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Better Farming

APRIL 2020 | \$8

OPTIMUM
SEEDING RATES

50

PESTS & DISEASES

Battle Continues

12

MANAGING DISEASE

Practical Strategies

46

ASSESSING BIOLOGICALS

Growing Opportunity

40

CANOLA PRICES

2020 Analysis

38

DR. HALEY CATTON

Studies Crop Threats

FARM LEADERSHIP

PERFORMANCE REVIEWS

MARKETING LESSONS

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LETTERS FROM A FAMILY FARM

BREAKING THE SILENT STRESS

Sometimes, a simple gesture can help spark some valuable self-reflection.

Earlier this month, I received a note from a colleague. She hadn't heard from me in awhile, so she was checking in to see if everything was OK, she said.

As basic as the message was, it started the wheels churning in my mind.

I was touched that my colleague reached out. Her message prompted me to acknowledge, too, that I'd been mentally – and physically – holding onto a fair amount of stress.

Pushing myself to acknowledge the stress, rather than continuing to simply remain buried in it, helped me start to release a bit of the tension. I began to think about when some of the extra pressures would drop off and what strategies I could use to better cope.

Typically, I think I'm mindful about connecting with close col-

leagues and family members when I think they could be worried or have a lot on their plates. But the mental health check-in I received led me to realize that I'd recently become so inward-focused that I may have failed to notice the challenges other people around me faced.

It clicked, for example, that it had been some time since I chatted with a colleague who was usually pretty outgoing. So, I dropped by for a short visit to see how he was doing.

One quick email from a thoughtful person prompted some notable ripple effects.

I would encourage you all to take a moment to reflect on your circle. Is there someone you haven't heard from in awhile? Does someone seem to be a bit more withdrawn than usual?

If so, please reach out. After all, I think we can all benefit from a friendly connection.

If you or someone you know needs support, visit domore.ag or farms.com/mental-health-and-suicide-prevention-resources/. And call 911 for a crisis.

Andrea

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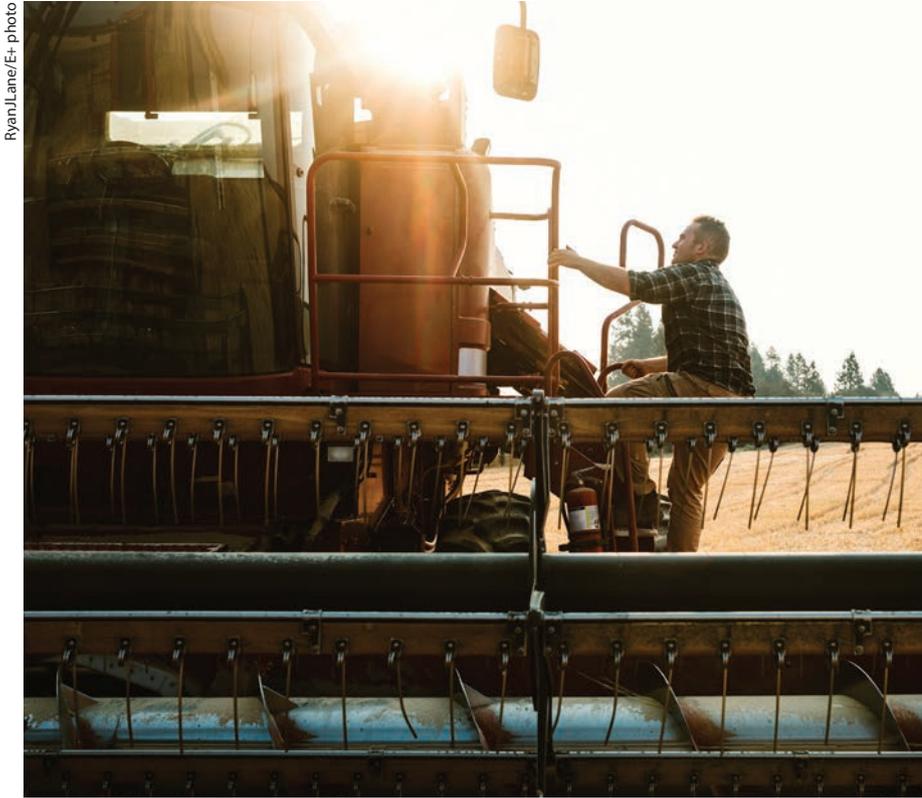
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**COMMERCIAL
VEHICLES**

WHEAT COALITION FUNDS RESEARCH

A Canadian wheat research group has committed more than \$9.6 million in funding to the Crop Development Centre (CDC) at the University of Saskatchewan.



Ryan/Lane/E+ photo

The Canadian Wheat Research Coalition (CWRC), whose members include the Saskatchewan Wheat Development Commission, the Alberta Wheat Commission and the Manitoba Wheat and Barley Growers Association, will provide the five-year investment to further the development of spring wheat cultivars.

CDC researchers will concentrate on Canada Western Red Spring wheat, Canada Western Amber Durum and Canada Prairie Spring Red wheat with higher yield potentials and better resistance to diseases like Fusarium head blight.

Significant investments like this one will help farmers produce better crops, said **Jason Lenz**, a director with the Alberta Wheat Commission and chair of the CWRC.

“The membership values the breeding work that’s being done to create new varieties for us to use on the farm,” he told *Better Farming*. “Variety development is very high on our priority list and we thought that we needed to step up and support the work being done at” the CDC. **BF**

ASF RESEARCH

A Canadian vaccine developer has received permission to work with African swine fever (ASF).

In the fall, the **University of Saskatchewan’s Vaccine and Infectious Disease Organization – International Vaccine Centre** (VIDO-InterVac), received clearance from the **Canadian Food Inspection Agency** (CFIA) to work with ASF.

The centre is Canada’s first non-government facility to receive clearance to work with the virus.

Researchers at VIDO-InterVac have worked on ASF vaccines for about five years. Until they received CFIA approval, however, the scientists had to conduct testing at a federal facility. Now, researchers can test the vaccines in-house.

“We’re trying to get the country ready for this disease,” said **Dr. Volker Gerdt**, director and CEO of VIDO-InterVac. **BF**

INDUSTRY ADVANCES TRAILER TECH

Some livestock spend a lot of time on the road, so the ag industry is paving the way to make the trip as smooth as possible. The pork sector provides a prime example of the work underway.

“One of the big improvements for pig transport is with trailer interiors,” said **Dr. Egan Brockhoff**. He is a partner with **Prairie Swine Health Services** in Red Deer, Alta.

“Instead of fixed-deck trailers with ramps, we are seeing the evolution of lift-deck systems that use hydraulics to move pigs into compartments,” he added.

Because the system makes it easier to load and unload animals, pigs avoid activities that make them uncomfortable. They don’t have to walk up and down ramps or turn corners in the trailer to reach their compartments.

As well, electronic advances have enhanced the geo-fencing technology that sends instant notifications to producers when someone enters the farm boundaries. In the past, drivers needed to have the geo-fencing app on their phones.

Now, the technology is built directly into the trailer.

Another transport innovation is controlled-climate trailers. These systems offer complete ventilation and heating to maximize pig comfort. **BF**



National Pork Board and the Pork Checkoff, Des Moines, Iowa photo



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NEW CDN. BARLEY RESEARCH GROUP FORMED

Three barley commissions have joined together to help manage long-term investments, improve profitability and increase sector competitiveness.

The **Saskatchewan Barley Development Commission** (SaskBarley), **Alberta Barley** and the **Manitoba Wheat and Barley Growers Association** launched the **Canadian Barley Research Coalition** in January during SaskBarley's annual general meeting in Saskatoon.

The idea to form the research group came from discussions during the **Barley Industry Roundtable and Working Group**. This 2018 meeting brought together around 35 participants from across the value chain, including producers, beer companies and commissions.

"We realized ... that we need to have better coordination, not only with our sister agencies but also with other members of the value chain within the Canadian barley sector," **Jason Skotheim**, chair of SaskBarley, told *Better Farming*.

"We thought it would be better if Saskatchewan, Alberta and Manitoba created the coalition to facilitate the core (breeding) agreements. (This) vehicle (could enable us) to collaborate on finding regional and national research projects in variety development and things that will serve Canadian barley producers."

The first item of business for the new coalition will be negotiating the core agreements with the **University of Saskatchewan's Crop Development Centre** and **Agriculture and Agri-Food Canada**, Skotheim said to *Better Farming*. **BF**

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MORE FUSARIUM CAUSES CHALLENGES

If you think more is always better, you're not a producer who dealt with higher levels of Fusarium head blight (FHB) in 2019.

After widespread incidence of the disease on the Prairies in 2016, levels dropped the next two years due to drier conditions. Then, FHB spiked again in 2019.

"People are calling the FHB problems in 2019 the 'perfect storm,'" said **Sarah Foster**, founder, president and senior seed analyst at **20/20 Seed Labs** in Nisku, Alta. "We had just the right amount of humidity and heat for the pathogen to become a big problem."

In total, 20 per cent of all samples taken in Alberta last year tested positive for FHB, Foster said.

However, the rate varied widely by crop type: 60 per cent of durum, 50 per cent of triticale, 25 per cent of rye, 20 per cent of wheat, 10 per cent of barley and 0.3 per cent of oats tested positive. Of those crops testing positive, 3 per cent showed infection, ranging from 1.5 per cent of barley to 4.5 per cent of triticale.

While the situation was a bad news story in Alberta, the blight was a worse news scenario for producers in the provinces of Manitoba and Saskatchewan.

Manitoba had a 90 per cent positive rate for FHB, while Saskatchewan came in at 75 per cent. Their infection rates were 18 per cent and 6 per cent, respectively.

"We need to be doing more in terms of crop rotation to avoid a repeat of these numbers," Foster said to *Better Farming*. The pathogen which causes this fungal disease can overwinter in crop residue.

"Try to plant as early as possible. If you get FHB in your field, test seed in the fall to ensure it's clean. If it's not, you need to clean it hard and use a seed treatment for the next growing season," she said.

Increased seeding rates can also help, the Government of Alberta says.

FHB affects the milling and baking qualities of wheat, as well as the malting and brewing qualities of barley. **BF**

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SASKATCHEWAN RESEARCHERS PLOT NEW AG TECH

University of Saskatchewan (USask) scientists are streamlining the province's seed development with a new web tool that uses artificial intelligence and drone images to evaluate test plots.

William van der Kamp developed the PlotVision tool under the leadership of **Dr. Ian Stavness**. Van der Kamp is a research associate at USask's **Plant Phenotyping and Imaging Research Centre** and Stavness is an associate professor in USask's department of computer science.

Agricultural scientists can upload drone images to PlotVision's cloud server. The technology analyzes the images and sends the scientists spreadsheets with key results for each plot under evaluation.

Researchers "might be evaluating tens of thousands of types of wheat and the (scientists) want to narrow it down to the one viable seed they want to send to market," van der Kamp said to *Better Farming*. "Our software goes through all the varieties and detects the different plots in the field so they can narrow down which are the best varieties."

PlotVision is available to ag scientists, but van der Kamp is expanding the tool's capabilities to help farmers with challenges like weed detection in fields, or to improve crop insurance claim processes. **BF**

MANITOBA BEEF HOLDS YOUTH RETREAT

Almost 50 young farmers between the ages of 18 and 39 attended the first youth retreat hosted by **Manitoba Beef Producers** (MBP) in Brandon, Man. in January.

The two-day event featured guest speakers like **Dave Pratt**, who presented his Ranching for Profit School, and **Peter Manness**, a farm management consultant.

These young farmers "are venturing into an industry that they're already a part of but are also looking for ways to make it more profitable," **Tom Teichroeb**, former chair of MBP, told *Better Farming*.

Attendees found the retreat valuable.

Brett McRae, a 32-year-old rancher from Brandon, Man. attended the event to hear Pratt's presentation and to help educate someone close to McRae about the industry.

"I have a fiancée now and she's newer to the ag industry," he told *Better Farming*. "I figured this retreat was a good place to get her some core information that we can build on going forward."

MBP will send a survey to the retreat attendees. Those survey results will help gauge interest for a possible second retreat, Teichroeb said. **BF**



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TELLING CHILDHOOD FARM STORIES

A retired educator living in Minnesota who spent his childhood on a farm near Beausejour, Man. is sharing those memories in a recently published book.

Gary Schnellert started writing *Small Farm in the Swamp* during his downtime while working at universities in countries like Ukraine and Moldova after the breakup of the Soviet Union. His surroundings brought back memories of what life was like on his family farm in Manitoba.

"I noticed that (farmers in those countries) were basically 50 or 60 years behind us in terms of the way things were done in agriculture," he

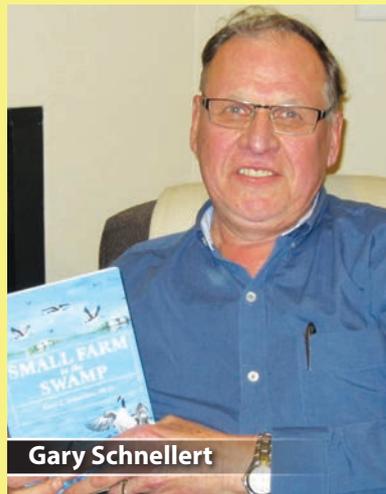
told *Better Farming*. "It reminded me of how we used to do things on the farm and when getting 30 bushels of wheat per acre was considered doing very well.

"So, in the evenings when my interpreters went home, I would write chapters."

The book includes 60 short chapters and illustrations inspired by photos from Schnellert's upbringing in Manitoba.

"The stories in the book are from the time I can remember until I was

about 15," he said. "The stories are incidents that happened on the farm, in the community, how they impacted people and how I grew up with the values that I did." **BF**



Gary Schnellert

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INTRUDE WHEAT, PULSE GROWERS

This month, *Better Farming* connects you to
the latest on pesky pests

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For city dwellers, the greatest threat from insects could be a bed bug infestation or a mosquito bite. But when farming is your livelihood, insects and plant diseases can bite into your operation's bottom line in a hurry.

The key to winning any battle is knowing your enemy. The more you learn about these unwanted guests and their effects on pulses, soybeans and wheat, the better your chance of winning this year's war.

Insects targeting pulses

The two insects that pose the highest risk to pulses are cutworms and grasshoppers, many industry stakeholders say. Scouting your fields and using economic thresholds to make spraying decisions are your best ways to address these pests.

"Cutworm populations tend to go in cycles, and they have been building for a few years now on the Prairies," says Dr. John Gavloski. He's an entomologist in the primary

agriculture branch of Manitoba Agriculture and Resource Development. Gavloski is based in Carman, Man.

"We've also seen growth in grasshopper numbers over the last three years because of hot, dry summers."

Apart from weather, natural enemies also influence grasshopper populations. In 2019, Manitoba had high levels of bee flies, which are predators of grasshopper eggs. After tracking the places where grasshoppers lay their eggs, bee flies deposit their eggs

R ALERT: AND SOYBEAN S BEWARE

by GEOFF GEDDES

ects with industry experts to learn
s and dreaded diseases.



nearby. The bee fly larvae feed on the grasshopper eggs.

Though the presence of bee flies has somewhat mitigated grasshopper damage in pulses, both natural enemies and conducive weather conditions are necessary to eliminate the threat of grasshoppers.

For years, farmers in Alberta and western Saskatchewan have worried about pea leaf weevil. Recently, the pest spread to eastern Saskatchewan and, in 2019, appeared in Manitoba,

Gavloski says to *Better Farming*.

“The larvae of pea leaf weevil feed on pulse root nodules, preventing the plant from fixing nitrogen,” says Gavloski. “I am trying to educate agronomists and pea growers on what to look for when surveying their fields so we can track the location and levels of this pest.”

Lentil growers can use a sweep net to gauge insect levels, while pea growers should examine plant tips for signs of the pest.

Insects attacking soybeans

Cutworms and grasshoppers are also two of the greatest enemies of soybeans.

Agronomists encourage growers to scout their fields in late May or early June for both cutworms and grasshoppers. Producers should only spray if needed, using patch spraying if populations are isolated. Since both pests are nocturnal, growers should spray as late in the day as possible. (While grasshoppers are active during

INSECTS AND DISEASES

the day, they also feed at night.)

“Regardless of the pest, producers should consult a provincial guide such as Manitoba’s *Guide to Crop Protection* for information on registered insecticides and economic thresholds to aid in spraying decisions,” says Gavloski.



Dr. John Gavloski

In 2019, the thistle caterpillar was another common threat in dry areas of the Prairies. In these conditions, the pest thrived and

soybeans grew poorly, making it harder for the plants to resist the attack.

“Thistle caterpillar tends to be hit and miss,” Gavloski says to *Better Farming*.

“Most years, the levels are low enough that it’s not an economic issue. But, when you have high populations combined with drought conditions, (thistle caterpillars) can

be a problem for growers. While no insecticides are registered in Canada for thistle caterpillar, soybeans are good at compensating for defoliation brought on by this pest.”

Spider mites – another soybean pest – also do better in drier conditions. These insects can often be controlled by spraying the edges of fields where the pests tend to congregate.

Insects homing in on wheat

One of the leading wheat enemies on the Prairies today is the orange blossom wheat midge, a tiny mosquito-like orange fly that lays eggs in developing wheat flowers. Adults emerge during a four- to six-week period that coincides with wheat head emergence and flowering. The wheat midge deposits its eggs on florets or developing kernels just prior to flowering and generally hatch in four to seven days.

Wheat stem sawfly – which belongs to the wasp group – is common in southern Alberta and parts of Saskatchewan. The adult looks like a wasp and lays eggs on growing wheat

stems. The eggs hatch into larvae and live inside the plant.

“This wasp can be devastating to yields,” says Dr. Haley Catton. She’s a Lethbridge-based research scientist at Agriculture and Agri-Food Canada and focuses on cereal crop entomology. Wheat stem sawflies “mine the



Dr. Haley Catton

inside of the stem out and make the plant fall over, so it lodges and can’t even be harvested.”

Control methods for wheat stem

sawfly may be warranted when 10 to 15 per cent of last year’s field is cut. However, effective chemical control does not exist for this pest. The most effective management system is a combination of cultural and biological control. Cultural control consists of crop rotation away from cereals and using resistant (solid-stemmed) varieties.



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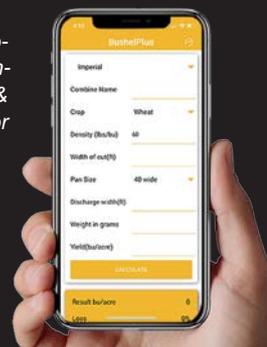


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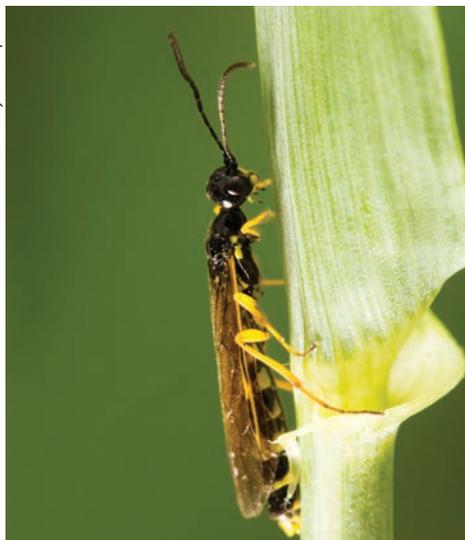
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Dr. Haley Catton photo



Wheat stem sawflies
 “can be devastating to yields,”
 says Dr. Haley Catton.

Some of Catton’s research focuses on wireworms. As the distribution of this pest tends to be patchy, farmers must know the field’s history to determine the likelihood of a problem.

But, if left unchecked, wireworms are another pest that can cause great damage to wheat.

A relative newcomer, the cereal leaf beetle appeared on the Prairies in 2005. This leaf-feeding pest only warrants spraying if you find at least one larva in every plant.

“There is a beneficial insect called *T. julis* that controls cereal leaf beetle quite well, so we don’t want producers spraying for it unless it’s widespread,” says Catton.

“We are asking people to send us a sample of the larvae, and we can tell them if there are beneficials in the field that need to be preserved.”

For many crop pests, risk maps are available through the Prairie Pest Monitoring Network, a group of field crop entomologists who aid crop protection through research and tracking.

“Controlling insects takes a multi-pronged approach that includes risk maps, crop scouting, resistant varieties and proper rotation,” says Catton.

Diseases threatening pulses

One disease common to all legume crops is Sclerotinia or white mold. While this disease is most common in dry edible beans, its host range extends to

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Recently, pea leaf weevil spread to eastern Saskatchewan and, in 2019, appeared in Manitoba, Dr. John Gavloski says.

other broadleaf crops, such as canola, grown in rotation. Sclerotinia also affects sunflowers, which are an important crop in Manitoba.

Both canola and sunflowers can leave a lot of resting bodies in the soil, so the fungus survives apart from the living host. The leftover

fungus is the greatest threat to all pulse crops, which don't generally have plant-to-plant contact. Sclerotinia can move quickly this way and cause considerable damage.

Several fungicides are registered for this disease in beans, but all products must be used preventatively and

applied before spores of Sclerotinia are airborne in the area. The application window would usually be when the bloom begins and continues through the bloom period for up to two to three weeks depending on the weather.

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Dr. Haley Catton photo

The cereal leaf beetle larvae only warrants spraying if you find at least one larva in every plant.

warranted in a season, which occurs when conditions favourable to spore release persist beyond the effective protection period of the fungicide, other factors come into play.

“Any time you apply two fungicides consecutively in a crop, you must be concerned about resistance management,” says Dr. David Kaminski. He is a field crop pathologist in the Government of Manitoba’s primary agriculture branch. He focuses on agriculture and resource development and is based in Carman, Man.

Growers should also be aware of pre-harvest intervals and how late in a crop’s development a product can be applied. Because people eat many of these crops, the fungicides must break down and be undetectable at the time of harvest.

Pulse crops are often grown under contract, so producers should check with their buyers to confirm which fungicides or pesticides are acceptable to the end users.

Since pulse crops are often grown for the food market, eye appeal is important. As a result, any disease that visibly stains the seed could be an issue for producers as it can cause dockages for lower grading. In wet years, for example, anthracnose – a fungal disease of edible beans that can transmit through the air or crop stubble – may pose a problem.

Bacterial diseases such as common blight and halo blight often occur in bean crops. These blights require minimal moisture to establish themselves and begin growing.

“If these blights are serious enough, they will discolour pods, and not many products are effective in controlling them,” says Kaminski. “The most common fungicides for this purpose are copper-based, and they have a short residual lifespan, so they may have to be applied repeatedly to get results.”



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Dr. John Gavloski photo



“Most years, the levels are low enough that it’s not an economic issue. But, when you have high populations combined with drought conditions, (thistle caterpillars) can be a problem for growers,” says Dr. John Gavloski.

Diseases affecting soybeans

Septoria leaf spot and bacterial blight are regular visitors to Prairie soybean fields, especially in wetter periods. White mold and frogeye leaf spot may also pose challenges, and seed staining can result from a range of

canker diseases that attack the stems.

One of the more destructive diseases for soybean yield is root rot, which thrives in wet conditions. Soybean cyst nematode (SCN) can also devastate yields, and industry experts pay close attention to this

disease in Manitoba.

“Nematode is firmly on our radar, as many areas of the province rely heavily on soybeans in their rotation,” says Kaminski. SCN “survives apart from the plant as a cyst in females that can move with the soil via many modes including water, wind and equipment.

“Growers should be cautious when moving equipment from field to field and focus on management techniques to minimize the disease, just as with clubroot in canola.”

While many fungicides now have broader registrations for use in many conditions, growers must consider the specific disease-host combination when they select their strategies.

Diseases striking wheat

Fungal leaf spot complex is a constant threat to wheat. Depending on the weather, rotation and the variety’s resistance, this complex can range from trace amounts to levels that require fungicide application on the flag leaf to prevent losses.

“You need to scout for cereal leaf spot every year and look for symptoms on the leaves that often appear as light green or yellow spots or streaks,” says Dr. Michael Harding. He’s a research scientist and plant pathologist at Alberta Agriculture in Brooks.

Other diseases such as seedling

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blight and root rot are harder to spot as they exist underground, so growers must selectively sample some plants to determine prevalence. These diseases can cause problems with stand establishment, as new plants either fail to emerge or die soon after emergence.

To avoid these interlopers, use good-quality seed with high vigour and time planting to minimize the number of days to emergence.

Growers should seed into warm soils and avoid seeding more deeply than necessary.

“The more time your germinating seed spends underground struggling to get up, the more time there is for those pathogens to attack and cause problems,” says Harding.

A good news story of late is the lower incidence of Fusarium head blight (FHB) in Alberta. In 2016, the disease caused substantial damage, so the reprieve is welcome. FHB does best in wet soil, so the drier weather through much of the province in recent years has helped keep the



Shelley Barkley photo

Dr. Haley Catton discusses some of her latest research.

disease at bay. Even so, growers should never let their guard down.

“The problem is that the FHB pathogen doesn’t just attack the wheat head,” says Harding. “It grows happily at the crown of the plant and in the roots, just hanging around and waiting for an opportunity to cause head blight again. Extended periods of precipitation or high humidity when flowering are both conducive

to FHB, so don’t assume it has gone away.”

Strategies for combating FHB include growing cultivars with the best levels of resistance, using healthy seed with a fungicidal seed treatment, and employing at least a two-year break between host crops.

Knowing your enemy – pest or disease – is no guarantee of success, but it’s a good start. **BF**

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FAMILY DEVOTED TO MILK FOR THE MANY

by CHRISTINA W. KROEKER



Through life's twists and turns,
these Manitoba farmers
have built an operation which
centres on family and community.

The Verhoog family of the Rural Municipality of Piney in Manitoba have experienced quite the journey since they started Moonshadow Holsteins Inc. in the 1970s.

Garry and Teresa Verhoog began their operation in New Jersey with 30 cows. In 1984, to take advantage of an opportunity to grow the farm, the family purchased a property in New York state where they farmed for three years.

Then, the American government started its national export program. Through this milk reduction program, farmers could choose to either export or slaughter their cows. The Verhoogs opted for the latter choice, moving to southern Ontario where they purchased their first quota and 40 cows.

In 1997, the family moved again, this time to St. Labre, Man. By selling their more expensive land and quota in Ontario, the Verhoogs could purchase 80 kilograms of quota and a bigger parcel of land in Manitoba.

The move and expansion made sense to help establish the next generation, as Garry and Teresa sold their Manitoba farm to their sons in 2009. Now, the parents focus on their missionary work in Ukraine. The seven brothers have grown the Manitoba operation from the family's starting point of 80 kilos of quota in 1997 to over 1,000 today.

Each Verhoog brother fulfils a distinct role in the operation. Currently, four of the brothers hold voting shares while the three younger brothers are investing to pur-

chase voting shares in the future.

Josh serves as the president, managing the business side of the farm. Noah manages the daily operations and is the main contact for the farm's 40 full-time employees. Matt oversees the farm's dairy rations and, until recently, also managed the finances. Micah manages the calves and young stock. Seth handles hoof trimming, along with Luke, who also helps Micah with the young stock. Jonah, the youngest, milks and fills in wherever he is needed.

"Milk for the many" is Moonshadow Holsteins' slogan and it shines through in several of the family's activities.

"Dairy farming has been really good to us, so we try to ... find ways to give back to the community" says Josh.

For example, in 2017, the family built a hall when they upgraded their shop. This facility hosts weekly basketball games for family and community members, and the company's annual holiday party. The guest list of approximately 150 people includes both employees and community members. The Verhoogs also used the hall for a family wedding in 2018.

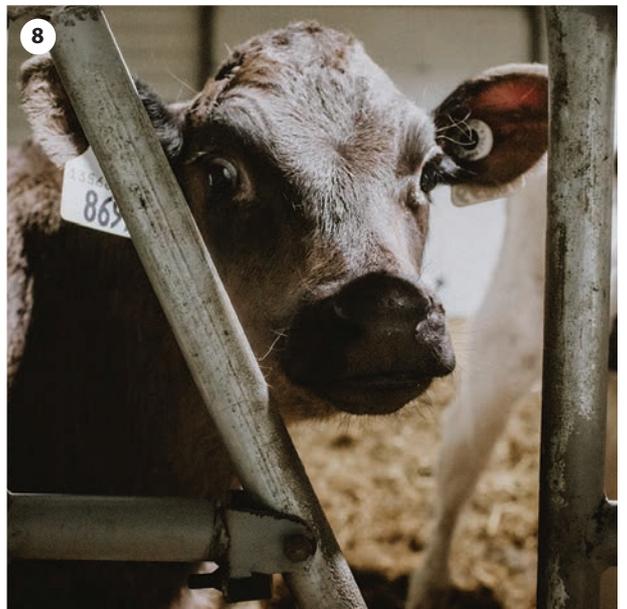
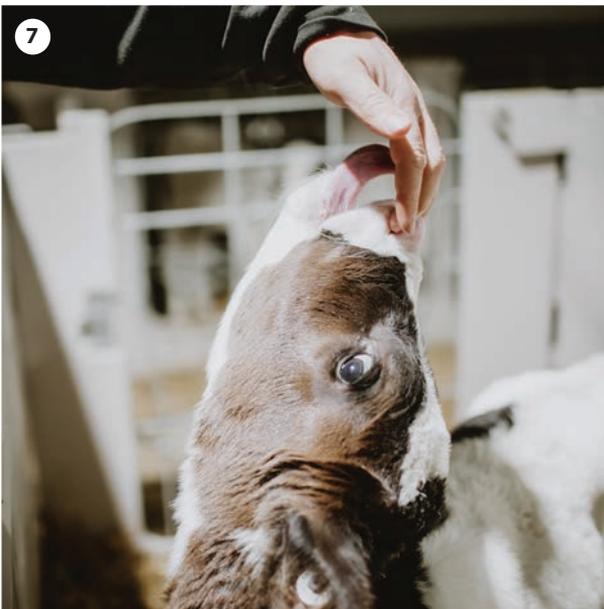
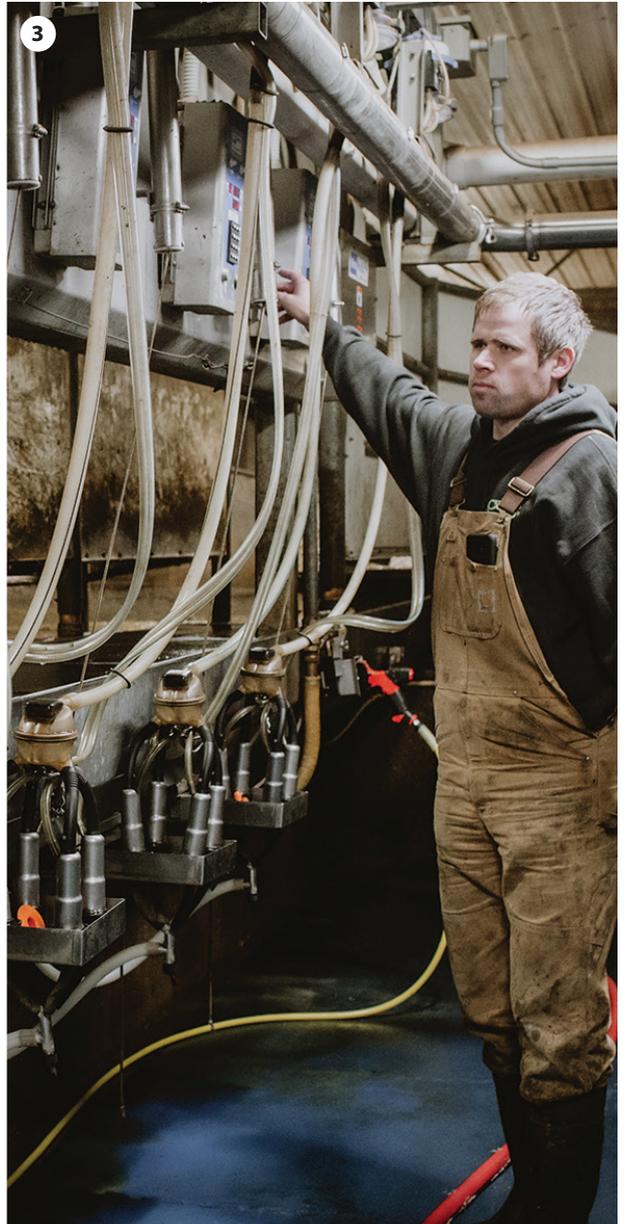
In addition to the hall, the Verhoogs have built and purchased rental properties to house about half of Moonshadow Holsteins' full-time employees. Providing housing for employees has proved key to attracting and retaining staff in this remote location, the family say.

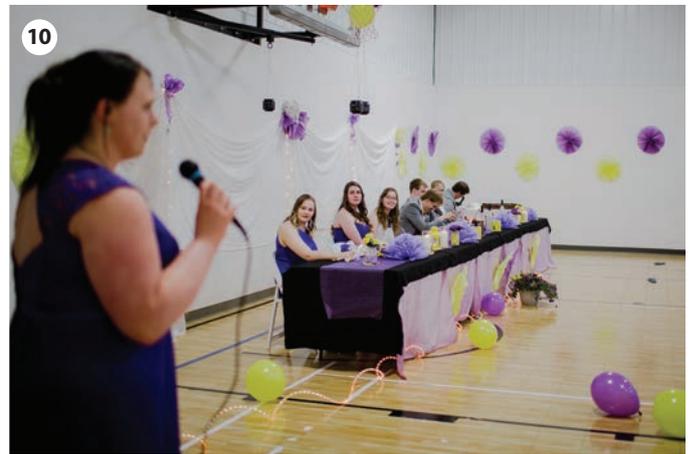
Moonshadow Holsteins continues to grow as the brothers dream about the future of the company for the third generation.



1. Moonshadow Holsteins Inc. has purchased quota every year since the family moved to Manitoba.
2. Calves are kept on a separate yard, across the road from the main yard.
3. Josh Verhoog, who serves as the farm's president, gives tours and acts as the farm's spokesperson.
4. Most of the brothers live close to the farm, or right on one of its yards. This situation is true, for example, for Micah Verhoog, his wife and two daughters. Micah takes care of the young stock and is a voting shareholder in the farm.
5. Each barn houses approximately 400 cattle, totalling over 1,000 cattle in four barns.
6. While the majority of the farm's cattle are Holstein-Friesians, Moonshadow Holsteins has a handful of Jerseys.
7. The calves are a big hit when Moonshadow Holsteins hosts farm tours.
8. As the calves mature, they are either sold or kept for future milk production. The decision depends on how much quota the family can purchase.





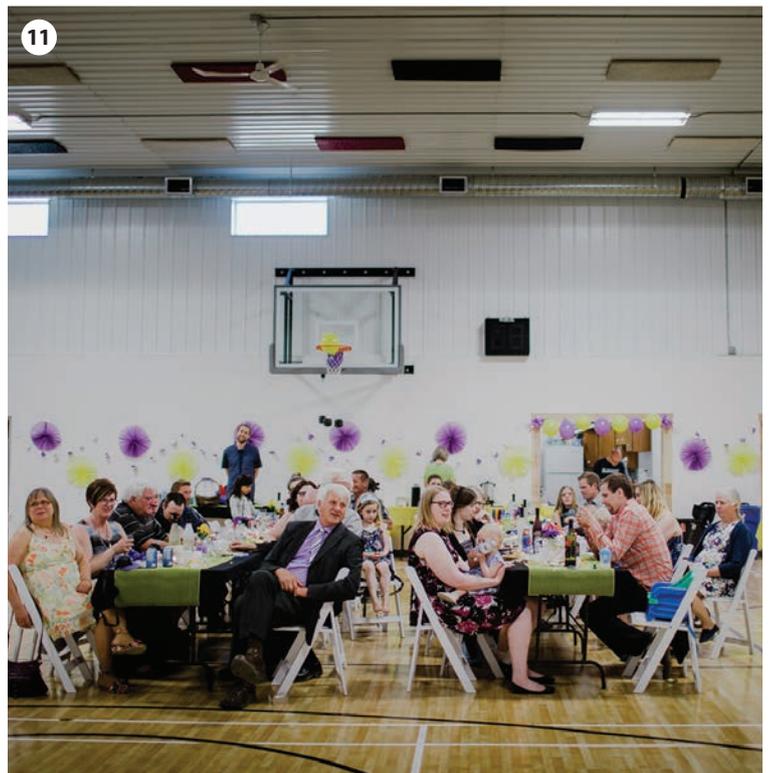


9. The farm recently rebranded but kept its original name of Moonshadow. Garry and Teresa Verhoog initially named the farm after a Cat Stevens song with the same name. The sign pictured shows the farm's original logo and branding.

10. In May 2018, the family hosted Luke Verhoog's wedding reception in their new hall.

11. In 2017, when the family built a shop, the brothers decided to build a hall/gym attached to the new structure. The family hosts weekly basketball games for members of the community. The brothers played as a team in a Winnipeg basketball league, but felt they needed a local space to practice.

12. The Verhoog family look to the future of their farm, preparing the business for the third generation of dairy farmers. The entire family gathered for a photo at Luke Verhoog's 2018 wedding. [BF](#)



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PRODUCER UNDERSCORES NEED FOR TEAMWORK

This grower has transferred leadership skills from the ice rink to the farm operation and the boardroom.

If you were to ask Jason Lenz, a third-generation cash crop producer from Bentley, Alta., he'd say running a farm is a lot like running a sports team.

He would know, since he used to coach hockey at the minor and semi-pro levels. He was the general manager of the Innisfail Eagles Senior Men's AAA Hockey Club and, in 2009, helped the Bentley Generals win the Allan Cup as a member of the team's coaching staff.

Lenz still spends some time on the ice playing hockey in the winter and in the field playing slo-pitch during the spring and summer.

Effective sports and farm teams have at least one commonality: everyone works towards the same goal.

"Running a farm and being part of cropping commissions is creating a team environment with the people you work with," he tells *Better Farming*. "Everybody can be a leader in their own way and the best leaders are the ones who make everyone around them better.

"When everyone is working towards the same goal, you can do great things," he adds.

Lenz is a member of several teams within the ag industry.

He was a director and former chairman with Alberta Barley, is in his second year as a director with the Alberta Wheat Commission, and is the chair of the Canadian Wheat Research Coalition.

Lenz is also a director on the Canada Grains Council, part of a committee for the AgSmart farm show at Olds College and is a member of the ALUS Canada committee for his local county.

At Lenz Farms Ltd., Jason, his father Brian and his uncle Glen are continuing the family operation Jason's grandfather Fred started.

Today, the family grow about 2,000 acres of barley, wheat and canola together. They also run a small cow-calf



Lenz family photo

Jason Lenz checks the seedbed on his farm in Bentley, Alta.

operation.

"I'm one of the shareholders on the farm. I look after all the marketing decisions and most of the cropping decisions, as well as fertilizer and chemical decisions," Lenz says.

Team Lenz also includes Jason's wife, Paula, who works off the farm as a nurse, three adult children (Jared, Kyle and Stephanie) and six grandchildren.

How many people does your farm operation employ?

Just the three of us but we also have some seasonal help which is usually another family member like an uncle or one of my kids.

Hours you work per week?

That's a tough question. In the summer I would say at least 70 hours per week and closer to between 40 and 50 hours per week in the winter.

Hours in the office per day?

One or two.

What are three items that are on top of your desk?

There's a laptop, a binder with all our grain contracts, and some bills.

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Lenz family photo



This drone shot provides an aerial view of Lenz Farms.

Any favourite apps?

Google Maps when needed. We have another one called Bin-Sense which is hooked to the temperature cables in our bins. Another app we use is FarmCommand since we use Farmers Edge as our precision agronomy company.

What role does social media play in your life?

I use Twitter to gather news and stay in touch with others.

What do you like best about farming?

It's the lifestyle – country living.

I like being my own boss and the anticipation of the spring and fall.

What do you like least?

Probably the weather. We've had some pretty difficult falls. (2019) was the worst.

What does your family think of farming?

Agriculture has always been in our family since my grandfather moved here from Saskatchewan in 1948.

We think agriculture is an important part of the Alberta economy.

What's your top tip about transition planning?

Start early because it takes a lot of time. Everyone involved will need to have some flexibility.

What's the most important lesson you've learned?

Mother Nature always has the final say.

What's your guiding management principle?

Plan for things like equipment purchases and (understand) the importance of staying out of debt.

What are the biggest challenges you face in the industry? How have you addressed them?

Weather is always a challenge for anyone who is farming.

We purchased a larger combine so we can get the crop off a little faster.

We've also started to dry more grain and put aeration in all our bins.

What do you think are the most exciting opportunities in the industry?

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Another opportunity would be new varieties that plant breeders are coming out with. Over the last 10 years we've seen varieties that are higher yielding and have better disease resistance.

If you could send a message to non-farmers, what would you say about the industry?

Today's farm is not your grandpa's farm. Farming has become so much more advanced through technology and modern farming practices.

The best thing to do is ask farmers about what they're doing and why they're doing it. Don't assume anything based on what you've read or heard.

How do you define success?

You have to enjoy what you do and the business you're in.

Continue to have a safe working environment for myself and the people who I work with, and find a way to make a profit. You must be able to put some jingle in your jeans at the end of the day.

If you weren't a farmer, what do you think you'd do for a living?

I think I'd still be in agriculture in some capacity.

Maybe I would be working as an agronomist.

Is your farm vehicle messy or neat?

I try to keep it quite neat.

What was the last piece of shop equipment you bought?

A new air compressor.

How do you support your mental health during the busy times of the year?

I think it's important to spend time with family. Maybe it's a meal in the field or taking your kids or grandkids with you for a ride in the combine.

Getting rest when you need it is important too, as is staying in touch with people daily. With a lot of today's equipment being self-guided, it allows us some time to be on the phone if we want.



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What are your hobbies or recreational activities?

I still play a little bit of hockey and slo-pitch. I like to water-ski in the summer and snow ski during the winter.

What was the last book you read?

I really like reading biographies. The last one I read was *Decisions: Making the Right Ones, Righting the Wrong Ones*, by Jim Treiving, the owner of Boston Pizza.

How often do you travel?

My wife and I try to take two holidays per year. We have family in the Okanagan in B.C., so we try to get there in the summer. In the winter, we go south into the Caribbean or even the southern U.S.

Where did you last travel to?

We were in the Maritimes last summer, so we saw quite a bit of Nova Scotia, New Brunswick, Cape Breton Island and P.E.I.

What's the best time of day?

I like the end of the day, right at sunset.

What was your most memorable crop year?

Our 2019 wheat crop was the biggest we ever had. We had some that yielded over 100 bushels per acre and we've never had that before.



Lenz family photo

The Lenz family use a 2019 Case IH 8250 combine.

Three years ago, we had some canola that we got 62 bushels per acre with and it was the first time we yielded 50 bushels or better. **BF**

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The CCGA story started in 1984, when a group of canola farmers from Western Canada came together to give farmers access to the same financing program that had been available on cereal grains for many years.

35 years later, more than 10,000 farmers across Western Canada look to CCGA to support their grain marketing and farm financing plans with a cash advance through the Advance Payments Program.

The Advance Payments program is a federal program delivered and administered by CCGA. Under the program, the Government of Canada provides the loan guarantee, funds the interest-free portion of advances, and

helps to make low interest rates on the remainder for Canadian producers.

"Our devoted team is constantly striving to deliver better customer service to our cash advance customers, including improving our phone and online services, as well as streamlining the application process and making the program more accessible for those who use it," says Rick White, President and CEO of CCGA.

The experience that CCGA has cultivated over the last 35 years, coupled with a grassroots farmer voice at the CCGA board, helps the organization affect policy changes for the benefit of canola farmers.

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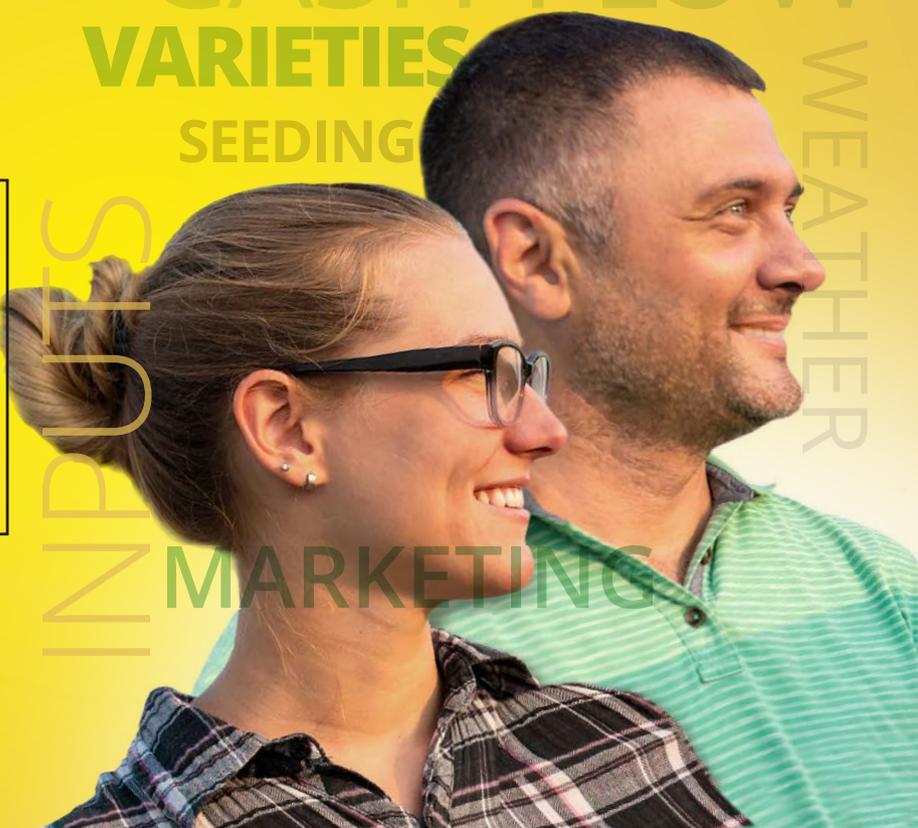
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THE INS & OUTS OF PERFORMANCE REVIEWS

While the thought of completing such reviews may be daunting, the process could benefit your farm.



An annual performance review is the norm, though some businesses may choose to do them more often, Joseph Schmidt said.

Employee performance reviews can involve time-consuming processes, so some managers opt not to do them. But performance reviews need not be such a hurdle.

In fact, the process can become a key part of team management and a successful internal communications strategy – if reviews are appropriate for your business and done correctly.

So, this month, *Better Farming* examines what elements go into such a review, so you can decide what is best for your farm operation.

For advice on employee performance reviews, we spoke to Joseph Schmidt. He is the department head and an associate professor at the Edwards School of Business at the University of Saskatchewan.

Schmidt studies how organizational management systems can affect business performance and outcomes, including workplace turnover. He also teaches strategic human resource management and leadership courses.

To get a farm-specific look at

performance reviews, we talked with Terry Aberhart. He farms with his family near Langenburg, Sask, and he's a regular *Better Farming* columnist. (See his article on page 40.)

Together, Schmidt and Aberhart share their thoughts on the performance review process.

Are they necessary?

Some businesses have opted to dispense with the formality of performance reviews. Some big companies, like General Electric, Netflix and Adobe, abolished this tool from their workplaces, Schmidt said, to do away with the formal process.

Biases in the performance review system mean that managers sometimes do not record accurate information, leading to an ineffective process, research from the 1980s and 1990s indicated.

As well, some managers forego performance reviews because they want to avoid having difficult conversations with their employees or

because employers feel that these talks can lead to internal workplace conflict.

But more recent research has examined how managers can give effective feedback so that the process is more fruitful, Schmidt said.

That said, not all businesses need to do formal performance reviews, he added. If a company is quite small, for example, or if employees receive feedback fairly consistently, "it might not be necessary to do regular performance reviews," he said.

Instead, the senior managers at these companies might decide to train their supervisors and lower-level managers to provide constructive feedback more regularly.

So, farm managers must decide if a formal performance review system is appropriate for their businesses.

The process

"No point exists in conducting an employee performance review just for the sake of doing one. You must know

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the purpose of the activity and how it fits into your business structure to get the most out of performance reviews.

The first question to consider is how often to conduct a review. An annual performance review is the norm, though some businesses may choose to do them more often, Schmidt said. If a review is tied to compensation, for example, it may be motivating for employees to complete this process more frequently.

The next step is to determine a performance review process that works best for your operation.

Some organizations may choose to involve the employees at the planning stage, well in advance of the review itself, Schmidt said.

For example, if you and your employees set goals for the year, a performance review can be a time to sit down with your employees and review how they achieved those goals and where they struggled.

Overall, “it is best to have a clear understanding of what the job requires (and) the (desired) outcomes ... when you set goals,” Schmidt said. So, well in advance of the review, your employees must know what you expect of them.

And “managers or supervisors should coach and provide feedback about positive and negative performance as it happens,” rather than waiting for the yearly discussion, Schmidt added.

“If there is a performance problem, don’t leave it to the



SDI Productions/Stock/Getty Images Plus photo

“Managers or supervisors should coach and provide feedback about positive and negative performance as it happens,” rather than waiting for the yearly discussion, said Joseph Schmidt.

end of the year. Try to address these (issues) in a timely manner,” Schmidt said. This way, “when you officially have a meeting, there won’t be any surprises.”

Thinking about the format of the review can also be beneficial.

“It’s a good idea to have the employee first do a self-evaluation,” and the manager can do a separate evaluation. This way, both the employee and the manager participate in the process and have a chance to reflect on the year before the formal discussion starts.

It’s best practice for both the manager and employee to record their thoughts. “If (reviews are) used to make personnel decisions around performance and pay,” having these records in hand and on file is ideal, Schmidt said.

Dealing with feedback

A performance review ought not to be a once-per-year “rating” scheme, during which employees go into their manager’s office and receive a score without anything else attached, Schmidt said.

Further, “in terms of giving feedback, whether positive or negative, it should focus on the behaviour and not be overly evaluative about someone’s character or personality,” Schmidt added.

So, don’t say, “I find you to be very rude,” to someone who works in customer service. Rather, comment on how the individual might rethink his or her customer-service behaviour, for example.

As well, feedback must be specific and unambiguous. Managers should explicitly avoid the “compliment sandwich,” Schmidt said. In this tactic, the manager buries a criticism of an employee between two compliments. This strategy can be confusing and sends mixed messages to the employee.

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Reviews on the farm

In his farm business, Aberhart has regular yearly, quarterly and weekly team meetings, and these complement his separate performance review system.

Those meetings help Aberhart do what Schmidt recommends: providing staff with feedback regularly throughout the year and ensuring goal setting and follow through are not left to the last minute.

Aberhart's formal annual performance review process for staff has two components – an employee self-review, which the employee completes after reflecting on his or her performance over the year, and the manager's review of the employee's performance.

During the review, Aberhart and his employees also discuss a three-year vision. Employees describe where they want to be in three years so that Aberhart can better understand their desires and passions.

Employees also have the chance to expand their skill sets. If they want to



shooby/dave/Stock/Getty Images Plus photo

“We have found that there’s value in this” discussion, Terry Aberhart said. “You learn something about your employee that you don’t often know.”

try to do something on the farm, for example, he can look to creating this opportunity for them.

Through this process, Aberhart receives important information from the employees, so he and his company benefit from the review, too.

“We have found that there’s value in this” discussion, Aberhart said. “You learn something about your employee that you don’t often know.”

Aberhart's performance review process for his staff focuses on four categories: attitude, performance, reliability and contribution.

“We evaluate these categories and look to each area trying to see what employees are doing well – the wins. Then, we look to the areas of improvement that we would like to see employees strive for. We also have a small monetary attachment to these goals to give an incentive.”

Employees receive written copies of their reviews.

Overall, going through the performance review process helps people open up, Aberhart said. The process also provides a chance for the leadership and the employees to learn together.

Performance reviews are “a great way to get reconnected at least once a year,” he said.

While an informal process may be good, it doesn't always allow for clear communication. “When it's written and more formal, you uncover layers and can work together to achieve goals,” he added.

This year, Aberhart is experimenting with having employees provide him with feedback, so that they can assess his performance, too.

What next?

While performance reviews can be “hard to do well,” the feedback can be helpful, Schmidt said.

The constructive feedback in a review “helps people do better and helps them know where they stand. ... It is a potential motivational piece,” he added.

To learn more about employee performance reviews, Schmidt recommended a couple of resources:

- *Common Sense Talent Management: Using Strategic Human Resources to Improve Company Performance* by Steven Hunt
- performance-appraisals.org

So, if you have yet to add performance reviews to your management strategy, check out these resources and consider how reviews may benefit both your employees and your farm operation. **BF**

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by
**MOE AGOSTINO
& ABHINESH
GOPAL**

INFLUENCES ON 2020 CDN. CANOLA PRICES

While Canadian-Chinese political tensions are an ongoing hurdle, other factors bode well for prices.

nathan4847/iStock/Getty Images Plus photo



This year, Canadian canola acreage will drop to 20.51 million acres, AAFC projected in February.

After a very difficult growing and marketing season for canola in 2019, producers and analysts wonder what the markets have in store for 2020.

Western Canadian farmers had over two million acres of unharvested

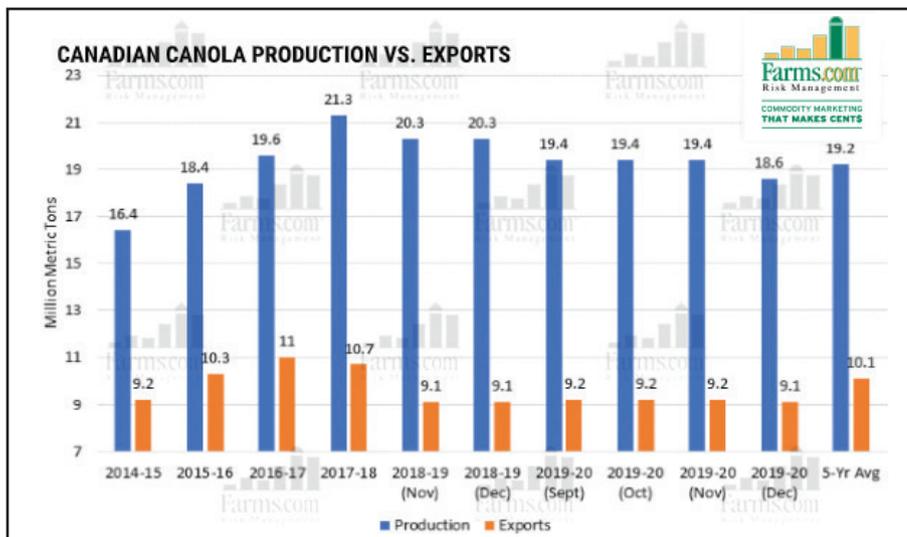
canola when winter set in, market analysts estimated. How much of that crop farmers can harvest this spring and the seed quality was unpredictable, however. Some farmers believed they'd rather let the unharvested old

crop go until later in the spring than risk delaying 2020 seeding. As a result, we could see further reductions in the 2019-20 crop figures.

As of February, Agriculture and Agri-Food Canada (AAFC) expected the 2019-20 Canadian canola ending stocks to be 2.7 million metric tons (MMT). This figure is 0.5 MMT lower year over year (Y/Y) and 1.131 MMT lower than two years ago.

This year, Canadian canola acreage will drop to 20.51 million acres, AAFC projected in February. This figure is down slightly from 20.96 million acres in 2019 and 22.81 million acres in 2018. But, depending on weather conditions, stronger canola prices during seeding could lead to more acres in 2020.

Canadian canola exports are handicapped by the Canadian-Chinese political tensions. This strain is connected to the Canadian detention of Meng Wanzhou in December 2018 on behalf of the United States.



A resolution of the trade issues, tied to political issues, with China is essential to boost Canadian canola exports.

She is the CFO of Huawei, a Chinese technology company.

A resolution to the Canadian-Chinese political tensions is essential to breathe life into canola exports.

Canadian canola (some seed and more oil) is still being shipped to China. Some of these shipments are being exported to middle destinations where the seed is processed into oil before delivery to China.

As of late February, the 2019-20 Canadian canola exports ran slightly ahead of the pace required to reach the AAFC marketing year estimate. AAFC projected the country's 2020-21 canola exports at 9.5 MMT, which is higher than the 2019-20 estimate of 9.1 MMT. However, the 2020-21 projection is much lower than the 2016-17 canola export record of 11 MMT.

Australia is one of Canada's main competitors for canola exports. In February, the Australian Bureau of Agricultural and Resource Economics estimated the country's 2019 canola crop at 2.33 MMT. This figure is a 37 per cent drop compared to the country's five-year average and this decrease results from the country's third consecutive year of drought. Weather and natural calamities have

played havoc with Australia's crops.

The 2020 canola crop has also not received conducive weather; these conditions put the harvestable crop quantity and quality at risk. Some of the export business that Australia may be unable to fulfill could come Canada's way.

A weak Canadian dollar also supports Canadian canola exports. Between October 2018 and February 2020, the Bank of Canada kept interest rates unchanged. But, to stimulate the stressed economy, the bank lowered the rates by 0.5 per cent (following America's 0.5 per cent rate drop) to 1.25 per cent in early March.

As crude oil prices struggle, there is not a very strong impetus for the Canadian dollar to rally in the short term – especially with a very strong American dollar index.

Crush is the shining light on the demand side of the canola balance sheet. As of mid-February, total marketing year-to-date domestic canola disappearance ran ahead Y/Y, Canadian Grain Commission data showed. AAFC expected the 2019-20 domestic use of canola to be 10.28 MMT, which is higher than the 2018-19 figure of 10.023 MMT. The

past two marketing years are the only times that domestic use has surpassed 10 MMT.

For 2020-21, AAFC expected significantly lower domestic usage of 9.6 MMT, but it is still early days. Crush margins were strong, trading at roughly \$110 to \$120 per metric ton (MT) above the nearby futures in late 2019. Those margins were closer to only \$55 per MT above the futures at the same time a year ago. But the margins have been falling since the beginning of 2020 and were down to \$79.30 per MT by February.

At the start of 2020, canola futures derived support from higher European canola prices, as well as higher palm and soy oil prices.

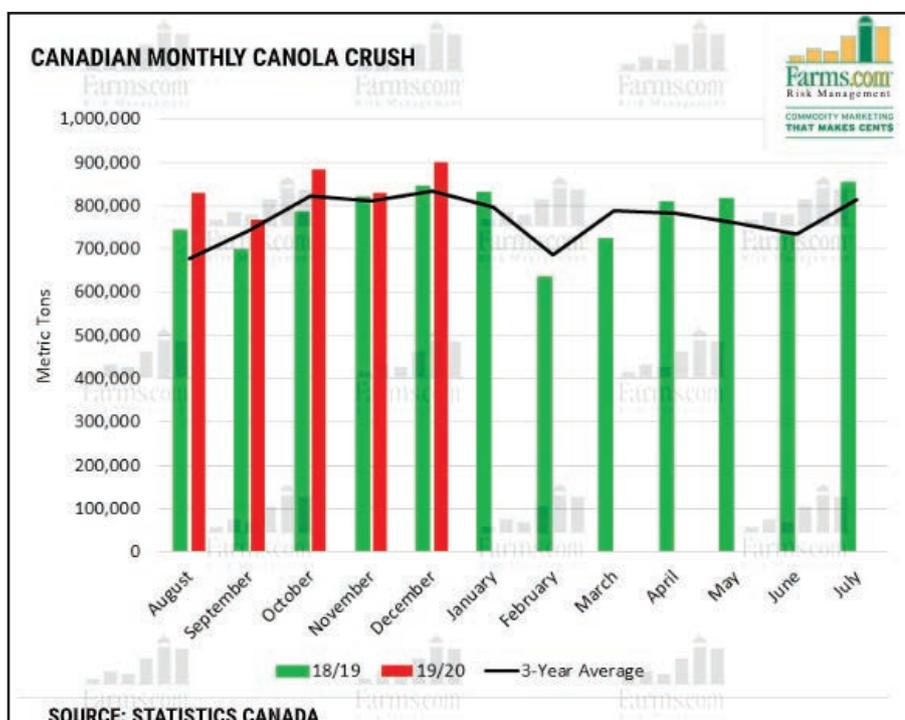
More recently, weakness in Malaysian palm oil prices prompted some profit-taking by the funds after covering a record short position from 2019. Malaysian palm oil is facing heavy production and export hurdles. India's halt on Malaysian palm oil imports has disrupted global edible oil trade flows.

A turn higher in the vegetable oil complex will bode well for canola prices as will strong European canola demand. Market analysts forecast a 1.6 MMT Canadian canola business to the European Union for 2020; this figure is up from 642,000 MT in 2019.

Although not directly linked to the canola market, the signing of the U.S.-China trade deal should soften the global trade atmosphere. Now that China has that deal out of the way, the country could look to resolving the Canada-China trade relations at some point.

Canola market fundamentals look optimistic for 2020. However, the Canadian-Chinese political trade situation is a risk to demand, as are macro knee-jerk shocks like the black swan of the coronavirus outbreak. **BF**

Maurizio "Moe" Agostino is chief commodity strategist with Farms.com Risk Management and Abhinesh Gopal is head of commodity research. Risk Management is a Farms.com company as is Better Farming. Visit RiskManagement.Farms.com for more information.



Crush is the shining light on the demand side of the canola balance sheet.



by
**TERRY ABERHART
& TYLER LEFLEY**

PREPARE FOR THE NEW DEVELOPMENTS IN AG

While biologicals hold significant potential, we must carefully review new product offerings.

ImagineGolf/iStock/Getty Images Plus photo



The starting point for understanding biologicals is to know that bacteria and fungi involved in agricultural applications must be thought of using the same management principles that you use for livestock management.

Biological agriculture is about to take off. We're seeing a lot of excitement in the industry – both within large and smaller companies – about the use of biologicals.

Agricultural biologicals are, essentially, products that come from a living organism, whether micro-organisms or organic matter, and they can be insects or plant extracts too. Biologicals help protect crops from pests, weeds and diseases, and these products can also improve nutrient uptake and yield.

Consumers and industry leaders, who are calling for more sustainability and environmentally friendly products, are pushing us in this direction. With that drive, scientists are undertaking research and development to propel the growth of the market.

In short, everyone is getting excited about products coming “from nature.” Who wouldn't love to use

something that offers an appealing story of sustainability? After all, we want to be able to tell our cousins in the city about the great and natural things we're doing on the farm.

That said, it's in the excitement that the danger lies. Many of us have information biases toward the narrative of natural that is programmed into us. As a result, we may buy into a product before we ask the right questions about the science.

So, let's do a biologicals 101.

The science

The starting point for understanding biologicals is to know that bacteria and fungi involved in agricultural applications must be thought of using the same management principles that you use for livestock management.

You control the content and quality of the food source, optimize the abiotic conditions (i.e., the non-living

chemical and physical parts of the environment), and properly process the product so that it can be a marketable commodity.

Nitrogen and carbon are the most important resources to micro-organisms, but it is how they acquire those nutrients that is drawing researchers' attention. And scientists are developing a pool of possibilities to exploit our abilities to create efficiencies and avoid waste.

Ag industry stakeholders can also learn from strategies the food industry uses. The latter industry uses a lot of bacteria in the fermentation of meat, vegetable, and dairy products; this bacteria is cultured and sold on a commercial scale.

To develop the right bacteria for what is needed, the industry works with phages and genetic purity. Much like how mono-cropping systems make weeds stick out in the field, us-

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ing a single type of bacteria makes it easy to detect contamination in food.

Stakeholders in the processing industry know a lot about how to make microbes work and how to kill them. The size of the processing facilities creates a unique micro-climate where new methods of biological control such as phages can be tested and deployed before they make their way into other climates.

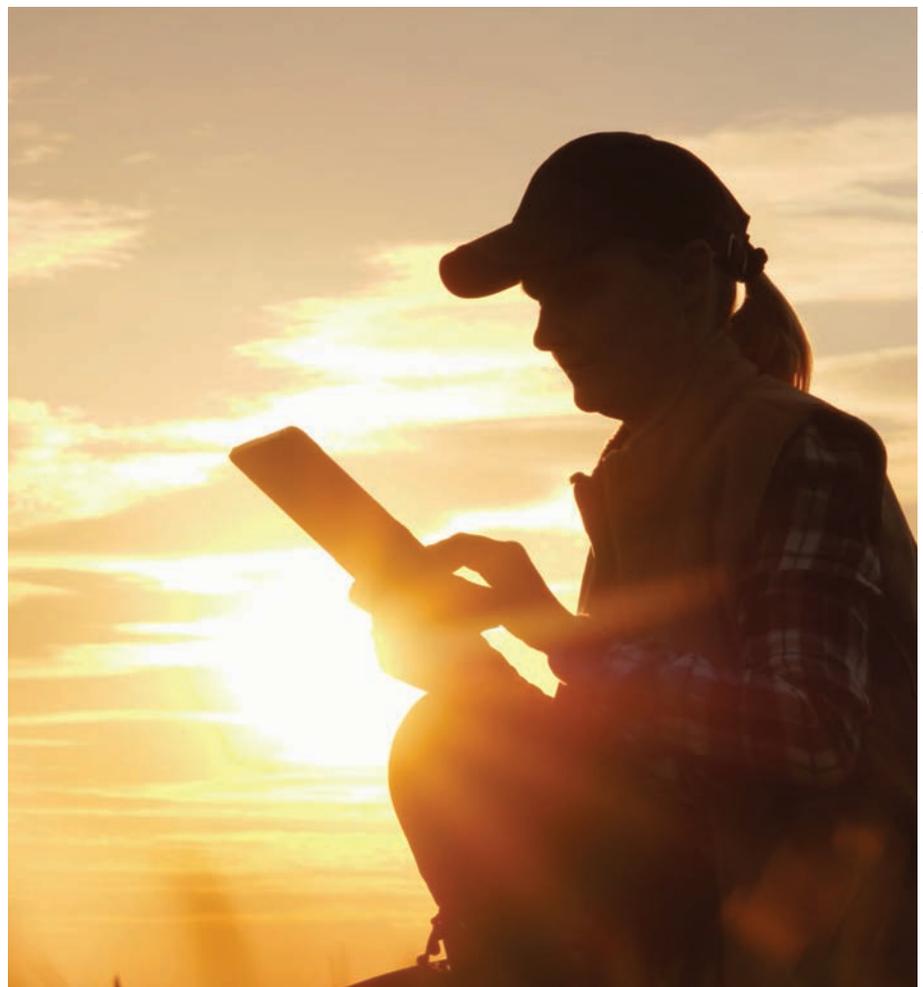
Phages are viruses that infect and replicate in bacterial hosts and are found everywhere bacteria exist. We know little about phages in comparison to the millions that exist, but we can accredit phage and bacteria research for one of the biggest discoveries from the 2010s.

With investigating odd regions of repetitive DNA sequences present in many bacterial genomes, scientists made the connection that these strands of DNA matched those of the viruses (phages) that affected them.

These odd repetitive sequences are the foundation of a bacterial anti-viral response system now known as CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats). This system has revolutionized the field of molecular biology because CRISPR can be modified to cut DNA in any organism.

A surge of biotech startups are looking to apply the CRISPR technology to all aspects of life.

CRISPR's implementation hinged on a ruling just a couple years ago from the European Parliament which classified site-directed mutagenesis as genetic modification. Nevertheless, the parallel 2018 U.S. Department



StockSeller_Ukr/Stock/Getty Images Plus photo

We need to be prepared with the knowledge to critically analyze the products that will be put before us.

of Agriculture's (USDA's) ruling on the subject was a win for public and private entities conducting research and developing products. The USDA classified CRISPR-edited organisms as non-GMO.

The Canadian Food Inspection Agency regulates products, not the processes by which they are achieved. So plants and bacteria destined for agricultural uses are assessed on individual bases to determine whether they have potential to introduce new traits to wild populations, etc.

Unfortunately for agriculture in North America, the science and innovation are stuck waiting on the social acceptance of international markets to catch up.

So how does gene editing influence what I am spraying on my crops?

CRISPR has added a lot of potential in the value chain because researchers are now looking at editing

whole metabolic systems, rather than just a single gene. Scientists can be ambitious and look at microbes that are more economical in characteristics such as growth rate and optimal growth conditions to produce products like plant growth hormones.

The dangers

You may remember several years ago a company was developing a system to use your tractor exhaust to "carbon" your soil. Though this product isn't a biological, the relation is clear.

I remember attending a field day and chatting with a farmer while we watched a demonstration of the technique. Despite the lack of product testing, the farmer wanted to believe in the idea so heartedly that he'd "bought it."

The big companies were merely out to take advantage of farmers, he said. The startup making this tractor ex-

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haust product was there for farmers, he added in our chat.

This type of mindset underlies how some people approach biologicals, and this thinking might be dangerous. As the thousands of products come forward in the next decade, we must be very discerning and ensure we can see through the pizzazz. We must be sceptical about the “natural” narrative.

As well, the tables are turned when it comes to biologicals. Only the big companies may be able to afford to do the necessary testing on these products. So, the better and more effective biologicals might come from big companies, rather than from the startups. Time will tell.

Either way, though, researchers are pushing discovery. We as farmers need to be prepared with the knowledge to critically analyze the products that will be put before us. We must choose the right ones.

We will have incredible opportunity to leverage biologicals to our advantage. It’s important for the industry, and especially growers and



Orientaly/Stock/Getty Images Plus photo

We want to be able to tell our cousins in the city about the great and natural things we’re doing on the farm.

advisers, to better understand this area of agriculture and ensure we manage the risks. **BF**

Terry Aberhart farms near Langenburg, Sask. with his family and runs Sure Growth Solutions Inc., a

professional independent agronomy consulting company. Terry also operates Aberhart Ag Solutions, a marketing and distribution company, with his family.

Tyler Lefley is an agronomist and master’s candidate in plant sciences at the University of Saskatchewan.



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SASKATCHEWAN AG'S PEST MONITORING PROGRAM

By conducting these surveys, the ministry helps farmers and agronomists track potential crop threats.

Saskatchewan Agriculture participates in and coordinates several pest surveys during the growing season. Insects and diseases can have major effects on crop quality and yield. Through these surveys, we monitor the abundance, severity and effects of new and existing pests.

We have a broad network of partners and co-operators who assist in surveillance. These groups include the Saskatchewan Crop Insurance Corp., Agriculture and Agri-Food Canada, the University of Saskatchewan, the Saskatchewan Association of Rural Municipalities, commodity associations and industry groups.

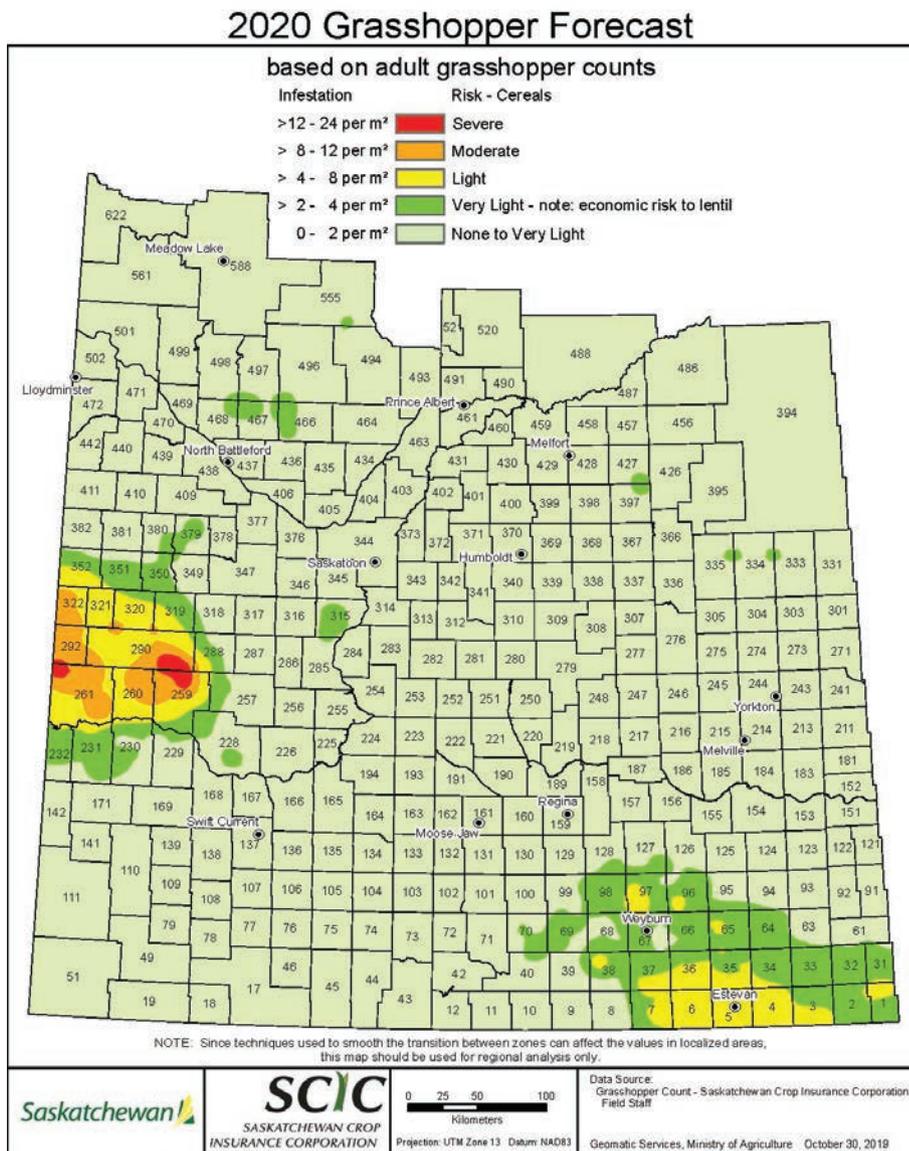
Monitoring for insects helps guide our recommendations and we share information with producers. We use monitoring results to publish insect forecast maps for producers and agronomists, who use these tools to help with decision-making and scouting plans on individual farms.

The maps show general areas where pests are spotted and their abundance. The forecast maps should be used in conjunction with proper field scouting.

We create forecast maps for wheat midge and grasshoppers annually, and we monitor bertha armyworm and diamondback moth in season on a weekly basis.

Ministry staff use surveys to learn about insects and plant diseases in their regions, detect possible outbreaks or concerns early, and potentially find new pests as we grow new crops. Insects such as the pea leaf weevil are not native to Western Canada, so monitoring the spread of these types of pests is not only important for producers in Saskatchewan but in our neighbouring provinces as well.

Finding new or emerging pests also assists in directing research efforts in the province. Producers first grew newer crops to Saskatchewan,



Government of Saskatchewan photo

The grasshopper survey gives producers an estimate of the populations for the upcoming growing season using the previous season's survey counts.

like soybeans, with relatively low disease levels. As acres of this crop increase, so will disease pressures. We can track these diseases, their presence and severity through our monitoring program.

We also use the program to monitor for pests that may lead to trade-related issues. An example would be surveying and collecting samples of blackleg in canola when

this disease was an issue of concern in international trade.

Many of the surveys we conduct provide information in the form of historical trends of the pests in Saskatchewan.

Disease surveys we conduct annually include:

- Fusarium head blight
- flax diseases
- cereal leaf diseases

- chocolate spot of faba beans
- lentil diseases
- field pea diseases
- Ascochyta blight in chickpeas
- soybean diseases
- canola diseases including blackleg and clubroot
- blossom blight of caraway and coriander

Monitoring programs include the following insects:

- diamondback moth
- bertha armyworm
- aster leafhopper
- swede midge
- pea leaf weevil
- cabbage seedpod weevil
- lygus bug
- wheat midge
- grasshoppers
- spotted wing drosophila

Alberta and Manitoba conduct similar pest surveys. The type of surveys these provinces conduct, and how they do the work, varies from Saskatchewan, but the use for the surveys is the same.

Officials report the results of many of these surveys in the Prairie Pest Monitoring Network blog during the growing season.

Agriculture and Agri-Food Canada (AAFC) coordinates weed monitoring programs. The department assesses changes in abundance, frequency and herbicide-resistance status of all weed species. AAFC and its collaborators conduct these extensive surveys on a provincial



To sign up for the Pest Monitoring Program, scan the QR code, or sign up online at ca.surveygizmo.com/s3/50060966/Pest-Monitoring-Sign-up. If you farm in Saskatchewan, contact your nearest crops extension specialist to learn more about the monitoring programs and individual surveys.



Insect traps can give an estimated forecast on areas that may show higher populations later in the season when larvae have hatched and begin feeding.

basis once every four years.

For example, AAFC conducted the most recent kochia survey in Saskatchewan in 2019 but the results are not yet available.

The next herbicide-resistant weed survey is also underway. Stakeholders surveyed part of the province in 2019 and will survey the remainder this year.

How participants conduct each survey depends on the pest being monitored, the affected crops and where those crops are grown in the province.

We monitor diamondback moth, bertha armyworm, swede midge and aster leafhopper on a weekly basis in pheromone traps placed on the edge of canola fields. We monitor other insects by sweeping the crop, collecting soil samples, undertaking visual confirmations or assessing plant damage.

We monitor diseases by identifying presence or absence, incidence and severity. We may collect samples of insects and diseases for study.

We don't conduct every survey in all areas of the province. The number of surveys we complete in each area coincides with the acres of the appropriate crops grown.

Effects on the farm

For 2020 and beyond, Saskatchewan Agriculture is adopting a permission-based survey system. Producers are

encouraged to sign up and allow us access to their lands for our surveys. By participating, growers can help ensure the data we collect continues to be as accurate and representative as possible. Signing up is easy, and does not commit you immediately.

Registering for the pest monitoring program only gives us your contact information. We will follow up for crop information, field history and land locations prior to conducting any surveys.

All surveyors follow strict biosecurity protocols and are trained in the survey they are conducting.

Tools

Sign up for regular insect updates throughout the growing season from the Prairie Pest Monitoring Network blog at prairiepestmonitoring.blogspot.com/. Here you will find the latest in pest issues across Western Canada, information about insects and more. Follow the Prairie Crop Disease Monitoring Network on Twitter (@pcdmn) for in-season updates on crop diseases. **BF**

Kaeley Kindrachuk and John Ippolito are crops extension specialists for the Ministry of Agriculture. Kaeley holds a bachelor of applied science from Lakeland College and is a technical agrologist. John holds a bachelor of science from the University of Saskatchewan and is a professional agrologist.



by
**JEREMY
BOYCHYN**

HOW CAN I LESSEN THE EFFECTS OF DISEASE?

As we head into the 2020 growing season, consider these fundamental steps in reducing disease risks.

Dr. Kelly Turkington, AAFC/Lacombe photo



This barley displays symptoms of the net form of net blotch.

Crop disease can significantly affect yields and reduce cropping options. Producers affected by *Aphanomyces* are limited to growing susceptible crops such as peas and lentils every six years. Fields with clubroot, depending on severity, may be restricted to growing canola once every two to four years to minimize the disease effects.

Additionally, Canadian wheat and barley producers lose \$50 to \$300 million annually from Fusarium head blight (FHB) through yield, grade, and marketability loss.

Wheat and barley growers battle a wide range of diseases, including scald, net blotch, spot blotch, ergot, rusts, tan spot, Septoria, and FHB. The nature of these diseases, along

with diseases found in other Prairie crops, require a full-farm management approach to reduce the weight that genetics and fungicides carry in the fight against disease-induced yield loss.

Pathogen adaptation to genetic resistance found in varieties and the development of fungicide resistance are concerns that occur when the tools are placed under too much pressure through over-dependence.

So, what tools can wheat and barley producers in Western Canada implement to mitigate disease in the short and long term?

Integrated disease management includes the use of multiple tools in addition to in-season field monitoring. To set yourself up for success, some of these tools include:

- rotation
- variety selection (genetic resistance)
- seed testing
- fertility and seeding best management practices
- intercropping
- varietal blending

Dr. Sheri Strydom, Alberta Agriculture and Forestry image



TKW (g)	42.58	39.14	38.06	48.74
Germination %	96%	97%	98%	99%
Rate (lbs/ac)	166	151	145	184
Rate (bu/ac)	2.6	2.5	2.4	3.0

This figure shows seed samples of CDC Go, Harvest, Andrew, and Foremost and the range of thousand kernel weight, germination percentage, and seeding rates in lbs./ac and bushels/ac when targeting a plant stand of 35 plants/sq. ft.



In the photo on the left, you see Stettler wheat seeded with a dual insecticide and fungicide seed treatment in Lacombe, Alta. at 400 seeds/m². The wheat on left was seeded on April 25 at a two-inch (five-centimetre) soil temperature of 4 C (39 F). The wheat on right was seeded May 9 at a two-inch soil temperature of 8 C (46 F). The photo on the left was taken on June 26. The image on the right, taken Aug. 28, shows the same plot later in the growing season.

Rotation

Rotation is one of the most important tools for disease mitigation. In the short term, rotation can reduce disease inoculum buildup, and the yield and quality losses associated with disease.

In the long term, rotation mitigates situations in which the production of certain crops is no longer feasible due to disease proliferation.

FHB, scald, net blotch, spot blotch, ergot, common root rots, and tan spot all overwinter in the crop residue of host plants or in the soil. Rotation increases the time between host plants, allowing for decomposition of the infected residues or inactivation of pathogen survival structures. In the process, rotation decreases disease inoculum in fields, which reduces your risk of disease effects.

Including non-hosts crops for two years between susceptible hosts crops can reduce the severity of diseases such as scald, FHB, and other foliar diseases. It is increasingly important that producers look to increase the complexity of their rotations.

Pulses can be a great option; in addition to disease mitigation, these crops offer other benefits such as increased soil tilth and nitrogen credits for the following crop.

Integrating a new crop into your rotation is not a simple task. You must investigate which crops are capable of growing in your region, what kind of market and prices are

available, potential yield, and agronomic concerns specific to your farm and region.

The following resources can help with crop selection:

- CropChoice\$ – alberta.ca/cropchoices-decision-making-tool.aspx
- Agriculture Financial Services Corporation yield guide (Alberta) – afsc.ca/wp-nfs/wp-content/uploads/2020/02/Yield-Alberta-2020.pdf
- Ag-Info Centre and 310-FARM – alberta.ca/ag-info-centre.aspx
- crop commissions
- experienced regional agronomists

Variety selection

Each variety of wheat and barley has a unique disease-resistance package which causes varieties to respond differently to disease pressure.

Dr. Sheri Strydorhst, an agronomic research scientist at Alberta Agriculture and Forestry, provides a great example. She compared foliar fungicide applications on AC Foremost and AAC Penhold. She found variability between varieties as AAC Penhold responded to fungicide 36 per cent of the time, while AC Foremost responded 79 per cent of the time.

When selecting a variety, you can compare resistance ratings in your provincial seed guide. For example, CDC Go has strong overall yield but is susceptible to leaf spots, reports the Alberta Seed Guide. Although Parata

has a comparably lower overall yield to CDC Go, Parata has intermediate resistance to leaf spots, the Alberta Seed Guide reports.

However, growers need to be cautious when taking this approach for selecting and managing varieties. The leaf spot ratings reported in the seed guide are taken in fields that weren't inoculated for specific diseases.

For example, a variety could be stronger against tan spot as compared to Septoria leaf diseases. As such, a variety could respond differently in your field compared to what the seed guide reports, depending on the disease pressure in your field.

A good approach would be to trial new varieties on your farm each year. You should seed more acres of the varieties that showed promise on a small number of acres the previous year. Use the seed guide and talk to your local seed growers, neighbours, and seed reps to see what varieties are successful for other producers in your region.

Seed testing

Seed testing is a vital tool to mitigate disease risk and/or the introduction of FHB on your farm.

You can use a seed fungal test to gain a full understanding of whether diseases such as seed rots, seeding blights, root rots, leaf blights, or FHB are present in your seed. Moreover, seed with excellent germination and



Dr. Kelly Turkington conducted this intercropping trial. Intercrops in this image include barley, oats, and triticale.

vigour can get out of the ground more rapidly.

Based on seed fungal test results, you can make an informed decision on how to manage a seed lot through seed treatment, increased seeding rates, or non-use of that seed lot.

Seeding a diseased lot can lead to reduced plant stand, increased tillers leading to increased risk of FHB, yield loss, and increased weed management challenges. Diseased seed may also increase levels of disease inoculum in your fields, causing greater risk of effects on future cereal crops.

Agronomics and best management practices

Fundamental agronomic choices can also mitigate disease effects and risk.

Seeding rate, seeding date, and crop fertility are important factors to manage. Seeding rate plays a fundamental role in plant stand which, in turn, affects tiller numbers and canopy density. Low plant stands increase tiller numbers, creating problems such as delayed maturity, increased green seed, and increased

flowering time which increases FHB infection risk.

Dr. Brian Beres, a senior research scientist in agronomy at Agriculture and Agri-Food Canada (AAFC) in Lethbridge, has shown yield plateau at 28 to 33 seeds per square foot (sq. ft.) and even up to 42 seeds/sq. ft. for Canadian Western Red Spring wheat, while ideal barley yield and quality is typically achieved with 25 seeds/sq. ft.

To determine your seeding rate, you must first know your seed thousand kernel weight (TKW), germination and vigour. Then, you can enter this information into the seeding rate calculator available for use on the Alberta Agriculture website: agric.gov.ab.ca/app19/loadSeedRateCalc.

It's important to not rely on seeding rates based solely on pounds per acre of seed. Variation in TKW, germination, vigour, and disease between seed lots can result in substantial differences between final seeds planted per square foot and therefore plant stand.

The chart on page 46 demonstrates the range of seeding rates possible

when aiming for a plant stand of 35 plants/sq. ft.

Seeding date will invariably affect the flowering date of your wheat and barley. Ultra-early seeding (UES) of spring wheat between a soil temperature of 2 to 6 C (36 to 43 F), measured at 10 a.m. and 2 p.m. at two-inch (five-centimetre) depths, provided higher and more stable yields than spring wheat seeded above 6 C (43 F), Beres has shown.

The photos on page 47 demonstrate maturity differences seen within an UES demo in Lacombe, Alta. in 2019. Implementing this seeding strategy may promote earlier flowering that avoids high FHB risk season.

Although scientists have yet to conduct UES research on barley, growers could consider seeding barley first to help reduce FHB risk. However, barley is more sensitive to spring frost than wheat, so growers must consider the risk of frost on individual fields along with overall farm seeding plans.

Kequan Xi and colleagues at Alberta Agriculture and Forestry showed that early seeding of barley



Take the time to consider these factors to help create a foundation for strong disease management on your farm.

favours scald development over net blotch, while later seeding favours net blotch. This differential response may be mediated by temperature; scald is favoured by cooler temperatures (15 to 20 C or 59 to 68 F), while net blotch is favoured by warmer temperatures (>20 C or >68 F).

If planting barley early, you may want to focus on the level of scald resistance in the variety grown. If planting barley later, you may want to focus on the variety's level of net blotch resistance.

Finally, ensuring proper fertility through soil testing will help to mitigate disease by reducing plant stress and increasing plant health.

Potassium deficiency has increased the severity of Septoria infection in susceptible wheat cultivars while nitrogen deficiency can lead to increased tan spot. Chloride and copper can influence foliar and head diseases in cereals.

Moreover, deficiencies in chloride may lead to increased presence of physiological leaf spots, which can increase the risk of making an incorrect spray decision.

Intercropping and varietal blends

A less popular but increasingly discussed idea in Western Canada is the use of intercropping and varietal blends. Intercropping is the seeding

of multiple types of crops in the same field. Varietal blending is the seeding of multiple varieties of the same crop within one field.

Research on intercropping in Western Canada under organic and conventional production methods has shown variable results. At this point, recommendations regarding intercropping are limited.

Although scientists have yet to research wheat varietal blends in Western Canada, Dr. Kelly Turkington, a research scientist at AAFC in Lacombe, studied varietal blends and intercropping in barley, oats, and triticale for silage purposes in 2010, 2013 and 2016. Both tactics can reduce leaf disease severity, he found. Barley varietal blends in Lacombe and Lethbridge, Alta. demonstrated significant decreases in total leaf spot severity while maintaining yield.

These results reinforce that growers can use variation in varietal and crop choices as a disease-management tactic.

Take-aways

Take the time to consider these disease management factors to help create a foundation for strong disease management on your farm. Understanding how these factors can affect the impact of disease on your farm and how to best use them will put you a step ahead.

Under high disease pressure conditions, however, the above factors will not eliminate yield loss to disease. You should combine these tools with educated fungicide application practices that are based on visual disease symptoms and conducive environmental conditions. This strategy will not only provide value for this year's crops, but also for the crops that follow. **BF**

Thanks to Dr. Kelly Turkington for reviewing this article for accuracy.

Jeremy Boychyn is the agronomy research extension specialist at the Alberta Wheat and Barley Commissions and writer for the commissions' agronomy e-newsletter "The Growing Point." He holds his P.Ag. and an M.Sc. in plant physiology from the University of Guelph in Ontario.

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69

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HOW TO OPTIMIZE PLANT POPULATIONS

Let's review the key factors to consider when determining your seeding rate for spring wheat.

Dylan Wiebe, LD Seeds photo



This drone photo was taken on July 7, 2015 after a significant thunderstorm. AAC Penhold wheat stood in the middle. To the left, Prosper wheat and, to the right, Cardale wheat exhibited more lodging.

Many factors influence the final plant stand in cereal crops like spring wheat. These factors include seedbed preparation, seeding depth, seed quality, and herbicide carryover. Arguably, however, the most important factor is seeding rate.

This initial management step directly affects plant population. We must optimize plant populations from the start, as we cannot increase the number of plants in the field once the crop is up.

Currently, Manitoba Agriculture recommends spring wheat growers target stands of 23 to 28 plants per square foot (sq. ft.).

As researchers develop new wheat genetics with better standability, disease tolerance and yield potential, many growers are adopting models from Europe, New Zealand, and the United States for increased seeding rates. Overall, these farmers have experienced increased yields, suggesting the provincial government recommendations for plant populations are outdated and should be reviewed.

Before we can dig into determining the right seeding rate for a cereal crop, we must examine how seeding rates are calculated, and the overall rewards and risks to increasing plant populations in our field.

The rewards

Perhaps the biggest advantage to increasing plant populations is increased yield potential, said Pam de Rocquigny. She worked as a contract agronomist for the Manitoba Wheat and Barley Growers Association when she conducted this research.

Remember, plant population influences all three primary yield determinants: number of heads per acre, number of kernels per head, and the weight per kernel. Higher plant populations also mean greater light interception (more photosynthetic area) and lower weed competition.

Some wheat cultivars also contain the Ppd-D1 gene that makes them more photosensitive. Wheat with this gene responds better at higher populations because it would canopy sooner, thus capturing more light.

Another benefit of a higher plant population is the increase in stand uniformity. Heavier plant stand densities result in a fewer tillers. A reduction in the number of tillers can result in uniform flowering and maturity, which hopefully translates into improved yields, improved kernel uniformity and higher quality.

In areas where growers have concerns with wheat midge and Fusarium head blight (FHB), farmers can better manage insecticide and fungicide applications if the crop flowers or heads uniformly. Timing is critical for product effectiveness – particularly with FHB products.

A more uniform stand can result in more uniform maturity, which can make operations such as swathing or straight-cut harvesting much easier.

In contrast, the higher number of tillers associated with lower populations will delay maturity. In turn, this delayed maturity may increase the risk of a fall frost affecting both yield and quality.

Seeding rate and cultivar had a significant effect on stems per plant,

Grant Mehring found. He's Bayer CropScience's wheat technical product manager and he researched wheat seeding rate by variety at North Dakota State University.

The number of stems per plant is directly related to tillering; if you subtract one from the number of stems per plant, you'll know the true number of tillers per plant.

Mehring did not find the physiological response of unculm plants, where only one stem per seed is produced, at even the highest density seeding rates. Tillers that do not fully mature do not grow tall enough to rob sunlight from productive spikes. These immature tillers tie up very small amounts of nutrients that, in part, return to the plant before the tiller dies.

The risks

One of the risks associated with higher plant populations is the increased potential for lodging which can affect yield and quality, de Rocquigny said. This risk may be heightened in high-yield environments like the Red River Valley.

When using higher seeding rates, growers should select semi-dwarf and shorter-straw varieties or varieties with very strong straw strength.

A higher plant stand produces a thicker canopy, which may lead to higher disease pressure. Growers must scout their fields during the season to monitor for disease pressure and determine if they should

apply fungicide.

Increased plant density can also place plants under more stress through inter-plant competition or "self-thinning" for access to nutrients, light, and moisture. The chances of "self-thinning" increases if any of these factors are limiting.

Mehring also found that stand losses increase as seeding rate increases. The result can affect any of the three yield components, potentially leading to a reduction in yield and quality. Seeding rate affects lodging and yield, and some varieties are more negatively affected than others, he found.

When determining a seeding rate, producers often default to what worked in the past. However, this line of thought creates some challenges.

If the kernel weight or number of seeds in a pound has changed in a seedlot, seeding rates in bushels per acre would not adjust for that change. If producers do not run seed weight tests on their seedlots, then growers could be seeding at much different rates than they intended to or then they seeded in previous years.

Calculating seeding rates

The next step is to calculate seeding rate which refers to the number of wheat seeds planted per acre. We need to determine the seeding rate to use to obtain the desired plant population, which refers to the number of wheat plants per acre that will produce yield.

To achieve higher plant stand densities, the top rule to follow is do not seed by bushels per acre.

To help ensure success, farmers must determine three critical pieces of information: target plant stand, thousand kernel weight (TKW) and expected seed survival, which includes per cent germination. You can use the equation below to determine the most accurate seeding rate to achieve the desired plant stand.

Seeding rate (pounds/acre) = (target plant stand per square foot x TKW in grams) / (percentage expected seedling survival x 10).

Target plant stand

We determine the optimum plant population for a field by considering many factors, including our crop management practices and the growing conditions.

We may not have the same target plant stand for every field. In contrast to the Manitoba government recommendation for spring wheat of 23 to 28 plants/sq. ft., many farmers are tar-

Heading counts at 23 environments

Feekes 1	Feekes 11	Feekes 11	Yield
million seeds/ac	stems/ plant	million stems/ac	bu/ ac
0.6	4.0	2.1	76.6
9.0	2.8	2.4	79.6
1.2	2.2	2.5	80.2
1.5	1.9	2.5	80.0
1.7	1.6	2.6	79.7

As seeding rate increases per acre, stems per plant typically decrease. In contrast, stems per acre typically increase slightly.

Source: Grant Mehring, wheat technical product manager for Bayer CropScience

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getting up to 30 plants/sq. ft. In some cases, growers are aiming for up to 35 plants/sq. ft or 1.3 to 1.5 million seeds/acre.

When targeting higher plant stands, growers should consider:

- **Variety** – Select semi-dwarf and shorter-straw varieties or varieties with very strong straw strength.
- **Seeding date** – When seeding is delayed in order to shorten the time to maturity, seeding rates should be increased.
- **Field selection** – Ideally, target higher plant stands in fertile well-drained fields with good moisture-holding capacity.
- **Growing conditions** – Ensure conditions in your area can handle an increase in plant population. Evaluate temperature and potential disease issues.
- **Management practices** – Examine fertility programs and pest (weed, disease, insect) control measures to help ensure your crop can handle the increase in plant population.
- **Economics** – Consider the economic return of planting more seed. Because many factors come into play when determining target plant stands, a producer may need a few growing seasons to fine-tune his or her targets and determine just how far they can be pushed in his or her system.

Thousand kernel weight

Growers can measure TKW simply by counting 1,000 seeds of grain and obtaining the weight in grams. Growers should do this calculation with multiple batches from the lot and average the TKW.

Seed weights vary between varieties and fields, and by year. Remember that not every lot of seed and variety are the same. Just because the TKW of your chosen wheat variety was 38 grams last year does not mean that it will be the same this year.

It is important to get the TKW of your seed either through your seed dealer or annual testing of farm-saved seed. The TKW will influence how much seed you need to order or to save from the previous crop.

Expected seedling survival

Expected seedling survival is the expected germination less a small amount for seedling mortality. In the formula for calculating seeding rate, expected seedling survival is expressed in decimal form.

For example, 0.9 should be used in the formula for 90 per cent.

Per cent germination

The ability of the seed to germinate is critical.

A seed is a living organism that can change from the time it's harvested to planted. Ask your seed dealer for the

germination test results.

If considering using farm-saved seed, be sure to test – and ensure you test again after seed cleaning. Since most germination tests are relatively inexpensive, it is a small price to pay to ensure seed has planting potential.

It's good practice to repeat a germination test a few times throughout the winter if you find a high percentage of abnormal or dormant seeds.

Seedling mortality

When determining seeding rates, be sure to consider the seedling mortality rate, meaning what per cent of viable seed will not produce a plant.

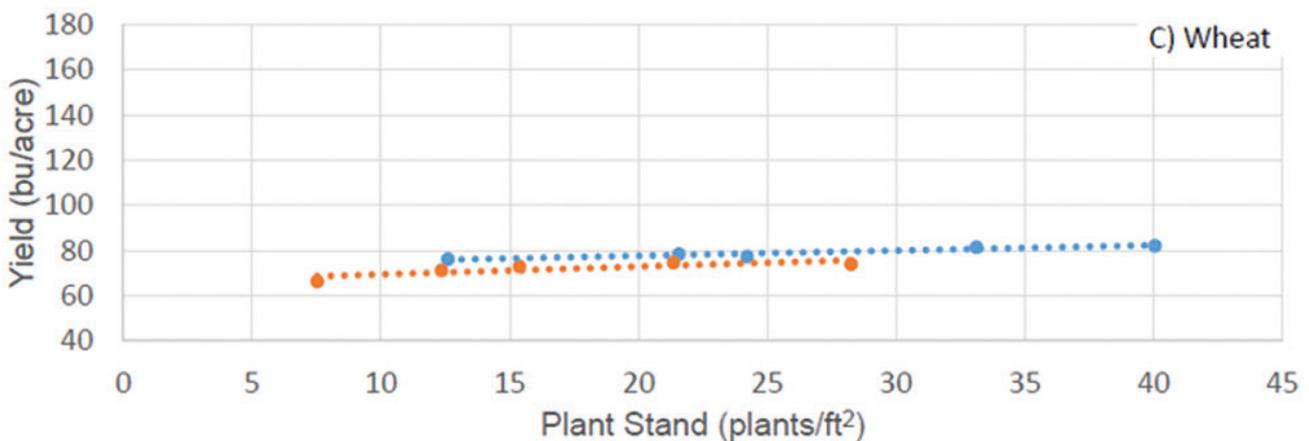
Under normal conditions, many farmers and agronomists have found a 5 to 10 per cent mortality rate can be assumed. If you anticipate challenging conditions during seeding, including wet, cold soils and heavy residue, assume higher mortality rates (15 to 20 per cent) when calculating seeding rates.

In his research, Mehring saw 10 to 19 per cent stand loss at seeding rates from 1 to 1.8 million seeds per acre. The higher the seeding rate, the higher the mortality.

In 2017, Anne Kirk also studied the optimum seeding rate by variety for spring wheat, barley and oats. She is a cereal crop specialist with Manitoba Agriculture.

Source: Anne Kirk, cereal crop specialist, Manitoba Agriculture

Plant stand and yield in wheat



This graph shows the effect of increasing plant stand on yield at two locations in Manitoba in 2017. The orange line is the Melita trial and the blue line is the Carberry trial. Yields are represented by circles, while linear trend lines are represented by the dashed lines.

She studied multiple seeding rates in Canada Western Red Spring (CWRS) wheat AAC Brandon and Canada Northern Hard Red wheat Prosper. When calculating seeding rates for spring cereals, she found growers should anticipate a 10 to 20 per cent stand loss.

Her work complements Mehring's research findings.

Cereals typically compensate for lower plant populations by increasing tillering, Kirk's research confirmed. Cultivars have differing abilities to tiller. For wheat, plant stand did not affect yield at the plot in Carberry, Man. but yield significantly increased with increasing seeding rate in the Melita plot.

Wheat varieties respond differently to differences in seeding rate. The environment in which a variety is grown also has an effect, Kirk and Mehring show. The combination of factors affecting yield is known as genetics by environment by management (GxExM).

Current research

Dr. Robert Gulden, an associate professor at the University of Manitoba, is leading a project that assesses crop rotations, row spacings and seeding rates to find the optimal choices to maximize wheat yields.

The research project runs from 2017 to 2021.

He is interested in crop spatial arrangements because of their influence on things like disease, lodging and crop competitiveness with weeds.

"We want to find the optimal spatial arrangements in light of modern cultivars. As growers know, cultivars can differ from one another in traits like tendency to tiller, resistance to lodging and resistance to disease, which all influence optimal spacing," Gulden said.

He is also looking at the influence of the previous crop (either canola or soybeans) in the rotation before wheat.

Differences could exist in snow capture and water retention in the soil from the previous crop. Differences could also exist in soil nitrogen



Anne Kirk, Manitoba Agriculture photo

This photo shows the trial Anne Kirk conducted examining different seeding rates for AAC Brandon. She is a cereal crop specialist with Manitoba Agriculture.

content and nitrogen release. Finally, canola is more competitive with weeds than soybeans are, so weed pressure differences could exist in the subsequent wheat crop.

The spatial arrangement study involve two varieties of CWRS wheat: AAC Brandon and Cardale. The study's four seeding density treatments range from 200 to 500 seeds per square metre. The row spacings are: 7.5, 15, 22.5 and 30 inches.

At this preliminary stage, Gulden has seen some differences in how these varieties respond to different row spacings and seeding rates. AAC Brandon yields continued to increase with increasing seeding rates, he said. Cardale yields leveled off around 300 seeds per square metre and dropped with increasing seeding rates. Also, Cardale covered the ground and closed in row spacings quicker than AAC Brandon, resulting in better light capture.

Final thoughts

For producers who want to optimize their wheat production, having the ideal crop stand is key.

Through the most recent research

and hands-on experience, we can see that differences exist between varieties in their response to seeding rate.

Growers and agronomists are trending towards increasing seeding rates to adjust plant populations. This strategy could reduce weed populations and disease levels, as well as the need for herbicide and fungicide. Increased seeding rates could also lower the risk of lodging. **BF**

Jason Voogt is a professional agrologist and certified crop advisor.

He is the owner and lead agronomist at Field 2 Field Agronomy Inc. in Carman, Man.

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KEY LESSONS FROM MARKETING THE 2019 CROP

After surviving harvest, students experienced hands-on learning opportunities about crop marketing.



Inconsistent weather between May and June meant delayed germination and growth, leading to a late harvest.

Students enrol in Lakeland College's crop technology diploma program to learn the ins and outs of agriculture, and the biggest lesson they learned during the 2019-20 academic year was the value of patience.

At Lakeland, a key component of all agricultural sciences programs is student-led hands-on learning. Students in the crop technology program are responsible for making six-figure decisions as they manage

hundreds of acres of crops on the Student-Managed Farm (SMF) – Powered by New Holland at the Vermilion, Alta. campus.

The students buy and sell in commodity markets. They decide what crop to purchase and how to plant it. The students connect with companies about services and products that are critical to managing their operations. They decide when to harvest and which cutting-edge

equipment to use.

In 2019, when inconsistent weather between May and June delayed germination and overall growth, crop technology students faced the same decisions that farmers across the Prairies faced: when to harvest, how to prepare the crop for market and how to procure the best price for their investment.

Students seeded 977 acres. They sold some of their crops to the SMF dairy and beef units, leaving the crop technology program students with 662 acres of wheat, canola and barley to harvest in the fall.

"Everything was about two weeks late" in 2019, said Carter Bodell, a second-year crop technology student and analysis manager for the SMF crop unit.

After they finally could complete harvest, students faced more decisions. The crop had high levels of moisture, which affected the way it was marketed, said Blair Chesterman, a member of the SMF crop marketing team.

"There was a lot of precipitation in the fall," he said. "There was some ergot in our samples, so most graded

RESEARCH AT LAKELAND

Applied research is also an essential component of Lakeland's agricultural sciences programs.

In 2019, Lakeland conducted 1,024 experimental research plots and 39 experimental trials, with three public field tours. The 2019 trials tested a variety of agronomic practices and encompassed all major crop species that are (or could) be grown in the region, including four wheat classes, three barley classes, oats, triticale, yellow and green peas, lentils, faba beans, soybeans, canola and flax.

Lakeland has also introduced innovative technology to student-led learning. Students can use a drone, for example, to help assess the practicality of this technology for farmers. The college has also implemented GrowSafe technology for measuring livestock feed efficiency, new software packages for collecting and interpreting data, field mapping technology, and automated feeding and milking technology in the Dairy Learning Centre. **BF**

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Lakeland College crop technology students are responsible for making six-figure decisions on the Student-Managed Farm – Powered by New Holland.

as a number two. Due to the high moisture, we had to do a lot of grain drying to get it sold.”

It was a careful process, as students considered the financial investment in the crop and break-even points. The students had to decide whether to invest additional funds in drying the crop, and whether they would receive a significant return on investment.

“We really didn’t have a choice,” said Regan Ruch, the manager of the SMF crop marketing team.

“We had to dry (the crop) somehow, someway. We figured it was best to do it ourselves rather than take it to an elevator or custom dryer and have to truck it.”

Luckily, however, protein levels in the crop were significantly higher than expected, which meant the

students had a chance to make back what they spent on drying the crop.

“The protein level would help us out on the selling end because we get premiums for our protein levels,” said Ruch. “That was helpful because we did have to spend quite a bit of money getting the crop to a marketing level by drying it.”

After the grain was dry, the only thing left to do was have patience.

“You need to look forward. Your hands are tied sometimes because you’ve got to make that decision. Are you happy with the prices you’re getting? They could drop at any time,” said Chesterman.

“Working with the markets – that’s what we spent the first quarter of the school year doing,” added Ryan Young, another member of the SMF

crop marketing team. Buyers “weren’t giving us the prices we wanted. We were sitting on our crop for a long time and now we’re finally getting some prices we want.”

Thanks to the high protein levels, as well as keeping an eye on market prices, the marketing team is confident they have the best return on their investment. They still have 3,000 bushels of wheat and 9,000 bushels of canola left.

For now, though, as the students navigate the ins and outs of receiving the best prices they can, of working with buyers, and of ensuring their contracts are honoured, the marketing team is confident in both their return on investment and the lessons they learned along the way.

“We are absolutely happy that we waited to sell. Patience is the biggest thing,” said Young. “We did a good job waiting, but it was hard.”

In addition to crop technology students, animal science technology (AST) students also have access to 2,000 student-managed acres, hundreds of head of livestock and numerous learning facilities on the SMF. AST students can study one of four majors – beef science, dairy science, equine science or livestock science – in the two-year diploma program.

With the SMF, students reap the benefits of work-integrated learning and don’t have to wait until graduation to be leaders in agriculture. **BF**

AWARD-WINNING EDUCATION

This year, Lakeland caps off a year-long celebration marking 30 years of hands-on experiential learning on the Student-Managed Farm – Powered by New Holland. For three decades, students have tried new things with real-world consequences, whether that’s growing faba beans for the first time, tackling environmental farm plans, or helping plan facilities like the Dairy Learning Centre that opened in 2017.

Lakeland has received several awards for its programming and student initiatives, including Alberta Farm Animal Care’s 2018 Award of Distinction for Industry Leadership. Lakeland received two Awards of Excellence from the World Federation of Colleges and Polytechnics – for industry involvement in the SMF (2014) and leadership development (2016).

Lakeland is also the first post-secondary institution in Alberta to attain Verified Beef Production Plus certification. **BF**



HELPING CORN RECOVER QUICKLY AFTER A COLD SNAP

Producers in more regions of the world could soon incorporate corn into their rotations, thanks to American researchers.

While corn is a tropical plant that is sensitive to cold weather, the introduction of a chilling-tolerant strain in the crop could allow farmers to grow corn at broader latitudes, a January release from New York's **Boyce Thompson Institute** said. This discovery could also allow farmers to



increase productivity. Rubisco is the key enzyme for improving corn's recovery after a cold snap. This enzyme allows plants to turn atmospheric carbon dioxide into sugar, the release said.

When the ambient temperature drops, so do Rubisco levels in corn leaves. "The corn with more Rubisco performed better than regular corn before, during and after chill-

ing," **Coralie Saless-Smith**, the paper's first author and a post-doctoral researcher at the **University of Illinois**, said in the release.

"We were able to reduce the severity of chilling stress and allow for a more rapid recovery."

The engineered corn grew taller and developed mature ears of corn faster than normal corn following colder conditions, the release said.

The study is published in the December issue of the journal *Plant Biotechnology*. **BF**

MODIFIED METABOLISM HELPS PLANTS ABSORB MORE CO₂

Scientists are striving to increase food production while reducing atmospheric carbon dioxide (CO₂) levels.

Modifying plant metabolisms could be the ticket to reach these goals, a January release from Germany's **University of Würzburg** said.

A research team found that its modulated plant metabolism network results in plants that can absorb five times more CO₂ than plants with normal metabolic pathways, the release said. The scientists' findings

are based on computer models and complex calculations.

These plants could also produce higher amounts of biomass, which could lead to higher yields.

These modifications still need to be tested in field conditions, but this research provides a solid foundation for future studies.

"We will experiment with tobacco plants and thale cress ... which are



both easy to modify," Muhammad Naseem, a research scientist at the

University of Würzburg and an assistant professor at **Zayed University** in the United Arab Emirates, said in the release. Thale cress is a small flowering plant, often considered a weed, native to Eurasia and Africa.

The study is published in the January edition of the journal *Trends in Biotechnology*. **BF**

NEW DEVICE OFFERS ALTERNATIVE METHOD OF WEED CONTROL

North American farmers could soon have another effective tool to add to their weed control toolkit.

The Harrington Seed Destructor (HSD) could be a non-chemical control method to effectively reduce weed seed banks in the soil, said a January release from the **University**



of Illinois.

This impact mill destroys weed seeds picked up by a combine during the harvest of such crops as wheat and soybeans.

While Australian farmers already use the HSD, researchers are studying its application in American fields. During field trials over the last five

years, researchers have seen an overall 70 to 80 per cent reduction in weed seed survival. However, if producers start using the HSD, they will still need to use multiple methods of weed control to prevent selecting for problematic traits in weeds, the release said.

The full study is published in the November 2019 online issue of the journal *Weed Science*. **BF**

NEW BIOLOGICAL PEST CONTROL FLIES TO FIELDS

American and British scientists may have developed a new and effective pest control method for field crops.

A genetically engineered strain of diamondback moths could regulate populations of pest diamondback moths in such crops as canola, broccoli and cauliflower, a January **Cornell University** release said.

Modified male moths mate with "wild" females and pass a self-limiting gene to offspring. This gene

prevents females from surviving, the release said. The self-limiting strain effectively suppressed populations of the moth and limited insecticide resistance, previous studies in greenhouses showed.

Now, the field study "demonstrates the immense potential of this exciting technology as a highly effective pest manage-



ment tool, which can protect crops in an environmentally sustainable way,"

Dr. Neil Morrison, Oxitec's agricultural lead and study co-author, said in the release.

Oxitec is a British biotechnology company, the company's website said.

The full study is published in the January edition of the journal *Frontiers in Bioengineering and Biotechnology*. **BF**

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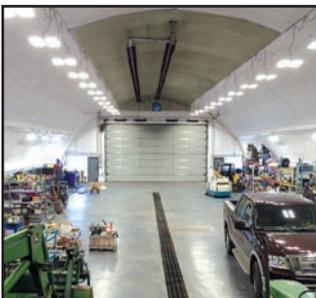
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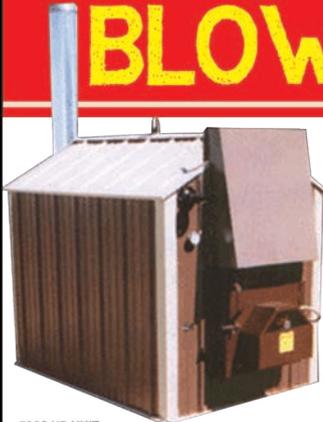
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- 2018 CASE IH 4440** 120', Lux Cab, Front Fill, Viper 4, RS1 Autosteer, AutoBoom, AIM Flex, LED Lights, 710 Trelleborg's, 380 Goodyear's, 537 Hrs stk: 030829 **\$499,000**
- 2017 CASE IH 4440** 120', Lux Cab, Active Susp, 380's & Trelleborg 710's, Pro 700, AIM FLEX, LED Lights, Accuguide, Fenders, Reversible Fan stk: 026963 **\$390,000**
- 2015 CASE IH 4440** 120', AIM Pro, Lux Cab, AutoBoom, Accuboom, Pro 700, Omnistar, Accuguide, 320's & 650's, Fenders stk: 023117 **\$325,000**
- 2014 CASE IH 4430** 120', Lux Cab, Active Susp, HID Lights, AutoBoom, Accuboom, Viper Pro, AIM Pro, 380's & 620's, Power Mirrors, Smartrax Steering stk: 023712 **\$280,000**
- 2014 CASE IH 4430** 120', 380's & 620's, AIM Pro, Active Susp, Viper 4, Raven AutoSteer, AutoBoom, Accuboom, Lux Cab, 262 Omnistar, Crop Dividers stk: 027394 **\$340,000**

- 2011 CASE IH 3330** 100', Deluxe Cab, 650's & 320's, Viper Monitor, AutoBoom, Accuboom, Raven Autosteer, Fenders stk: 033310 **\$155,000**
- 2013 CASE IH 4530 FLOATER** Lux Cab, 810 Applicator, Power Mirrors, Dix Light Pkg, Fenders, Aux Light Pkg, Double 6" Auger, Viper Pro stk: 025205 **\$220,000**
- 2013 CASE IH 4430** 120', Lux Cab, 380's, AIM, Pro 700, Accuguide, Accuboom, AutoBoom, HID Lights stk: 028558 **\$248,900**
- 2011 CASE IH 4420** 120', AIM, Viper 4, 380 Duals, HID Lights, AutoBoom, Accuboom stk: 028816 **\$213,000**
- 2013 NEW HOLLAND SP.365F** 120' Front Boom, 1600 Gal, 380's & 650's, Raven E-Pro, Smartrax, AutoBoom, Accuboom, HID Lights stk: 033089 **\$249,000**
- 2006 APACHE AS1010** 90', 850 Gallon, 380/80-38 Front Tires, 380/90-46 Rear Tires, AutoBoom, Smart Steer, Tridekon Crop Dividers, Shedded stk: 030106 **\$99,000**

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- 2017 CASE IH STEIGER 580 QUADTRAC** Lux Cab, LED Lights, Pro 700, Accuguide, 2 Hyd Pumps, 6 Remotes, PTO, 36" Tracks, Tow Cable stk: 031839 **\$475,000**
- 2018 CASE IH STEIGER 580** IF800 Duals, Twin Flow Hyd, 6 Remotes, Pro 700, Accuguide, Tow Cable, Ballast Pkg, Ext Warranty stk: 030932 **\$505,000**
- 2018 CASE IH STEIGER 370 CVX** 520 Duals, CVT Trans, Lux Cab, HI Cap Hyd Pump, LED Lights, Tow Cable, PTO stk: 030941 **\$385,000**
- 2018 CASE IH STEIGER 620 QUADTRAC** 36" Tracks, Lux Cab, PTO, HI-Cap Twin Pumps, 6 Remotes, Accuguide, Pro 700, HID Lights, Tow Cable stk: 030991 **\$585,000**
- 2017 CASE IH STEIGER 500 QUADTRAC** 36" Tracks, Lux Cab, LED Lights, Twin Pumps, PTO, 6 Remotes, Pro 700 Monitor, Accuguide stk: 031814 **\$489,000**
- 2014 CASE IH STEIGER 620 QUADTRAC** Luxury Cab, PTO, Twin Flow Hyd, 36" Tracks, 6 Remotes, Pro 700, Accuguide, HID Lights stk: 025032 **\$385,000**

- 2014 CASE IH STEIGER 550 QUADTRAC** 30" Tracks, Pro 700, Accuguide, 4 Remotes, 57 GPM Hyd, Tow Cable, HID Lights, Deluxe Cab stk: 024674 **\$310,000**
- 2004 CASE IH STEIGER STX450** 710/70R42 Duals, 16 Spd Powershift, HI-Cap Pump, 4 Remotes, Deluxe Cab, Ezee Steer stk: 032635 **\$149,000**
- 2005 CASE IH STX450 QUADTRAC** 30" Tracks, Powershift, EZ Steer 250 Auto Steer, 6 Remotes stk: 031567 **\$120,000**
- 2015 JOHN DEERE 9620R** IF800 Duals, Full Weights, 6 Remotes, 115 GPM Hyd Pump, Lux Cab, Premium Light Pkg, Tow Cable stk: 032158 **\$410,000**
- 2010 NEW HOLLAND T9050** 800 Firestone Duals, 6-Way 16' Degelman Blade, Auto Steer, 55 GPM Pump stk: 034004 **\$180,000**
- 2011 VERSATILE 435** 800 Duals, 12 Spd Std, Outback Autosteer, 4 Remotes, 50 GPM Hyd stk: 032316 **\$179,000**

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- 2018 CASE IH 7240** 3016 Pickup, Ext Wear Rotor, Long Auger, Fine Cut Chopper, Dual Disc Spreaders stk: 031457 **\$409,000**
- 2017 CASE IH 9240** 3016 PU Head, 620 Duals, Accuguide, Lux Cab w/ Leather, HID Lights, Ext Wear Rotor, Long Auger, Fine Cut Chopper stk: 031845 **\$450,000**
- 2016 CASE IH 9240** 620 Duals, Lux Cab, Magnacut Fine Chopper, 50' Auger, Accuguide, HID Lights stk: 023148 **\$385,000**
- 2014 CASE IH 9230** 3016 Pickup, 620 Duals, Lux Cab, HID Lights, Long Auger, MAV Chopper stk: 029710 **\$319,000**
- 2015 CASE IH 8240** 620 Duals, Accuguide, Ext Wear Rotor, Air Comp, Long Auger, Std Chopper, Lux Cab, HID Lights stk: 029071 **\$403,000**
- 2013 CASE IH 7230** 7520 Duals, Long Auger /w Pivot Spout, Hyd Fold Hopper, Fine Cut Chopper, Accuguide, HID Lights stk: 024148 **\$195,000**

- 2012 CASE IH 9120** 620 Duals, Accuguide, HID Lights, MagnaCut Fine Cut Chopper, Rocktrap, 24' Unload Auger stk: 023485 **\$160,000**
- 2010 CASE IH 8230** 3016 PU Header, 520 Duals, Long Auger, Accuguide Ready, Fine Cut Chopper, Accuguide, Lux Cab stk: 026921 **\$250,000**
- 2009 CASE IH 7120** 2016 PU Header, 900 Singles, EZ Steer, Pro 600, Lux Cab, HID Lights, Small Tube Rotor, 2100 Hrs stk: 025606 **\$105,000**
- 2015 JOHN DEERE S690** 615 PU Header, 650 Duals, Power Fold Cover, HID Lights, Autotrac, Active Terrain stk: 033757 **\$396,000**
- 2011 JOHN DEERE 9870STS** 615 PU Header, 520 Duals, Auto Steer, Premium Cab, Michel Hopper Topper stk: 025918 **\$170,000**
- 2015 NEW HOLLAND CR8.90** 620 Duals, HID Lights, 26' Folding Auger, IV4 Monitor, Autosteer, Pivoting Spout, Fine Cut Chopper stk: 028637 **\$265,000**

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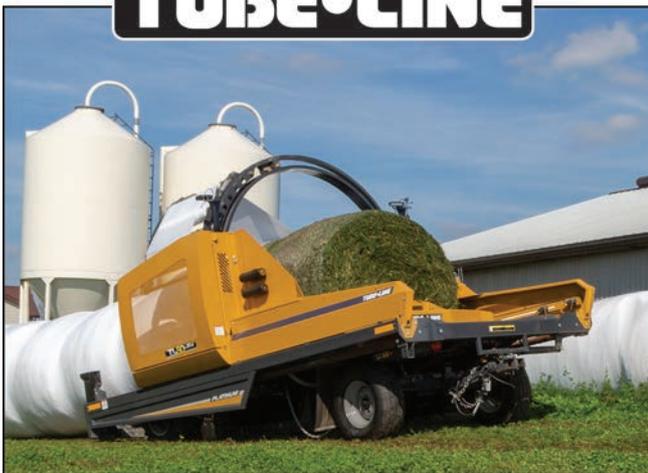
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IS SALARY IMPORTANT?



Of course it is, so how do you accurately and fairly place a value on the roles within your organization?

Salary is just one part of a company's overall compensation package for employees. Access to health benefits, vacation, pensions and savings plans all contribute to the overall investment needed to attract and retain qualified staff.

We all know that it is important to reward people with fair and reasonable compensation in exchange for meaningful work. But what are the competitive market rates? What is the current availability of talent within your community or region? Thankfully there are tools to gauge, assess and evaluate workforce talent, availability and compensation benchmarking.

In our recent findings from the AgCareers.com Canadian Agribusiness HR Review, we found that 48.6 per cent of participating employers commented that having fair and competitive compensation systems is their most concerning human resource matter. Compensation has a direct correlation to employee engagement, employee satisfaction in their roles, as well as the ability for companies to retain qualified and highly performing team members.

Our survey results found that 94.3 per cent of participating employers have conducted salary reviews in the last 12 months. This indicates that many organizations are looking to stay current and relevant, especially in job markets where it is difficult to attract and retain staff. Of the participating organizations, 84 per cent indicated they were conducting annual benchmarking reviews of their compensation program. In 2018-2019, the average salary increase was between 2.1 and 2.5 per cent annually.

Salary increase percentages are generally not the same among all employees within an organization. Many participating employers noted they base salary increases on each individual employee's performance level. As a result, the use of performance reviews and established benchmarks of success are key to rewarding and ultimately motivating employees to do well, but also to be compensated appropriately for a job well done.

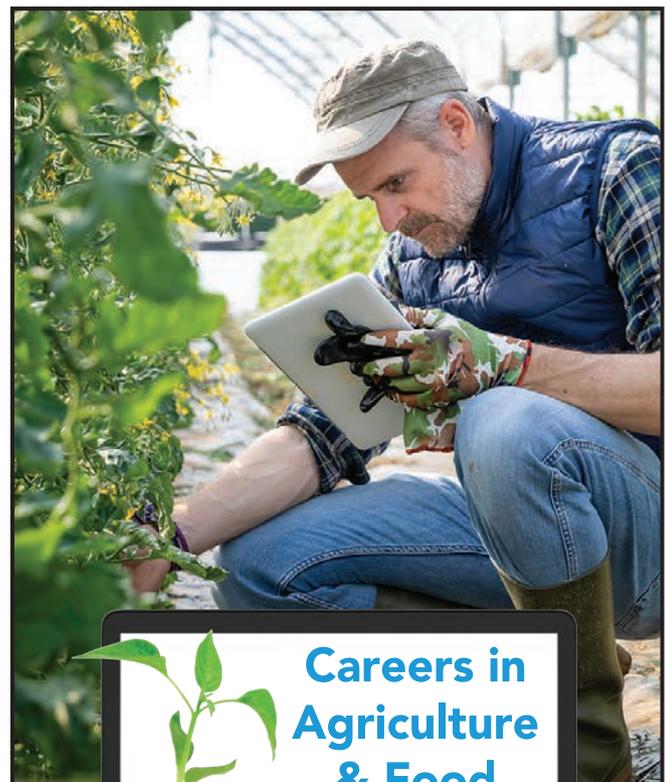
Regional challenges of attracting suitable candidates can occur across geographic areas. Competition or the physical location of an organization can mean that employers need to pay more to attract qualified workers.

Skills continue to adapt and evolve to keep up with the progress of technology in the agricultural sector. Attracting tech-savvy employees can be extremely important for an organization. These highly skilled, well-paid employees will be looking to compare compensation against related automated fields in other industries, not just those in the traditional agricultural sector.

As employers, it is important to remember that we can offer perks such as flexible work arrangements, train-

ing reimbursement and employee well-being events, but offering a competitive salary is essential. And the process of benchmarking salaries provides employers with sound knowledge to use for budgeting and workforce planning.

AgCareers.com is proud to provide advice to the agricultural and agri-food sector to ensure we remain relevant and competitive in attracting and retaining quality employees. For more information, check out the 2019-2020 Canadian Agribusiness HR Review at agcareers.com/reports.cfm. **BF**



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This is an amazing opportunity to provide these very much needed facilities in Centre Wellington, the community I also call home

Grand River Agriculture Society is Growing

The Grand River Agriculture Society (GRAS) is pleased to announce that Katie Giddy is joining their leadership team as Director of Hospitality, Sales and Marketing.

Effective April Katie will be leading the charge in the recently announced \$6 million events and banquet space. The expansion is in addition to the improvements made to the raceway building, which is home to Elements Casino Grand River.

"This is an amazing opportunity to provide these very much needed facilities in Centre Wellington, the community I also call home" says Giddy, former Chief Growth Officer at RLB Chartered Professional Accountants.

As owners of the Grand River Raceway, GRAS is a Not for profit entity who's vision is to be recognized as a leading destination for unique agricultural, environmental, and entertainment experiences.

"Katie's connection to the agriculture industry and local community, coupled with her background in finance and leading organizations through growth, make her an incredible asset to the GRAS team" comments Paul Walker, President.

In addition to overseeing the launch of the new space Katie will be working closely with the Board to execute their revised strategic plan, increasing access to grants and seed funding for innovative ideas in the agriculture and food space, and building stronger more collaborative community relations.

Katie grew up on a dairy farm in the United Kingdom and moved to Centre Wellington 17 years ago. A graduate of the University of Guelph Bachelor of Commerce in Agriculture Business program Katie was one of the first recipients of a Grand River Agriculture Society Scholarship.

Although this is certainly a bittersweet move for Giddy as she leaves behind her colleagues at RLB. As auditors of GRAS for many years both organizations have taken a collaborative approach to her transition.

Bill Koonstra Managing Partner at RLB, shares "Katie's passion and enthusiasm for our people, our business and our community have resulted in incredible success over the past five years. Although we are very sad to see her go we look forward to maintaining a strong working relationship as the vision for GRAS grows."

The new events space will be open to the community June, 2020 offering event and banquet space accommodating up to 300 people, for weddings, community and corporate functions.

For additional details please contact GRAS.

Katie Giddy

GRAND RIVER
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by
**KEITH
FOSTER**

PESKY HARDSHIPS ON THE FRONTIER

As they began their new lives, settlers in Western Canada had to contend with a host of pests.

As farmers started pouring into the Canadian Prairies in the 1880s, these settlers encountered many hardships. These challenges included various pests that made people's lives miserable and, at times, almost unbearable. Yet settlers skilfully found ways to cope.

Bedbugs were the bane of the countryside. Mary Mercer, a young girl living northwest of Moose Jaw, said that her mother used more coal oil trying to control bedbugs than she used in lamps and lanterns.

Robert Cairns, a Saskatchewan homesteader, remembered his family's experience with bug infestations in the spring of 1903. "We organized bedbug hunts – the bugs came out at night and crawled across the ceiling and walls," he said.

"By putting a lighted kerosene lamp under them, they fell into the lamp and were killed. My father also painted all the cracks in the walls and ceiling with kerosene. We got rid of the bugs in one summer."

Settlers often made their first homes out of the most abundant material available – prairie sod. Other creatures, such as mice, sometimes found accommodations there too, setting up their nests in the thick dirt walls.

Richard Day, another Saskatchewan homesteader, related how he solved the problem. "As there was no cats, I brought a couple of garter snakes up from the creek and put them in the sod wall. They cleaned up on the mice," he said.

This solution, however, created a minor problem when a neighbour stayed overnight. "After a hard day on the trail," the neighbour "was tired and soon climbed into the bunk, but got out quicker," Day said.

"Gosh, there is snakes in the bed!" is what the man said."

One might imagine that the neighbour used harsher language



Early Saskatchewan Homes, Saskatchewan History & Folklore Society photo

Thick walls of sod houses provided shelter for farmers, and sometimes for mice and other critters.

than "Gosh."

William Wallace, farming in southern Manitoba in 1881, noted that house flies "are continually going into something and even tumbling into your tea while you are drinking it."

The much larger horse flies were not just a nuisance; they were dangerous. Known as bulldog flies, they were more than half an inch long and were responsible for the deaths of cattle in hot weather.

George Tuxford, homesteading north of Moose Jaw, hated flying ants. Saying they were "far worse" than mosquitoes, he wrote in 1890: "They flew in one continuous line through the air from as far as one could see."

"These little flying insects light on the individual and immediately proceed to crawl all over him, getting inside one's shirt, down one's neck, etc. The slightest movement evidently irritates them and puts them in a fighting mood as they immediately commence to sting, not a sharp painful sting but one that induces an

intense itching, which with me lasted for several days."

Wallace wrote that flying ants "fill the air in clouds and cover you completely." He was in the bush a few miles from home when they suddenly descended on him with a hum. He unfortunately had his shirt neck open, and they quickly covered his back.

He reported "slaying millions with my jacket."

Sandflies were another irritant. Rev. James Morrison, a Presbyterian missionary serving north of Moose Jaw, recorded in his diary: "The bread was all swarming with sandflies. So was the butter and the sugar. I saw it was no good fiddling around, so I just buttered them down if they didn't get out of the way."

That approach was certainly one way to deal with the problem. **BF**

Keith Foster has a keen interest in Saskatchewan history. He holds a master's degree in history from the University of Regina.

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