The Wheat Field
THE NEWSLETTER OF THE SASKATCHEWAN WHEAT DEVELOPMENT COMMISSION
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SaskCrops and APAS make submission to AAFC fertilizer emissions consultation

On August 31, SaskCrops, which includes Sask Wheat, SaskBarley, SaskCanola, SaskFlax, SaskOats, and the Saskatchewan Pulse Growers, in partnership with the Agricultural Producers Association of Saskatchewan (APAS), provided a submission to the Government of Canada's Fertilizer Emissions Reduction Target Consultations.

The submission responded to an Agriculture and AgriFood Canada (AAFC) discussion document which outlined the Government's target of reducing greenhouse gas (GHG) emissions from fertilizer applications on Canadian farmland by 30% below 2020 levels by 2030. The document took particular aim at nitrogen fertilizer, the use of which results in nitrous oxide emissions. According to information in the document, nitrous oxide emissions pose a global warming potential that is 265 to 298 times higher than carbon dioxide emissions over a 100-year period.

The submission by SaskCrops and APAS points out that Saskatchewan farmers were early adopters of technologies such as reduced tillage and continuous cropping that have greatly lowered our emissions compared to other regions of Canada. Saskatchewan farmers, as a group, are unique among the provinces in their low emission intensity coupled with high agricultural intensity. An increasing number of Saskatchewan farmers already follow the 4R fertilizer application principles of right source, right rate, right time, and right place as well as other best management practices (BMPs) to ensure they are using fertilizer efficiently.

Farmers rely on these BMPs to apply nitrogen, often their highest individual input cost, in the most efficient way possible, to maximize their economic returns from production. This economic efficiency has positive benefits for the environment, as the submission to AAFC points out, since farmers do not overuse fertilizer and cause unnecessary GHG emissions. It is crucial to be able to accurately measure and account for the impact of these on-farm practices on emissions reductions to understand current emission levels in different regions of Canada and correctly measure progress.

There is increasing pressure on farmers, as the Government of Canada has stated goals of increasing Canadian agricultural production and exports over the same period as it is targeting on-farm fertilizer emissions reductions. Given the short timeframe to 2030, a major increase in production and exports as well as a 30 percent reduction in fertilizer emissions presents significant challenges and it is improbable to achieve these goals simultaneously.

Our submission emphasized that it is crucial any recommended or incentivized practices are economically, operationally, and environmentally feasible for farmers. Additionally, as we are only eight growing seasons away from 2030, this short time frame will make it challenging for farmers to evaluate BMPs for their farms and possibly make significant capital investments in equipment and technology.

To read the full submission, please go to our website: saskwheat.ca.

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CHAIR'S REPORT

Sask Wheat continues to work to bring clarity and balance to grain contracts

I hope you and your family are well and that you had a bountiful harvest this year. Although it was much better for most than in 2021, some areas still faced challenges, notably in the west-central and southwest, which still met a shortage of rain in the growing season, impacting their yields.

As you read on the front page, Sask Wheat joined our fellow crop commissions and the Agricultural Producers Association of Saskatchewan (APAS) to make a joint submission to Agriculture and Agri-Food Canada's fertilizer emissions reduction target consultations. The federal government's desire to both increase agricultural production and exports and reduce fertilizer emissions presents significant challenges to producers already burdened with high costs for inputs and difficult growing conditions.

It is important to note that the fertilizer emissions reduction target of 30% relative to 2020 levels is a target, rather than a mandate, and should remain that way. Saskatchewan farmers have been, and remain, at the forefront of innovation in agricultural production globally and have long been early adopters of technologies that have significantly lowered emissions compared to other regions of Canada while ensuring high agricultural productivity. And they have done this without any regulations in place.

Sask Wheat believes that all agricultural and environmental policies and targets must be supported by science and verifiable data. The focus must remain on emissions reduction, not nitrogen use reduction, which is a vital input for Canadian field crop production. With the current spotlight on global food security, we need to ensure that we can continue to increase production to meet rising global demand.

Longstanding producer concerns around the balance and transparency of grain contracts intensified during the 2021 growing season when many producers couldn't meet their contractual obligations. This led to resolutions on grain contract terms passing at the Annual General Meetings (AGMs) of Sask Wheat and several other crop commissions last January, prompting the commissions and APAS to hire Mercantile Consulting Venture Inc. to complete a review of the current state of grain contracts in Saskatchewan. The review was released by the commissions under the SaskCrops banner, together with APAS, in July.

The report concludes that contracts, as they are currently structured, heavily favour the interests of grain buyers. We are hopeful that farmers and grain buyers can work collaboratively to make improvements, ensuring that contract terms are clearly defined, transparent and fair. Important areas to address include the responsibilities of sellers and buyers if contracts cannot be fulfilled, and the specification and calculation of related costs, including timelines. Contract terms should not reallocate handling, transportation, or market risks to farmers that other value chain sectors should bear.

We strongly believe there is an opportunity for farmers and grain buyers to work together to improve the clarity and balance of contract terms and conditions, and to prevent regulatory intervention. We believe a clear, balanced approach is desirable and beneficial for the industry. Improvements to grain contracts remain a top priority for our organizations and we are committed to continuing work on this issue on behalf of Saskatchewan farmers.

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EXECUTIVE DIRECTOR'S REPORT

Railway performance an ongoing concern for Saskatchewan farmers

The 2022 growing season presented several challenges for farmers - delayed seeding in the eastern half of the province due to excessive moisture, recurring drought conditions and gopher and grasshopper infestations, especially in the southwest and west central areas, and a variety of hail and rain events. Harvest progressed quickly in the drier areas, essentially finishing by the end of September. Average durum and spring wheat yields there were well-below average and, because of the dominance of these areas in durum production, the provincial average durum yield is also below average. Some spring wheat still remained unharvested in early October in the northern and eastern areas of the province. Spring wheat yields in these areas and the northwest will be above the five-year provincial average. Regional, and in cases, farm-by-farm variability seems to be a defining characteristic of the year.

Record wheat prices over the last winter and spring were only captured to a limited extent by producers because of 2021's generally disastrous yields compounded by low on-farm carry-over from 2020 and forward contracting at lower prices earlier in the year. The 2021/2022 grain marketing year ended with Canadian exports of wheat and durum down significantly from the previous year. Wheat exports (excluding durum) reached 11.5 million metric tonnes (MMT), down 41% from the previous year. Durum exports reached 2.6 million metric tonnes (MMT), down 57% from the previous year. Even with producer deliveries and exports down significantly, both railways struggled to fulfill orders, especially during the winter months.

Export supplies of Prairie crops look to be ample this year, raising renewed concerns about upcoming railway performance. It is not only wheat that has to be moved to port. The railroads' own annual and winter Grain Plans already have indicated that meeting all demand for rail space, especially to the West Coast this fall and winter, will be challenging given both the increased supply of grain and the potential for poor winter conditions negatively impacting rail movement. In the first few weeks of the new crop year, both railways struggled to fulfill car order demands across the Prairies. Recently Sask Wheat, as a member of the Ag Transport Coalition (ATC), provided its logo in support of the Pulse Canada-led "Canada's Ready" campaign. This campaign highlights that Canadian farmers, processors, and exporters are ready to step up to support global food security and outlines what is needed from grain handlers and the transportation system to ensure we can meet that demand.

Globally, wheat production for the 2022-23 crop year is expected to exceed the five-year average, with large crops forecast in Canada, Russia, China, and Australia offsetting expected lower production in Ukraine. Prices remain historically high, but strong competition is expected in the global wheat market as exports also are projected to be ahead of the five-year average. However, there is continuing uncertainty as to the actual amount of global exportable wheat that will be available and the ability to export it, especially regarding the Black Sea region.

In July, federal, provincial, and territorial agriculture ministers met in Saskatoon to discuss the details of the Next Policy Framework for agriculture. The Ministers reached an agreement in principle on a new five-year agreement, named the Sustainable Canadian Agricultural Partnership (SCAP), which will take effect in the spring of 2023, focusing on the priority areas of tackling climate change; furthering investments in science, research, and innovation; building sector capacity to ensure global competitiveness; and enhancing resiliency through improved business risk management (BRM) programs. Sask Wheat, along with other Saskatchewan crop commissions, has raised concerns with the Federal government about the potential incorporation of environmental objectives into BRMs rather than addressing these objectives with adequate new programming and funding.

The next AgriScience Cluster program will also be delivered through SCAP. Sask Wheat, through the Canadian Wheat Research Coalition (CWRC), is actively participating in ensuring the ongoing funding of wheat research efforts through this programming. For the first time since the creation of the program, research projects under the Cluster program must meet minimum thematic requirements set by government.

While we recognize that government can and should provide a framework for Cluster activities, rigid minimums on particular research topics and activities are counter to the stated intent and focus of the program. The impact on the program will be one of insufficient funding to cover all priority areas which will further dilute the program and industry funds available.

Sask Wheat has input into the CFIA-led Seed Regulatory Modernization process through the Common Seed and Variety Registration Task Teams which provide initial recommendations on potential options for regulatory change. At some point in the future, the CFIA will consult a broad range of stakeholders regarding any proposed amendments to Canada's Seed Program and Regulations.

Investing in science, research, and innovation and advocating on behalf of Saskatchewan wheat producers continues to be the focus of Sask Wheat to ensure that wheat is a highly profitable and sustainable crop.

Blair Goldade, Executive Director

Inaugural year for Sask Wheat "On Farm Trials"

By: Carmen Prang, Agronomy Extension Specialist

Sask Wheat is very excited to wrap up the inaugural year of our "On Farm Trial" program.

Thank you to the producers and their agronomists who took the time to participate in the trial program this year.

Through the "On Farm Trial" program, we hope to build a network of on-farm research which is led and used by producers. This will allow producers to fine-tune recommendations for their specific farm conditions and assist with future management decision.

This year's protocol was "Evaluation of Spring Wheat Seeding Rates." Ideal seeding rates can vary and are dependent on many factors including management, variety, and environment. The goal of this protocol was to fine-tune generalized seeding rate recommendations under the producer's environment and management practices to maximize yield, quality, and economic return. Producers tested a low, medium, and high seeding rate which was based on a desired plant population of 20, 25, and 30 plants per sq ft . Currently, the Saskatchewan Ministry of Agriculture recommends a target plant population for CWRS varieties of 20 to 25 plants per sq ft (Government of Saskatchewan).

To determine seeding rate based on a desired plant population, thousand kernel weight (TKW) of the seed lot must be considered as seed size can vary. Seed mortality, which is the percent of viable seed that germinates but does not produce a plant, also needs to be considered. In cereals, this can range from 5-20%, but will vary depending on moisture, temperature, seeding depth, etc. Higher seeding rates tend to have higher seedling mortality rates.

An example of how to calculate seeding rates based on plant population using the formula from the 2018 article from Alberta Agriculture "Using 1,000 Kernel Weight for Calculating Seeding Rates and Harvest Losses" is below.

$$\text{Seeding Rate (lb/ac)} = \frac{\text{(target plant stand/ft}^2\text{) x (TKW (grams))}}{\text{(Seedling survival rate*) / 10.4}}$$

Target plant stand = 25 plans/ft^2 TKW = 35 g
Germination = 99%
Assumed seedling mortality = 10%

Seedling survival rate:
(germination-mortality) (0.99 - 0.10) = 0.89

$$\text{Seeding rate (lbs/ac)} = \frac{25/\text{ft2} \times 35\ \text{g}}{(0.89) / 10.4}$$

= 94.5 lb/ac

Increasing seeding rates can result in higher plant populations and increased yield due to more heads and fewer tillers. It can also mean a more even uniformity and faster maturity for ease of fungicide timing and harvest. Higher seeding rates have also been used as another tool for weed management. On the other hand, too high of a seeding rate will no longer result in significant yield gain or make economic sense as seen in the chart from Alberta Agriculture and Forestry.

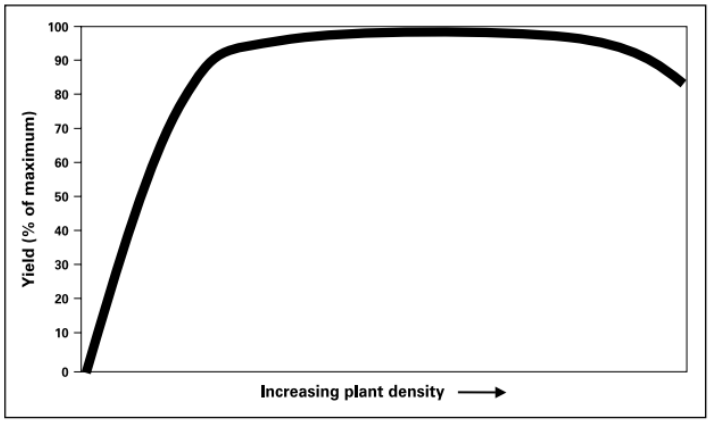

Figure 1. The crop yield and plant density relationship normally follows a pattern

This year there were four trials, one each at Indian Head, Davidson, Cut Knife, and Tisdale. These farm-scale trials were set up to be replicated and randomized in a Randomized Complete Block Design. Setting the trials up this way can help account for variability in the experiment.

Once the plants had emerged, plant counts were conducted to determine the emergence percentage. Ideally, these counts are conducted after 21 days to avoid missing plants that have not emerged yet or trying to count plants in advanced growth stages with multiple tillers. Ground truthing through plant counts can help you determine if you hit your target plant population. Disease, soil moisture, fertilizer injury, residue levels, and seeding depth can all impact emergence.

Throughout the growing season, each treatment was managed identically. This includes seeding date, seed treatment, fertility and herbicide/fungicide. The producers sent updates throughout the season and notes were taken as to whether there were any differences that could be seen between the treatments.

At harvest, yield data was collected and a composite sample from each treatment was collected for quality analysis. The yield and quality data was analyzed to determine if there is a statistical difference between treatments.

Trial participants and their agronomists met with Sask Wheat to discuss the trial results. The trial results will be published on our website: saskwheat.ca.

If you have any questions about our "On Farm Trials" or are interested in participating in the program next year, please reach out to Carmen Prang at carmen.prang@saskwheat.ca.

Tracking stripe rust in Canada: identifying virulence patterns and resistance genes to defend against it

By: Michelle Boulton

Project Title: An efficient system to identify virulence patterns of stripe rust in Canada

Lead Researcher: Dr. Reem Aboukhaddour

Organization: Agriculture and Agri-Food Canada

Sask Wheat Funding Amount: $67,650

Funding Partners: Alberta Wheat Commission

Stripe rust emerged as a significant threat to wheat production in Canada around 2000 and quickly became one of the most destructive wheat diseases.

The most efficient, durable, and environmentally friendly way to defend against stripe rust is to grow resistant varieties. Unfortunately, rust changes in virulence quickly, so wheat pathologists and breeders are constantly trying to find and integrate effective resistance genes (Yr genes) that the pathogen has not yet defeated.

Dr. Reem Aboukhaddour, a research scientist and cereal pathologist at Agriculture and Agri-Food Canada's Lethbridge Research and Development Centre, compares the evolution of rust to antibiotic resistance in bacteria.

"That is the difficulty with rust. It's one of those pathogens that evolve virulence to defeat resistance very fast," she says. "Whatever we grow, the pathogen will eventually develop a way to defeat it."

That effort is at the heart of her research. When she came to Lethbridge, she found a large collection of stripe rust isolates (over 140) originating from across Canada between 1984 and 2017. The isolates were stored in liquid nitrogen, so she and her team recovered and tested their abilities to defeat known stripe rust resistance genes.

"I thought this collection of isolates was invaluable because they were collected by Canadian researchers over the past 30 years, and their virulence was never tested against the differential wheat cultivars used by stripe rust labs around the world," she says. "This collection we are maintaining and building on is a priceless resource for the scientific community."

Through her research, she identified three periods in Canada: 1984 to 1999, 2000 to 2009, and 2010 to 2017. Over those 33 years, Aboukhaddour and team discovered that stripe rust races in Canada had expanded their ability to defeat at least 13 of 18 tested resistance genes.

"Before 2000, the majority of resistance genes were not yet defeated," she says. "Between 2000 and 2009, five additional genes were defeated by most of the isolates from that time. By 2017, you have only a few resistance genes that remain undefeated, and those that do remain are not yet integrated into commercial wheat cultivars."

Aboukhaddour and her team also uncovered geographical differences within this timeline. Before 2010, she says only 31% of isolates were identical to races in the US, and the rest were unique to Canada. After 2010, 64% matched races present in the US. She says it's likely the virulent races that invaded North America around 2000 are now predominant over both the US and Canada.

Stripe rust spores are very small and can travel long distances on the wind. "The stripe rust races in the west were different from those in the east, which tells us that there are two different populations arriving in Canada on two different wind currents," says Aboukhaddour.

She says stripe rust populations in Western Canada are most likely to travel on wind currents from the Pacific Northwest, while populations in Eastern Canada come from the South Central and Midwest regions of the US. However, Canada still has unique rust races occurring at low frequencies, which Aboukhaddour says supports the hypothesis that mutations continue to occur at a local level.

"In Canada, we generally based all of our observation in terms of stripe rust on what the US was doing because they defined stripe rust as a problem in the 1950s and they have been screening for it since then. We usually assumed that, whatever they have, we have."

Given the geographical differences and the different wheat cultivars we grow, Aboukhaddour says the pathogen in Canada can adapt to our local environments. "I thought we needed a Canadian perspective because we have different cultivars," she explains. "They grow a lot of winter wheat in the US, whereas we grow more spring wheat. And our wheat does not necessarily share the same genetic background as in the US."

To define sources of resistance in Canadian wheat cultivars to the most virulent stripe rust races, Aboukhaddour and her team tested 100 of the most common wheat cultivars grown in Canada since the late 1880s.

"We found about 10% of these cultivars to be resistant," she says. "Some of the cultivars that were resistant at the adult stage were susceptible at the seedling stage. More work is needed with breeders and geneticists to comprehend the reasons for these results."

While only about 10% of the Canadian cultivars she tested remain resistant to contemporary stripe rust at the seedling stage, Aboukhaddour points out that, "a defeated gene won't always stay defeated. The Yr 1 resistance gene, for example, was a gene that was defeated in earlier years, but the rust population now doesn't need to defeat it."

Given the constant evolution of both stripe rust pathogens and the resistance genes used to combat them, Aboukhaddour says, "this project is an ongoing process."

Can sourdough fermentation improve wheat tolerance and restore consumer confidence in the wholesomeness of wheat?

By: Michelle Boulton

Project Title: Fermentation technologies for improved nutritional quality and digestibility of wheat products

Lead Researcher: Dr. Michael Gänzle

Organization: University of Alberta

Sask Wheat Funding Amount: $57,250

Funding Partners: Alberta Wheat Commission

Once a ubiquitous staple in every pantry, wheat has developed a bad reputation among a certain segment of the North American population. According to the United States Department of Agriculture (USDA), consumption of wheat products has been dropping in the US since 2000, and the Canadian market appears to be trending in the same direction.

This growing aversion to wheat is partly attributable to increased awareness of celiac disease and non-celiac wheat intolerance. Dr. Michael Gänzle, a professor at the University of Alberta and a Canada Research Chair in Food Microbiology and Probiotics, says only about 1% of North Americans have celiac disease. Still, another 10% to 12% have non-celiac wheat intolerance.

Precisely what causes non-celiac wheat intolerance, or "gluten sensitivity," and how that sensitivity might be overcome was not well understood. "I knew very well what the difficulty was to degrade gluten in wheat, gluten being the causative agent for celiac disease. But the triggers for non-celiac wheat intolerance were mysterious," explains Gänzle. He wondered if sourdough fermentation could improve wheat tolerance.

"There was a lot of anecdotal evidence that sourdough bread is tolerated by consumers with non-celiac wheat or gluten intolerance, but the science was not available to back up these claims," he explains. So, Gänzle set out to determine if fermentation could reduce or eliminate wheat components that are known or suspected to cause problems for people with non-celiac wheat intolerance:

- fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs)
- immune reactive proteins in wheat, including amylase-trypsin inhibitors (ATIs)
- wheat germ agglutinins (WGAs)

"Fermentation of bread with lactic acid bacteria, or sourdough fermentation, has become a major tool for bread production in Europe," says Gänzle. He predicts it will also increase in North America in the next five years.

There are a couple of practical reasons for this trend. "First, use of sourdough can reduce the need for additives," explains Gänzle. "Second, sourdough fermentation can be very cheap. All you need is water and flour to make your functional ingredient."

He also offers a third, more personal reason why interest in sourdough is increasing. "Sourdough bread usually smells better, tastes better. . . It's just better bread," he says.

Gänzle's research has demonstrated that sourdough fermentation reduces fructans, the major FODMAP in wheat, during bread-making, which appears to improve the tolerance of wheat bread even by sensitive individuals.

"This is probably best illustrated by the amount of bread a person who is sensitive can eat," he says. "For a straight dough bread, we calculated that half a slice of this bread can lead to adverse symptoms in a sensitive individual. For sourdough, we calculated this as two slices of bread, which means one sandwich. If we used a lactobacilli specifically selected for fructan degradation, we calculated an amount of at least four slices of bread. Typically, few people will eat more than four slices."

The conclusions are less clear for his efforts to use sourdough fermentation to decrease the level of immune-active proteins (amylase-trypsin inhibitors, or ATIs) and the wheat germ agglutinins. "Whether or not sourdough does anything to ATI-mediated intolerance is unknown. But whether or not the ATIs directly contribute to wheat intolerance is also not very solidly proven," he says.

While he concedes that more research needs to be done, he's confident "we are moving in a direction that explains why some individuals have a non-celiac wheat intolerance. And we know that we can, at least partially, alter the process by fermentation to increase wheat tolerance."

He hopes the results of his research will "contribute to wheat reclaiming its reputation as a health beneficial part of the diet, particularly whole wheat, and not something that should be avoided."

He is part of the scientific advisory council for a new initiative to improve the perception of wheat among dieticians. What About Wheat? is a website developed by the Canadian Wheat Nutrition Initiative (CWNI), a group of grower associations (including Sask Wheat) and millers across Canada.

"When they asked whether or not dieticians perceive wheat as something that is health beneficial or health adverse, they got a bit of a mixed message," he says. "Anytime you mention whole wheat and fibre, you get a positive perception. Anytime you say refined wheat flour or gluten, you get a negative perception. Fermentation is one of the ways we can shift it a little bit toward a more positive perception."

Attend the 2023 Sask Wheat Annual General Meeting

The Sask Wheat AGM will be on Monday, January 9, 2023 from 10 am to 11:30 am in Hall A at Prairieland Park in Saskatoon, Saskatchewan during the Crop Production Show.

Producers and observers may register to attend in person or online. Registered wheat producers, who are producers who have paid a check-off to Sask Wheat in the previous two crop years (August 1, 2020, to July 31, 2022) and have not requested a refund in the previous crop year, are eligible to vote on motions and introduce and second resolutions. Voting will be available for those attending online and in person.

Farmers and industry representatives from private and government organizations may attend any AGM as observers.

To register for the Sask Wheat and other Saskatchewan crop commission AGMs, please go to saskcrops.com.

Welcome to our new Policy Analyst

Sask Wheat welcomed our newest staff member, **Aiden Sanden**, who joined us as a Policy Analyst in August.

Aiden grew up on a fifth-generation mixed grain and cattle farm near Craik, Saskatchewan. In 2019, he graduated with a B.Sc. in Agribusiness from the University of Saskatchewan.

Currently, Aiden is completing his M.Sc. in Agricultural Economics at the University of Saskatchewan, focusing on wheat yield gaps. He has multiple years of industry experience through summer employment in sales, and integrated solutions support roles across Saskatchewan. Additionally, he remains actively involved on the family farm.

Chair's Report *continued from page 2*

Following the positive feedback received from last winter's online consultation on a potential Sask Wheat – Saskatchewan Winter Cereals Development Commission amalgamation, we will be seeking further producer opinion on the full amalgamation proposal. The proposal will then be discussed at our respective AGMs in January. As a levy-paying producer, your voice is important, and we want to hear from you. Details on how to participate are available on our website: saskwheat.ca.

I hope you can attend our AGM in person or online on Monday, January 9, 2023, from 10:00 to 11:30 am. For those who can attend in person, we will hold the AGMs for the Saskatchewan crop commissions in Hall A at Prairieland Park in Saskatoon. Details on how to register are available on page four of the newsletter. I encourage every producer who has paid a levy to Sask Wheat in the last two years and has not received a refund to register and exercise their votes. Your involvement is essential to our organization and industry.

As always, please contact me, one of my fellow directors, or the Sask Wheat office if you have any questions or concerns. We are always happy to talk to you.

Brett Halstead, Chair

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