

Chinese canola ban threatens years of hard work

BY KEVIN WEEDMARK
After spending years building up the Chinese market for canola, Canadian growers of the oilseed are reeling from China's decision to cut imports. Canola is an all-Canadian crop, its name meaning Canadian oil, low acid. University of Manitoba and government researchers created the crop in 1974, reducing certain acid levels in the rapeseed plant to make the oil edible for humans and the meal edible for animals. Since then, canola has become a staple in Chinese kitchens and feed lots, generating about \$2.7 billion a year in export earnings for Canada.

Last month, the Chinese government cut imports, blaming pests found in Canadian shipments. Now farmers face a tough call: Plant the same amount, or cut back.

Many farmers don't want to disrupt their crop rotation schedules because of concern about how it might affect nutrients in the soil.

At the same time, there really is no crop that they could switch to right now that would give them any higher net returns or have better marketing options than canola, which is also sold to other export markets.

There are problems in some other markets as well. Pulse markets are down because India has import tariffs in place, durum wheat is facing export problems to Italy, where there are now Country of Origin Labeling laws in place that nudge consumers away from buying pasta made from Canadian durum, and the milling wheat market is facing a global glut.

With canola, the situation is complex. In March, China rescinded export licenses for Richardson International and Viterra. A third unidentified company has also received a non-compliance order.

Industry groups and Canadian executives believe



An aerial photo showing canola fields in bloom near Moosomin.

Kevin Weedmark photo

the restrictions may be less about pests and more about a feud surrounding Huawei Technologies Co. Chief Financial Officer Meng Wanzhou, who was arrested in Canada after a U.S. extradition request.

China has demanded her release, and has since detained two Canadians before choking off canola sales.

Some have forecast that Canadian canola acreage will drop this year. Richardson International Chief Executive Officer Curt Vossen said he expects acreage to fall by 5 per cent to 15 per cent during government committee meetings on April 2.

But even though seed isn't in the ground yet, many farmers have said they won't be switching away from canola.

Since rumors circulated in January that China would slow purchases, the May canola contract has dropped about 7 per cent to \$455.50 per tonne.

As the 2019-20 crop year nears, exporters are looking at other export

markets, according to the Canola Council of Canada.

"We have canola in around 50 or so markets around the world," according to Jim Everson, president of the Canola Council, which takes an average of three trips to China annually.

The council's first priority, though, is working with the government to re-establish the Chinese market, Everson said.

"Is there some swing capacity in certain markets today? Yes there is," said Kyle Jeworski, the chief executive officer at Viterra, which processes and markets crops, during an April 2 government meeting.

Overall, though, "it requires a lot of foresight and planning to be able to actually talk about diversification," Jeworski said.

Berthold says government must take stronger stance

Conservative Agriculture Shadow Minister Luc Berthold told Plain and

Valley in an interview Thursday, April 11 that the government needs to recognize the canola issue as a crisis and take a stronger stand.

"I'm trying hard to talk about it in the House of Commons, but the Liberals always block me," he said.

He said the government refuses to acknowledge that the issue isn't actually about pests in a canola shipment.

"In one communication, the Chinese officials said we must fix our mistakes from before," he said.

"We could only interpret that the mistake was the arrest of the Huawei CEO, but we can only presume that."

"There is a larger issue in this file. The government wants to take it at the scientific and test level. In the meantime if we don't engage with the Chinese government we are losing time and the Canola producers will pay for it."

"It's been more than 10 days now since the Ag Minister sent a letter to her Chinese counterpart and

we have heard nothing back from the Chinese government. In our opinion this is a huge mistake, to not put pressure on China, to not try hard to fix this trade issue with China, and addressing it at the highest political level possible with China. We should raise it at the political level, we should engage with China, we should talk to the ambassador, the government should name an ambassador to China as soon as possible to have an opportunity to discuss this issue with the Chinese officials right there. We do not have one (Prime Minister Justin Trudeau fired former ambassador John McCallum in a dispute over Canada's handling of the Huawei arrest.)

"The government could send an envoy to show the government of China that we are serious and that we believe that our canola is the best quality."

"At the ag committee we have been asking for an emergency meeting since the beginning of the crisis, requesting the Ag Minister,

the Trade Minister and the Foreign Affairs Minister to testify before us, and they have refused."

"The Ag Minister went before the trade committee to testify about the crisis but she is refusing to come before us to talk about this issue."

"This is an emergency and we feel that they don't have the sense that this is an emergency for canola producers."

"We must address it as a national economic issue."

"That's why we have requested seven times to have an emergency debate in the house about this issue, to make sure that all Canadians know what is happening now, and seven times they have refused to hold this debate."

"We believe this is a national economic issue but it seems the government doesn't want to see it like that. That's why we will continue to pressure the government and the Ag minister to act at the political level, where I believe a real solution can be found."

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New policies needed to combat grain fungus of cattle

BY FEDERICA GIANNELLI

University of Saskatchewan research has shown that beef cows that ate ergot-contaminated feed showed signs of poisoning even at concentrations deemed safe by Canadian livestock guidelines, and after a short-term exposure to the toxin.

Ergot, a harmful fungal toxin in grain, is an increasing problem for the health of Canadian cows and quality of crops.

Ergot exposure negatively affects cows' milk production and causes symptoms of gangrene, which means the flesh rots due to the decreased blood flow in the body. This leads to ear tips and tails falling off.

"In the most severe cases, animals lose their hooves and have to be put down, so there are economic losses for producers," said University of Saskatchewan PhD student Vanessa Cowan. "It's terrible. There is no treatment, except to stop eating contaminated grains."

Cowan has found that beef cows that ate ergot-contaminated feed showed signs of poisoning even at concentrations deemed safe by Canadian livestock guidelines, and after a short-term exposure to the toxin.

Her results also show that the blood flow in the cows'

tails diminished even at 'safe' quantities due to progressive shrinking of arterial blood vessels from ergot poisoning. Her study, funded by the federal agency NSERC and the Saskatchewan government's Agriculture Development Fund, is published in *Frontiers of Veterinary Science*.

"Our goal is to provide evidence that will help decision makers create new regulations," said veterinary biomedical professor Barry Blakley, Cowan's co-supervisor. "Policies need to be more stringent. Sheep, pigs and horses have different sensitivities to ergot from cows, so regulations should also be species-based."

People can get poisoned from eating contaminated grains, but not from animal-derived products such as milk or meat. In humans, gangrene may appear with psychosis and LSD-like hallucinations.

"In the Middle Ages, they called it Saint Anthony's fire because people felt their arms and legs burning as the toxin cut off the blood flow in the limbs," said Blakley. "People used to go on religious pilgrimages and when they recovered, they thought it was a miracle when in fact they just stopped eating contaminated grains."

In Canada, Blakley said, ergot contamination of crops has increased in the last few years due to wetter summers and a lack of consistent crop rotation.

"New farming techniques involve less crop rotating and plowing, which in the past has helped bury ergot in the soil and minimized the spread of the fungus to crops and other farmers' fields," he said.

He noted farmers cannot sell contaminated crops, and exports abroad may also suffer.

Cattle and crop producers are aware of ergot and regularly inspect crops for contamination, which is indicated by dark, kernel-like structures in the grains. Producers often realize their cattle have been exposed only when the animals show symptoms.

"Routine lab testing of the feed is the only way to know for sure," said Cowan. "It should become a routine prac-



Vanessa Cowan at the USask Large Animal Research Clinic.

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...tice for producers because the problem won't go away."
The USask Prairie Diagnostic Services, co-owned with the Saskatchewan government, is one of two labs in Canada able to run the test, which costs around \$90. The lab runs 75,000 analyses per year for a variety of contaminants, 50 per cent of which are made up of mycotoxins like ergot.

"USask is the best place to study ergot because of the excellent toxicology program, the Western College of Veterinary Medicine, and the new university's livestock facility for doing research on large animals," said Cowan.

Cowan, Blakley and co-supervisor Jaswant Singh, professor in veterinary biomedical sciences, have also completed a study on long-term ergot exposure in beef, which will be published in the summer.

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Debt-to-equity ratio: Leverage assets for farm financial fitness

BY JP GERVAIS

What a difference time makes. Borrowing costs climbed in 2018 from their historic lows one year earlier. Farm cash receipts flattened nationally over the same period.

With Canadian agriculture's total debt outstanding now over C\$100 billion, we can ask some important questions about the value those liabilities provide.

Taking on more debt to finance the purchase of assets allows a business to expand and grow.

Paying off the debt is done with the additional revenues generated by properly deploying these assets. Reducing debt or seeing assets gain value over time are two ways to build equity or net worth. However, financing a large portion of the business growth through debt also exposes a business to financial risk. The last ratio I look at in our March Financial Fitness series, the debt to equity ratio, can answer the question of the long-term value generated by liabilities.

Debt-to-equity ratio

The debt-to-equity ratio indicates the ability of shareholder equity to cover all outstanding debt.

DER = total liabilities / total shareholders' equity

Total liabilities include both short- and long-term obligations. Total equity is defined as total assets minus total liabilities.

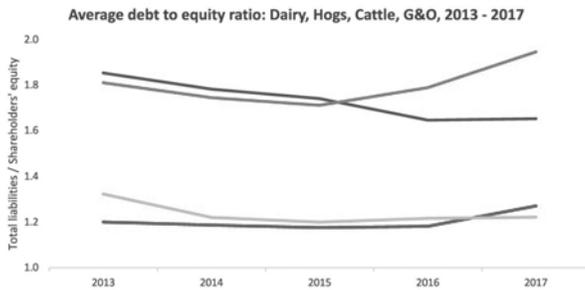
DER ratios can range broadly and still be considered healthy. Different levels of debt are required to take advantage of different sectors' opportunities; what would be an ideal level of debt for one sector is less optimal for another. A low DER could indicate a mature operation that's not seeking to expand or innovate. A high DER can indicate a highly leveraged business pursuing growth opportunities while being exposed to financial risk.

How it works

A low debt-to-equity ratio provides flexibility:

To extend terms on existing debt when profits and repayment capacity are tighter.

To borrow more money if an opportunity shows up.



Leveraging assets with different returns to equity

Different leverage for different sectors

The figure above shows the average DER for dairy, hogs, cattle and grains and oilseeds between 2013 and 2017.

Each sector shows a healthy range of scores over a five-year period, reflecting its unique capital expansion needs and trends in revenues.

With a more predictable income, dairy producers can carry higher debt to equity than other ag sectors. As the demand for dairy products expanded, opportunities arose to expand production capacity starting in late 2014.

We'd expect the other three sectors shown here to have ratios lower than dairy's: revenues for each of these sectors are more volatile and borrowing to fund assets and growth makes sense for these producers only during periods when such investment will offer profitable returns.

Cattle and grains and oilseed producers had low debt-to-equity scores each year between 2013 and 2017.

The period was generally characterized by strong revenue growth for crop producers that enabled payback of any increase in debt obligations, and matching increases in farmland values.

Between 2013 and 2017, we see hog

producers' DER fall. Even at its lowest, it's still higher than either cattle or grains and oilseeds. But it's a great example of why we can't compare across sectors and why, instead, we look only at a sector's history: Hog producers' five-year average of 1.74 compares to the sector's previous five-year average of 1.96 and represents a continuing decline in DER since 1998. Canadian hog producers have steadily improved their net worth through periods of consolidation and investment.

What does the future hold?

Highly leveraged farms are more likely to show more volatile rates of return on equity. The debt-to-equity ratio shows how leverage amplifies the return—whether in good times or bad. Revenues will shift in 2019 when commodity prices respond to shifts in the demand for agricultural commodities. There'll be opportunities that emerge in the year ahead that will have to be evaluated considering each operation's exposure to financial risk.

There'll be opportunities that emerge in the year ahead that will have to be evaluated considering each operation's exposure to financial risk. Tweet this

As with each ratio we highlight throughout this series, DER is only one view of the financial health of Canadian agriculture. Using different ratios together fills out the big picture. As well, using the average DER as we've done here doesn't begin to tell the whole story, as it reflects both operations with recent production investments and higher DER scores, and more mature operations carrying lower debt levels (and lower DER scores). Work with your lender and accountant to determine the suggested ratios for your specific industry and be sure to understand them according to your own strategy and the risks facing your own operation.

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Agricultural innovation key to sector growth

BY MARTIN SCANLON, DEAN OF AGRICULTURAL AND FOOD SCIENCES, UNIVERSITY OF MANITOBA

Recognizing Canada's large natural endowment of water and arable land, Innovation, Science, and Economic Development Canada (ISED) defined agri-food as one of six interconnected sectors with tremendous global growth prospects. But, as with the other five sectors, the government of Canada emphasized that the agri-food industry's potential would only be realized through a concerted innovation mindset.

So, what does innovation look like in the ag sector? And what must the government do to cultivate innovation that ensures bold targets are met while also fostering food systems that are safe, healthy, just, and sustainable?

Canada's Agri-Food Economic Strategy Table has set an ambitious target for increased production, proposing a 32 per cent increase in exports by 2025. A key determinant for this economic growth, which would allow farmers to produce more on the land they already have, is improved plant genetics.

The Canadian Food Inspection Agency works with industry to ensure a pipeline of better yielding varieties is available. However, with the advent of new technologies such as the gene-editing tool CRISPR, distinctions between plants with new traits and conventional varieties become blurred. If Canada is to be an attractive market for new products and technologies, then as Pierre Petelle of CropLife Canada recently remarked, our regulatory environment has to be predictable.

Good production outcomes also require the judicious application of plant protection products like herbicides, insecticides, and fungicides. This practice, essential for healthy organic and conventional crops, is frequently a point of concern for consumers. Social pressure demands that companies continue to innovate to seek ever more precise pest management solutions. As unmanned aerial vehicles like drones proliferate, the potential to deliver targeted doses of these products will further reduce the amounts applied to crops. Future innovations in robotics, driven by good image analysis technologies, portend the elimination of herbicides and insecticides altogether.

In "vertical farms," plants grow in stacked layers, fed hydroponically in a closed and controlled environment. In these intensively managed systems, annual yields can be up to 12 times those in the field, while manipulation of the vertical farm's light source can enhance the nutritional profile of the crops. In northern communities where fresh vegetables can be expensive, these indoor crop-growth innovations can help combat the development of diseases brought about by poor diets.

The Advisory Council on Economic Growth report of 2017 (also known as the Barton Report) noted that Canada only processes half its agricultural output. An underdeveloped food-processing sector was deemed responsible, with Canada running about a \$4-billion trade deficit in agri-food products. Encouraging investment is key to adding value to Canada's agricultural bounty. A motivated and skilled workforce is one investment attractor, and for this the country's educational institutions must inspire Canada's brightest and best to pursue careers in the food sector.

A receptive regulatory environment is also important for attracting investors. The Agri-Food Economic Strategy Table called for a regulatory reform agenda. How do we get more online detection of food safety hazards and fewer compliance-verification demands,



such as measuring the density of water?

For countries that get it right, the benefits are enormous. In the Netherlands, one in six work in the food industry, and the country's promotion of sustainability and thirst for innovation allow it as a small state to be the world's second-largest food exporter. If Canada's agri-food sector had the same commitment to training and innovation and appeal to investors, imagine the possibilities for our country, and the potential food security benefits for millions on this planet.

Canada has already made a substantial innovation investment in an important agri-food resource: protein. Protein Industries Canada (PIC) was the chosen agri-food supercluster by ISED in 2018. With a government investment of \$153-million, matched with industry contributions of \$400-million, Canada's agri-food innovators are now part of the single biggest supercluster investment on the planet. By targeting better ways to produce and process plant proteins, PIC is leading Canadian businesses as they innovate their way into a \$13-billion market opportunity.

But proteins are not just in plants. Canada's Maple

Leaf Foods, a company with more than \$3-billion in revenues, aspires to be "the most sustainable protein company on earth." One of its suppliers, an international animal genetics company, has invested heavily in state-of-the-art X-ray tomography infrastructure to examine relationships between an animal's genetics, the proteins in its feed, and the protein in its muscles in order to reduce waste in both production and processing.

The House Agriculture Committee noted in 2017 that "research, science, and innovation are critical for maintaining and enhancing the sector's competitiveness, both internationally and domestically." The government of Canada's innovation agenda in agricultural and food systems is set to foster sustained, long-term economic growth in an area where high quality continues to govern economic success.



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Improve soil to boost crops and profits

BY RICHARD KAMCHEN

With another growing year approaching, experts advise farmers know their soil to get the most out of their fields.

"It's a living system and the organisms that live in that soil can really help us out, but we have to help them out as well," says David Burton, a professor at Dalhousie University's plant, food, and environmental sciences department.

SOIL TESTING

Soil sampling and analysis are vital to understanding available nutrients and the fertility program required to maximize economic yields, says Jocelyn Velestuk, a Saskatchewan farmer and agronomy con-

sultant at Western Ag.

How soil sampling and analysis help in understanding available nutrients and the fertility program required for best economic yields. Tweet this

"Nutrient balance is important to growing a healthy crop that has a lower chance of disease and is more competitive with weeds," adds the Saskatchewan Soil Conservation Association president.

Velestuk points out that nutrients change from year to year, depending on the previous years' crop uptake, precipitation and management, making benchmark site choices important to understanding how soil functions over time.

Continued on page 37

Doyle Piwniuk
 MLA for Arthur-Virden



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Diversifying chickpea genetics for better crop performance

BY SARATH PEIRIS
University of Saskatchewan researchers Bunyamin Tar'an and Donna Lindsay at the Crop Development Centre (CDC) are part of an international project that will increase the genetic diversity of chickpea crops by providing plant breeders around the world with access to thousands of seed progeny from wild plants. "The scale and depth of this study makes it unique," said Tar'an, Agri-Food Innovation Chair at the CDC. "This research generated close to 10,000 progeny from crossing samples from where wild chickpeas grow in south-

eastern Turkey and crossing them with cultivated lineages." In a paper published Feb. 13 in Nature Communications, the 49 university researchers, faculty members and students involved in the five-year project say the seed collection they've developed "contains greatly expanded diversity and a range of traits of potential agronomic importance." The collaboration was led by Doug Cook from the University of California Davis. The diversity of available materials means chickpea breeders from countries such as Canada,

Turkey, India, Ethiopia, Pakistan, Russia, Australia and the United States can select desired genetic traits to address their current problems and future opportunities. "Characteristics like drought, heat and cold tolerance, seed nutrient density, reduced dependence on inputs and resistance to stresses—many of these are crucial for the sustainability of the chickpea crop in Western Canada," explained Tar'an. The CDC, which has developed more than 400 commercialized crop varieties since its inception in 1971, provided the

protocols for successful crossing between the wild and cultivated varieties of chickpeas during the early stages of the project. U of S expertise and facilities such as the greenhouse complex, phytotron, analytical lab and field breeding lab were critical to analysing seed nutrition quality, stress tolerance and disease resistance in chickpea plants. While the new primary seed material gathered for the project are maintained in a gene bank in Turkey, the progeny lines (more than 2,500 in all) were distributed to member countries of the project.



Pictured above is Bunyamin Tar'an—Agri-Food Innovation Chair at the CDC.

Research at the U of S has now generated more than 650 diverse seed lines that are available for the CDC's chickpea genetic improvement program. While the new progeny material can be readily used in breeding programs, it could take as many as 10 years until the traits are fully integrated into commercial varieties because plant breeding is a long-term endeavour, Tar'an said. "The research we describe in Nature truly reflects the value of global collaborations with common goals and sharing expertise among different groups," he said. Sarath Peiris is assistant director of Research Profile and Impact at the U of S

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USask crop scientists help crack the durum wheat genome

University of Saskatchewan (USask) researchers played a key role in an international consortium that has sequenced the entire genome of durum wheat—the source of semolina for pasta, a food staple for the world’s population, according to an article published today in Nature Genetics.

“This ground-breaking work will lead to new standards for durum breeding and safety of durum-derived products, paving the way for production of durum wheat varieties better adapted to climate challenges, with higher yields, enhanced nutritional quality, and improved sustainability,” said Luigi Cattivelli of Italy’s Council for Agricultural Research and Economics (CREA).

In an exciting discovery, USask plant breeder Curtis Pozniak, along with University of Alberta scientists Gregory Taylor and Neil Harris, identified the gene in durum wheat responsible for accumulation of cadmium, a toxic heavy metal found in many soils. The USask team discovered how to significantly reduce cadmium levels in durum grain, ensuring the safety and nutritional value of the grain through selective breeding.

The durum wheat genome is four times as large as the human genome. The team has for the first time assembled the complete genome of the high-quality Svevo variety.

“We can now examine the genes, their order and structure to assemble a blueprint that will provide an opportunity to understand how the genes work and communicate with one another,” said Pozniak.

“With this blueprint, we can now work quickly to identify genes that are responsible for the traits we select for in our breeding programs such as yield, disease resistance, and nutritional properties.”

The research involved more than 60 scientists from seven countries. The work was co-ordinated by Cattivelli and included corresponding authors Pozniak of USask and Klaus Mayer of the Helmholtz Zentrum München (Germany), as well as researchers Aldo Ceriotti and Luciano Milanese of Italy’s national research council CNR and Roberto Tuberosa of the Uni-



versity of Bologna (Italy).

Durum wheat is mainly cultivated in Canada, Europe, United States, and South Asia, and remains a key crop for small farms in North and East Africa, as well as the Middle East.

“This is an exciting development for durum farmers as it will mean wheat breeders will be able to produce varieties with improved yields and resistance to disease, pests, and environmental stressors quicker than before,” said Laura Reiter, Chair of the Saskatchewan Wheat Development Commission board of directors, who farms near Radisson, Saskatchewan.

“The investment in this research on behalf of Saskatchewan durum farmers is expected to lead to productivity gains and will allow them to capture opportunities in markets that desire the high-quality grain that Saskatchewan farmers produce,” she said.

Durum wheat, mainly used as the raw material for pasta and couscous production, evolved from wild emmer wheat and was established as a prominent crop roughly 1,500 to 2,000 years ago in the Mediterranean area.

The scientists compared the durum

wheat sequence to its wild relative and were able to reveal genes that humans have been selecting over the centuries.

The team uncovered a loss of genomic diversity in durum wheat compared to its wild wheat relative, and they’ve been able to map these areas of loss and precisely recover beneficial genes lost during centuries of breeding.

“We can now see the distinct DNA signatures that have been so critical to the evolution and breeding of durum wheat, enabling us to understand which combination of genes is driving a particular signature and to maintain those target areas of the genome for future breeding improvement,” said Marco Maccaferri, lead author of the manuscript.

As pasta is a staple for the world’s population, industries are asking for more, safer, and higher-quality durum wheat.

“Having this durum wheat high-quality genome sequence enables us to better understand the genetics of gluten proteins and the factors that control the nutritional properties of semolina. This will help to improve pasta quality traits,” said Italian scientist Ceriotti.

Funding was provided by: CREA; the

Italian Ministry of Education University and Research Projects InterOmics and PON-ISCOCEM; Natural Sciences and Engineering Research Council of Canada; Genome Canada and Genome Prairie; Saskatchewan Ministry of Agriculture and Government of Canada through the Agriculture Development Fund; Western Grains Research Foundation; Saskatchewan Wheat Commission; Alberta Wheat Commission; Manitoba Wheat and Barley Growers Association; Fondazione AGEI; University of Bologna; Binational Science Foundation; Israel Science Foundation; U.S. Department of Agriculture; German Federal Ministry of Food and Agriculture; and German Ministry of Education and Research.

In 2018, USask researchers also played a key role in decoding the genome for the bread wheat variety Chinese Spring, a discovery made by an international consortium and published in the journal Science: U of S crop scientists help crack the wheat genome code Andrew Sharpe, director of genomics and bioinformatics at the USask Global Institute for Food Security, was also involved in both the durum wheat and bread wheat research projects.

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Improve soil to boost crops and profits

Continued from page 31

Also, test different fields and even areas within fields separately. They are likely to vary in their fertility and therefore need different levels and types of nutrients, says University of Saskatchewan soil fertility professor and agrologist Jeff Schoenau.

ORGANIC MATTER

"One of the things we're doing is encourage a broader concept of soil testing that encompasses both physical and biological aspects of the soil in addition to the chemical," adds Burton.

Low soil organic matter is affecting the physical structure of the soil and its ability to hold water, highlighting the need for practices other than providing nutrients to plants in order to build up soil organic matter.

"We're looking at things like cover crops, adding animal manures, reducing tillage, as ways in which we can try to promote more organic matter in the soil," says Burton.

Schoenau lauds manure's efficacy in improving organic matter content and fertility

in soil, but warns against excessive tillage and burning: "You don't want to open that soil up to erosion by wind or water."

SOIL COVER

Burton emphasizes the importance of covering soil as much as possible.

"Leaving the soil bare over winter is not a good thing," he says. "Ensuring that there's continuous cover is a very effective way of stimulating the biological activity in the soil and maintaining soil organic matter."

Perennial forage crops provide additional organic matter to the soil and improve structure, Schoenau says.

A three-year perennial forage crop can return more than twice the soil organic matter as annual crops like cereals or pulse crops.

BOTTOM LINE

Soil experts say testing soil is the best way to best adjust management and fertility programs for the highest yields and profits. Additional steps of using cover crops and animal manure, as well as reduced tillage, also add nutrients to the soil.



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Why spring fence checking is important

BY CRAIG LESTER

Before moving cattle or livestock into any pasture this spring, farmers should ensure fences are in tip-top shape.

That's the advice from two farmers who say it's imperative to check all the fence-lines from beginning to end and do maintenance where needed to avoid problems while livestock are grazing in that pasture.

A complete fenceline check for damage is a necessity after a Canadian winter. Here's what to watch for.

Only as strong as the corner post

Cochrane, Alta. rancher Morrie Goetjen says when doing routine maintenance, producers should start by checking the corner post.

"If your corner posts are rotting or they are lifting then you are never going to keep your wires tight," says Goetjen, adding it's important to build a proper corner and a brace.

Trochu, Alta. farmer Charlie Chris-

tie says when checking fences for any downed wires or missing staples, keep a sharp eye on where snow drifted over the fence.

"As the snow melts, it weighs on the fence and it can pull fence down quite a bit," Christie says.

He adds to check posts where water is laying as the frost may have forced them up.

Christie, who is the chair of the Alberta Beef Producers, says fenceline treed areas are also prone to damage.

"We look for deadfall that has fallen on a fence and try to knock down anything that might come down throughout the year," he says.

Be proactive

Both farmers say it's important to stay ahead of the curve by building new fences regularly.

Christie says he has a schedule on his farm where he builds a mile and a half to two miles of fence every June. He believes

an ounce of prevention is worth a pound of cure. The Ontario Ministry of Agriculture, Food and Rural Affairs offers tips on selecting the right fencing system for the task and livestock. Page wire, barbed wire, smooth wire suspension, barbed wire suspension and electric fencing are detailed, as are estimated costs of building supplies.

Bottom line

Damage such as rotted posts, weighed down wires and frost heaves may happen on fencelines over a winter on the Canadian Prairies.

Make those anticipated repairs and consider establishing a rebuilding schedule for fences.



A complete fenceline check is a necessity after a Canadian winter.

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USask students poised for career success, thanks to new RBC-funded program

Through the RBC Future Launch initiative, a gift of \$300,000 will fund a two-year pilot program at USask—the RBC Learn to Work, Work to Learn program—in partnership with the College of Agriculture and Bioresources (AgBio) and the Student Employment and Career Centre.

The program involves semi-monthly career meet-up events, through the Student Employment and Career Centre in conjunction with the University of Saskatchewan Students' Union. Open to all USask students, these events give students the opportunity to network, meet professionals and alumni in a variety of industries, and discover career options in areas such as agribusiness and entrepreneurship; renewable resources and environmental science; government and community; science and technology; and animal science and food bioproduct production.

Additionally, Agriculture and Bioresources students have the opportunity to take an eight-month, work-integrated course, to help them develop the essential skills that students and employers have both identified as an important addition to their degrees, setting them up for a successful career start.



David MacTaggart, a third year USask crop science student.

"In collaboration with the University of Saskatchewan, RBC is striving to help address the quiet crisis of no experience-no job, no job-no experience, affecting the now and the next generation of young leaders," said RBC regional president Kim Ulmer. "Young people are entering the workforce at a time of profound economic, social and technological change requiring a new mix of skills. It is through innovative programs like RBC Learn to Work, Work to Learn that our young people and our country will be best positioned to thrive and prosper."

The first RBC Learn to Work, Work to Learn course will begin on May 1 in AgBio. The three-credit class (AGRC 445.3) will help students develop transferable skills through a combination of their summer employment and ongoing course assignments. By collaborating with their employer and the course facilitator, students will be empowered to identify their own personal learning outcomes to achieve during their employment, and develop and reflect on those skills on the job.

The course has been developed by Grant Wood, assistant professor in AgBio, who said his aim is to help students grow their transferable skills—skills employers highly value like communication, customer service, time management and interpersonal skills.

Wood said that the course is unique and helps univer-

sity students apply themselves in a different way, jointly working on skill-development with the support of their professor and their employer. When they graduate students are then committed to their roles as employees and active learners.

"When students interview after graduation the employer knows they have the technical skills. What they are looking for is whether students also have the communication skills, social skills, dependability and initiative to be successful in diverse workplaces. That's what this course addresses," Wood said.

RBC's support will also help students with the practical applications of the job-search process, including developing a professional cover letter and resume, participating in mock-interviews, and learning how to stand out at career fairs.

Additionally, interactive workshops, mini-conferences, events and case competitions will be offered to all AgBio students to help them hone abilities in the areas of communication, professionalism, resume building, negotiation, critical thinking and networking. This includes the AgBio Challenge, a unique two-day event which empowers students from USask and other post-secondary institutions to showcase their skills in a competitive environment, solving real industry problems with innovative ideas.

Mary Buhr, dean of the College of Agriculture and Bioresources, said she is confident in the success of the program.

"We have incredible students and alumni in this college, and one of the facets of this pilot program helps bring these important groups together, allowing us to further tap into the rich expertise and experience that our industry partners are so willing to share with our students. Both the College of Agriculture and Bioresources and the Student Employment and Career Centre are uniquely positioned to execute this pilot program, which we hope will prove so successful that we can roll it out across the university."

The program is over half-filled already and students in the college are excited to begin.

"Coming out of this course, I'm hoping to have a better understanding of what different organizations are looking for in their employees," said David MacTaggart, a third-year crop science student who is already enrolled. "I'd like to transfer some of those skills to develop my own personal brand as I compete in the job market in the future."

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AGRICULTURE CONTINUES TO SEE STRONG BUDGET SUPPORT

The Ministry of Agriculture's budget will increase three per cent in 2019-20 to \$391.3 million, ensuring programming to support the success of farmers, ranchers and agri-businesses continues. The budget fully funds business risk management programs and sustains investments in agricultural research. This will encourage our agriculture sector to continue to grow.

"This provincial budget provides a stable foundation for Saskatchewan's farm and ranch families with increases to the right programs and services," Agriculture Minister David Marit said. "This budget provides program enhancements and continued investment in research."

In response to feedback from stakeholders and producers on the Pest Biosecurity Program introduced last year, funding to the Rat Control component of the program will increase by \$350,000 to \$1.25 million. This increased funding will be directed to grants paid to rural municipalities and First Nation bands, to cover the cost incurred for rat inspections and bait.

The 2019-20 Budget contains \$271.9 million to fully fund business risk management programs offered under the federal-provincial Canadian Agricultural Partnership (CAP), including Crop Insurance, AgriStability, AgriInvest and Western Livestock Price Insurance.

The Crop Insurance program includes a number of enhancements for 2019-20, including higher coverage on tame and native grazing land to better reflect the losses producers experience during a shortfall in forage production. Approximately 30 million acres are anticipated to be insured under Crop Insurance this year.

The government continues to invest \$31.9 million in agricultural research, with funding for research projects, demonstration and adoption of new technologies. The research funding is part of the \$71.2 million that will be invested this fiscal year into strategic programs under the five-year CAP agreement.

This budget continues to support a number of industry organizations, with funding for groups that include Agriculture in the Classroom Saskatchewan, Saskatchewan 4-H Council, and Farm and Food Care Saskatchewan. These organizations, among others, help build trust in agriculture, develop future leaders and support a sustainable industry.

Saskatchewan's agriculture sector is an important part of the province's diverse economy. Producers harvested a crop of more than 35 million tonnes in 2018, the sixth consecutive year the provincial harvest has been more than 30 million tonnes. Saskatchewan's 2018 total agri-food exports were \$13.4 billion, an increase of more than 60 per cent since 2010.

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Clubroot—the sky is not falling . . . yet

WENDY SCHATZ LEEDS, PAG,
CCA AGRONOMY LEAD,
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There has been no limit this winter to clubroot presentations at conferences and articles in agriculture print. Listening to producer conversations around clubroot has left me with some apprehension. I am going to discuss less about the science of this disease and more about the psychology of the disease by addressing some of the comments I have heard.

First comment: "The Ministry survey showed I do not have clubroot spores or plant symptoms so I'm not going to worry about it." While this is true we must understand how the survey was conducted. The Sask Ag and Food survey was excellent but realize that only one field per township was sampled. That leaves many other fields that spores could be present in.

I think understanding spore load in the soil is important. Spores can last in the soil for 20 years or more. However there seems to be a natural spore population decline if no host crop is present for two years. Preventing spore build up will help keep inoculum at a level that may not cause plant symptoms and therefore no yield loss. This is easily achievable by following a longer canola rotation or using a clubroot resistant variety.

New research from the Alberta camp (AAFC, U of A and Alberta Agriculture) supports this. The research demonstrated most clubroot resting spores disintegrated within the first two years in the soil. Additionally, growing a clubroot-resistant hybrid substantially increased yield and reduced the resting spores going back into the soil compared to a susceptible hybrid.

Lower inoculum also helps reduce selection pressure within a resistant variety. These findings highlight the value of using clubroot-resistant hybrids in combination with a greater than two-year break from canola to help minimize the impacts of clubroot and to help slow the spread of the disease.

Second comment: "I am not scouting or looking for the disease—I would rather not know." Understanding your fields is key to keeping clubroot at a manageable level.



Clubroot is spread by the movement of soil containing soil-borne resting spores. The obvious place to keep an eye on is field entrances.

Clubroot surveys in Alberta have found almost all new infections begin near the field access pointing to contaminated equipment as the culprit. This is not the only spot that needs to be watched. Clubroot spores transform to zoospores which will swim in water to find a root to infect. Watch areas where water accumulates such as runways or low spots for strange canola symptoms.

Also watch areas where old yard sites existed. Clubroot is a disease of Brassicaceae species which include many vegetables. Baba's old garden site could have resting spores. Areas that show above ground symptoms of wilting, yellowing, stunting or premature ripening need to be examined closely. Carefully dig up the canola plants and inspect the roots for swollen galls. Patch management is feasible where disease levels are low and caught early. Double the size of the patch, dig up plants and dispose.

Lastly: "It will be too time consuming to clean off my equipment." Areas where clubroot is present require strict sanitation procedures. In areas where clubroot has not been detected follow a common sense approach—90% of the soil removed equals 90% of the in-

fection risk reduced. Small windows of effort can help towards long term prevention of this disease. Make sure to knock off big clumps of soil and sweep off any loose soil before you move fields. Sanitation of equipment with a 2% bleach solution after season use could also be considered.

I truly believe Saskatchewan will not be in the same situation as Alberta. As my title suggests, the sky is not falling "yet"—as long as we don't ignore the potential presence of this disease.

We have more knowledge and tools at our disposal than Alberta did in the early days of clubroot discovery. The psychology of awareness is key. Keep your eyes open for any weak plants this summer and contact an agrologist like myself to help you determine what is going on in your field.

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How to help microbes improve your soil

BY RICHARD KAMCHEN

There's an entire ecosystem in your soil that's as complex as the Serengeti.

Among the teeming life underground are microbes, which aid in nutrient and carbon cycling, improving soil structure and suppressing plant disease.

Benefits

"Your soil microbial communities cycle the nutrients that plants need for growth. Without them, you wouldn't have that," says Lori Phillips, a research scientist in soil microbiology with Agriculture and Agri-Food Canada.

Microbes break down carbon and continually cycle it in the system. A diverse and abundant soil microbiome will sequester more carbon.

"And more carbon in your soil means more nutrients, better water holding capacity and better structure," Phillips says.

Microbes are hugely important for soil structure.

Fungi produce compounds that help increase aggregation. And better soil structure means less compaction, greater water infiltration and better channels for roots to grow in.

A healthy soil biological community also can help suppress plant diseases.

"They can either directly outcompete for niche resources or they can prey on plant pathogens," Phillips says.

Taking care of soil microbes results in better soil nutrition, carbon cycling, soil structure and suppression of plant disease.

Harmful practices

Some farming practices, however, can potentially harm microbials.



Tillage, for instance, can be a catastrophic event for microbials as it destroys their habitats.

"I believe that the key to increasing soil health and the microbial population of the soil revolves around keeping live roots in soil at all times," says Manitoba farmer and soil health advocate Ryan Boyd.

A healthy microbiome can help resist damage, be that from tillage, high levels of fertilizer and herbicide, and even floods and droughts.

"We also try to limit our use of seed treatments and insecticides, and use fungicides in crop sparingly," Boyd adds.

of the system's functional resilience would have been lost, Phillips says.

"We try to grow pastures that are diverse in species and manage grazing as to have green growing plants as long as possible throughout the year, feeding the soil biology with root exudates," Boyd says.

Diversity also goes for his annual crops.

"We have a diverse crop rotation and will occasionally grow a forage mixture of annual species for grazing or stored feed," Boyd says.

Cover crops and manure

Any practices that can increase diversity and carbon in the system will promote healthy microbiomes.

Cover crops increase the types of carbon, or food, entering the system, thereby boosting below-ground diversity, Phillips says.

She adds that manure and compost also increase the types of food available for microorganisms.

Bottom line

Microbial abundance and diversity are keys to soil health. Farming practices such as crop rotation, increased crop diversity and cover crops help build microbes, experts say.

Monoculture

Monoculture is another detriment as it typically causes a decrease in microorganism diversity. Recovery from a catastrophic event would take longer because some



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Why agricultural groups fiercely oppose the carbon tax

BY TRISTAN SKOLRUD

When the Pan-Canadian Approach to Pricing Carbon Pollution was announced in October 2016, it was met with passionate responses, from supporters and those in opposition.

Agricultural groups were quick to dismiss the announcement, condemning the federal government for imposing costs on their operations.

Farmers in Western Canada were particularly incensed. After investing in zero-tillage practices that sequester massive amounts of carbon into the soil, they were still being forced to pay a tax.

Understanding the likely effect of the tax is of course more nuanced. I've spent a significant amount of time on this issue, informing farmers and interest groups in the agricultural sector on what to expect with the new policy.

How much will it cost?

Amid the cacophony of complaint, common themes have emerged. The loudest complaints are understandably economic.

Farmers produce a homogeneous product and sell into an international market.

This is a perfect recipe for having zero control over the price to sell their output.

This means that any additional costs incurred by farmers—from a carbon tax, for example—are difficult to pass on in the supply chain.

To make matters worse, we're far from consensus on the extent of those additional costs, especially as the federal backstop (the policy that takes effect when provinces, including Saskatchewan, don't have their own plan) has only just been implemented.

Farmers are exempt from most of the direct costs with the backstop policy, but indirect costs remain.

The costs associated with the carbon-intensive transportation required to get the product to market will likely be the largest, followed by increases in heating expenses and, possibly, fertilizer.

Both sides of the debate tend to bolster their arguments by pointing to British Columbia's experience with an agricultural carbon tax. When the tax was implemented in 2008, agricultural energy inputs such as diesel were not exempt.

This naturally prompted concern about the sector's ability to remain competitive with international jurisdictions not subject to the tax—a rational, justified concern. In 2014, the sector was permanently exempted from the tax.

Diverging strategies on the Prairies

The bulk of Canada's agricultural production occurs in the Prairie provinces where carbon tax opposition has been fierce.



Saskatchewan is in the midst of a lawsuit challenging the authority of the federal government to impose such a tax, and several parties throughout the country have taken sides as intervenors in the case.

Alberta, overruling the objections of its farm sector, imposed its own tax in advance of the federal announcement.

In designing a custom tax policy, Alberta moved to protect its agricultural sector from the direct costs of the tax while still providing incentives to cut emissions.

This level of flexibility has been removed in the latest iteration of the federal backstop, constraining provinces that have not yet adopted carbon pricing to a much narrower range of choices.

Misplaced focus?

Neither B.C.'s progressive system, the flexible system of Alberta, nor the default federal backstop tax the largest source of agricultural greenhouse gas emissions.

In 2016, agriculture accounted for 8.5 per cent of Canada's emissions, and of that, carbon dioxide only accounted for four per cent.

Nitrous oxide (48 per cent) and methane (48 per cent) make up the rest. Both are potent greenhouse gases. Preventing the emission of one kilogram of nitrous oxide can be much less costly than preventing 300 kilograms of carbon dioxide.

But a well-understood fact from environmental regulation suggests that an optimal policy induces change at the lowest possible cost. Taxpayers benefit more from greenhouse gas reductions that cost \$15 per kilogram compared to those that cost \$30.

The current federal policy does not facilitate this low-

est possible cost arrangement, nor was it designed to. The idea was for each province to construct a plan suited to its economy and energy generation sources, not to act as a one-size-fits-all for a country as diverse as Canada.

For provinces with large agricultural sectors, the lowest-cost option for reducing greenhouse gas emissions may very well be in agriculture. But the political strength of the sector makes such policies difficult to envision.

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Where farming starts

Managing forages for uncertain weather conditions

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Whether conditions will turn dry or not, extremes of weather have become more of a norm than the exception. The best way to manage your pasture or range through these tosses and turns is to A) have a plan and B) keep your forage stand as healthy as possible.

No roots—no Grass

Have you ever strained to grab something from a shelf but despite your efforts, the desired item stayed out of reach? That is how your forage root system feels when it is too short to access a moisture layer which may be just below its reach. Roots are out of sight and often out of mind. Yet, it pays to remember that roughly two-thirds of total plant growth occurs below ground, while the visible above ground portion only makes up about one-third. This extensive root system forms the lifeline for forage plants and helps ensure long-term survival as well as productivity. Remember that drought stress can reduce or

impair root growth even without added grazing pressure.

Resist the urge

It is challenging but imperative to leave residual forage at a height of 3-4 inches (7-10cm). Removing every last blade of grass only leads to a longer road to recovery. The resulting rest period will automatically be longer. The grazing stubble left behind also helps shade and cool the soil, which reduces evaporation and conserves what little moisture there is. Just as important as removing the animals on time, is resisting the urge to put livestock back on a pasture as soon as some form of regrowth has occurred. Grass regrowth needs to reach 8 -10 inches (20-25cm) before animals can return to that paddock. Overgrazed plants will dip into the root reserves and stop allocating resources to root growth in an attempt to survive short-term. If dry conditions persist into subsequent years, desirable plants will first reduce production and eventually disappear from your stand.

It takes moisture to grow grass

This may be obvious but it is a reminder that there

are no miracle solutions to forage growth in dry conditions. The absence of moisture will inevitably result in an absence of forage growth. Adjusting stocking rates and using alternative feeding systems helps protect your pastures, your animals, and your financial bottom line.

Keeping pastures healthy during good weather conditions is an investment in ensuring the pasture will remain more productive during weather extremes and recover quicker in the aftermath. Leaving sufficient carry-over may be the hardest but most critical management tool in dry conditions.



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