment."

"This is a very interesting area for me," says Starke.

"In Germany, for example, using antibiotics is not allowed (for livestock production) except when they are needed for medical treatment, so things such as probiotics are seen as a prospect for dealing with animal health and care."

Wang echoes those comments, adding that their area of research has implications beyond just the livestock industry.

"The reason I chose to study in this field is because it can produce benefits for both human and animal health, and because it can help reduce antibiotics in both feed and the environment, and lead to green production," says Wang.

Both also say it's fascinating work because there is so much to discover. And because of the challenges of charting this vast microbial world, researchers aren't afraid to take creative approaches. Starke, for example, spent five years studying soil microbiology at the University of Vienna before diving into probiotics. While the study of soil and a pig's gastro-intestinal tract may seem worlds apart, it makes perfect sense to scientists such as Van Kessel.

"We require an inter-disciplinary approach to unravel what's going on," says Van Kessel, noting that's why collaborating with and visiting fellow researchers is so helpful.

> "IT'S GOOD TO SEE HOW PEOPLE ARE APPROACHING A PROBLEM FROM A DIFFERENT DIRECTION. THAT CAN INSPIRE FRESH THINKING AND NEW APPROACHES."

That's a huge challenge, but also a stimulating one. Freie has 15 research teams investigating "nutrient-microbe-host interactions" in pigs alone. PhD student Jing Wang, who came from ShaanXi Province in central China to study under Van Kessel, had a chance to join one team earlier this year. She's looking for ways to 'encapsulate' probiotic bacteria (sort of like the cold medication Contact C) so they can reach an animal's intestine without being killed by oxygen or stomach acid.

"There is a large probiotic research project at the institute, that's why I went to Berlin," says Van Kessel. "There was funding from the German government in this project for student exchanges. So Jing was able to have her travel paid for and receive a stipend while she studied for four months."

Freie PhD student Ingo Starke tapped into the same program to fund his travel expenses so he could follow Van Kessel back to Saskatoon. He's trying to uncover the mechanism by which probiotics help animals resist disease.

"You find that some things you are doing are the same and that gives you confidence that you're going in the right direction. At the same time, when you've been beating your head against the wall, it's good to see how people are approaching a problem from a different direction. That can inspire fresh thinking and new approaches."

For now, Canadians can feel pretty confident that there's an ample supply of affordable oil and gas to fuel their cars, heat their homes and generate electricity. And hog and other livestock producers can count on retaining antibiotics in their production toolkit.

But in the future, the game may change. And the research being done today by Van Rees, Van Kessel and their colleagues here in Saskatoon, and abroad, will help to ensure we are where we need to be.

Lightbulb moment

BRENT ZETTL DISCOVERED MICROPROPAGATION WHILE RESEARCHING A TERM PAPER. TODAY THE U OF S AGRONOMY GRAD AND HIS CUTTING-EDGE COMPANY ARE PRODUCING PLANT-MADE PHARMACEUTICALS

By Glenn Cheater

There were days when Brent Zettl might have wished he hadn't found his ag courses so interesting.

Zettl was a bit older, 24 and already a father of two, when he enrolled at the College of Agriculture and Bioresources. Partying certainly wasn't a priority and even marks were somewhat secondary. What captivated the agronomy major was the potential —and potential business opportunities —in the rapidly advancing world of plant sciences. So in 1988, just two years into his studies, he and another student founded Prairie Plant Systems Inc.

"We could see a real opportunity in biotech and how it would create new markets," says the Class-of-90 grad. "We were enamoured of the whole science arena and what science could do."

Thanks to its expertise in biosecure growing chambers and plant technology, Prairie Plant Systems (www.prairieplant.com) would later garner international media attention by winning a federal government contract to grow medical marijuana in a mine near Flin Flon, Manitoba. But its real focus is on bioengineering plants to produce pharmaceuticals. For example, it has created a legume that produces adenosine deaminase. People who have a deficiency of this protein have compromised immune systems, the so-called bubble boy disease. Clinical trials of plant-produced ADA are underway and other transgenically produced proteins are in development. The company employs more than 50 people in Saskatoon and another seven at a subsidiary in Michigan.

But that's now. The magic moment came 23 years ago when Zettl was researching a paper for a plant physiology course and came across a paper on micropropagation of plant tissue.

"I was just fascinated," recalls Zettl. "How could you grow a plant in a test tube and make multiple copies without it even having roots?"

Fascination quickly turned to inspiration, and the two students concocted a can't-miss plan: Clone high-yielding, prairie-hardy saskatoon trees and help start a new small-fruit industry on the Prairies.

"We thought this would be a big new-generation crop, and we'd be able to move half a million trees a year," recalls Zettl. "But we only did one-tenth of those sales."

It was then that Zettl earned a second degree in the school of hard knocks.

"I learned necessity is the mother of invention, but cash flow is the father," he says with a laugh. "And father spoke many times in those early years."

Worn down by the grind, the partner departed but Zettl carried on—still seized by biotech's potential, especially bioengineering plants to produce pharmaceutical proteins. The big plant-science companies were focused on doing that with corn but Zettl believed, correctly, the risk of contamination in open-field growing was too great. So when a Flin Flon mining company was searching for a company to build growing chambers in an unused portion of a mineshaft for vegetable production, he aggressively pursued the contract. The deal he struck included access to part of the chamber for research.

"We then started looking for a project that would get the attention of the pharmaceutical companies by highlighting the advantages of a contained facility for these types of designed plants," he says. "So when the federal government put out a tender for growing medical marijuana, we said, 'Hey, that's the project for us.'"

The marijuana contract quickly made a name for the company, and helped launch its entry into the plant-made pharmaceutical business.

"The rest, as they say, is history—but those early years were really tough slogging," says Zettl. "We could see the potential but we had to find a way to pair the prospects with real markets."

Today, Zettl's company continues to conduct research, as it has since its founding, at L.F. Kristjanson Biotechnology Complex. And the passion first kindled at U of S continues to burn, he says.

"The courses I took really inspired me. I was excited by the science but also the potential—if you combined it with a little innovation—to create a business from it." ■

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Centennial events

JOIN US IN CELEBRATING 100 YEARS OF GRADUATES AT THE COLLEGE OF AGBIO

- **Centennial Kick-off - Friday, January 6 @ College of AgBio**

  Faculty, staff and students are invited to hear Dean Buhr commemorate the centennial year and retire the Senior Stick being placed in a display case.

- **SAGA Reunion - Saturday, January 7 @ TCU Place**

  The weekend events include tours of the Agriculture Building as well as the annual hockey and curling tournaments. For more information and registration please visit saskaggrads.com.

- **Open House - Friday, June 22 @ College of AgBio**

  College tours will be available and displays will be set up to showcase endeavours from within the college. Everyone is welcome to come and learn about the College of Agriculture and Bioresouces.

- **SIA BBQ - Friday September 14 @ College of AgBio**

  Students, staff and faculty are invited to attend the special centennial celebration at the annual Saskatchewan Institute of Agrologists BBQ.

- **Centennial Column in the Western Producer for 2012**

  Watch for weekly features about the history of the college, and current research and discoveries at the College of AgBio.

For more information visit agbio.usask.ca/centennial or contact Trina Mortson at (306) 966-4063.

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