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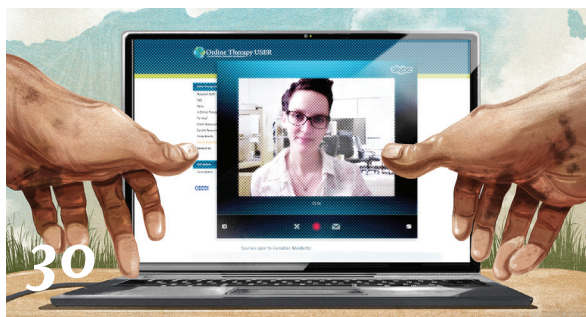
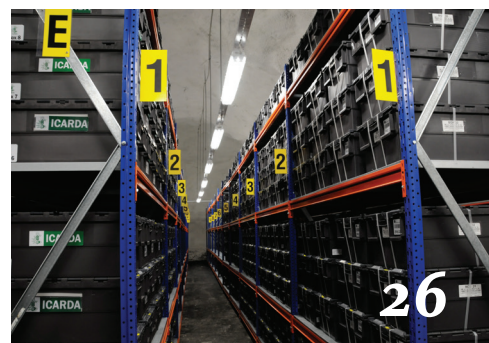
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Alberta Barley





Give and take

SOCIAL LICENCE IS NO LONGER A GIVEN

MORE AND MORE CONSUMERS ARE becoming curious about food production. This is an important development, since it's the consumers who ultimately pay farmers by purchasing the food they grow. Yes, the path from farm to table includes a number of intermediaries that obscure that connection, but it remains a relatively straight line. This vital connection depends on trust—a trust that has been taken for granted by the agriculture industry in the past. The good news is that the bulk of Canadian consumers still do trust farmers. But consumers also want to know that farmers are being sustainable—in all aspects of the word's constantly evolving definition. If farmers want to make sure consumers maintain their level of trust in our food system, then both sides have to find a middle ground of understanding.

The very popular government initiative Alberta Open Farm Days brings out thousands of people from cities big and small across the province every summer. Each year, the number of attendees increases as interest in farming rises. People have taken stock of the food they eat and have a growing interest in the behind-the-scenes work of agricultural production. The new normal is that urban consumers' identities are more connected to their food and how it is produced than ever before, whether the agriculture industry accepts it or not.

This shift puts a greater burden on the average farmer. When global multinationals set sustainability measures and goals while making lofty claims about the types of foodstuffs they will source, the buck always stops with the farmer. The onus now falls on them to prove that

the way they farm is in line with the public image put forward by large companies like Unilever, Walmart, McDonald's and McCain. Buying foods made with a myriad of voluntary labels makes consumers feel confident in the food system, but it has also fundamentally changed the way that many operations function to meet label criteria.

On the other hand, many farmers had been holding themselves to the high standards these labels and certifications demand long before they even existed and this is a fact that should be celebrated. Farmers can, and should, show the average consumer that their practices are ethically and environmentally sound in order to cut through the misinformation that swirls in the media and circles of public opinion.

This is not only beneficial to farmers, but it's quickly going to become a standard practice. It's simply not feasible to roll your eyes at consumers and ignore their questions, concerns and deep-seated beliefs. If you want your voice to be heard and acknowledged, you must grant them the same courtesy.

According to a recent survey by the Canadian Centre for Food Integrity, 50 per cent of Canadians do not know whether Canada's food system is headed in the right direction. Much of this is likely attributed to a lack of basic knowledge about agriculture and food production, as 93 per cent of respondents also said they know "a little," or "very little" or "nothing" about what goes on in a farmer's field. That's an alarming number given the influence those same consumers have on how the ag industry functions.

By taking time to make your farm as

open and transparent as possible, you will gain the all-important social licence that the food system demands. In the past, that social licence was granted based on an implicit promise that on-farm practices were above board, but today's consumer asks for more in return. It's possible that the knowledge gap between consumers and producers is the largest it's ever been. Yet, many consumers are ready and willing to learn. As an industry, we just have to meet them halfway. ■





NEW WIREWORM TRAP DEVELOPED IN P.E.I.

CLICK BEETLE TRAP OFFERS HOPE FOR CONTROL



Photo: Christine Noronha

The trap works by using a solar-powered light to attract click beetles, which are the adult stage of wireworms.

MENTION “WIREWORMS” TO producers across Canada and watch faces fall.

The pest, which is the larval stage of the click beetle, causes millions of dollars in damage annually to Canadian cereal and potato crops.

“Wireworms are a huge, huge problem across the country,” said Christine Noronha, a researcher with Agriculture and Agri-Food Canada (AAFC) based in P.E.I.

In cereals and canola, wireworms are controlled at the larval stage with neonicotinoid seed treatments. In potato crops, they can be chemically controlled with Thimet 20-G insecticide applied using SmartBox technology. But no adult click beetle control measures existed—until now.

This spring, Noronha unveiled her Noronha Elaterid Light Trap (NELT) at P.E.I.’s Wireworm Research and Extension Seminar. The simple in-field mechanism uses a solar-powered spotlight to attract and trap adult click beetles.

“The spotlight shines into this 16-ounce glass with a white surface that reflects the light. The glass is buried in the ground, and the rim of the glass is flush with the surface of the soil, so the light shines around the cup. The beetles are attracted to the light and move toward it, and they fall into the cup,” she explains.

Noronha said she got the idea for the trap when she was young, but couldn’t find an appropriate light source until she came across the solar spotlights in a hardware store last year.

She took 10 NELT prototypes out to a

potato field, and over the course of six weeks trapped an astonishing number of click beetles—9,320 in total, 60 per cent of which were male and 40 per cent female—which prevented the births of around 600,000 wireworms.

Based on the surprise success of Noronha’s initial trial, AAFC’s Office of Intellectual Property and Commercialization has trademarked the trap name and issued a request for proposals for manufacturers who can build and market the traps by late winter 2017.

“We still have to do a lot of research, but because of the sheer numbers of my catch in the trial, I thought—because this insect has a five-year life cycle—it’s best to tell the growers now so that we are a little bit ahead, instead of waiting until we’ve done all the research,” she said.

Scott Meers, an insect management specialist with Alberta Agriculture and Forestry, said wireworms are emerging as a complicated problem in the province. “We have fields where there are very few wireworms, and fields where there is a perennial issue,” he said. “We have areas where producers are struggling mightily to get a good crop stand due to wireworms.”

Meers said Alberta producers would welcome the NELT—if tests prove that it works in Alberta conditions. Research will be required to determine which click beetle species cause problems in which areas. “There may be some concepts there that we have to apply each time we move into a new area and look at our species and conditions,” he said.

Currently, Alberta growers rely on seed treatments and crop rotation with resistant varieties to control wireworms, with only limited success.

“You have to prove an integrated pest management tool in each area before you can get excited about recommending its use, but wireworms are a tough one to deal with so it would be great if we had more tools,” Meers said.

Noronha and her colleagues are currently testing the NELT in locations across Canada to gather data on species by region and best modes of use.



STOP, DROP AND ROLL

IN THE WAKE OF FORT McMURRAY DISASTER, WILDFIRE PREPAREDNESS ON FARMS IS A MUST



Photo: iStock

Although farm and ranch wildfires are not common in Alberta, it is still important to have an emergency action plan at the ready.

APRIL SHOWERS—OR LACK THERE-of—brought May wildfires instead of flowers this year to the residents of Fort McMurray. The tragic natural disaster burned through almost 1.5 million acres of land, according to a report by the provincial government, costing hundreds of millions of dollars and triggering the largest fire evacuation in the province's history.

Doug Forge, an emergency management officer with Alberta Agriculture and Forestry, said that wildfire threats to Alberta farms and ranches are, thankfully, not common.

"The most frequent threat is in the spring before green-up and in the fall when we've got a lot of dried vegetation on the ground, but we don't hear that often of actual threats to farms and ranches,"

Forge said. "This spring was a little unusual because we were under almost drought conditions, very dry throughout the forest protection area, so that was an extra hazard."

However, as outlined by the province, farmers and ranchers should have an emergency action plan in place.

"Option one is decide whether you can shelter in place," Forge said, "and if you figure you can, have that mapped out. Second option would be to have an evacuation plan where you're actually going to evacuate your animals and your family and leave the acreage or farm. And the last resort, if you've got one of those [wildfires] that's really fast-moving and comes upon you unexpectedly and you haven't had time to evacuate the animals, just free the animals

and let them fend for themselves."

He added that you should have a "72-hour kit" ready for grab-and-go purposes to keep your family comfortable for a few days if necessary. And, of course, prioritize family before livestock.

"There's a really good program out here run through our forestry division called FireSmart," Forge said. "It covers all sorts of things about 'FireSmarting' your home and acreage.

"They have good tips on dry grass, grain fields, hay fields, pasture lands. They also talk about ditches, the threats posed by feed storage, and about granaries, barns and unused land."

Contact your local fire department to get more material on FireSmart and to have your property assessed.

GOLDEN YEARS

ICONIC CANADIAN POTATO REACHES IMPORTANT MILESTONE

REVERED BY CHEFS, FOODIES AND potato growers alike, the Canuck born-and-bred Yukon Gold potato celebrates its golden anniversary in 2016.

For 50 years the yellow-skinned variety has been mashed, scalloped, baked and roasted, and we have one Guelph, ON, potato breeder to thank—the late Gary Johnston.

“The timing of it was right,” said Vanessa Currie, a potato breeder and member of the University of Guelph’s potato research program. “It was just as people began to experiment more and become more open to different foods, and different cultures as well.

“Up until that point the potato had simply been sustenance on the plate, it was just a basic filler for the population.”

Johnston created the variety in 1966 in response to the large number of European immigrants migrating to Canada. These new Canadian farmers wanted a yellow-fleshed potato like the ones they grew up on back home.

Johnston hoped to “produce a useful, yellow-fleshed potato variety which at least would be welcomed by our new Canadians from Europe,” he wrote in a 1998 letter about the vegetable’s inception. “I suggested the name Yukon (for the Yukon River and gold rush country) and Charlie Bishop suggested we add the word Gold so it officially became Yukon Gold.”

In another letter, this one from 1992, Johnston highlighted the role of brand recognition and good publicity in the potato’s success: “Yukon Gold was the first Canadian-bred potato variety to be promoted, packaged and marketed with its name right on the pack. It also received excellent promotion by the media and by magazines.”

Currie had the opportunity to work with Johnston for two years in the early ’90s when he agreed to come out of retirement to fill a gap in the University of Guelph potato breeding program.

“Gary was very generous in terms of his knowledge and his time and his wisdom,” she said. “He conducted his own private breeding at home even after he was retired. He had a greenhouse on his plot. He was passionate about it... He had a really good eye for his crop in terms of recognizing a variety that had something special.”

The Yukon Gold is assuredly something special. In accordance with all three metrics used to measure culinary quality—appearance, texture and flavour—it is exceptional.

The potato breeding industry is constantly evolving, Currie said, with new varieties emerging every year. However, even though the potato market is extremely diverse, it doesn’t look like any one variety will be eclipsing the Yukon Gold anytime soon.

On Prince Edward Island, Canada’s potato powerhouse, the Yukon Gold continues to be grown, even as newer varieties with beneficial characteristics have been developed.

“Yukon Gold has been an important part of the mix of P.E.I. varieties for many years,” said Mary Kay Sonier, seed co-ordinator for the Prince Edward Island Potato Board. “The recent introduction of many yellow-flesh potato varieties that have improved production characteristics for growers, such as greater yield and improved disease resistances, has led to reduction of Yukon Gold acreage over recent years. However, Yukon Gold is still grown on P.E.I. by producers who supply a



Photo: Nick Murphy

Yukon Gold potatoes have become a mainstay in the kitchens of chefs and home cooks alike.

niche market supported by loyal customers of the variety.”

In the cultural mosaic that is Canadian society, we take pride in combining elements of the “old” to create an inclusive “new.” In 2016, 50 years after it was first harvested from the soil, the Yukon Gold potato acts as a powerful symbol of Canadian identity and a representation of our societal values.

“By developing a variety to suit the taste of new Canadians, it opened the door to other crops and other potatoes to develop things for newcomers and expanded the palate of Canadians,” Currie said, adding that without the Yukon Gold, “we might not have the great diversity in Canadian food that we have.”



GRAIN UPGRADE

INDUSTRY SUPPORTS PUSH FOR CGC MODERNIZATION

SEVERAL SECTORS OF THE

Canadian grain industry are hoping the current federal government will follow through with longstanding plans to modernize the Canadian Grain Commission (CGC) after the latest bill to revamp the Canada Grain Act died on the order paper prior to the 2015 federal election.

Efforts to modernize the act, which is administered by the CGC, have been ongoing for more than a decade. While there have been amendments to the act over the years, there has been no major review since 1971. Two previous modernization bills, Bill C-39 and Bill C-13 (tabled in 2007 and 2009, respectively), were also introduced during Conservative governments, but fell victim to election writs just as Bill C-48 did last fall.

While Bill C-48 contained 92 clauses, it didn't propose a major overhaul to the CGC, said Jim Smolik, acting chief commissioner. However, it did include three important changes to better serve the Canadian grain industry that the CGC would still like to see implemented: enhanced producer protection, enhanced grain quality and safety assurance, and increased clout and more options for the CGC when dealing with violators of the act. The CGC has requested new modernization legislation from the federal government, but has left the matter in the hands of Agriculture and Agri-Food Minister Lawrence MacAulay for consideration.

Smolik said there was a clause included in Bill C-48 to extend the right of "subject to inspector's grade and dockage" to include grain processors and grain dealers. Currently, if a farmer delivering grain to a licensed grain company doesn't agree with the grade the grain receives, the farmer can request a ruling by the CGC to determine an official and final grade. As part of any modernization bill, the CGC wants to extend this right to cover deliveries to

licensed processing facilities, grain dealers and container loading facilities. It would also like to see a new class of licence created to cover these container facilities.

The act amendments included in Bill C-48 also asked that a fund be created to compensate producers when a licensee fails to pay for a grain delivery. Right now, each company is required to carry a bond, but there have been cases where the bond is insufficient. The

broader compensation fund would create a larger pool of money from which to draw.

Organizations representing agricultural producers and commodities also welcome plans to amend the Canada Grain Act and modernize the CGC. But in addition to the changes the CGC would like to see, these organizations have a few suggestions of their own.

Rick White, CEO of the Canadian Canola Growers Association (CCGA), said the CCGA has a number of changes it would like to see. Key among these changes would be a move to shift part of the CGC's operating costs off the shoulders of the Canadian grain industry and onto general government revenues.

"We support the CGC, but a big part of its role is to protect the reputation of Canadian grain, protect the reputation of Canada," White said. "The maple leaf means something on an international scale. Its role provides a lot of public good. We feel that, rather than the grain indus-

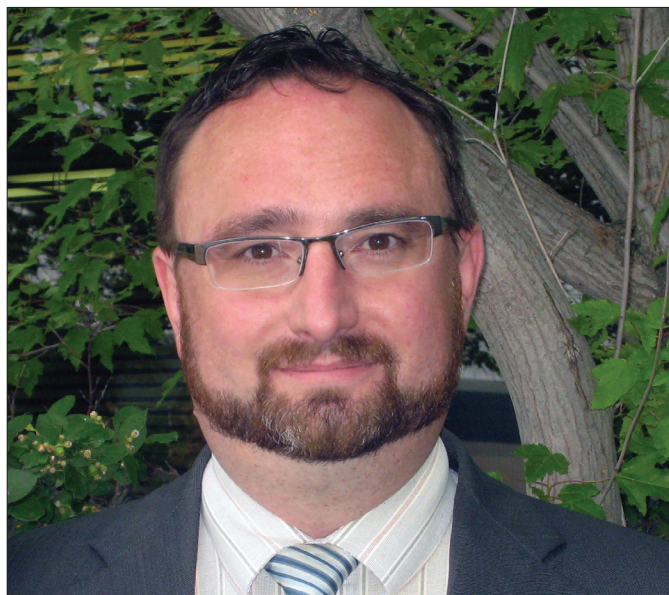


Photo: Cereals Canada

try carrying the full burden of cost recovery, we need to look at the public-good aspect and draw support from the general tax base as well."

Cam Dahl, president of Cereals Canada, would also like to see specific changes included in any legislation to modernize the Canada Grain Act that go beyond the scope of Bill C-48.

"One of the changes Cereals Canada would like to see is the removal of a trade irritant between Canada and the U.S., allowing U.S.-grown varieties registered in Canada to receive Canadian grades when delivered to Canadian elevators," said Dahl. Currently, any U.S. wheat coming into Canada, for example, is automatically graded as feed. Even if it is of high quality and could be used for milling, it receives the lower grade. This downgrade doesn't go unnoticed by U.S. suppliers.

"Reducing irritants like this will facilitate trade, help keep the border open and benefit farmers," said Dahl.

SOWING KNOWLEDGE

NEW CENTRE HOPES TO BUILD PUBLIC TRUST IN CANADA'S FOOD SYSTEM



Photo: Farm & Food Care

Crystal Mackay, CEO of Farm & Food Care, speaks at the launch of the Canadian Centre for Food Integrity.

THERE'S A DISCONNECT BETWEEN what's happening in Canadian agriculture and what Canadians *think* is happening in Canadian agriculture. To help Canadians better understand what's going on in the fields and what ends up on their plates, a new food centre was launched this spring.

The Canadian Centre for Food Integrity (CCFI) is a division of Farm & Food Care, an Ottawa-based national organization that aims to build public trust in food and farming. Crystal Mackay, the CEO of Farm & Food Care, was personally involved in the creation of the new centre. According to Mackay, the centre collects data to get a true understanding of Canadian consumers and their perceptions of Canadian food and agriculture. Farm & Food Care then uses that data to connect with Canadians and have an honest, transparent conversation about agriculture and food. In a nutshell, the CCFI works together with Farm & Food Care to dispel food and agriculture myths, and to let Canadians know what's actually happening and why.

The CCFI surveyed 2,510 Canadians in February and March to provide benchmark data for its report, *2016 Canadian Public Trust Research*. The survey measured consumer concerns, gauged their attitudes toward Canadian agriculture and food, and identified Canadians' main sources of information.

The survey found that Canadian consumers' overall impression of agriculture is at a record high since 2006, but there are concerns that need to be addressed. Canadians are highly concerned about humane treatment of animals, environmental protection and food safety. Top food concerns included the use of hormones and antibiotics in farm animals, and the use of pesticides in crop production. Interestingly, 93 per cent of survey respondents self-assessed as knowing little or nothing about farming practices.

More than 90 per cent of respondents said their top three information sources were websites, Google and social media. Because credible information on food and agriculture isn't always easy to find,

Mackay said the first step to improving public trust is improving the online presence of credible information. "We are populating three websites with credible content: Best Food Facts, Virtual Farm Tour and The Real Dirt on Farming," Mackay said. "Between those three resources, there is literally an answer to every question every Canadian should ever have about the food on their plate."

The CCFI will conduct this research every year and continue to measure the benchmark data to monitor progress and re-evaluate Canadians' opinions of food and agriculture.

Another way the Centre is beginning to improve trust is through direct engagement with key target audiences, including dietitians, food bloggers and science writers.

Rob McNabb, general manager of the Canadian Cattlemen's Association, believes that the CCFI will do a great service for Canadian agriculture's perception among consumers.

"The public is much more removed from the farm than at any other time in our history," said McNabb. "The public doesn't necessarily understand what all is done to produce the food that is so abundant. We need to demonstrate that what we do—and why we do it—is both safe and sustainable."

Mackay is also optimistic about the impact the centre could have on the Canadian agriculture industry: "I think, before now, there wasn't the co-ordinated effort we really needed to have a conversation with Canadians who had questions," she said. "Now, working together, we can truly make a bigger difference and help shape food for the future."

David Smith has been brought on board as the business development lead for the CCFI. Smith's extensive food industry experience includes management roles with Sobeys and McDonald's in Canada, and Whole Foods Market in the United States. He is currently working to build the CCFI brand and membership base by meeting with potential funding partners in the food industry and helping current CCFI members to make the most of the centre's resources.



BUMP IN THE ROAD

CHINA CREATES OBSTACLES FOR CANADIAN CANOLA

Photo: Canola Council of Canada



China is Canada's No. 1 customer for canola exports, with annual trade worth billions of dollars.

NOT ALL TRADE ISSUES ARE WORTH the worry—in our complex global system of international trade, the odd snag is to be expected. But when the trade at stake is worth billions of dollars to Canadian canola growers, let the fretting begin.

The concern centres on new dockage regulations and policies around the herbicide quinclorac that could impact Canadian canola exports to China.

“Last year, we exported \$2.6 billion to China just in canola seed,” Canola Council of Canada (CCC) president Patti Miller said. “We sell 40 per cent of our seeds to the Chinese, so it’s a hugely important market.”

Canada’s trade stake in China doesn’t end with canola either.

“We ship a number of other commodities to China as well, such as wheat, barley and pulses,” said Jim Smolik, acting chief commissioner of the Canadian Grain Commission (CGC). “Maintaining a healthy trade relationship is critical to Canada.”

Chief among the worries for canola producers is that on Sept. 1, 2016, the Chinese reduced allowable dockage, which

is the readily removable foreign material that is extracted in the cleaning process.

“One concern that China has identified is that dockage is a vector for transmission of blackleg [a disease of canola and oilseed rape that can cause significant yield losses],” said Randy Dennis, the CGC’s chief grain inspector for Canada. “They are therefore lowering dockage from 2.5 per cent to one per cent.”

While the change is recent, dockage has been an issue for some time.

“We’ve been working with China since 2010 on their concerns about blackleg and how to mitigate the risk of transmission,” Miller said. “Extensive studies last year showed that lowering the dockage level from 2.5 per cent did not lower the risk.”

During the summer, a group from China was invited to tour terminal elevators in Vancouver and primary elevators near Winnipeg, and to view things at the farm level, Dennis said. The tours were designed to demonstrate how the product is handled at the elevators and what the producer does on the farm, with the hope that transparency will reinforce trust.

The other issue plaguing the canola trade relationship between the two countries involves the herbicide quinclorac, which helps control cleavers in canola. China currently lacks a maximum residue limit (MRL) for quinclorac, so it defaults to zero tolerance.

“In agriculture, you can have approval to use a product in Canada, but if it’s not approved or governed by an MRL in your key export markets, you are putting those markets at risk,” Miller said.

To address the problem, the CCC is encouraging the establishment of an MRL for quinclorac through the Codex Committee on Pesticide Residues, an international body responsible for setting MRLs for pesticide residues in specific food items or groups of foods.

“China has typically accepted the recommendations of Codex, so we hope this will offer more certainty to exporters dealing with the Chinese market,” Miller said.

If an MRL is not set soon, growers can still combat cleavers without quinclorac through integrated weed management. “Cleavers are harder to control at the three- or four-whorl stage; early weed control is important,” said Ian Epp, an agronomy specialist with the CCC.

According to Epp, a pre-seed burn-off is the most effective way to control cleavers, and managing them in rotation is the best long-term approach.

Regardless of how the dockage and quinclorac issues are resolved, Miller stressed an important takeaway message: “Whether it’s new varieties or new crop-protection products, everyone wants farmers to benefit from the latest technology. At the same time, we must always be mindful of what our customers need and address those needs while respecting their decision-making process.”

FRESH WATER

ALBERTA IRRIGATION RESEARCH GETS A BOOST



Photo: Lethbridge College

Willemijn Appels, Lethbridge College's new Mueller Applied Research Chair in Irrigation Science, came to the college from the University of Saskatchewan and originally hails from the Netherlands.

LETHBRIDGE COLLEGE HAS A NEW research chair in irrigation science—the school's first-ever fully funded applied research chair.

Willemijn Appels joined Lethbridge College earlier this year to fill the position, which is paid for by a \$3.1-million gift from Lloyd and Dorothy Mueller, announced in 2014, and \$1.9 million in additional funding from the college. Appels, who is originally from the Netherlands, came to Lethbridge from the University of Saskatchewan, where her work focused on hydrological processes at reclamation sites in the Alberta oil sands. So far, her work in Lethbridge has centred on soil dynamics in canola using different irrigation methods and finding ways to allow for more advanced water management practices on farms.

"It is great timing to become part of the college as it is ramping up its applied research program," Appels said. "There is a lot of support available that will hopefully translate into relevant and innovative research projects."

Irrigation is critical for Alberta agriculture, as the province contains 67 per cent of all the irrigated land in Canada. Even though less than six per cent of Alberta's farmland is irrigated, that land contributes more than 19 per cent of the province's gross primary agricultural production. Lethbridge County, in particular, has gained a reputation as the irrigation capital of Canada, with more than 297,000 acres of irrigated land.

Appels' colleagues at Lethbridge College are excited to see how her research program will benefit the vibrant irrigated

agriculture industry throughout southern Alberta.

"After working with Willemijn for a short amount of time, it's easy to see that she has a scientific mind and a desire to understand and solve problems," said Jeff Bronsch, irrigation industry liaison at Lethbridge College. "Her approach to develop a deep understanding of irrigated agriculture and her role as the Mueller Applied Research Chair in Irrigation Science is a great opportunity to move the industry forward in many different areas."

Over the course of her first few months at Lethbridge College, Appels has branched out to create positive relationships with the key industry partners and producers she will be working closely with throughout her irrigation research.

"Willemijn is eager to dig in, get her hands dirty and contribute to the agriculture community through her research," said Ken Coles, general manager of Farming Smarter. "We are thrilled to have the opportunity to work with her and wish her much success."

Now that she is established in her new role, Appels is ready to put her expertise and new producer and industry relationships to work in order to drive innovation in the field of irrigation science.

"I have been fortunate to meet some wonderful people in and around Lethbridge who work in irrigation," Appels said. "Producers, businesses, irrigation district people, government researchers—there is a wealth of knowledge and experience in this region and an enthusiasm to explore new technologies as they emerge. Figuring out how we can really optimize water use in agriculture with all available and advanced technology is a complex issue that will keep me busy for the coming years."



GROWING CHANGE

UPOV '91 AND THE FUTURE OF THE CANADIAN SEED INDUSTRY



Photo: Rob McMorris

Glen Logan, president of the Alberta Seed Growers, on his farm near Lomond, AB.

MORE THAN A YEAR AFTER THE passage of the Agricultural Growth Act and ratification of the 1991 Act of the International Union for the Protection of New Varieties of Plants (UPOV '91), which strengthened intellectual property protection and plant breeders' rights, seed growers are starting to see the change in their industry.

The reaction to the new legislation was almost immediate, including the announcement of a joint venture between Canterra Seeds and French company Limagrain Cereal Seeds, the fourth-largest seed company in the world.

"The new environment is going to allow for a lot more outside investment from other countries," said Trent Whiting, Se-Can's marketing specialist for Alberta and British Columbia. "The rest of the world held back on plant breeding in Canada because they were worried about intellectual property. There was a huge change right

after it passed. Now we're getting sources of genetics from all over the world asking us if we want to try different varieties."

As public research dollars become harder to find, many tout the influx of outside investment and genetics as a boon for the industry—leveraging partnerships to help Canadian growers maintain or, in some cases, secure a competitive edge.

"It still has to be seen how UPOV '91 is going to be fully implemented, but we expect that the changes will be positive for us if our program is competitive," said Flavio Capettini, barley breeder and head of research at Alberta Agriculture and Forestry's Field Crop Development Centre in Lacombe. "We can already see an increase in competition among the programs."

Others worry that the shift to private investment will limit opportunities for independent growers to remain competitive.

"There are going to be more contract growers because of the investment compa-

nies are putting into breeding programs," said Kelly Chambers, executive director of the Alberta Seed Growers (ASG). "If we don't pay attention to details and pay attention to the whole value chain, seed growers could be left out as individual businesses."

While the availability of plant genetics is the most visible outcome of UPOV '91 and the Agricultural Growth Act, they also affect the way that changes will be made to the seed industry in the future.

"The UPOV '91 amendments are important at two levels. First, they are having an immediate impact on how people look at innovation and how to support it," said Glyn Chancey, executive director of the Canadian Seed Growers' Association. "With the amendments there are also some new authorities that will allow the commissioner [of the Plant Breeders' Rights Office] to make adjustments through regulation, not just legislation, which means they won't require parliamentary approval."

According to Chancey, these new powers pose the greatest risk to seed growers.

"There's a risk that the seed growers' associations could be outweighed politically if we don't engage and build consensus with others inside and outside the seed industry—that if we don't stay relevant, then our views will be discounted and we won't be able to effectively influence decisions," he said.

ASG is currently engaged in a member outreach initiative to ensure it is aware of growers' top concerns and priorities so their views can be properly reflected within the organization.

"There's going to be a lot more change with UPOV '91 coming through, and federal and provincial governments cutting back on agriculture research as well. We need to know what's important from our growers so we can put our stake in the ground," said Chambers, who is leading the push to get Alberta seed growers involved. "Government regulators can change the rules of engagement, so it's important to pay attention to the details so we know how to make it work. It could make or break the seed grower industry." ■



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Bug ace

AAFC entomologist
outsmarts her
opponents at the table
and in the field

BY ELLEN COTTEE • PHOTOGRAPHY BY
ROB McMORRIS

Person: Haley Catton

Place: Lethbridge, AB

Thing: Battling the bugs that plague
Alberta's crops





A COMPETITIVE TABLE TENNIS PLAYER, A WINNIPEG Blue Bombers fan and now a plant entomology researcher at Agriculture and Agri-Food Canada's (AAFC) Lethbridge Research and Development Centre, Haley Catton is not one to shy away from a challenge.

Growing up near Winnipeg, MB, Catton never thought she would leave her home province. Her love for Manitoba's farm culture and her passion for being outside in nature led her to pursue her B.Sc. in agriculture and M.Sc. in plant science at the University of Manitoba. Catton, however, eventually did leave Manitoba for British Columbia—she worked on her PhD in biology at the University of British Columbia's Okanagan campus in the winters and conducted research at AAFC's Lethbridge Research and Development Centre in the summers. When she finished her PhD research, AAFC hired her on full time.

Only six months into her new job, Catton couldn't imagine working anywhere else. "I can't believe how lucky I am to actually work here now, permanently," she said. "This is a dream come true."

GrainsWest: How did you get from plant systems to field crop entomology?

Haley Catton: My PhD was a plant-insect interaction project. I was studying a biological control insect that was released to control a weed, so the insect in that case was a good guy, and I was studying the impact of that insect on the weed. Crop entomology is the same thing—you're studying the impact of insects on plants, but in this case the insects are the bad guys ... Basically, the kind of research I do is figuring out what the insect is vulnerable to, whatever its Achilles heel is in its life cycle, and same thing with the plants. It's kind of like being a private investigator, asking "Where is this insect vulnerable? How can I control it?" It involves really getting up close and personal with the insects and the plants. I love that.

GW: What's the most interesting insect you've studied?

HC: Well, my PhD insect was my favourite. It's called *Mogulones crucifer* and it's fascinating because it was released in Canada as a biological control insect, but not in the United States. They outlawed it in the U.S., so in Canada the insect is a good guy, but in the U.S., where the insect is travelling naturally, it's a bad guy. There are a lot of cool social issues that come along with that project, and the insect is very effective, which is awesome. It's like a seek-and-destroy insect. It finds its weeds ... eats them and kills them. My PhD was about how it affects its target weed and also non-target plants. There was some concern that it might affect some related non-target plants, but we didn't find any evidence for that in my investigation, which was the biggest of its kind. It's good news.

GW: What solutions can be investigated in controlling pest populations that are harmful to crops?

HC: The first thing is you need to know the biology of the pest, the life cycle, where it lives, when it's active, what kind of damage



GAME ON: An avid table tennis player, Catton brings the same competitive spirit to her work at the Lethbridge Research and Development Centre.

it does. For some pests that's already known, and for some we don't know that yet. That's step one, figuring out what the pest is and how it behaves ... That usually takes years because you need to go through a couple generations to see how fast they grow, how many eggs they lay.

I'm working on integrated pest management, which means using a number of different approaches to control a pest. You may use something like resistance crop varieties and combine that with maybe planting your crop a little bit earlier than normal, and, if you have to, use insecticide or maybe biological control—it's not just relying on one method. Integrated pest management is about using a number of tools to hit 'em where it hurts, from multiple angles.

Another thing I will be doing once I get more into the program is economic thresholds, which means you might have a low number of pests in the field and if you spray the field, it will cost you money for the spray. But the pest wouldn't have cost that much in damage if you had just left it. We want to figure out how much damage you need before it becomes economically worth it to spray ... If the insect isn't doing much damage, then you're wasting money by spraying. Not only that but you're

killing all the insects in your field and there's a whole bunch of beneficial ones in there too, like natural predators and even spiders. So you don't want to spray those guys out because they're the ones [who are] going to be eating any pest insects you have. We try to determine when it's smart to spray—when it's worth it.

GW: Sustainability is a big topic for producers right now. How does crop management come into play with sustainability?

HC: That's huge. In talking about integrated pest management, that's very related to sustainability because it may not be sustainable to only use insecticide. Insects can develop a resistance to insecticide, so if you use multiple strategies ... then you're going to slow down any resistance in the insects. That makes our current practices sustainable in the long run. If we only use spray, then we're going to lose the power of the spray, and then what are we going to do? Integrated pest management is the best way we know to go forward sustainably.

I like the term "life hacking," and this is kind of like hacking biology. We're trying to find out what is the hack we can use on this insect population—how can we control it in the best, quickest way? To do

that, you have to know your system inside and out.

GW: Rumour has it you are a competitive table tennis player, yes?

HC: Yes! That's another thing about Lethbridge I love. There's a table tennis community here. At the research centre there are tables downstairs. We play at lunch, and also there's a club full of people who will go up to tournaments in Calgary and Edmonton and across the Prairies, and I love playing with them.

GW: You like the challenge of table tennis. Is that similar to the challenge you have investigating these pests?

HC: Yes! A lot of table tennis is about reading your opponent, knowing what they are going to do before they do it, and your job is to try to put them off balance and make them vulnerable. Maybe you shoot it to one side of the table, get them a bit off balance, and then shoot it to the other side right after so that they can't get to the ball. Studying the insects is the same thing. You're studying your opponent, those insects, and saying, "Okay, how can we make them vulnerable? What can we do to put them off balance and make them vulnerable to a control method?" And you're reacting. When they do something, you have to react, and hopefully you set them up so that you can win the point. And that's a challenge that I really love working on. It does sound kind of cheesy, but I'm serious about it. I love reading my opponent and positioning myself where I can score the point.

GW: What are the next challenges for you at AAFC?

HC: I'm always looking for new project ideas. I want to hear from producers what they think the priorities are. If they have a burning question, it could turn into a research project for me. So I want to get out there and I have been talking to people, hearing what they think and what their concerns are for cereal crops. This is a service, and I want to serve producers. I'm a real team player—I want to do the research that needs to be done. ■



Being proactive pays off

THE VALUE OF A WELL-DESIGNED MARKETING PLAN



IT'S NO SECRET THAT FARMING

can be extremely stressful. Weather is a constant threat—from planting conditions in spring, to the amount and timeliness of rain during the season, and finally the risk of adverse conditions during harvest. Markets are also a source of stress for farmers and, like the weather, we have no control over what prices will do. But there are actions that growers can take to help reduce their vulnerability to volatile markets and, in the process, their anxiety over price volatility.

The single biggest thing producers can do to help reduce marketing stress is to develop a detailed marketing plan in advance. This starts with knowing the cost of operating your farm, accurately and in detail, for each crop. It is equally as important to clearly map out the anticipated cash flows for the crop year. Most producers might have a pretty good idea of their numbers, but it's hard to overstate how important it is to peg the figures as accurately as possible.

The next step is to have a good understanding of the fundamental outlook for

each of the crops that are grown on the farm. Which markets have greater upside potential? Which markets are more vulnerable to a sharp pullback? What are the key bullish and bearish dynamics to monitor in each market, and how might shifts in these dynamics change the price outlook?

The purpose of a detailed outlook isn't to perfectly forecast prices—markets are uncertain and unpredictable, and no one has that perfect crystal ball. But it does allow you to navigate through all the market noise and gauge how to respond to events. Is that market rally a good pricing opportunity, or just the beginning of a possibly longer-lasting move? Is that "special" being offered at the local elevator a timely chance to get a sale on the books during a window when movement is needed, or is it something that can comfortably be passed on? A solid marketing outlook goes a long way when it comes to knowing how to respond.

It's also important to understand the pricing and risk management opportunities for each market. For example, some crops offer the potential for forward pricing contracts, but the grower takes on all of the production and quality risk (e.g., wheat, durum). Other crops will commonly have "act of God" clauses built into a forward contract that can remove this risk (e.g., malt barley, lentils), but this may only be offered in exchange for locking in at a lower price. Crops that trade on futures markets provide opportunities to use put options, which provide downside protection without capping the upside potential or taking on production risk.

The most important part is when the on-farm margin goals and cash flow needs are combined with the individual crop outlooks and risk management opportunities. Crops with greater downside risk can be planned for more aggressive sales earlier in the year, perhaps allowing for those with a stronger outlook to be held back for better pricing opportunities later. Use of "act of God" clauses where available can make a nice fit for fall sales with limited risk. Maybe a rally in wheat or canola could allow you to lock in some values while still leaving the upside open.

Successful marketing is often less about what happens in the market than it is about how you respond to what happens in the market. Many of the pieces of the puzzle start to naturally fall into place when the farm needs are laid out well in advance, and holes get filled when market opportunities present themselves. This removes much of the guesswork around whether it makes sense for your business to sell grain on any given day or not.

There is no magic formula that can make price risk disappear completely. Every action to reduce risk requires some type of trade-off, whether it's production risk, forfeiting an upside opportunity or premiums on an option. But a well-researched marketing plan designed in advance of the growing season can be a very powerful tool to help determine how to respond to changes in the market, make the right decisions for your business and reduce a great deal of stress along the way. It's a lot of work, but it is proven to be effective and profitable. ■

Jon Driedger is a senior market analyst with FarmLink Marketing Solutions.





THE PEOPLE HAVE SPOKEN

For large food companies, “the customer is always right”—whether the ag industry likes it or not

BY KELSEY JOHNSON

THESE DAYS, A TRIP TO THE GROCERY STORE CAN be an overwhelming experience.

Gluten-free, GMO-free, MSG-free, free-run, cage-free, hormone-free, organic, all-natural, pesticide-free—the list goes on and on. Row upon row of descriptors and labels plastered on food packaging, all aimed at better informing the consumer.

As a consumer, the amount of choice and selection can be baffling. As a producer, determining what is and isn’t simply a short-lived trend can be nearly impossible, making it increasingly difficult to succeed in an increasingly globalized marketplace. This begs an important question: Has Canada’s agriculture industry been too slow to react to the growing demands of the consumer? Or is the situation more complex?

Back in the day, conversations about “social licence” (the industry term used for the right to farm, grow food, raise livestock and more with public backing) weren’t of significant concern to Canadian farmers. Farmers and consumers were worried about food safety and nutrition, cost and access, but, for the most part, conversations centred on farmers being stewards of the land, with their practices backed by science. While food remained an integral part of community life, the industry’s practices were generally unquestioned by the broader public.

Photo: Istock

"I personally think that it wasn't really an issue," said Sylvain Charlebois, dean of the Dalhousie University faculty of agriculture, when asked why the agriculture industry has been slow to respond to consumers' growing demands. "Most people felt current practices were acceptable to the broader public."

According to Charlebois, the industry has benefited from new trends, but now it is being asked to become more accountable. Not only that, it's being asked to provide evidence that its practices are acceptable to the broader public.

"It's not something the industry was ready for or accustomed to," he said, adding the sector may have "underestimated how impactful these new trends would become."

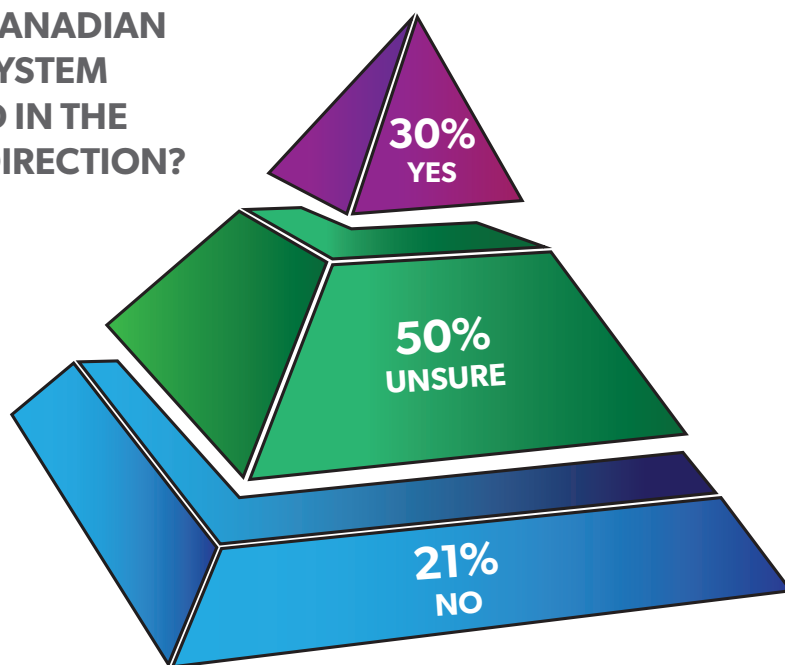
Today's food marketplace is a competitive, consumer-driven, international supply chain—one where big industry players are choosing to make business decisions aimed at satisfying consumers' ever-shifting demands and desires.

"Consumers are the new CEO of the food supply chain. You sort of have to listen to them," said Charlebois, who formerly taught at the University of Guelph and has written extensively about the modern relationship between the consumer and the agriculture industry. "On the other hand, you have to recognize that [consumers] are making decisions based on imperfect information. So, there is some confusion out there."

Given the interconnectedness of the food supply chain, those business decisions can have a profound effect on primary producers, who may need to make significant investments and adjustments on their farms—investments some feel are unnecessary or even risk setting back their industry.

Consider Canada's decision in 2014 to move away from the use of gestation crates in sow barns. Animal activists and some consumers, including Canadian actor Ryan Gosling, argued the crates

IS THE CANADIAN FOOD SYSTEM HEADED IN THE RIGHT DIRECTION?



This data comes from the Canadian Centre for Food Integrity's 2016 public trust research report. The web-based survey was completed in February and March by 2,510 respondents who are representative of the Canadian population. A series of questions was asked to gauge public opinion on the state of the Canadian food system. Percentage values have been rounded.

were "inhumane" and "archaic." Meanwhile, hog farmers insisted the crates were integral to animal welfare, arguing the systems protected piglets from being crushed by their mothers.

McDonald's, Tim Hortons, Burger King and Wendy's have all committed to sourcing their meat from humanely housed animals, while Costco Canada, Loblaws and Walmart Canada pledged to move away from gestation crates by 2022.

SEPARATION ANXIETY

The widening gap between the consumer and the farm has challenged the agriculture sector for years. This disparity has been buoyed by the steady migration of people from rural to urban areas.

Fewer Canadians are farming, while the country's farmers are getting older. In 1991, Statistics Canada data showed Canada was home to 265,495 farm operators under the age of 55. By 2011, that figure had dropped by almost half to 152,015.

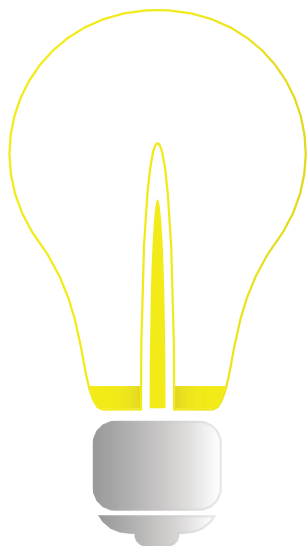
In an effort to find out just how much Canadians know about Canada's multibillion-dollar agriculture industry, Agriculture and Agri-Food Canada conducted 18 focus groups in 2014 with rural and urban residents in eight different municipalities. Each meeting lasted just over two hours, with the focus groups made up of eight to 11 participants over 18 years of age.

"Findings from this series of focus groups clearly indicate a relatively low level of awareness, particularly among urban dwellers, of the current state of the [agriculture] sector and its contributions to provincial, regional and the national economy," the report noted.

Few among those surveyed were aware of the sector's economic clout—it contributes some \$100 billion to the national economy each year. Others expressed surprise at the fact that the industry is responsible for one in eight jobs in Canada. Only a handful of the survey's participants had visited a working farm.

At least one person tied their

HOW WELL INFORMED WOULD YOU SAY YOU ARE ABOUT CANADIAN FARMING PRACTICES IN GENERAL?



93%
**KNOW A LITTLE,
VERY LITTLE
OR NOTHING**

knowledge gap to a lack of advocacy and education about the industry from Canadian farmers. "I feel like agriculture is silent in Canada," the participant noted.

It's an observation that hasn't escaped some within Canada's agriculture industry. Canadian Federation of Agriculture president Ron Bonnett has long insisted the sector needs to do a better job of telling its story. "We are too modest," Bonnett told delegates at the Federation's annual meeting in Ottawa in February.

Consumers and politicians alike, he insisted, need to be told about the sector's economic importance, while the industry needs to start highlighting its achievements in areas like innovation and environmental stewardship.

Andrew Campbell is one Canadian farmer who has made an effort to bridge the gap between consumers and the agriculture industry. Campbell is an Ontario dairy producer and former agriculture journalist who has taken it upon himself to open his barn doors to curious consumers. In 2015, as part of his New Year's resolution, Campbell pledged to take a picture on his farm every day for a year, posting the photos to Twitter under the hashtag #Farm365. The project eventually went viral and gained national media attention. Campbell said his followers

WOULD YOU LIKE TO KNOW MORE ABOUT FARMING PRACTICES?



60%
YES

doubled in 24 hours. Eventually, more and more farmers followed his lead, posting photos, despite threats to their operations from some animal rights activists.

"Consumers, as I'd hoped and as I'd wanted them to be, are generally interested in what is happening on farms today,"

Campbell said of the project during a recent webinar aimed at encouraging farmers to talk to consumers about agriculture and their food.

"We do have a really positive story," he said. "We as an industry have to be present in the online conversation because when people are looking for the information, they're going to go online, they're going to use Google, they're going to use social media. If we're not there, in that space, presenting our side of the story, then to the consumer our side of the story doesn't even exist. And

we really cannot afford to let that continue to happen."

Despite the increase in consumer outreach initiatives throughout the agriculture industry, farmers shouldn't be patting themselves on the back just yet. Charlebois isn't convinced education and advocacy campaigns will make a dent in consumers' agriculture knowledge deficit. "You can't really institutionalize the education of consumers," he said. "You're at the mercy of trends."

"Consumers, as I'd hoped and as I'd wanted them to be, are generally interested in what is happening on farms today."

—Andrew Campbell



WHERE'S THE BEEF?: The power of consumer demands was demonstrated earlier this year when A&W and Earls changed their beef sourcing policies, creating a rift between the restaurant chains and Alberta's beef producers.

BRAIN DRAIN

As the divide between consumers and producers continues to widen, research shows people are looking for direct information. Thankfully, the agriculture industry has one thing going for it in this regard—people trust farmers.

A 2016 online survey of 2,510 Canadians by the Canadian Centre for Food Integrity (CCFI) found Canadians' impressions of farmers have warmed, with 69 per cent of those surveyed saying they trusted farmers for information about their food—the highest level seen in 10 years.

Doctors, nurses and medical professionals came in second, at 65 per cent.

Yet, the report warns that agriculture's old strategy of relying on science to deal with misinformation and questions about growing practices, animal welfare and other concerns simply doesn't cut it anymore.

"Historically, when under pressure to change, the industry has responded by attacking the attackers and using science alone to justify current practices," the report reads. "Too frequently, the industry confuses scientific verification with ethical justification. Not only are these approaches ineffective in building stakeholder trust and support, they increase suspicion and skepticism that the food industry is worthy of public trust."

Half of those surveyed said they were uncertain about the direction in which Canada's food system was headed, the CCFI found, compared to one-third of Americans.

Meanwhile, many of those surveyed highlighted increased concerns about the rising cost of food, the humane treatment of animals, food safety and ensuring Canadian food security.

"When you're dealing with food, societal trends, any rules based on science go out the window. It's based on emotion, it's about experience."

—Sylvain Charlebois

BURGERS AND BUCKS

If consumers lack an understanding of general farming practices, why are companies conceding to their demands around how food is produced? According to Charlebois, the answer is simple:

they're business decisions, designed to carve out an edge.

"At the end of the day, it boils down to price ... It's a very competitive

marketplace," he said. Decisions are made even if those business moves risk angering farmers and ranchers in the process.

"When you're dealing with food, societal trends, any rules based on science go out the window. It's based on emotion, it's about experience," he said. "I think that what needs to happen is that companies need to address and manage perceptions, more so than factual evidence."

Consider A&W's ongoing "Guarantee" campaign. When the restaurant chain announced its new Better Beef Campaign (since renamed the Beef Guarantee because consumers weren't connecting with the "better" part) in 2013, Canadian ranchers were livid.

The move meant A&W would no longer serve beef in its restaurants produced with hormones or steroids. In order to do so, the company needed to source meat from outside of Canada, with most of it coming from the United States, Australia and New Zealand.

Many ranchers took to Twitter to voice their displeasure, threatening to boycott the restaurant chain, but A&W refused to back down. More than two years later, the company insists the move was well received overall and has since extended its guarantee to include eggs, poultry and bacon.

"We're selling more beef. We're having more people tell us they've come back to eating burgers again," Trish Sahlstrom, A&W vice-president of purchasing and distribution, told attendees at the Canadian Farm Writers' Federation's annual conference in September 2015. Same-store sales, she added, had increased by approximately seven per cent.

Sahlstrom insisted the restaurant's decision was solely driven by consumer demands. "We see it as a responsibility for us to do what the consumer wants—not try to get the consumer to do what we want, as frustrating and as difficult as that can be."

Consumers, she said, had felt the burger chain was out of touch—a perception that was hurting the company's bottom line. "Consumers were saying, 'Where's the evidence? I no longer trust just that it tastes good. I want to know where it came from,'" she said.

While A&W survived the industry backlash and stuck with its beef guarantee, other restaurant chains and distributors haven't been able to weather similar storms.

In April, Vancouver-based restaurant chain Earls announced it would stop sourcing Canadian beef for its menu because the company, which uses more than 900,000 kilograms of beef annually, couldn't find a capable Canadian supplier that met the chain's newly introduced Certified Humane welfare standards.

The Certified Humane program sources beef that is free of antibiotics and steroids. The meat must also be slaughtered according to criteria outlined by animal welfare advocate Temple Grandin.

The company's decision was immediately met with a fierce backlash. Furious ranchers argued the move was nothing more than a marketing ploy that tainted the reputation of the rest of the beef industry in the process. Within 24 hours of the



PLENTY OF CHOICE: Labels like this one have become more common as consumers look for more information about how their food is produced and seek out products that match their values.

announcement, the hashtag #BoycottEarls was trending on Twitter, with several politicians, including Alberta Agriculture and Forestry Minister Oneil Carlier, Saskatchewan Agriculture Minister Lyle Stewart and former federal agriculture minister Gerry Ritz taking to social media to voice their support for Canada's beef industry.

After a week of trying to extinguish the flames on social media, Earls backed down. In a video released by the company, Earls president Mo Jessa admitted the company had "made a mistake." Earls, he said, would now work with several Canadian suppliers to satisfy its beef needs.

"We want to make this right. We want Canadian beef back on our menus so we are going to work with local ranchers to build our supply of Alberta beef that meets our criteria," Jessa said in a statement.

Charlebois said he doesn't fully understand why the company apologized. "I'm still not sure why they did that," he said. "They made a business decision."

"It's hard to blame a company in doing so. They were just trying to respond to what the market was looking for. Earls was looking for evidence it was able to convey on a menu and that was something that Canadian ranchers couldn't do."

Still, Charlebois said the fallout perfectly encompasses how fluid the food market has become. "The Canadian consumer is different today for all sorts of reasons—globalization, health trends, ethnicity, demographics," he said. "And, it's going to be even more different in 10 to 15 years' time." ■



SEEDS OF FUTURE PAST

Gene banks and their keepers preserve the building blocks of agriculture

BY NATALIE NOBLE • PHOTOS COURTESY OF MAZEN ALJARRAH AND GLOBAL CROP DIVERSITY TRUST

THERE IS NOTHING LIKE THE feeling of fall on the Prairies. The vibrant colours and sweet scents of another successful harvest before winter creeps in inspire festive get-togethers that are a farming tradition more than 10,000 years old. As we get set to give thanks this year, it's fascinating to consider exactly where this year's harvest originated.

Thomas Payne, head of the Gene Bank at the International Maize and Wheat Improvement Center (CIMMYT) based in Mexico City, thinks about this history a lot—he's enjoyed a 40-year career contributing to its preservation.

"The crop varieties we hold in the gene bank are the result of legacies that thousands of farmers have been involved with," he said. "From the times crops were first developed, each year men and women would have to sow the

crop, tend to it, defend it from cows, neighbours, pests, the vagaries of climate, and then eventually they'd have to harvest the seed.

"After harvest, they would have a party, similar to our Thanksgiving celebrations today," Payne added. "But you can imagine there were probably years in which the crop was not adequate to feed the farmers' families. Yet they would have to intentionally retain a portion of that seed and not eat it, even though their children might be starving, in order to replant it. This happened year after year for 10,000 years. The seed that we conserve in the gene bank is a result of that altruistic management of genetic resources."

This enormous contribution by generations of growers is a precious resource, as was recognized in 2001 by the Food and Agriculture Organization of the United Nations' International

Treaty on Plant Genetic Resources for Food and Agriculture. The Treaty protects the exchange and conservation of crop genetic resources among its member nations.

THE SEED CONSERVATION MOVEMENT

According to Stephanie Greene, a plant geneticist at the United States Department of Agriculture National Lab for Genetic Resources Preservation (NLGRP), the momentum that led to international crop conservation efforts started with concerns dating back to the 1970s.

"The genetic diversity of crops was disappearing all over the world as folks moved to more modern agriculture and adopted these modern hybrids and cultivars," she said. "There was this growing recognition that we were losing material, losing diversity."

This concern was coupled with the recognition that, in developing modern agriculture, growers were increasingly relying on varieties that were highly uniform, or genetically similar. The corn leaf fly epidemic in the U.S. in the 1970s brought this observation home for Americans.

"Across the landscape, we were growing varieties that all had the same susceptibility to this corn leaf fly. The epidemic at this time, and of course the resulting major economic ramifications, sort of jerked everyone's heads up," Greene said. "We realized we had to broaden the genetic base of our crop plants to protect us against these types of epidemics."

This growing recognition spurred the establishment and funding of gene banks in the U.S. The NLGRP, based in Fort Collins, CO, serves as the security backup location for the entire U.S. collection of germplasm, with a distributive network of gene banks across the country. These are active collections, where individual curators are responsible for individual collections.

While preservation efforts were happening in the U.S., gene banks were also being established worldwide, as people began the work of collecting genetic material, storing it and learning how best to preserve the valuable plant diversity for an uncertain future. Currently, Plant Gene Resources Canada's collection of more than 110,000 seed samples—which includes "wild and weedy relatives of crop species, cultivars and inbred parental lines, elite breeding lines, and some rare and threatened species and genetic stocks"—is housed at Agriculture and Agri-Food Canada's Saskatoon Research and Development Centre.

Mazen Aljarrah is a wheat and triticale breeder from Syria who has been part of the team at the Field Crop Development Centre (FCDC) in Lacombe since 2008. Previously, Aljarrah worked with CIMMYT in Mexico and the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria, which gave him international experience with the multifaceted global gene banking system.

"As a breeder, genetic diversity is our first line of defense against any new disease strains or changes in environment," he said. "With outside challenges, we have to find genes we are able to incorporate into the breeding of new varieties."

Aljarrah said one of the most important aspects of his job is listening to farmers, and that the relationship between breeders and growers is strong.

"They will tell you what they need," he said. "They are better than us in that they are growing the varieties on a large scale, they know what's going on and they express their needs. We have to take their notes very seriously and address them in our breeding program."

When grain growers from around Alberta report changes in climate conditions or that certain varieties are weak with lodging, lower in quality or have other issues, researchers at the FCDC go back to the drawing board to devise a new strategy for their breeding program to address those concerns for



BETTER BREEDING: Mazen Aljarrah, a wheat and triticale breeder at the Field Crop Development Centre in Lacombe, gained experience with the global gene banking system while working with the International Maize and Wheat Improvement Center and the International Center for Agricultural Research in the Dry Areas.

future varieties. This is when they go to their collection to find specific genes. The team involved in Lacombe's wheat, barley and triticale programs rely mainly on the CIMMYT and ICARDA gene banks because of the unique wheat, barley and triticale collections each holds.

Over the years, selection for specific traits, such as yield and protein content, has resulted in narrow adaptation for crop varieties in the developing world. The uniformity that results from this type of breeding has advantages in terms of yield and quality. However, this narrow genetic base can also result in susceptibility to emerging pathogens.

"If we make such varieties more fragile against any emerging epidemics—and this is what's happening—we have to find new sources, new genes," Aljarrah said. "This is when we turn to our gene bank."

Ironically, in order to find these "new" genes, breeders must look to the past and into the history of today's crops.

CENTRES OF ORIGIN

In the world, there are six major independent agricultural centres of origin. This means most of the known crops originated in one of these six regions. For instance, while we grow wheat in Canada today, it likely was not grown here 300 years ago. It came from somewhere else.

If you visit the fields of Turkey, located at the intersection of two of these important centres of origin, you will see a place where wheat is treated with an almost spiritual reverence and



SAVING SEED: Seed samples stored at the International Maize and Wheat Improvement Center are kept for scientists to use in their attempts to breed better varieties and preserve genetic diversity.

it is considered sacrilege to so much as drop a loaf of bread on the floor. The country boasts a rich history of plant genetic resources and important plant diversity.

"The Turks really have this ingrained cultural respect for the crop and the plant. It's considered to be extremely wasteful if you destroy or harm wheat," Payne said. "There's a cultural connection to the crop. That really was fascinating to me."

Wheat was domesticated in that fertile crescent of the Middle East, while maize originated in Mexico and the potato traces its beginnings to Peru. In each of the centres, the original farmers started to domesticate the wild relatives of our modern-day plants. As a native of wheat's historical birthplace, Aljarrah has a deep understanding of the early stages of crop breeding and the value that wild relatives and landraces, or locally developed cultivars, still hold today.

"The old-time farmers started by selecting good plants for their own needs, and that primitive selection led to emerging landraces," he said. "In the Middle East, some farmers still grow these landraces, or blends of the same variety. Some plants may be taller than

others, some may develop earlier than the others."

What are the benefits of growing these landraces? The farmers in these areas are not necessarily looking for the highest yields. Instead, they are looking for quality and stability year to year. Because they are not pure varieties, but rather blends of slightly different genotypes, landraces are more stable than modern cultivars in the face of climate change, disease and other adverse conditions.

Without gene banks, the global agriculture community cannot possibly preserve these pockets of genetic diversity—diversity we might be forced to rely on sooner than we think.

A GLOBAL NETWORK

Brian Lainoff, partnerships and communications officer with the Global Crop Diversity Trust (Crop Trust), referred to gene banks, or global storage facilities, as agriculture's insurance policies that contain the diversity from wherever a variety was originally found.

"They also allow us to use organic material to advance what we're doing in agriculture," he said. "Each one of the varieties preserved might carry one

specific trait within that can be bred to create a new variety that will likely help us defend and improve agriculture."

The Crop Trust refers to this genetic diversity as the building blocks of agriculture, and believes that its preservation is the foundation of food security.

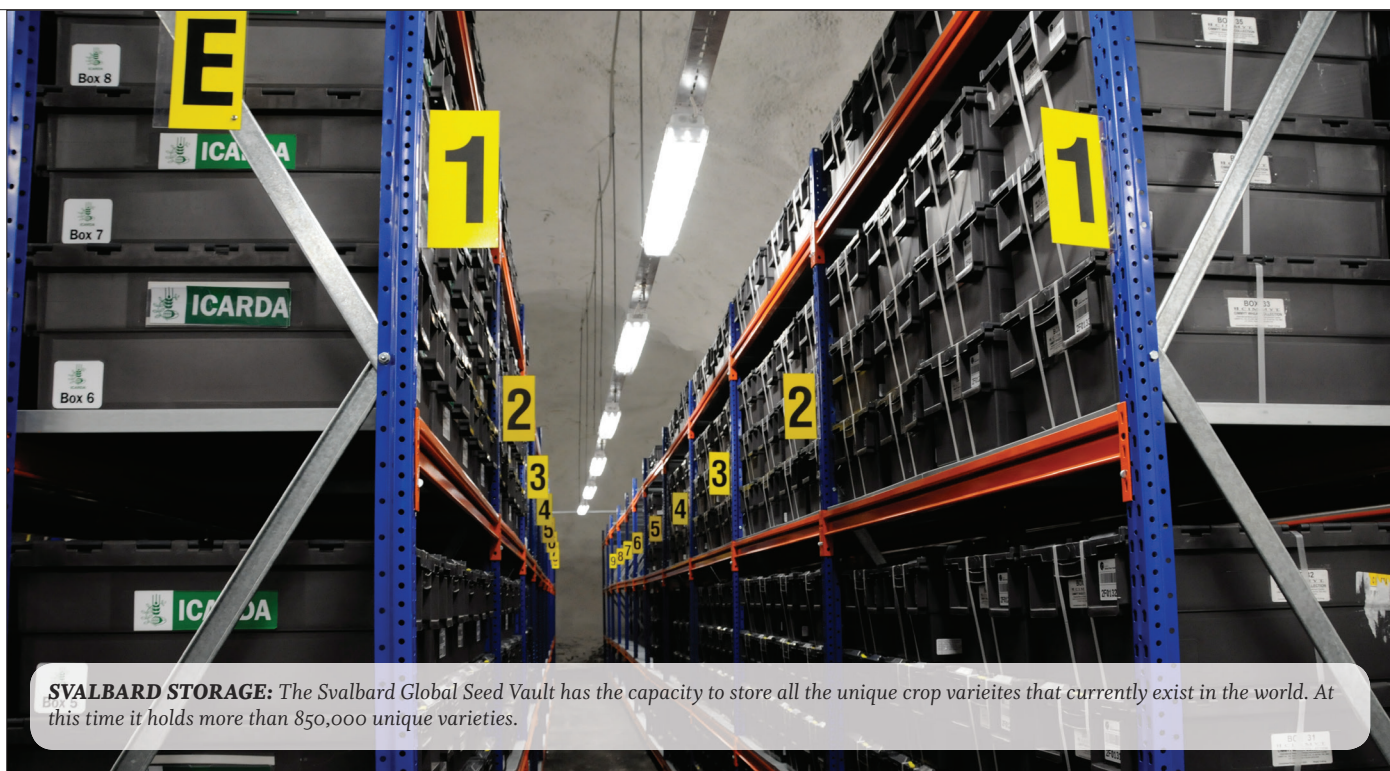
There are more than 1,700 gene banks worldwide where plant material is properly conserved once it has been collected, tested and catalogued at one of the research centres around the world. Many gene banks are located in developing parts of the world, where funding is not easily accessible. Lainoff said that when the Crop Trust was established in 2004, it was clear that many of the gene banks needed funding and their contents were constantly at risk.

The goal at the Crop Trust was to fund the Consultative Group for International Agricultural Research (CGIAR) collections and establish a global system that was dependable and widely accessible, as well as consistent, cost effective, rational and efficient.

The Crop Trust's global system is three-pillared. First are the collections of seeds that come from international banks, national collections and non-profit organizations like Seed Savers Exchange, which collects and conserves heirloom seeds and then makes them available for purchase. The international gene banks, including CIMMYT and ICARDA, store the majority of the most-used and most-important seeds. More than 750,000 varieties are held in trust by the international community and are available to the public by request or through the gene banks' databases.

The next pillar of the Crop Trust's foundation is the dissemination of information that ties the global system together. "We supply funding for information systems," Lainoff said. "It's like a spiderweb of interlinking collections that contain the world's most unique diversity."

Finally, the third pillar is the Svalbard Global Seed Vault built into a mountain on a remote archipelago halfway between the North Pole and mainland



SVALBARD STORAGE: The Svalbard Global Seed Vault has the capacity to store all the unique crop varieties that currently exist in the world. At this time it holds more than 850,000 unique varieties.

Norway. Difficult to reach, it is a four-hour flight north of Oslo and there are more polar bears than people on the island. Described by Lainoff as the “tip of the iceberg,” the facility acts as a backup hard drive for the world’s seed collections.

SVALBARD: MORE THAN JUST A “DOOMSDAY VAULT”

Perhaps the Crop Trust’s most talked-about initiative, the Svalbard vault currently holds more than 850,000 unique varieties. While it has the potential to store up to 4.5 million varieties, Lainoff estimates there are around 2.5 million unique varieties in the world, meaning the vault has more than enough room to serve its purpose. The facility’s 150-metre tunnel has two vault rooms plus one completely empty room. Lainoff describes the vault as one of his favourite places on Earth.

“When I’m in there, I feel completely disconnected from the rest of the world,” he said. “I feel something much bigger than me. It’s partly the presence of the vault, and also the way I feel about the work I’m doing.”

Payne, too, talked about the intrigue of the remote vault. “Svalbard is a high-profile operation. It’s something that really captures imaginations and attention. And so the vault has really elevated the public relations aspect of the need to conserve genetic resources.”

When the Svalbard vault was less than 10 years old, its importance was demonstrated with its first withdrawal in 2015—the ICARDA collection. The organization’s gene bank was formerly located in Aleppo, Syria, but ICARDA researchers had found themselves in the middle of an increasingly volatile situation as the country descended into civil war. As far back as 2006, the teams at the Crop Trust and ICARDA realized they

needed to act quickly to preserve the collection. Together, they worked around the clock to get most of the collection’s plant diversity out of Syria and into the Svalbard vault.

“They were still sending boxes of seeds up there when the war was happening, which was crazy,” Lainoff said. “They were sending DHL packages of seeds to breeders and scientists during the war, but it was getting more and more difficult.”

Active collections like ICARDA’s need to be regrown in order to replenish the collection. Because of the tragic circumstances in Syria, it was no longer possible to do this type of work there. Fortunately, ICARDA was able to withdraw its collection from the vault and move it to the organization’s new headquarters in Beirut, Lebanon.

“Svalbard is really accomplishing what it is meant to accomplish,” Payne said. “It’s not intended to replace the global or national gene banks. Those gene banks are still critical because we maintain very close linkages with users of the materials, breeders and scientists.”

“The other critical aspect of the seed vault is that it serves as a repository for the cultural heritage of seed,” he added. “We are all too aware of the vagaries of funding, the mishaps or priority changes that occur in times of change within institutions or governments. All of these things put collections at risk, and when material is lost from a collection, that’s equivalent to extinction. The Svalbard Global Seed Vault is the last bastion of conserving materials.”

We might not always think about where our food comes from, but the work generations of worldwide growers and breeders have done, and continue to do, to ensure the future of agriculture is absolutely something we should be thankful for. ●



Neighbours in need

Awareness of mental health issues in farming communities is on the rise,
but finding help is not always easy

BY ALEXIS KIENLEN • ILLUSTRATIONS BY JONATHAN BARTLETT

DEPRESSION. MENTAL ILLNESS. PEOPLE IN RURAL communities used to be quiet about these conditions, and many still are. But there's a growing movement of people who want to talk about depression—who realize how mental illness is affecting people in rural communities.

Gerry Friesen is one of those people. Friesen used to be a hog farmer in Wawanesa, MB, but quit farming in 2007. Now based in La Salle, MB, he works as a consultant and conflict resolution specialist, and often works with farmers. Friesen frequently speaks about mental health issues and his own struggle with depression.

"Back when I was farming, there were certain challenges, and I found myself at one point slipping into a depression," he said. "It's been a journey for me and it continues today. I recognize now that it probably started long before I recognized what it was."

Friesen thought that his problems would end when he quit farming, because his farm caused him significant financial stress.

"I've learned since then that that was not the cure-all, although getting rid of a large stressor did help," he said. "But I still have to be very much aware of what is going on in my life and recognize when I'm slipping backwards again."

Financial issues are only one of many stressors farmers face on a daily basis. They work long hours and have extremely busy seasons. They face uncertainty because of volatile markets and unexpected weather events. Some farmers struggle with financial management and communication with their families. Shrinking rural communities and fewer neighbours can mean that farmers have fewer people to talk to and resources to access.

Friesen's story is not uncommon. Many farmers are dealing with mental health challenges. In fact, mental health problems in rural areas may be more prevalent than previously thought.

The University of Guelph recently conducted an anonymous survey to determine the frequency of mental health issues among producers in Canada. More than half of the 1,100 respondents self-diagnosed themselves as experiencing "high stress."

"Stresses that producers face are continuous and from multiple different sources. Very few of these stresses are under their control," said Andria Jones-Bitton, an associate professor in the department of population medicine at the University of Guelph and one of the researchers behind the survey. "They're dealing with changing weather, government regulations, disease outbreaks, herd productivity and constantly changing prices. They work in social isolation, so that's a factor as well. They work long and hard hours, and rarely does a producer get to leave work. They're living their work, day in and day out, 24/7."

Many producers haven't taken a vacation in years, she added.

"When you think about the wide array of stresses that producers are facing, it wasn't too surprising—unfortunate, but not surprising—that there were so many in that high-stress category," she said.

A high proportion of study respondents reported they have experienced anxiety, depression, emotional exhaustion and cynicism, which are contributors to burnout. "All of these things are helping to show everyone that mental health is something that we need to be paying attention to in Canadian agriculture," said Jones-Bitton.

The University of Guelph conducted the study on rural mental health because there was so little Canadian information available. The university initially wanted to focus on livestock producers living in Ontario, but soon found that farmers from all sectors of the industry wanted to participate in the study. Researchers are analyzing the preliminary data, and will use it to work directly with producers, government, veterinarians,

psychologists, social workers and rural family-health teams to address the issue.

"One of the first things we'd like to do is help develop mental health literacy programs that will teach people about mental health. And that will help to break down some of the stigma that we know exists quite strongly, both in general and especially in agriculture," Jones-Bitton said.

The next phase will also involve creating a mental health emergency response system.

"When the next agricultural emergency hits—like, say, a big disease outbreak or an extreme weather event or a major disaster—then we can be very quick to respond to producer mental health under those crisis situations," she said.

There was one bright light in the University of Guelph's findings: about three-quarters of the people who completed the survey said that seeing a mental health professional could be helpful, and they would seek professional help if they were stressed or worried for a long period of time, said Jones-Bitton. Little by little, the stigma is decreasing and people are starting to get help.

However, there are still challenges hampering help for rural residents, many of whom have few formal or clinical services available to them.

"That doesn't mean that communities can't support people with mental illness. In fact, historically, Albertans have been doing it in their communities for years using natural supports, community helpers, clergy and family members. In rural communities where there are gaps in services, family, friends and the community pitch in," said Dave Grauwiler, executive director of the Canadian Mental Health Association's (CMHA) Alberta division.

Even with help available in the community, the stigma associated with mental health can still prevent people from accessing that help. For example, said Grauwiler, "maybe your sister-in-law is a nurse at the same hospital where you would get support in an emergency room."



Family and Community Support Services (FCSS) programs are also available across the province and can be easy for people in rural communities to access.

"We see that FCSS in those communities are doing their best to help people find the help they are looking for, whether that is as a caregiver for someone living with mental illness or as someone who is experiencing mental illness in their community," said Grauwiler. "There are challenges that exist around receiving the support you need, but the biggest challenge is

probably understanding what resource to access at what time."

Alberta Health Services has a province-wide mental health helpline, and many of the regional hospitals offer support in emergency rooms or primary care networks. The CMHA also maintains a website, www.mymentalhealth.ca, that has an interactive map of Alberta outlining CMHA programs and resources across the province.

Additionally, the CMHA has nine regional offices in Alberta and can help people connect with the mental health resources in their area.

"There are still huge areas of the province and communities that are too far away from our offices to be able to access service. We certainly understand that, and so we have to look at mental health delivery as well as what exists within the local community and then what resources can be accessed electronically. It has to be a mix because we're never going to have everything we need in every community across Alberta," said Grauwiler.

To help more people access support, a team at the University of Regina has developed the first online therapy program in the country, www.onlinetherapyuser.ca. The free program, which offers participants access to a registered therapist, is only open to Saskatchewan residents and serves 400 people a year. Originally designed as a research pilot in 2010, the program is now connected with Saskatchewan's health regions. Each participant spends eight weeks working through five modules, learning about depression and anxiety, thought-challenging and the physiology of depression. They finish off the course by learning how to reintegrate themselves into their lives if they have been withdrawing, and creating plans that help them stay well.

Marcie Nugent, co-ordinator of the online therapy unit, said the program has worked well with Saskatchewan's rural residents.

"Access to services isn't high in the rural areas, although they are covered by the health regions," she said. "People do have access to psychologists and things like that, but often they do have to travel to get that appointment, because there's not somebody locally based. Transportation becomes an issue if they're not able to go into the community as well, and they happen to be in a community where someone doesn't come out."

Also, in urban centres, if waitlists are too long for services through the health region, people can choose to pay for services—but this isn't an option in rural areas.

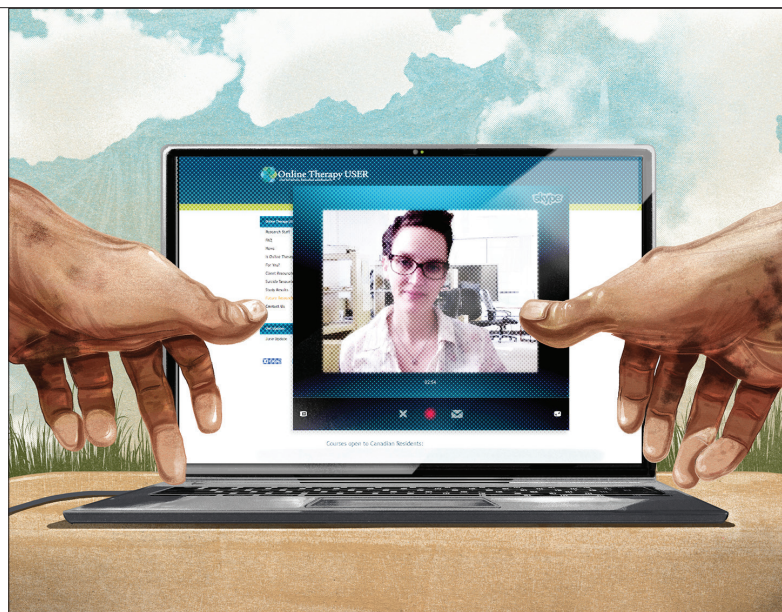
So far, the reaction to the online therapy program has been overwhelmingly positive. "Ninety-four per cent of clients said that the program is worth their time and they would recommend it," said Nugent. "Clients seem to think it is valuable, and professionals in the community think that this is something that is needed."

While the program is the first of its kind in Canada, this type of programming has become popular in the United Kingdom and Australia. There is interest in expanding the program, but no concrete plans to do so yet.

"There are lots of people interested in this in other parts of Canada," said Nugent. "We have no formalized plans to expand, but we do recognize that it needs to grow."

One thing that can help people increase awareness of mental health issues and depression is just talking about mental health and being open about mental health issues. It's also important to know some of the signs of mental health problems.

Friesen said there are four types of mental illness symptoms—



mental, social, physical and emotional. Sometimes frequent headaches or a sore back can actually be part of a larger mental health issue. People with depression might also feel tired, have lower energy levels and feel irritable or sad. They might have problems with eating or sleeping enough, or find themselves eating or sleeping too much. Many people who are feeling depressed will withdraw and stop taking part in social events. They might find themselves snapping at the people around them.

Just talking with someone can make somebody with mental health problems feel better, and this can also help to reduce the stigma surrounding mental health.

"From personal experience, I remember a neighbour came by and he just looked at me and said, 'How are you doing?' Of course, my response would have normally been, 'I'm okay,' or 'I'm good.' For some reason, that day I talked and he listened. He didn't give me any advice. He was a neighbour, another farmer, and so he just listened and normalized and validated what I was feeling. When people can verbalize what is going on in their brains, that in itself is a huge relief," said Friesen.

He still needs to watch certain things to make sure his mental health issues are kept in check. He watches his nutrition and makes sure to eat properly.

"Make sure that, even in busy times, you take the time to eat," he said. Getting enough sleep also helps him to maintain his mental health, and exercise makes a big difference as well. "It releases endorphins in your brain, and I know from personal experience that that really helps," he said.

Friesen said that no one, especially men, should be scared to go see a medical doctor, psychiatrist or psychologist, or to talk about what they're going through.

"Men in particular, we have this ability to put on this façade. We go out in public and pretend everything is okay," he said. "It's better to talk about these things. People feel relief when they learn there are people going through the same things they are." ■





UNCHARTED TERRITORY

Alberta craft distilleries forge their own path in the shadow of the beer boom

BY TYLER DIFLEY • PHOTOS COURTESY OF BIG RIG CRAFT DISTILLERY, PARK DISTILLERY AND RED CUP DISTILLERY

OVER THE PAST FEW DECADES, CRAFT BEER IN Alberta has gone from a myth, to a rarity, to a pervasive and positive force of change that shows no signs of slowing down. Now, another ambitious craft alcohol movement with a rich history in the province has emerged in the hopes of replicating craft beer's success and enthusiastic following among Albertans. However, the brew being touted by these new craft acolytes is not beer. In fact, it's much stronger stuff.

These new pioneers of craft are distillers, and instead of beer, they're producing vodka, gin, rum and whisky. Although the final product differs, these craft distillers maintain the same commitment to small-batch quality and local ingredients as their brewer brethren.

"We're extremely proud to be one of the pioneer Alberta craft distilleries," said Matt Hendriks, master distiller at Park Distillery. "It's something that's just starting to bloom in Alberta and we're going to see it slowly pick up steam."

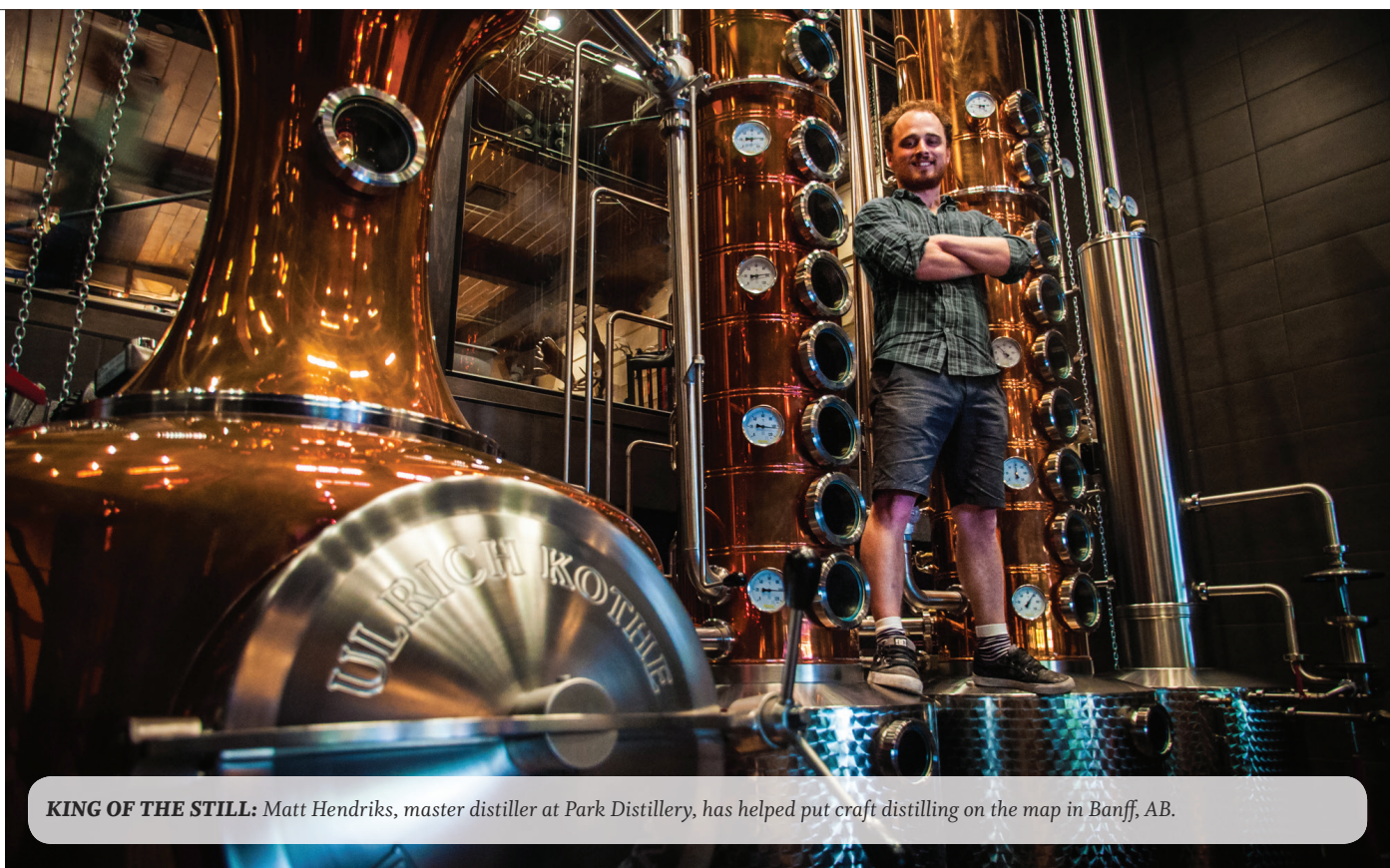
In early 2014, Fort McMurray's Wood Buffalo Brewing Co. added distilling to its already successful beer business to become the first holder of a craft distillery licence in the

province. Shortly after, Eau Claire Distillery in Turner Valley emerged as Alberta's first pure craft distillery. Currently, the number of craft distilleries in Alberta stands at five, bolstered by three new additions—Park Distillery in Banff, Big Rig Craft Distillery in Nisku and Red Cup Distillery in Vegreville.

NEW KIDS ON THE BLOCK

At Park, which is part of the Banff Hospitality Collective group of restaurants and bars, Hendriks has quickly developed a following among the locals and plentiful tourists who frequent Banff, thanks to his lineup of spirits that includes a mix of traditional and unique concoctions. The distillery turns out roughly 650 litres of spirits a week across its product line, which includes standard vodka and gin, three flavoured vodkas—vanilla, espresso and chilli—and an unaged white rye. Until recently, these products were only available at the distillery in Banff, but Park has started branching out into the rest of the province.

"Our local community has really gotten on board," Hendriks said. "It was a big education piece because everybody in Alberta, especially in Banff, hadn't seen craft distilleries yet."



KING OF THE STILL: Matt Hendriks, master distiller at Park Distillery, has helped put craft distilling on the map in Banff, AB.

To raise awareness about craft distilling, Park started offering free distillery tours. After their tour, many people choose to sample Park's spirits at the bar or buy a bottle to take home to their friends and family. "Nobody offers anything for free in Banff, but we offer three tours a day," Hendriks said. "It seems to be working pretty well."

Over in Nisku, husband-and-wife duo Geoff and Karen Stewart were originally leaning toward starting a brewery, before a fateful visit to Fairborn, Ohio's Stillwrights Distillery changed their minds.

"I mentioned to the owner of the distillery that we were thinking of doing a brewery and he said, 'don't do a brewery, do your homework better,'" Geoff Stewart said. "What he meant by that was to look at the ratio of breweries to distilleries where both were legal, and in some places in the States there are 800 breweries to every distillery, so it was very good advice."

After getting his craft distilling education in Seattle and some hands-on distilling experience during an

informal apprenticeship at Stillwrights, Stewart had the expertise to make Big Rig Craft Distillery a reality. Today, Big Rig produces 1,000 bottles a week—equivalent to 750 litres—and its products are available in nearly 100 liquor stores across Alberta. The distillery's product line is impressive for such a small operation, and includes vodka (original, plus garlic, saskatoon berry and espresso flavours), gin, coffee cream liqueur and a rum-like spirit made with sugar beets. Each Big Rig product comes in a bottle designed as a replica of the original Leduc No. 1 drilling rig that struck black gold in 1947.

"We actually have 14 products already, which is not normal for a startup distillery, but we wanted to have a little bit of something for everyone," Stewart said.

Standing in stark contrast to Big Rig's burgeoning product line is Vegreville's Red Cup Distillery, which only produces one spirit—a potent brew remembered fondly by many of Alberta's older rural residents. That spirit is moonshine, or



rather “wheat shine” as Red Cup Distillery owner Robert de Groot calls it, since it’s made from wheat rather than corn. At Red Cup, de Groot has tried to replicate the production process that was used to make moonshine on the Canadian Prairies during the years of Prohibition and, later, the Great Depression.

“We’re doing it the old-fashioned way, which means no cheating, no chemicals, no alpha amylase powder,” De Groot said. “It’s like grandpa did it.”

This old-fashioned philosophy also extends to the equipment at the distillery. Red Cup’s still was made from scratch and is Canada’s first legally constructed copper pot still, according to de Groot. Currently, Red Cup produces about 100 bottles of 100-proof wheat shine a week, and each batch sells out from the distillery in a few hours. This tremendous reception has led de Groot to start construction on a new distillery space in order to expand his production and distribution.

For de Groot, the cachet that comes with starting one of the first craft distilleries in Alberta is unimportant. While much of the craft segment looks forward, priding itself on experimentation and innovation, Red Cup looks to the past, striving to create liquor that is a perfect reflection of a moment in Alberta’s history.

“I’m upholding a tradition,” de Groot said. “That part, to me, is humbling.”

Despite their differences when it comes to products, marketing strategies and overarching philosophies, Alberta’s fledgling craft distilleries recognize that they all have shared interests and goals.

“We all really work co-operatively,” Stewart said. “We want the craft distilling industry to really flourish, and none of us see each other as competition whatsoever because we all have very different business models and we’re all in very different areas.”

“Our common competition is the big distilleries. That’s who we have to steal market share from.”

To that end, Alberta’s five current craft distilleries came together to form the Alberta Craft Distillers Association—a unified voice to represent their interests and promote the benefits of craft.

“The Alberta Craft Distillers Association is something really special,” Hendriks said. “Just creating that unity between us is a big thing.”

PLAYING CATCH-UP

Prior to December 2013, starting a craft distillery in Alberta was virtually impossible, thanks to minimum production rules for breweries and distilleries. Once those restrictions were removed, aspiring brewers and distillers were free to apply for a licence, but the challenges did not stop there, particularly for those with their sights set on a brand-new craft distillery.

“It’s not cheap to set up something the size of what we did,” Stewart said, adding that no bank would finance his business plan since craft distilling was an unproven industry in the province. “We’re into this for just shy of \$1 million right now, so



SHINE ON: While traditional moonshine is made from corn, Red Cup Distillery puts an Alberta twist on the classic formula by using wheat to create its signature wheat shine.

we cashed in all of our RRSPs, we took out a second mortgage on our house and we put our entire life savings into this.”

As it was with the craft beer movement, Canada has lagged behind our neighbours to the south when it comes to the proliferation of craft distilleries. Currently, there are more than 1,000 craft distilleries operating in the United States, where there were fewer than 100 a decade ago. Comparatively, Canada is the home of more than 40 craft distilleries, the majority of which are located in British Columbia and Ontario. Given the perfect conditions for distilling that exist in Alberta, the province seems to be poised to increase its share of that total.

“We are known to have some of the best grain in the world, period,” Hendriks said. “Having this abundance of grain and all the different varieties and species, we’re able to make different base spirits for whiskies, vodkas, gins, etc.”

With the exception of its white rye, all of Park’s spirits are made using 100 per cent Alberta-grown triticale—the wheat-rye hybrid most commonly used for livestock feed. After months of testing various grain mashes, Hendriks decided on triticale as a base grain because it produced a finished spirit with great mouth feel, character and body that couldn’t be matched by any of the other grains he tried.

“It’s a bit sweet and floral in character,” Hendriks said. “I

think we're the only distillery that we've researched in the world that uses 100 per cent triticale.

About 80 per cent of the grain used in Big Rig's spirits is Hard Red Spring Wheat (HRSW), Stewart said, in addition to small amounts of rye, malted barley and corn, depending on the product.

"Everything we use is Alberta-sourced. We go direct," Stewart said, adding that this applies not only to the grains, but also to all the flavouring agents—garlic, saskatoon berries, etc.—used in their products.

At Red Cup in Vegreville, de Groot is also partial to Alberta-grown HRSW, which he sources from a single farm in nearby Two Hills.

"We make so much wheat in this province—beautiful hard red," de Groot said. "For producing alcohol, it doesn't produce as much as a soft white, but it has a wonderful flavour."

Meanwhile, Eau Claire Distillery is notable for using only Alberta barley in its vodka and gin, which lends the finished spirits a subtle sweetness and rich mouth feel that differs slightly from spirits made with wheat, rye or triticale.

Grain is the essence of most craft spirits. Without the hard work of Alberta farmers to produce that grain, the province's pioneering craft distilleries would have no business and no product to sell—a fact that isn't lost on de Groot.

"I have nothing but the most positive things to say about our farmers," he said. "My moonshine is only good because of what they make. I did not expect to have that emotional connection to my farmer, to my seed plant, but without them it's nothing."

In addition to great grain, Alberta's freshwater supply is perfect for distilling. Both Stewart and Hendriks said that the

water used at their facilities needs very little treatment—a benefit that can't be overlooked, given water's integral role in the distilling process.

"It's your water that you're using to cook your grains and then your water that you use to proof your spirits back down to potable alcohol," Hendriks said.

THE ROAD FORWARD

Now that Alberta's first craft distilleries are operational and public awareness about their products is growing, it wouldn't be a stretch to predict that a rapid explosion of growth in the industry is on the horizon, similar to the growth experienced by craft beer in the province. However, one important hurdle still stands in the way for potential craft distillers—an obstacle that wasn't an issue for many brewery startups.

"The one big challenge that we're facing is the amount of tax that we have to pay per bottle," Stewart said. "If you add the provincial and the federal markups, it adds up to about \$14.52 for a 750-millilitre bottle, and that's tough when you're small."

In 2013, the provincial government changed the markup structure for all small breweries selling beer in Alberta to a graduated system where the amount of tax corresponded with the amount of beer produced. The change was designed to help small brewers

compete with large multinational breweries, which are able to take advantage of economies of scale to lower the price of their products. In 2015, this tax break was narrowed to only apply to breweries in the New West Partnership region (British Columbia, Alberta and Saskatchewan), and as of Aug. 5 the provincial government eliminated the graduated system

entirely, reinstating a blanket markup of \$1.25 per litre on all beer sold in the province. However, Alberta breweries now have access to provincial grants to recoup some or all of the money they have lost from the increased markup. Stewart said similar measures—whether in the form of tax breaks or grants—should be extended to Alberta craft distilleries to help them get established financially. "If we could have something like that, it would really help us," he said.

While the Alberta Craft Distillers Association continues to lobby the province for changes to the markup structure, this new wave of craft distillers is clearing a path for future protégés in other ways as well. Now that people across the province have seen that it's possible to start a successful craft distillery in Alberta, interest is growing. Stewart said he knows of at least a half-dozen aspiring distillers in the Edmonton area alone who are hoping to get into the business. However, in order for this second wave of distillers to be successful, they'll need a distiller's education—an education Stewart and the team at Big Rig are planning to provide.

"We're actually going to start teaching courses at our distillery to help people get started," Stewart said. "There's nobody teaching this kind of course in Alberta right now."

With five craft distilleries now operating in Alberta, a strong foundation has been laid for a craft distilling industry to grow and flourish in the province. The visionaries at Park, Big Rig and Red Cup, as well as their peers at Wood Buffalo Brewing Co. and Eau Claire Distillery, have blazed the trail. For all the would-be distillers across the province with dreams of starting their own operation, it's just a matter of following their lead.

"We want more and more of these [craft distilleries]," Hendriks said. "Hopefully, people get themselves educated and start talking to the government if they want to get licences, because the more of us there are in craft, that means the consumer sees it more often and will start to realize what this is all about." ■

"My moonshine is only good because of what they make. I did not expect to have that emotional connection to my farmer, to my seed plant, but without them it's nothing."

—Robert de Groot

HOW IT'S MADE

Is mandatory GMO labelling on the way for Canadian food products?

STORY AND IMAGES BY LYNDSEY SMITH AND BEST FOOD FACTS



THESE DAYS, THERE IS NO shortage of information on food packaging. But have you ever thought about what goes into a food label?

Some of the labels you see on food packaging are government mandated, while food manufacturers include others voluntarily. In Canada, government-mandated labels focus on two very important aspects of food: safety and nutrition. Based on these two areas of concern, certain pieces of information must be displayed on all food product packaging, such as ingredient lists and declarations of known allergens.

Voluntary labels often note what is—or, more importantly in many cases, what isn't—present in a particular food product (gluten-free celery, anyone?). Among these labels, some are regulated using specific standards or certifications, such as the Canada Organic Regime. Others have little or no evidence to back up their claims and may lean toward selling a product rather than informing the consumer.

One thing that won't explicitly appear on any food label, however, is that every product available in Canadian grocery stores has been tested and deemed safe by Health Canada. This includes all genetically modified (GM) crops and food ingredients that are currently available to Canadian consumers.

"Every plant with a novel trait, regardless of whether or not it is created through transgenic technology, goes through the same regulatory approval process," said Ian Affleck, managing director of science and regulatory affairs for plant biotechnology at CropLife Canada. In other words, every GM canola, corn or soybean crop, for example, has been deemed safe. If that is the case, why is there so much demand for labelling of foods that contain GM ingredients?

MORE THAN A RIGHT TO KNOW
Thibault Rehn is the co-ordinator for Montreal-based Vigilance OGM, a

group that is pushing for mandatory GM labelling in the province of Quebec and, eventually, Canada. He said that the group's campaign for government oversight and regulation of GM ingredients is designed to "ensure a standard of labelling that is clear and not confusing for consumers."

Rehn's group is advocating for label requirements similar to the organic standard, with a front-facing logo or label, plus identification of each GM ingredient on the ingredient list. He said a mandatory label "avoids the marketing or various ways a voluntary label can be made misleading."

Vigilance OGM also claims that there isn't enough science to prove that consuming GMOs are safe, and Rehn is concerned about agri-corporations "making big profits and increasing pesticide use."

Rehn said GM traits have only been associated with pesticide use and are lining the pockets of giant agri-companies—companies that don't care about the environment or farmers, and can't be trusted to do what's "right" to the land.

NEXT-GEN BIOTECH

Although the first transgenic traits were all related to herbicide or insecticide resistance, the second generation of approved GM foods addresses different aspects of crop production. The Arctic apple, for example, resists browning when cut, which makes it more appealing for many consumers. However, these next-generation foods aren't without controversy, as Rehn pointed out. GM products often possess negative connotations within consumer culture, and some industries, including fruits and vegetables, have concerns about these new products.

"I would rather plant breeding take 10 years than get unknown consequences from transgenic breeding," Rehn said.

Rehn's group points to the more than 60 countries that have mandatory labelling as an example of what Canadians deserve. Affleck views this

GENETICALLY MODIFIED FOODS



Corn
(field & sweet)



Soybeans



Cotton



Canola



Alfalfa



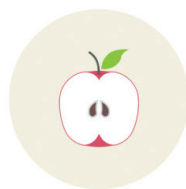
Sugar Beets



Papaya
(Hawaiian)



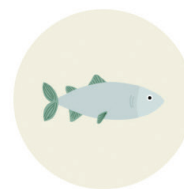
Squash



Arctic Apples



Innate Potato



**Aquabounty
Salmon**



Expert verified: **Dr. Kevin Folta**

statistic from a different perspective.

"Having GMO ingredients labelled in more than 60 other countries is a testament to their safety," he said. "It means that each of those countries has independently reviewed data and deemed GMOs safe for food and feed."

TRADE-OFFS AND DRAWBACKS

In our current environment of over-information, smartphones and countless Google searches, would a mandatory GM label really convey new, helpful information to consumers?

Vermont recently became the first U.S. state to enact a mandatory GM labelling law. The rules were somewhat scattered, as it exempted meat products—meaning a cheese pizza produced with genetically engineered rennet, for example, could be labelled, but not a pepperoni and cheese pizza. The one-state labelling law meant that many companies simply stopped shipping products there—some 3,000 of them, all told—rather than create two different packaging labels. The U.S. Congress stepped in in early July with a so-called compromise bill that would require labelling of foods "containing modified genetic material" and would give retailers the option of either text on a package or a scannable QR code for more information.

The congressional bill would override the Vermont bill, eliminating a patchwork of state-specific asks on the label. But as Brad Plumer wrote in a recent Vox article, the label doesn't actually tell you why or how a particular ingredient was modified, such as papayas being modified for disease resistance, or GM rennet being used in cheese so the ingredient doesn't need to be sourced from cows.

For many farmers, GM crops have become valuable commodities. Pesticide use has been reduced in many cases, and the new technology has helped farmers convert to reduced- or zero-till production practices. Many in the industry are concerned the spectre of GM labelling could drive some food processors to stop using GM crops entirely in lieu of creating two distinct product streams.

On the retail side, Canadians already have identifiable and available non-GM options. "Consumers have the option of GM-free products through the organic standard," said Dave Wilkes, senior vice-president of government relations and grocery division for the Retail Council of Canada. "[These food products] have all been deemed safe for our health. We believe Health Canada's approach is the right one."

OF BILLS AND LAWS

If the United States has joined more than 60 countries with some form of mandatory GM labelling, will Canada inevitably follow suit?

The rules and regulations around food and food labelling are complex. They are governed by the Food and Drugs Act, and involve several different government departments: Health Canada, the Canadian Food Inspection Agency, Agriculture and Agri-Food Canada, and even Environment Canada.

Rehn's group hopes Quebec's provincial agriculture minister, Pierre Paradis, will introduce labelling legislation this fall similar to the legislation that passed in Vermont. At the federal level, Pierre-Luc Dusseault, the NDP member of Parliament for Sherbrooke, QC, recently introduced a private member's bill (C-291) calling for mandatory labelling, but the bill is unlikely to gain enough support to become law.

Significant change will have to come from the governing party, but the Liberals' position on the issue is unclear. Agriculture minister Lawrence MacAulay has requested

that the House agriculture committee examine the current framework around GM animals. The committee recently undertook a review to ensure that current regulations "adequately address the full range of potential issues around the approval of products involving genetically modified animals beyond health and safety, the challenges and opportunities this presents to Canada, and what steps should be taken to best inform the public about new products

planned for introduction to the market." That report will be released in early December 2016.

According to Health Canada, "consumers who wish to know if their foods are derived or contain an ingredient from a genetically modified source may choose foods that have been labelled according to the national standard for Voluntary Labelling and Advertising of Foods That Are and Are Not Products of Genetic Engineering." For example, a food can claim that it is "non-genetically engineered" if other similar foods exist that are genetically modified. If consumers have questions about the method of production for a particular food, they can contact the manufacturer directly or inquire at the point of sale.

Where Canada goes from here is still anyone's guess. For those who feel passionate about the issue, it's an all-or-nothing game—full disclosure or none at all. If Canada's southern neighbour and No. 1 customer completes the move to some version of mandatory labelling, is the writing on the wall? If so, could Canada take a revised approach and create useful, informative labels that explain more than just what is or isn't in a package and how it got there? For many who have struggled to convey the complexity of farming and the difficult trade-offs involved with each production decision to the Canadian public, it might seem futile to attempt to fit all that information on a label. However, as the issue becomes more important and harder to ignore by the day, it might be worth a try. ■

***"I would rather plant
breeding take 10 years than
get unknown consequences
from transgenic breeding."***

—Thibault Rehn

PAYDAY

Cash advance gives farmers marketing options



BY SARAH HOFFMANN • PHOTOGRAPHY BY ROB McMORRIS

THE FLEXIBILITY TO SELL the crop when markets are favourable, rather than when circumstances dictate, is a pillar of farm profitability. It's one reason why farmers invest in grain storage. It's also why many turn to the Advance Payments Program (APP) or cash advance funded by Agriculture and Agri-Food Canada (AAFC).

The program allows producers to access up to \$400,000 cash in advance on expected farm income so they can pay their bills and invest in their businesses before they sell the crop. If this brings to mind a farm version of a strip mall payday loan company charging exorbitant interest rates, think again. The first \$100,000 of the advance is interest-

free for 18 months, and interest on the remaining \$300,000 (if borrowed) is close to prime.

Many young farmers see the cash advance as a way to grow their business early in their career when they are more

cash strapped and traditional lenders are not as eager to loan them money.

Casey O'Grady and Hannah Konschuh farm near Cluny, AB. Although they work with Konschuh's parents, they are eager to fund their farming venture independently and have accessed the cash advance for the last two years.

"It's a great way to access interest-free cash for a period of time without needing someone to co-sign on your behalf, which is often the case for new farmers seeking financing," said O'Grady.

The program also allows farmers to maintain business functions while waiting for marketing options to improve. "If prices are down, we can store the grain a little longer," said O'Grady.

"It's a great way to access interest-free cash for a period of time without needing someone to co-sign on your behalf, which is often the case for new farmers seeking financing."

—Casey O'Grady

According to the AAFC website, the “cash advance is calculated based on up to 50 per cent of the anticipated value of the eligible agricultural products that you are producing or have in storage.”

For example, if a farmer anticipates production of 1,000 tonnes of canola in a year, and the set value of canola for that year is \$440 per tonne, then he or she would be eligible for up to \$220 per tonne for a total of \$220,000. A combination of eligible commodities would increase that total. However, a farm business cannot have more than \$400,000 in outstanding advances at any one time.

There are three periods when grain farmers can access the cash advance. As early as April 1, they can submit an application based on their intended seeded acreage and receive up to 60 per cent of the qualifying amount. After seeding, they can receive the full amount. To qualify for spring advances, farmers must carry crop insurance or be enrolled in AAFC’s AgriStability program as security. Some producers wait until after they harvest their crop, and apply for their advance based on grain in storage. In the last case, the stored grain is the only collateral needed to secure the advance.

As Dave Gallant, director of finance and operations for the Canadian Canola Growers Association (CCGA), pointed out, traditional loans often require land or equipment to be put up as security, but the APP does not put that limitation on farm businesses. “You have your equity in the farm to use for other financing needs if you need to do that,” he said.

The program is open to farmers of many stripes. Grains, oilseeds, cattle, bison, hogs, sheep, goats, honey, maple syrup, fruits and vegetables are just some of the eligible products. However, the APP was not always such a diverse program.

According to Gallant, the program was started in the 1950s for farmers selling grain through the Canadian Wheat Board. Because it could take 18 months for farmers to deliver and be paid for their crop, wheat and barley growers needed a way to access the value from their stored production, so the government began the program to cover this cash flow gap. Over time, other farm groups in Canada asked if their members could access this program, as they too faced the limitation of having to sell their product at market lows in order to pay their bills.

The CCGA was actually formed in 1984 to administer the cash advance program for canola growers. Today, it is the largest administrator of the program, but certainly not the only one. In Alberta alone there are nine administrators. Some, like the Potato Growers of Alberta, only offer advances on one commodity (potatoes, in this case). Others, like the CCGA and the Western Cash Advance Program (WCAP), cover multiple commodities, including both crops and livestock.

For livestock producers, the advance can be issued based on a rate for calves sold in the fall, backgrounded calves sold the following year, or continuous flow operations like feedlots that always keep a minimum number of animals on hand.



Don Koberstein runs 1,000 cows and farms 1,000 acres with his brother in Barrhead, AB. While they are not in the early stages of their careers like O’Grady and Konschuh, they made the decision to expand the cattle side of their business in the last few years and have taken the advance payment through WCAP for about five years to help with upfront costs.

“You have to have a bull and feed, and you’re basically banking two years of expenses on that market animal by the time you sell it,” said Koberstein. “[The APP] helps with cash needs along the way.”

While the loans must be repaid within 18 to 24 months, depending on the commodity, there is flexibility in the repayment schedule. For every calf or tonne of grain sold, producers need to repay at least the advance amount on that unit, but they can pay at a higher rate if they want to retire the loan earlier.

O’Grady said he believes he and his wife will continue to use the APP long after they have graduated from “young” farmer status.

“Farming is a game of margins, and the [cash advance program] is part of the bigger picture of knowing your farm business and using all the tools available to you.” ●



Food fears

GOING BEYOND THE GMO LABELLING DEBATE



BEFORE STARTING ANY

conversation about whether or not so-called genetically modified foods—commonly referred to as GM foods or GMOs—should be labelled, I like to make one thing clear: this is not a discussion about health and safety. We have been eating foods containing GM ingredients for two decades. These foods have a remarkable food safety record. People around the world have eaten innumerable meals containing GM ingredients without a single credible case of harm.

There is an international consensus in the scientific community around the safety of these crops. The American Medical Association, the World Health Organization and regulatory agencies around the world, including Health Canada, have concluded that GM crops are just as safe as non-GM crops.

Here in Canada, food labels specifically identify nutrition and safety information. GM crops go through a rigorous health and safety assessment by Canada's world-class regulator to ensure they do not pose a risk to human health or the environment. To label foods containing GM ingredients could cause fear and con-

fusion for consumers, suggesting there is a safety concern where there isn't one. As it stands, consumers can choose to avoid these products if they wish by purchasing foods labelled as organic.

However, the fact that our industry does not support the mandatory labelling of GM food does not mean we're not proud to talk to anyone who asks about the role this technology plays in producing the safe and affordable food that we as Canadians have come to enjoy.

What I find particularly concerning about the debate around whether or not to label these foods is what's being left out of the conversation. GM crops are part of the toolbox that has made farming more sustainable than ever before. As some brands and groups try to portray a move away from such crops as a move toward sustainable agriculture, nothing could be further from the truth.

Thanks in part to their use of tools like pesticides and GM crops, farmers produce more per acre than at any other time in history. This is not only good for the farmer, it's good for the environment and it's good for Canadians.

The world population is growing and we need to continue to produce more food to meet rising demands. Today's farmers are stepping up to the challenge in a big way, growing more food on existing farmland and leaving valuable wildlife habitat untouched.

In fact, without using pesticides and these crops created through modern plant breeding, we'd need to turn an additional 35 million acres into farmland to produce what we do today in Canada—that's the total land area of New Brunswick, Nova Scotia and P.E.I. combined. That's a significant amount of forest, native grasslands and wetlands that are safeguarded through the use of GM crops, which is a

boon for biodiversity in this country.

GM crops have also been one of the innovations that have helped farmers adopt conservation tillage practices. Herbicide-tolerant crops brought in a new era of weed control, allowing farmers to apply pesticides to eliminate weeds rather than relying on the old practice of plowing the soil, known as tillage, which is extremely hard on the soil. By reducing tillage, farmers have been able to improve the health of their soil, something that is fundamental to any sustainable agricultural system.

Pesticides and GM crops have allowed farmers to work more efficiently using fewer resources. They have been able to limit the number of times they pass over their fields with tractors, which saves huge amounts of diesel fuel from being burned and reduces greenhouse gas emissions by almost 30 million tonnes a year.

In addition to the environmental benefits, Canadians also see the benefits of food derived from these enhanced crops at the grocery store. In fact, Canadian families save about 55 per cent on their grocery bills, or about \$4,400 per year, because farmers use pesticides and GM crops. That's a significant savings that allows more Canadians to feed their families while enjoying a healthy and nutritious diet.

While we all debate whether or not GM foods should be labelled, we shouldn't lose sight of the incredible success story this technology represents. ■

Ted Menzies is the president and CEO of CropLife Canada, the trade association representing the plant science industry. Before joining CropLife Canada, Menzies served as a member of Parliament for 10 years. During his career, Menzies has also played an active role in agricultural policy development through various commodity organizations and operated his grain farm outside of Calgary.



Long-term gains

GERMAN AG SOCIETY IS SERIOUS ABOUT EDUCATION

THE GERMAN AGRICULTURAL Society, commonly referred to by its German acronym, DLG, is a cutting-edge, farmer-focused group in northeast Germany that is committed to farmer gains.

The non-profit organization operates its 1,500-acre research facility on a \$145-million budget and conducts countless research projects on behalf of its 27,000 farmer members.

The DLG focuses on farmer education, test trials and research extension. Its International Crop Production Center (IPZ) in Bernburg-Strenzfeld holds field tours, conducts test trials and typically focuses its efforts on continued education for farmers' benefit.

One of the cornerstone projects of the IPZ is its 12-year study on crop rotation involving wheat, oilseed rape, corn, sugar beets and peas. Unlike other research farms, the IPZ test plots are 18 by 70 metres to mimic a realistic-size plot for German farmers.

"A farmer can really come to our fields and say, 'OK, this could work in our farm as well,'" said Klaus Erdle, division manager for plant production and field operations at the IPZ, adding its projects last one-and-a-half to two times longer than those at most German universities. "This is our aim—to have a long term and see which differences are going on in the soil for the plant."

The crop rotation project will track data on 68 test fields with randomized annual rotations in order to demonstrate real-life conditions and also experiment with what might work best on a year-over-year basis for optimum soil fertility.

"Crop rotation is, at the moment, a big topic in Germany because here in the region it's [a] very short, dense crop rotation of rapeseed, wheat, wheat again, and maybe rapeseed or another wheat," said Erdle.

"It's very economic, but we already see we have issues with plant protection, resistance and in soil fertility."

The northeast region of the country where the facility is located only receives about 500 millimetres of rain annually, which also makes irrigation research important for German farmers.

In conjunction with Israeli irrigation systems firm Netafim, the IPZ is researching irrigation systems for the country's arid-land farmers. Irrigation lines are laid in-ground at a depth of 35 to 40 centimetres about one metre apart. Sixteen of these test fields are being compared with eight above-ground lines resting on top of the soil over an area of 7.5 acres.

"In the last two years we already have quite good effects," said Erdle. "Last year was a very dry year. In wheat, we had a 30 per cent increase and this year it seems to be similar." The trials are said to have saved about 35 to 55 per cent of the water used in conventional irrigation systems, while Netafim has reported wheat yields of 12 and 14 tonnes per hectare with the system in place.

In addition to its fieldwork, the DLG also conducts lab work to ensure consumers are aware of its stamp of approval. Scientists perform sensory tests on a variety of German food products to ensure proper appearance, odour, taste and texture, according to Carl-Albrecht Bartmer,



CROP TALK: Alexander von Chappuis, manager of arable farming at the DLG, discusses test plots and crop rotations with a delegation of international journalists near Bernburg-Strenzfeld, Germany, as part of the 2016 International Federation of Agricultural Journalists annual congress.

DLG president and a farmer in Löbnitz, Germany.

"That [testing] is very important for even owners of strong brands," said Bartmer.

More than 600 companies have the DLG certification on their food products as a symbol of quality assurance to consumers.

Together, the field and lab work contribute to achieving the broader goal of the entire DLG, which is sustainability. The DLG has 21 sustainability indicators it uses to audit farmers.

"The idea is not to speak about sustainability as a quality," said Bartmer. "We want to measure sustainability. We want to measure relevant indicators—for example, energy use, biodiversity, use of crop protection, erosion questions.

"The idea is not only to say, 'OK, you are in' or 'you are out,' but to give good ideas to the farmer to improve his business." ■

GrainsWest managing editor Trevor Bacque attended the annual International Federation of Agricultural Journalists congress in Germany in July 2016.



Science non-fiction

REWARDING CAREERS ABOUND IN AGRICULTURAL RESEARCH



TRAVELLING AROUND WESTERN Canada in rural and urban areas, you will often see signs for agricultural research centres and field or livestock research sites. You might also see people working with livestock, planting test plots, doing fieldwork, taking notes or harvesting research trial crops. These research activities are undertaken by universities, governments, institutes, private-sector companies and farmer-directed applied-research organizations. Many people are unaware of the wide range of careers in agricultural research and the issues and opportunities addressed via the research activities of people working in a range of scientific disciplines.

This lack of awareness regarding agricultural research and potential career options isn't surprising. As I finished up high school at Evan Hardy Collegiate Institute in Saskatoon, I wondered about what to do. I finally decided that since my father was farming in the St. Brieux area of Saskatchewan, I would enrol in agriculture at the University of Saskatchewan. At the time, I wondered what courses I would have to take and what I would be learning about. When high school friends heard about my chosen area of study, they would

often reply, "What? Are you going into agriculture to learn to drive a tractor?"

As I looked at my course options, it became clear that a degree in agriculture offered an exciting range of opportunities related to crop and livestock production, food and feed quality, economics and agricultural mechanics. I decided to take a general course load with a focus on crop science. In my third year, I had an epiphany after taking an introductory course in plant pathology from Prof. Robin Morrall. My mark in the course was average, but the course, and Robin's passion for plant pathology, sparked my interest.

During university I was fortunate enough to expand my awareness of career options in agriculture as a summer student. For two summers, I worked with Bob Baker, a wheat breeder and professor in the plant science department, and his staff and graduate students. It was my first exposure to agricultural research and I learned about small plot research, wheat variety development, crop physiology and plant development. Subsequently, I worked as a summer student with Agriculture and Agri-Food Canada (AAFC) and the biology department at the University of Saskatchewan, where I learned about career options related to the management of canola and pulse crop diseases.

My knowledge of careers in agriculture and agricultural research continued to grow during my M.Sc. and PhD programs, as a post-doctoral fellow and as a plant pathologist at AAFC's Lacombe Research and Development Centre. Over the past 35 years, I have had the opportunity to work and interact with a range of technicians, summer students and research scientists working in agronomy, weeds, entomology, soils, food/feed quality, molecular biology, plant breeding and plant pathology. Growing up in the Sutherland neighbourhood of

Saskatoon, I would often wonder what all those people were doing in the research plots and laboratories at the University of Saskatchewan. Now I am much more aware of the diversity of work in agricultural research and the wide-ranging career options that are available.

The issues and opportunities in agriculture are not static, but continue to evolve. At the same time, we are seeing the older generation of agricultural researchers retire, and an infusion of young minds is needed. For someone finishing high school and looking at what career path to take, agriculture—and more specifically, agricultural research—should be a serious consideration. The diversity of career options is wide, ranging from the gene level to the field level and from the farm gate to the food plate.

Back in 1980, when I was a student graduating from high school and ready to start university, I couldn't comprehend the breadth and diversity of career opportunities in agriculture and agricultural research. In 2016, these options are even more extensive. There are many easy ways to learn about these exciting careers in agriculture and agricultural research. You can attend career days and open houses at universities and agricultural colleges. If you are fortunate enough to live close to a research centre or farm, you can check out any field days or tours they are hosting. Lastly, don't be shy—seize the opportunity to talk to people in agriculture and agricultural research. They are passionate about what they do and would be happy to share details about their experience that could set you on the path to your own rewarding career in the research field. ■

Kelly Turkington is a scientist with AAFC in Lacombe. At Lacombe, he focuses on field-based research leading to practical solutions for plant disease and crop management.



We're in this together

AGRICULTURAL RESEARCH IS A GLOBAL ENTERPRISE



WE ALL KNOW THE CLICHÉD

phrase about thinking globally and acting locally. In my experience, crop producers in Western Canada are the best example of this idea. You know how to manage the low spot in one field, but you are also aware of the weather in Australia and the political situation in the Middle East because all of these things may affect your bottom line.

Producers are also model innovators. You invest in research through your check-off dollars. You spend the money and time to attend conferences, workshops and field days. Many of you actually become research collaborators by working with the research community to try out new ideas on your farms. You connect with universities, colleges, Agriculture and Agri-Food Canada, provincial governments and more.

As science addresses larger and more complex questions, it is important to have the right talent assembled, which requires larger research and innovation networks. There are a number of groups that have changed the face of agriculture over the last 50 years, and will continue to do so throughout the next 50.

The Consultative Group on International Agricultural Research (CGIAR) started with investments from the Ford and Rockefeller foundations in the 1960s, when major starvation events were a regular occurrence in Asia, Africa and other parts of the world. Major research centres were set up in the developing world to focus on new science that would increase food security in the world's most vulnerable locations.

The success of my hero, biologist and humanitarian Norman Borlaug, created the world-changing production revolution labelled "the green revolution." Borlaug worked at the International Maize and Wheat Improvement Center (CIMMYT) based in Mexico, which has the global responsibility for wheat and maize. Many of our Canadian cultivars contain genetics developed at CIMMYT.

Of course, world events can influence CGIAR's work. While working for CGIAR, I visited the International Center for Agricultural Research in the Dry Areas (ICARDA) many times. ICARDA is based just outside of Aleppo, Syria, and has been overrun by rebel forces during the ongoing Syrian civil war. Despite the challenges it has faced, CGIAR has changed global agriculture. The model was so successful that there are now 16 CGIAR centres across the world addressing topics from forestry and fish to agricultural policy and livestock.

The Food and Agriculture Organization (FAO) is an agency of the United Nations. FAO is the group that declared 2016 the International Year of Pulses. Its influence in agriculture and innovation is focused on the elimination of hunger, malnutrition and food insecurity. FAO makes a difference by: 1) being an advocate for good agricultural policy, 2) creating new models for improving smallholder agriculture, 3) investing in thousands of field projects and 4) supporting countries by monitoring

and mitigating threats to agriculture and food. In my experience, the organization does suffer from the usual political issues associated with the UN, but the people who work for FAO on the ground are amazing and committed to improving agriculture in the developing world.

Finally, the Bill & Melinda Gates Foundation has changed the landscape of international agriculture. When Bill Gates said "Melinda and I believe that helping the poorest smallholder farmers grow more crops and get them to market is the world's single most powerful lever for reducing hunger and poverty" at the 2009 World Food Prize event, it changed the thinking of many of the world's influencers (I encourage you to read the entire speech, which is available online at gatesfoundation.org—it is amazing in its support of all agriculture). The Foundation's agricultural development strategy is based on four principles: listening to farmers and addressing their specific needs; increasing farm productivity; fostering sustainable agricultural practices; and achieving greater impact with partners, including governments, NGOs, and companies and individuals in the private sector. The influence that they have brought to agricultural development—which includes more than US\$2 billion in funding commitments, primarily in Sub-Saharan Africa and South Asia—is difficult to overestimate.

These are only a few of the many groups that support the innovation that will influence agriculture in the next decade and beyond. We are all doing our best in our own communities, but there are other communities that share our interests and goals too. ■

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Feed for thought

NEW RESEARCH DELVES INTO MECHANICS OF FEED BARLEY DIGESTION IN LIVESTOCK

THE RESEARCH NEVER STOPS—AT the end of every experiment, there may be answers, but there are always more questions. It's like the toddler who keeps asking, "why?" Is it because the more we know, the more we realize we don't actually understand? That may well be the case, but it is the almost child-like curiosity of our best agricultural researchers that drives innovation. It's all about incremental progress. The upshot is we all get to benefit from it in the end—whether we're other scientists, growers or consumers.

Such is the case with the most recent research conducted by ruminant and monogastric nutritionists Tim McAllister and Ruurd Zijlstra on the nutritional quality of Alberta-grown barley for livestock.

Funded by the Alberta Crop Industry Development Fund and Alberta Barley, this research, which spanned three years and two world-renowned research institutions—the University of Alberta and the Lethbridge Research and Development Centre—answered some key questions in both ruminant and monogastric nutrition science. It has also prompted additional research that will be conducted by two new scientists trained over the course of the original project—Hee-Eun Yang, who earned her master's degree through the University of Saskatchewan working with McAllister as one of her mentors, and Janelle Fohse, who earned her PhD at the University of Alberta with Zijlstra.

"Our research investigated the value of various cereal grains in the two primary digestive systems we see on farms in Alberta today, ruminants and monogastrics—in particular, pigs," said McAllister, principal research scientist of ruminant nutrition and microbiology at Agriculture and Agri-Food Canada's Lethbridge Research and Development Centre.



DIGESTIVE DISCOVERIES: Tim McAllister, principal research scientist of ruminant nutrition and microbiology at Agriculture and Agri-Food Canada, works to better understand the digestive process in cattle to help maximize feed value.

“We chose barley cultivars that differed significantly from each other in chemical composition, particularly carbohydrate composition. We also chose corn as a comparison, as its composition differs dramatically from barley and it is a major component in many cattle feed rations.”

The object in choosing the different barley cultivars, according to McAllister, was not to choose the best feed barley available, but to choose a wide range of varieties that would allow the team to better understand the processes of barley grain digestion in the intestinal tract. This, in turn, would allow them to create a guide for breeders to produce better feed barley varieties.

The barley cultivars chosen—CDC Fibar, CDC McGwire, CDC Hilose and Xena—included hulled and hullless types. CDC Fibar is a two-row waxy hullless type that contains high levels of beta-glucan, a soluble dietary fibre. CDC McGwire, another two-row hullless type, has about half the amount of beta-glucan as CDC Fibar. CDC Hilose, a two-row hullless type, has high amylose and beta-glucan content. Finally, Xena is a well-known hulled two-row feed barley variety that has been popular in Alberta for a number of years.

McAllister was most interested in understanding how the bacteria in the rumen—the first stomach of a ruminant animal—interacted with the grain, and he sought to understand the micro-organisms associated with the digestion of the different barley types. In order to answer this question, samples of the various barleys and corn were exposed in the rumen of live animals for two, four or 12 hours. Once in the rumen, a biofilm—a microbial community that works together to carry out digestion in the rumen—formed on the grain. “We collected the biofilms at the different exposure times, sequenced the DNA and identified the bacteria,” said McAllister. “We were essentially tracking the development of the biofilms over time. We discovered that at 12 hours the biofilm was relatively mature and didn’t change significantly.”

“What we discovered answered our hypothesis, which was that digestion of grain is a community process.”

—Tim McAllister

What the team in Lethbridge discovered is that processing, which breaks open the grain and exposes the endosperm to the micro-organisms that carry out digestion, had a bigger impact on digestibility than did the type of carbohydrate in the endosperm.

“What we discovered answered our hypothesis, which was that digestion of grain is a community process,” said McAllister. “The microbiome colonizes the grain over time and digests it. Our sequencing of the bacterial DNA answered this question. The massive diversity of bacteria in the rumen also means that the differences between the barley types were not nearly as important as the way in which the grain was processed, which gives the bacteria access to the endosperm and other parts of the grain.

“We did see big differences between the populations of bacteria digesting corn compared to barley. What this tells us is the need to adapt animals to the specific type of grain they are being fed.”

Meanwhile, Zijlstra and his team were investigating barley in swine diets. “Barley has had a long history as a grain that is best suited to those swine that have lower energy requirements, as barley is higher in fibre and lower in energy than most competing feed ingredients, such as wheat and corn,” Zijlstra said.

In the past, pig diets were formulated based on old concepts of digestible energy—that of corn being better than wheat and wheat being better than barley. Barley was discounted as a result.

“Generally, feed formulations used to be based on how much energy is digest-

ed in the gut but not how much of that energy actually contributes to growth,” said Zijlstra. “This placed too much value on protein and fibre and not enough on starch and fat. Moreover, it resulted in barley-based rations being under-formulated for the amount of energy barley actually contributes, resulting in poorer growth.”

Net energy (NE) value is a newer concept that, in the case of barley, can be a better indicator of feed quality than digestible energy value. “When the diet was formulated on NE, we found it interesting to see that young pigs ate more than we had expected,” said Zijlstra. “Which is surprising, as young pigs have difficulty eating a lot, as their gut is small.” As a result, the team saw that young pigs fed barley-based diets actually grew faster than pigs fed wheat-based diets.

Zijlstra’s team also collected and analyzed the gut content of pigs for microbial content. This research indicated that barley acts as a prebiotic, meaning that feeding pigs barley with increased amounts of beta-glucan and fermentable starch causes beneficial changes in the profile of gut bacteria and in the metabolites they produce. This gut health piece of the puzzle was a key finding in Zijlstra’s work on the project.

“Finding that barley may act as a prebiotic to stimulate a healthy gut flora is an important finding, meaning pork producers may reduce the use of antibiotics for pigs fed barley-based diets,” he said. “Including prebiotics in the ration is one of the tools to reduce antibiotic use in pig diets.”

Future research for monogastrics will seek to understand more fully this prebiotic property of barley and exactly how it contributes to gut health.

“There’s no doubt how important it would be to stimulate excellent gut health in pigs,” said Zijlstra. “Consumers are more and more concerned about antibiotics that are fed to those farm animals that end up on their plate. Being on the forefront of this sort of research is very exciting, and we’re both looking forward to continuing to understand and innovate for our Alberta growers.” ■



Glenbow Archives PA-3481-16

Prohibition profiteers

WHILE FEDERAL AND PROVINCIAL lawmakers tried for more than 50 years from the late 1800s to early 1900s to discourage the consumption of alcohol in Canada, referendums and legislation—often limited in scope—appeared to have only marginal success.

Demonstrating the truth of the adage “where there’s a will, there’s a way,” this moonshine operation in Irricana, just northeast of Calgary, was one of many home-based liquor setups. It was photographed in 1923, near the end of Alberta’s eight-year period of Prohibition.

After becoming a province in 1905, Alberta enacted a Prohibition law that was in force from July 1916 until May 1924. The law appeared to be relatively ineffective on many levels, as it contained several loopholes. People could still consume alcohol—it was the trade that was illegal. Even

then, people could still buy low-alcohol beer, and alcohol could still be purchased for medicinal purposes, with prescriptions often written for 40-ounce doses.

It was also still legal for Albertans to buy alcohol from out of province, which prompted some entrepreneurs to develop lucrative export/import businesses. Calgary Malting and Brewing Co., for example, continued to produce beer that was trucked to Saskatchewan, with some brought back to Alberta under the guise of an out-of-province beverage.

Bootlegger, home-brew and secret moonshine operations were widespread across Alberta. At one Calgary church, the caretaker was found to be fermenting raisins in the choir loft, and at one of the largest illegal still operations in the city, the operator, George Packwood, was found with 70 gallons of fine Scotch whisky. As

the operation was shut down, Packwood noted it was a very lucrative venture while it lasted: “Yes, I voted for Prohibition and I’d vote for it again. I went broke farming.”

As the Roaring ’20s were getting underway, the illegal sale of alcohol was widespread from many different sources. Along with bootleggers and illegal stills, it was estimated that in 1922 as many as 40 per cent of pool halls and 30 per cent of cafes were selling illegal alcohol.

In 1924, the illegal liquor smuggling and home-brewing trade in Alberta was reduced to a trickle after a successful referendum supporting the end of Prohibition. As a result, control of the liquor trade was given to the provincial government. Drinking was still discouraged, but the government would continue to manage legal alcohol distribution and sales until the system was privatized in 1993. ■



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