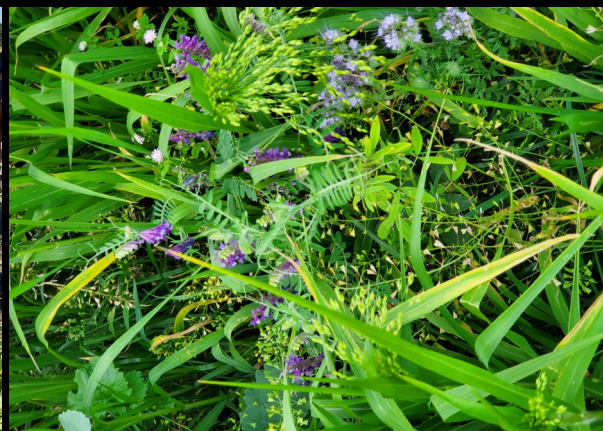


# 2022 ANNUAL REPORT

## LAKELAND AGRICULTURAL RESEARCH ASSOCIATION





# Lakeland Agricultural Research Association

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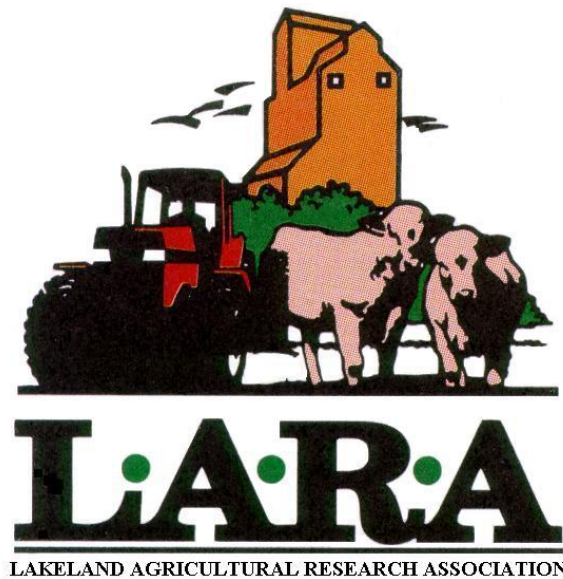
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## **Vision Statement:**

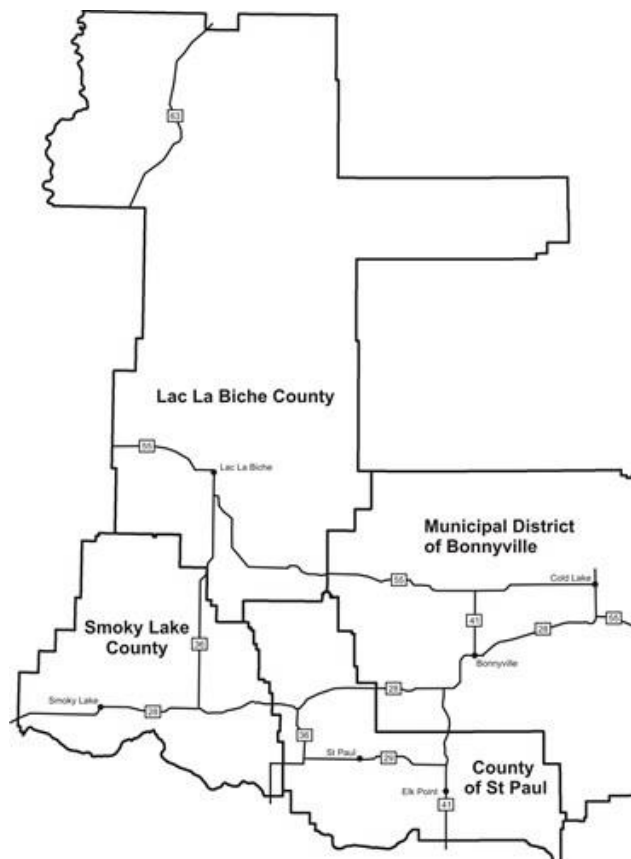
To be a leader in applied research and extension in Alberta

## **Mission Statement:**

Lakeland Agricultural Research Association conducts innovative, unbiased, applied research and extension, supporting sustainable agriculture

## **What is the Lakeland Agricultural Research Association?**

Lakeland Agricultural Research Association (LARA) is a producer-run organization conducting leading edge applied agricultural research and extension in Northeastern Alberta. Our aspiration is to make Alberta's agricultural producers profitable and sustainable through applied research, demonstration and extension in the areas of forages, livestock, annual crops, specialty crops, environmental conservation and regenerative agriculture.



**LARA is located ½ mile west of Fort Kent, Alberta on Township Road 615.**

**LARA is open Monday to Friday, 8:00 am to 4:30 pm**

# Table of Contents

Message from the Chair.....	v
Forage and Livestock Program Report .....	vi
Cropping Program Report .....	vii
Environmental Program Report .....	viii
2022 Board of Directors.....	ix
2022 Staff .....	ix
Acknowledgements .....	x
Lakeland Agricultural Research Association Projects and Activities – 2022 .....	xi
A Short Explanation of Various Statistical Terms Used in this Report .....	xii
Smoky Lake County Agricultural Service Board 2022 Overview .....	xiii
M.D. of Bonnyville 2022 – A Year in Review .....	xiv
Lac La Biche County Agriculture Review 2022 .....	xvi
County of St. Paul Agricultural Service Board 2022 .....	xvii
<b><i>Cropping Program .....</i></b>	<b><i>1</i></b>
<b>Regional Variety Trials.....</b>	<b>2</b>
Canada Western Red Spring (CWRS) Wheat at Fort Kent.....	4
Canadian Prairie Spring Red (CPSR) Wheat RVT at Fort Kent .....	4
Barley at Fort Kent .....	6
Barley at St. Paul .....	7
Triticale at Fort Kent .....	7
<b>Impact of Varying Rates of Environmentally Smart Nitrogen (ESN) on the Performance of Spring Wheat and Spring Barley in Northeastern Alberta .....</b>	<b>13</b>
<b>Impact of Soil pH &gt; 7.2 on Crop Yields (Wheat, Yellow Peas and Canola) .....</b>	<b>16</b>
<b>Hemp Demonstration .....</b>	<b>20</b>
<b>Pest Surveys.....</b>	<b>21</b>
Bertha Armyworm: .....	22
Diamondback Moth: .....	22
Orange Blossom Wheat Midge: .....	23
Pea Leaf Weevil:.....	24
<b><i>Forage and Livestock Program.....</i></b>	<b><i>26</i></b>
<b>Lakeland Forage Association.....</b>	<b>28</b>
<b>Northern Range Enhancement Project .....</b>	<b>29</b>
<b>Regional Annual Silage Trials .....</b>	<b>33</b>
Cereals .....	34

Winter/Spring Cereal Intercrop .....	42
Pulse Mixtures .....	45
Alternative Crops .....	50
<b>Longevity of Perennial Forage Varieties and Mixes Evaluation Trial .....</b>	<b>55</b>
<b>Evaluation of Perennial Forage Mixtures for Hay or Pasture .....</b>	<b>64</b>
<b>Evaluation of Early Seeded Winter Cereals as a Drought Mitigation Strategy.....</b>	<b>71</b>
<b>Long-Term Impact on Soil Biological, Physical and Chemical Health of Four Extended Grazing Strategies in Northeastern Alberta.....</b>	<b>75</b>
<b>Forage Crop Guidelines and Forage Analysis Summary .....</b>	<b>78</b>
<b>LARA Feed Testing Program and Price List .....</b>	<b>79</b>
<b>Rancher Researcher Project .....</b>	<b>80</b>
<b><i>Environment and Regenerative Agriculture .....</i></b>	<b><i>82</i></b>
<b>Impact of Stem Mining Weevil (<i>Hadropontus litura</i>) population density on Canada Thistle Suppression .....</b>	<b>83</b>
<b>Demonstration Solar Watering System .....</b>	<b>84</b>
<b>LARA Watershed Resiliency and Restoration Program .....</b>	<b>84</b>
<b>Environmental Farm Plans .....</b>	<b>85</b>
The EFP Process .....	85
<b>Riparian Health Assessments .....</b>	<b>86</b>
<b>Alberta Soil Health Benchmark Monitoring Project.....</b>	<b>87</b>
<b><i>Extension .....</i></b>	<b><i>90</i></b>
<b>2022 Lakeland Agricultural Research Association Extension Activities.....</b>	<b>91</b>
<b><i>Horticulture Program.....</i></b>	<b><i>96</i></b>
<b>LARA Garden.....</b>	<b>97</b>
<b><i>Appendices .....</i></b>	<b><i>101</i></b>
<b>Definition of Common Feed Nutrient Terms.....</b>	<b>102</b>
<b>Forages and Cattle Nutrient Requirements.....</b>	<b>103</b>

## **Message from the Chair**

Another year has come and gone. Looking back on 2022, overall it was a much better year than we have had to deal with over the past few years.

The weather was fairly normal. Hay crops were good, the haying weather cooperated and we saw lots of beautiful hay bales being made.

The cereal crops and canola crops were also good. And talk about a beautiful long fall! People were able to get all their fall work done which was certainly a pleasant change. Instead of having to look for stuff under the snow, we were looking for more little jobs to do before winter set in.

It was good to see cattle prices going up instead of the other way and it is nice to see prices for our product going in the right direction.

We saw some ups and downs and bumps in the road here at LARA and I want to thank the board of directors for keeping LARA on track. You truly are a good bunch of people to work with!

We also welcomed Megan Wanchuk to our staff in the Forage and Livestock division.

As you can see in the Annual Report, the work and accomplishments of LARA are pretty impressive. Our research and data are solid and people are using it to make decisions on their operations. Thank you to the LARA staff for all that you do.

And last but not least, a huge thank you goes out to Lac La Biche County, Smoky Lake County, the MD of Bonnyville and the County of St. Paul. We appreciate your support as it enables us to keep serving the farmers and ranchers in each of these Municipalities.

Wanda Austin

## **Forage and Livestock Program Report**

2022 was my first year with LARA, and what a year it has been! Amongst some challenges, there were many successes in 2022. The Forage and Livestock program had several trials in the final year of data collection and some new one-year projects. We also hosted several workshops and webinars throughout the year, including CowByte\$ with Barry Yaremicio and a perennial forage webinar series with Grant Lastiwka and Dr. Kevin Sedivec.

This year came with its fair share of challenges. Mother nature was one of those, with a very dry April and May, to much needed precipitation in June and early July, to a dry late summer and fall. While the lack of moisture in the fall made for good harvest weather, it created some challenges for hay and pasture production.

On the research side, all trials in the Forge and Livestock program were able to be successfully harvested. We completed the final year of the perennial forage longevity and forage mixture trials, the regional silage mixtures and alternatives trial, and the winter grazing project assessing the impact of four winter grazing strategies on long-term soil health. This year, we also had a new project examining early spring seeded winter cereals for forage production. The regional silage cereal trials continue to be a major project for our Forage and Livestock Program as we grew over 40 varieties of barley, wheat, triticale, and oats. LARA will continue with the regional silage cereal trials but in a new form for 2023.

Thank you to everyone who participated in our summer field days, extension events and webinars at LARA this past year. A huge thank you goes out to the producer that helped support LARA in any way. It is an honour to be involved in an organization that has such a great group of producers supporting them. I would also like to thank the hard-working, dedicated full-time staff, summer staff, and board of directors who have worked countless hours to make 2022 a success.

Here's to a great 2023!

Megan Wanchuk

## **Cropping Program Report**

The end of 2022 marks the completion of my third year as the Cropping Program Manager of LARA. Over the course of three years, I have been able to create and conduct agricultural research trials that benefits not only our local producers but also producers across the entire Northeast region.

The last three years have been interesting as we have seen one extreme to another. In 2020 we had a growing season of extreme moisture which caused flooded fields and unharvested crops, to an extremely dry year in 2021 which caused poor emergence, early maturity in crops and extremely low yields. 2022 was definitely an upgrade in environmental conditions compared to the previous two years. What started off as a fairly dry spring, showed promise as we had precipitation in June and July helping crops produce see increased yields.

Some of the highlights from 2022 research trials were our Evaluation of the interaction between seed size and seeding depth on canola establishment and yield. This trial did extremely well in the conditions seen in this year and producer quality data. Another highlight was the wheat staging demonstration that was conducted at our Fort Kent site. This demonstration along side with Sheri Strydhorst gave producers a hands-on demonstration of staging cereals for fungicide application.

I want to say a huge thank you to everyone who participated in our research and extension programs at LARA in 2022. Our producers and board of directors who are fantastic to work with throughout the year we greatly appreciate your input and support. Our exceptional staff here at LARA and summer students, your hard work and dedication truly does not go unnoticed. I am looking forward to another successful year in 2023.

Sincerely,

Amanda Mathiot

## Environmental Program Report

This past year it was great to get back into the swing of things with many workshops, webinars and field days again. In 2022, we hosted 34 events! It was great to see each other in person again. We had some spectacular speakers this year including Jimmy Emmons, Nicole Masters and Elaine Froese.

This was the last year of many of our Canadian Agricultural Partnerships funded projects, which included the soil health education series and cover crop demo. It was a busy year wrapping up projects, but I really appreciated the engagement and chance to share these projects and programs with Lakeland producers.

I was excited to start a microbial source tracking project on Moose Lake, that helped identify where fecal coliforms were sourced, either from humans, ruminants or avian. Tributary monitoring was also completed to have a better understanding of nutrient movement throughout the watershed.

Funding programs have become highly favorable for producers and there was an increase in those that completed Environmental Farm Plans. Along with applying for projects to be funded under Canadian Agricultural Partnerships, On-Farm Climate Action Fund and to prepare for the 2023 release of the Sustainable Canadian Agricultural Partnerships program.

This was a tough year with the rains stopping in June, and water quality and pasture conditions became a concern. This year we did complete the Farming in Extreme Conditions in Northeastern Alberta that is a great source of information on whole farm management to increase farm resiliency.

I want to thank those who have attended our webinars and workshops, and those that have shown interest in environmental stewardship.

Cheers to a great 2023!

*Kellie Nichiporik* MWS P.Ag.

## 2022 Board of Directors

<b>Chair:</b>	Wanda Austin
<b>St. Paul County Rep:</b>	Kevin Wirsta Louis Dechaine (alternate)
<b>Lac La Biche County Rep:</b>	Sterling Johnson Colette Borgun (alternate)
<b>MD of Bonnyville Rep:</b>	Don Slipchuk Josh Crick (alternate)
<b>Smoky Lake County Rep:</b>	Danny Gawalko Linda Fenerty (alternate)
<b>Producer Reps:</b>	Murray Scott – MD of Bonnyville Nick Kunec – MD of Bonnyville Phil Amyotte – County of St. Paul Patrick Elsen – County of St. Paul Wanda Austin – Lac La Biche County Laurier Bourassa – Lac La Biche County Charlie Leskiw – County of Smoky Lake Barb Shapka – County of Smoky Lake
<b>Lakeland Forage Association Rep:</b>	Jay Cory - Chairman, LFA

## 2022 Staff

<b>Executive Director:</b>	Alyssa Krawchuk
<b>Forage and Livestock Program Manager:</b>	Megan Wanchuk
<b>Cropping Program Manager:</b>	Amanda Mathiot
<b>Environmental Program Manager:</b>	Kellie Nichiporik
<b>Agronomy Technician:</b>	Stephanie Bilodeau
<b>Administration/Horticulture:</b>	Charlene Rachynski
<b>Full Time Staff:</b>	Vic Sadlowski
<b>Summer Staff</b>	Brooke Dechaine Katie Diamond Shae Worthington Hailey Lobe
<b>LFA Pasture Managers:</b>	Bob and Wanda Austin

## **Acknowledgements**

The success of LARA's programs is a testament to the support and partnerships we have with a number of organizations and individuals within our operational area. LARA would like to thank the following contributors and partners in making 2022 another successful year.

**Alberta Agriculture and Forestry (AF)  
Canadian Agricultural Partnership (CAP)  
Agriculture and Agri-Food Canada (AAFC)  
Alberta Environment and Parks (AEP)**

### **Municipalities & Counties**

MD of Bonnyville  
County of St. Paul  
Lac La Biche County  
Smoky Lake County

### **Associations & Societies**

Farming Smarter  
SARDA Ag Research  
West Central Forage Association  
Peace County Beef and Forage Association  
FarmRite  
North Peace Applied Research Association  
McKenzie Applied Research Association  
Gateway Research Organization  
Battle River Research Group  
Foothills Forage and Grazing Association  
Chinook Applied Research Association  
Grey Wooded Forage Association  
Craigend Agriculture Society  
Alberta Lake Management Society  
Moose Lake Watershed Society  
Organic Alberta  
Canadian Mental Health Association  
Food Water Wellness Foundation  
Do More Ag

### **Producers**

Philip Amyotte  
Kotowich Evergreen Farms  
Mary & Michael Carson  
Luc Tellier  
Sand Springs Ranch

### **Industry and Producer Commissions**

Results Driven Agriculture Research  
Alberta Beef Producers  
Alberta Pulse Growers Commission  
Alberta Wheat Commission  
Alberta Barley Commission  
Alberta Canola Producers Commission  
Canola Council of Canada  
Alberta Beekeepers Commission

### **Agri-Businesses & Collaborators**

AFSC Insurance  
St. Paul Municipal Seed Cleaning Plant  
Canadian Seed Growers Association  
Imperial Seed  
Axiom Agronomy  
Innotech Alberta  
FP Genetics  
Nutrien Ag Solutions  
SeCan  
Canterra Seeds  
Alliance Seed  
Cover Crops Canada  
Bonnyville Municipal Seed Cleaning Plant  
Association of AB Seed Cleaning Plants  
Top Gro Agro Ltd.  
A & L Canada Laboratories  
Yaremicio Ag Consulting  
Mastin Seeds  
Proven Seeds  
Solick Seeds Ltd  
SeedNet Inc  
Fabian Seed Farms  
Riddell Seeds Co  
Canadian Rockies Hemp Corporation  
Lakeland College

**And the many, many other suppliers and producers who gave us a great deal of assistance!**

## Lakeland Agricultural Research Association Projects and Activities – 2022

### Research and Demonstration Projects

#### *Cropping Program*

##### Regional Variety Trials – Cereals

- CWRS Wheat
- CPRS Wheat
- Oats
- Triticale
- Barley

##### Regional Variety Trials – Pulses

- Green Field Peas
- Yellow Field Peas
- Faba Beans

##### Use of ESN in Spring Cereals

- Wheat and Barley

##### Canola Seed Size vs. depth

##### Liming and Crop Rotations

##### Pest Monitoring

#### *Forage and Livestock Program*

##### Regional Silage Trials

- Barley
- Triticale
- Pea-Cereal Mixture
- Alternatives
- Winter-Spring Cereals
- Oats

##### Perennial Forage Project

- Grass/Legume Mixture
- Legumes

##### Perennial Forage Longevity Project

- Grass/Legume Mixture
- Legumes
- Grasses

##### Early Seeded Winter Cereals for Grazing

##### Drought Resiliency Forage

##### Winter Grazing Strategies and Soil Health

##### Northern Range Enhancement Project

- Heifer Project

#### *Environmental Program*

##### Canada Thistle Stem Mining Weevils

##### Riparian Health Assessments

##### Alberta Soil Health Benchmarking Project

##### Cover Crops and Soil Health Project

### Extension Activities

#### *Workshops, Seminars and Webinars*

##### Intercropping Webinar Series

##### Agronomy Update

##### LARA Research Update and AGM

##### Alberta Verified Beef Production +

##### Cover Crops and Cows

##### Succession Planning

##### Working Well Workshop

##### On-Farm Slaughter Operation Licences

##### Apivar Resistance

##### How To Grow Hemp

##### Connect For Food: Local Food Economy

##### Nicole Masters

##### Fort Kent Summer Field Day

##### Dr. Kevin Sedivec: Forages

##### Lac La Biche Summer Field Day

##### St. Paul Summer Field Day

##### Discover Organics

##### Smoky Lake Summer Field Day

##### Jimmy Emmons: Long Live The Soil

##### Grow What We Eat, Eat What We Grow

##### CowBytes Workshop

##### Perennial Forage Webinar Series

##### When Stress is More Than a Season

##### Young Farmer Social

##### Innovation on The Ranch

##### Joel Williams

##### Growing Profit From The Ground Up

#### *Education Events*

##### Grade Seven Wetland Education

##### Walking With Moose

#### *Demonstrations*

##### Solar Watering System

##### Wheat Staging Demonstration

##### Hemp Demonstration

##### Rancher Researcher Project

## A Short Explanation of Various Statistical Terms Used in this Report

### Least Significant Difference (LSD):

- Once the data from a test plot has been collected it can be used to calculate the Least Significant Difference (LSD). The LSD tells if one variety (or bushel weight, etc.) is significantly different than the other varieties in a test plot (same environment and soil conditions).
- Example: The LSD for a test plot has been calculated to be 2 bu/acre. If a test variety Ava differs from the other varieties by more than 2 bu/acre then there is a significant yield difference. We can say one variety yields higher than another. If the varieties are within 2 bu/acre then we cannot say the varieties yield differently.

### Yield Grouping:

- Once the LSD is determined, each variety is assigned a yield grouping letter (A, B, C, etc.). By using yield grouping letters, we can easily determine which varieties are significantly different. Varieties that share a letter will **NOT** be significantly different, but varieties that **DO NOT** share a letter **WILL** be considered significantly different.
- Example: In this example Bob, and Cora are **not** considered to be significantly different from Ava because they share the Yield Grouping letter A...but David, Evan, Frank and Gary **are** considered to be significantly different from Ava, because they do not have Yield Grouping letter A and therefore, it could be said that Ava has a higher yield than David, Evan, Frank and Gary.

Variety	Yield Grouping
Ava	A
Bob	AB
Cora	AB
David	BC
Evan	CD
Frank	CD
Gary	D

### Coefficient of Variability (CV):

- The coefficient of variability (CV) is a measure of the consistency of the data from a plot. A lower CV value means that the data collected from the plot was consistent, which implies that the data collected is reliable and that accurate conclusions/recommendations can be made from these findings. A CV value of less than 20 is considered to be acceptable. The data from any plots that have a CV value of greater than 20 will be discarded to ensure the statistical accuracy of the tests. Discarding plot data that has a CV value of greater than 20 will prevent any skewing of the test results due to inconsistencies in soil quality or unexpected events like droughts or floods.

### Bushel Calculation

- All bushels were calculated using 35.2L for volume, and test weight (0.5L) as measured



## **Smoky Lake County Agricultural Service Board 2022 Overview**

Smoky Lake County Agricultural Services Department appreciates the positive relationship we have with Lakeland Agricultural Research Association. Through this relationship the ASB delivers unbiased research and extension to producers in the County. It was a busy year for the department, with some highlights below:

3 Agricultural Pest Inspectors were appointed for the County. 63 fields were inspected for Clubroot, with 10 new locations being found. Clubroot Management Agreements outlining best management practices are sent out to Clubroot positive locations and landowners are encouraged to work with a Certified Crop Advisor or Agrologist to sign off on a management plan. 3 locations throughout the County were monitored for Bertha Armyworms, all reporting low numbers. 18 Townships were surveyed for Grasshoppers on behalf of Alberta Agriculture and Irrigation, also with low numbers being found. The 2023 insect forecast maps are predicting low numbers for both Bertha's and Grasshoppers in our area. 4 fields were surveyed for Blackleg in canola and 2 fields were sampled for Fusarium Head Blight in wheat.

Our Animal Control Technician was busy dealing with problem beavers and muskrats to protect County Road Infrastructure. Working with the beavers at repeat problem areas, 2 new pond leveler devices were installed and 4 existing devices were repaired/upgraded. The ACT also took over stray dog pickup for the County. Dealing only with stray dogs, pets that are wandering or barking remain a Bylaw Enforcement issue. Stray dogs are transported to an approved animal shelter.

3 Weed Inspectors completed 716 inspections on private land and awareness letters were sent to landowners, that's 43% higher than in 2021. Common Tansy, Oxeye Daisy and White Cockle continue to be the main problem weeds within the County, especially in pasture and hayland. 50% of municipal right-of-way's received a herbicide application for brush and noxious weeds. 1 location was sprayed for prohibited noxious weeds. 1 Black Henbane infestation was found and responded to quickly, being destroyed. A Black Henbane awareness campaign was put out to our residents as all parts of this plant are poisonous to humans and animals when ingested and a single plant can produce up to half a million seeds. A biocontrol release of Leafy Spurge Beetles was done near Spedden with the Alberta Invasive Species Council on a patch of Leafy Spurge. We will be monitoring for success in 2023. All County roads received one mowing pass, with high regrowth areas receiving an additional mowing pass in the fall.

Our 2022 Farmers & Ranchers Appreciation BBQ was well attended in Smoky Lake and included locally made burgers, a tradeshow and a fire department farm extrication demo. Posters from our Ag Poster contest for the schools in Smoky Lake County were displayed at the event. The 2023 BBQ will be held on June 9<sup>th</sup> in Smoky Lake and we hope to see you there! We wish all producers a safe and successful 2023!

Amanda and Tori

## M.D. of Bonnyville 2022 – A Year in Review



Where has the winter gone? It seems we have just finished harvest and are already considering our seeding needs.

2022 started off with lots of snow but mother nature brought in a perfect spring melt with little to no flooding allowing us to get our seed in the ground. It was a nail-biter with the hot dry weather again this year having us wondering if our crops will give us any yield and then we managed to get the rain that the South was lacking providing us with a little better than average yielding year.

The M.D. remained busy with field inspections, this year we surveyed 16 canola fields for clubroot and blackleg and we are happy to report no more clubroot was found and we are still recommending good crop rotations to help slow the spread. There was some pea leaf weevil feeding damage found and producers are going to want to be monitoring their pea fields this upcoming year. We monitored 2 fields for bertha armyworm and none of the traps reached the first warning level. Grasshoppers were prevalent in some areas of the M.D. and depending on weather conditions may need to be watched as well.

Scentless Chamomile, Oxeye Daisy, White Cockle, and Canada Thistle continue to be prolific noxious weeds in our area. Weeds will outcompete most vegetation when moisture is lacking. Our Weed Inspectors will be out in full force again this year to prevent or eliminate any infestations that may affect our fields. We had some producer requests asking for help with the spraying of headlands that contained difficult weeds to control. Our Fence line Spray Program was steady throughout the growing season.

Our Shelterbelt Program continues to be in high demand, the program was again sold out with the purchases of more than 9000 trees that have been put back into our community in strategically placed areas. This Environmental Stewardship is awe-inspiring with many other counties in Alberta following in our footsteps. On this note, our Rural Beautification and Agriculture tour was a huge success, selling out on two busloads of attendees. Thank you to all the Agribusinesses for opening your doors to us and Congratulations to Michaud Bison Ranch and Daryl Knapp, award winners of the Rural Beautification Contest.

We had great attendance in our workshops this year which included: Grazing School for Women, Tree Pests and Weeds Workshop, White Cockle in our Fields and Preparing your Trees for Winter.

We continue to support our local Bonnyville Seed Cleaning Plant by encouraging our producers to clean and test seed, this lowers and prevents the establishment of noxious weeds, pests and diseases. The Bonnyville Seed Plant passed their annual audit with a score of 94.45%.

A friendly reminder that the Goodridge Pesticide Collection site has been closed as of December 31, 2022 – The Bonnyville Pesticide Collection site will remain open until December 2023. The retailers will now be accepting the collection of plastic jugs for recycling.

Our VSI Services Program was well utilized with 11,290 animals treated. This program helps to ease the financial burden farmers and ranchers often face when hit with unexpected herd health issues.

Overall, we have seen a very successful and productive year throughout all our challenges. Here is goodbye to 2022 and best wishes to producers for a successful and prosperous 2023 growing season.

Matt and Janice



## **Lac La Biche County Agriculture Review 2022**

The Lakeland Agricultural Research Association is an important partner of Lac La Biche County Agricultural Service Board. Through the delivery of quality extension programs and applied research to the County's producers and those of the entire region alike, LARA is a great asset to the County.

In 2022, Lac La Biche County introduced raised beds to the Community Garden, thereby further enhancing the gardening experience of local gardeners. The overall reviews of the garden program has been positive.

Fifteen canola fields were surveyed in 2022 for clubroot and two sites tested positive for the disease. Twelve fields were surveyed for grasshoppers, while ten sites were inspected for Fusarium Head Blight disease.

Approximately 7,232 km of roadside vegetation mowed on County roads, highway entrances to the hamlets, ditches and right of ways, with most areas getting a second pass. This was 35 % higher than in 2021. Additionally, the ASB sprayed 260.20 km of municipal roads for noxious and prohibited noxious weeds. Due to staffing issues, only 537 noxious and prohibited noxious weed sites were inspected in 2022, compared to the 750 sites inspected in 2021.

Lac La Biche is beautiful by nature, and trees are vital part of the County's nature. Hence, the ASB distributed six hundred and forty-nine (649) tree seedlings to residents in 2022 for planting. The County's ASB in partnership with Portage College hosted the 2022 Agricultural Appreciation Dinner at the Bold Center. The event was attended by approximately 300 guests; the biggest one to-date. The County's Agricultural Service Board provided two bursaries to two post-secondary students in natural resource management programs.

The Agricultural Service Board appreciates the contribution of LARA to the County's agriculture sector, and looks forward to working with the research organization to deliver quality research and extension services to producers in the County and beyond.

Jacob Marfo (PhD, PAg)  
Agricultural Fieldman, Lac La Biche County

## County of St. Paul Agricultural Service Board 2022



The County of St. Paul Agricultural Service Board would like to thank LARA for all of its excellent work in the County and surrounding areas. LARA continues to be a great source of unbiased agricultural and horticulture information for our local producers. With agriculture receiving cutbacks provincially and federally over recent years it has increased the importance of having local experts who can answer questions and get us connected with government programs. Not every County has such a wealth of agricultural data and information at their disposal.

2022 started off wet and rainy and ended up dry as in 2021. Luckily, we did not see the same record-breaking temperature as we did in 2021 so the crops did not take such a yield reduction. In 2021 the County of St. Paul declared an agricultural disaster because of the heat and drought. This year the rain we got in early summer pulled us through for an average harvest. The lack of moisture also helped local producers to get their crop off dry and in plenty of time before the winter.

The County of St. Paul again checked every canola field for clubroot in 2022. We found 5 positive fields this year which is close to the 4 fields we found in 2021. Last year we had found a new clubroot pathotype in the County on two of our positive fields. This seemed to underline the importance of keeping vigilant to the disease and using tools like rotation to ensure we have clubroot resistant genetics working for us for years to come. This year we did not find any new clubroot pathotypes so hopefully this trend will be the same in 2023.

The County of St. Paul mowed about 900 miles of roadway ditches this year. In 2023 we are planning only to mow roads designated as collector or arterial. This year the total number of miles will drop to 660 total miles. You may notice some roads that were mowed last year will not be mowed in 2023 and this is why. The County was seeking tenders for the mowing for 2023 and if the bids are low enough we may have contractors mowing our roads for the first time.

The last two years of dry falls have given Canada Thistle the perfect growing competitive advantage. With its deep roots it can withstand drought conditions and we saw this on most pastures and ditches in the County. The County of St. Paul has a roadside spray truck, a side by side, and many backpacks to combat weed and brush issues on our land. Every year we try to spray about 1/3 of our roads for weeds and brush with hopes that the weeds are kept at bay for the two years between sprays. The past two years have made it difficult to keep up with weeds like Canada Thistle.

The County also has a Brushing Program that our ratepayers can take advantage of. On approved roads the program will pay between \$500-\$3000 per half mile of road. The roads must be of importance to the County and an inspection must be done prior to the start of the project to receive payment. So, if you are doing some improvements to your land maybe the County can help.

The County of St. Paul also has brought in a few bags of Zinc Phosphide for our producers to combat Richardson Ground Squirrels. This is a Strychnine replacement and also a single feed bait. Call the County if you think you may need some.

The County of St. Paul Agricultural Service Board would like to thank our producers for making our area of the world a great place to live and eat!

Keith Kornelsen  
Agricultural Fieldman  
County of St. Paul

# Cropping Program



## **Regional Variety Trials**

**Partners:** Alberta Agriculture and Forestry  
Alberta Wheat Commission  
St. Paul Municipal Seed Cleaning Plant  
Agriculture and Agri-Food Canada  
Nutrien Ag Solutions  
Alberta Barley  
Alberta Seed Processors  
Alberta British Columbia Seed Growers  
Alberta Oat Growers Association  
Results Driven Agriculture Research

### **Objectives:**

1. To detail agronomic characteristics of new varieties and proven varieties in a specific geographic area.
2. To provide information about new varieties to local producers.
3. To conduct these tests yearly to produce long term data.

### **Background:**

Regional Variety Trials (RVTs) have been used as a means of testing superior varieties under different environmental conditions. One of the goals of the RVTs is to help researchers and producers identify varieties that are suitable for each particular environment. Multi-location trials often show genotype x environment interaction due to differential response of genotypes to different environmental conditions. Information on the genotype x environment response obtained through RVT's may be helpful in identifying and selecting high-yielding varieties with specific or broad adaptations to their environmental conditions.

Efficiency in the RVT's depends on selecting a large number of locations within a region with varying environmental conditions and assigning to each location the variety most likely to succeed. It is also essential to assess varieties in the trial in terms of their productivity and quality, and to assess stability in yields across years.

The regional variety trials (RVTs) have been grown in the Lakeland since 1991. Each variety is tested for three years against a common check variety that is kept in the trial long-term. Each year, new varieties are added and older ones are removed from the trial. How a variety does relative to the check variety can be used as a comparison between varieties that are not grown in the trial at the same time.

The information gathered from these trials is important for producers first, to aid in crop variety selection and, second, to improve economic returns. Determining the cereal varieties that are best suited to production in the LARA area will aid producers in making the most economical decisions for their operations.

The data presented in the following tables is a useful tool for comparing varieties to each other. Information should not be used to determine how much a variety will yield, but **rather as a comparison of how one variety will yield in relation to another**. The tables will tell how a certain variety yields statistically compared to another variety.

**Cereal Regional Variety Trials (RVT) contracted to LARA in 2022**  
**Prepared by Sheri Strydhorst, PhD, PAg – ARVAC Regional Variety Trial Coordinator**

LARA ran the following RVT trials for the Alberta Regional Variety Advisory Committee (ARVAC) in 2022:

**Table 1.** LARA RVT Trials, 2022.

Trial	Sites	Number of Entries	Useable Data	Cultivar p-value
CWRS - RVTs	Fort Kent	15 varieties	Yes	0.0001 - Significant
	St Paul		No	
CPSR - RVTs	Ft Kent	9 varieties	Yes	0.0004 – Significant
	St Paul		Yes	0.0703 – Non Significant
Barley - RVTs	Ft Kent	23 varieties	Yes	0.0001 – Significant
	St Paul		Yes	0.0250 – Significant
Oat - RVTs	Ft Kent	10 varieties	No	
	Smoky Lake		No	
Triticale - RVTs	Ft Kent	2 varieties	No	
	St Paul		Yes	0.0435 - Significant
Winter Wheat - RVTs	Ft Kent	6 varieties	No	

ARVAC grants permission to LARA to publish useable data, from single site years, but cautions that single site year data can be misleading and it is highly recommended to refer to compiled RVT data in the Alberta Seed Guide at [seed.ab.ca](http://seed.ab.ca).

Acknowledgement is given to the 2022 RVT funders: Results Driven Agricultural Research (RDAR), Alberta Wheat Commission, Alberta Barley, Alberta Seed Processors, Alberta British Columbia Seed Growers, Alberta Oat Growers Association, and Seed Companies who pay annual entry fees as program entrants.

### Canada Western Red Spring (CWRS) Wheat at Fort Kent

The cultivar p-value = 0.0004; height CV = 2.57%, yield CV = 4.18%. Note that AAC Tomkins and AAC Whitehead VB are Canadian Western Hard White Spring Wheat varieties. Please see the compiled data from all ARVAC RVT sites at: <https://www.seed.ab.ca/wp-content/uploads/2023/01/rvt2023-1-9.pdf>

**Table 2.** RVT CWRS Data Fort Kent, 2022.

Variety	Yield* CAUTION – 1 SITE YEAR OF DATA
AAC Brandon - Check	100%
AAC Viewfield – Benchmark Check	100% b
AAC Hockley	107% a
AAC Dutton VB (BW1094)	106% a
SY Manness	105% a
AAC Whitehead VB	105% ab
AAC Redstar	103% ab
AAC Hodge VB	102% ab
Rednet	102% ab
AAC Hasler (PT496)	100% b
CDC SK Rush	100% bc
SY Donald	97% bc
PT5003	95% c
AAC Tomkins	95% c
CDC Silas	n/a – seed appeared contaminated

Varieties followed by the same letter are NOT SIGNIFICATLY DIFFERENT, based on a least significant difference (LSD) mean separation at  $p < 0.05$ . For example, AAC Hockley and Rednet have yields that are statistically similar.

### Canadian Prairie Spring Red (CPSR) Wheat RVT at Fort Kent

The cultivar p-value = 0.0001; height CV = 4.11%, yield CV = 3.21%. Note that AC Andrew is a Canadian Western Soft White Spring Wheat variety. Please see the compiled data from all ARVAC RVT sites at: <https://www.seed.ab.ca/wp-content/uploads/2023/01/rvt2023-1-9.pdf>

**Table 3.** Canadian Prairie Spring Red (CPSR) Wheat Data Fort Kent, 2022.

Variety	Yield* <b>CAUTION – 1 SITE YEAR OF DATA</b>
AAC Brandon - Check	100%
AAC Penhold – Benchmark Check	104%
Accelerate – Benchmark Check	111%
AC Andrew – SWS	117% a
AAC Rimbey	112% ab
AAC Westlock	111% abc
AAC Perform	108% bc
CDC Reign	99% d
Forefront	97% d

Varieties followed by the same letter are NOT SIGNIFICATLY DIFFERENT, based on a least significant difference (LSD) mean separation at  $p < 0.05$ . For example, AC Andrew and AAC Westlock have yields that are statistically similar.



### Barley at Fort Kent

The cultivar p-value = 0.0001; height CV = 5.75%, yield CV = 6.26%. Note: only the top 13 out of 23 entries are reported here. This trial is a mixture of feed and malt barley varieties. Please see the compiled data from all ARVAC RVT sites at: <https://www.seed.ab.ca/wp-content/uploads/2023/01/rvt2023-1-9.pdf>

**Table 4.** Barley Data Fort Kent 2022.

Variety	Yield* CAUTION – 1 SITE YEAR OF DATA
CDC Copeland – Check	100%
CDC Austenson – Benchmark Check	105%
AAC Synergy – Transition Check	103%
AB Prime	125% a
Esma	121% ab
AB Maximizer (FB20601)	118% abc
RGT Planet	117% abcd
CDC Durango (TR19175)	117% abcd
TR19758	116% abcde
RGT Asteroid	114% bcdef
AB Hague	112% bcdef
AAC Lariat (TR19268)	112% bcdef
AB Standswell (SR18524)	110% cdef
Ibex	109% cdefg
AB Brewnet	107% cdefgh
CDC Renegade	106% defgh

Varieties followed by the same letter are NOT SIGNIFICATLY DIFFERENT, based on a least significant difference (LSD) mean separation at  $p < 0.05$ . For example, AB Prime and TR19758 have yields that are statistically similar.

### Barley at St. Paul

The cultivar p-value = 0.0250; height CV = 6.08%, yield CV = 11.73%. Note: only the top 13 out of 23 entries are reported here. This trial is a mixture of feed and malt barley varieties. Please see the compiled data from all ARVAC RVT sites at: <https://www.seed.ab.ca/wp-content/uploads/2023/01/rvt2023-1-9.pdf>

**Table 5.** Barely Data St. Paul, 2022.

Variety	Yield* CAUTION – 1 SITE YEAR OF DATA
CDC Copeland – Check	100%
CDC Austenson – Benchmark Check	100%
AAC Synergy – Transition Check	100%
KWS Kellie	113% a
CDC Durango (TR19175)	112% ab
TR19758	109% abc
TR20761	109% abc
Esma	108% abc
AB Prime	107% abcd
AB Maximizer (FB20601)	106% abcde
AB Hague	105% abcdef
RGT Planet	105% abcdef
Cantu	104% abcdef
RGT Asteroid	103% abcdfeg
AAC Lariat (TR19268)	103% bcdefg
AB Standswell (SR18524)	100% cdefgh

Varieties followed by the same letter are NOT SIGNIFICANTLY DIFFERENT, based on a least significant difference (LSD) mean separation at  $p < 0.05$ . For example, KWS Kellie and Cantu have yields that are statistically similar.

### Triticale at Fort Kent

The cultivar p-value = 0.0435; height CV = 3.01%, yield CV = 2.29%. Please see the compiled data from all ARVAC RVT sites at: <https://www.seed.ab.ca/wp-content/uploads/2023/01/rvt2023-1-9.pdf>

Varieties followed by the same letter are NOT SIGNIFICANTLY DIFFERENT, based on a least significant difference (LSD) mean separation at  $p < 0.05$ .

**Table 6.** RVT Triticale Data Fort Kent, 2021.

Variety	Yield* CAUTION – 1 SITE YEAR OF DATA
Brevis - Check	100%
AB Stampeder	92% a



## **Evaluation of the Interaction Between Seed Size and Seeding Depth on Canola Establishment and Yield**

**Partners:** Craigend Recreational and Agricultural Society  
Lac La Biche County  
Canadian Agricultural Partnerships  
SARDA Ag Research  
Battle River Research Group  
Alberta Agriculture and Forestry  
Results Driven Agricultural Research

### **Objectives:**

- 1) Determine the impact on varying seeding depth on canola emergence, establishment and yield in Alberta.
- 2) Determine the impact on varying seed size on canola emergence, establishment and yield in Alberta.
- 3) Assess the interaction between seeding size and planting depth on canola emergence, establishment and yield in Alberta.

### **Background:**

Canola is one of the most widely grown oilseed crops grown in Alberta. The cost of establishing canola is significant with the cost of seed being second only to fertilizer costs. Cultivar development in recent years has produced varieties with different seed sizes that may alter the seeding rates as well as the seeding depth recommendations. This project aimed to provide producers with the ability to improve on farm production through the understanding of the interaction between canola seed size and planting depth on canola establishment and yield. This could prove highly beneficial in the case of extreme weather conditions where increasing planting depth could allow available soil moisture to be reached in dry years.

### **Method:**

The trial was conducted over three years in Lac La Biche County and was created in a randomized complete block design (RCBD) with four replications to reduce error. The sites for the trial were prepared and managed based on the current best management practices recommended by the Canola Council of Canada (CCC) and the Alberta Canola Producers Commission (ACPC). In the spring an appropriate canola fertilizer blend was created based on 100% of the recommended spring soil samples. A pre-burn application of heat and glyphosate was applied before seeding to ensure there was no competition for the seedlings. Also, there was an in-crop application of glyphosate to help with weed control. Throughout the season notes were taken on the environmental conditions as well as weed and insect populations to ensure that best management practices were met throughout this trial.

This year the participating ARAs had to choose a different canola variety than what was used in previous years due lack of this variety across the province. Because of this, DKL 7542 was used instead of CS2000 as it had similar characteristics and was still a Round-Up Ready variety. The following seed classes were utilized: extra small, small, medium, and large, these groups were created based on the average of thousand seed weights. A germination test was done on all seed

sizes before seeding to ensure good germination. The four classes were seeded at three different depths based on the CCC optimum seeding depth recommendations of 12-25mm. The seeding depths that were evaluated in this trial were 1cm, 2.5cm, and 4cm. The target seeding rate for this trial is based on the crop recommendation for the Canola Performance Trials at 120 plants/m<sup>2</sup>. Below show the treatments evaluated within this trial.

1. Extra small (TKW) at 1 cm
2. Extra small (TKW) at 2.5 cm
3. Extra small (TKW) at 4 cm
4. Small (TKW) at 1 cm
5. Small (TKW) at 2.5 cm
6. Small (TKW) at 4 cm
7. Medium (TKW) at 1 cm
8. Medium (TKW) at 2.5 cm
9. Medium (TKW) at 4 cm
10. Large (TKW) at 1 cm
11. Large (TKW) at 2.5 cm
12. Large (TKW) at 4 cm

After harvesting this trial all of the seed was collected and processed in our facility. This is where we collect the data from plot yield, moisture, TKW, test weights, greens, protein, and oil content. Once the data is collected our team enters the data into ARM. ARM is the database that LARA uses when looking at statistical analysis of the data that was collected from the trial. The data from all collection years were gathered and run through ARM to ensure the data is stable and useable. Running our data through this program allows us to make comparisons to ensure that we are getting accurate data that meet our project objectives and allows us to create quality data and information for producers and industry members to be able to use.

### **Results:**

This trial was seeded on May 29th and harvested on September 29th. Throughout the growing season, there was a total of 212.2mm of precipitation which is less than normal in the Craigend area in which this trial was conducted. During the growing season, it was observed that the area was in a drought due to the lack of precipitation. The total accumulation of moisture seen throughout the growing season was due to a couple of larger showers followed by long periods of hot dry weather. It was observed that for the entire month of July there was no precipitation seen in this area, which was hard on plants as the canola was flowing which may have caused heat blast in the canola.

**Table 7. Canola Seed Size vs Depth Plant Counts, 2022**

Treatment	7 Days	14 Days	21 Days
4.5 TSW at 1 cm	10	18	13
4.5 TSW at 2.5 cm	8	15	17
4.5 TSW at 4 cm	14	13	9
6 TSW at 1 cm	7	15	12
6 TSW at 2.5 cm	11	16	16
6 TSW at 4 cm	11	14	11
7.2 TSW at 1 cm	9	13	14
7.2 TSW at 2.5cm	10	17	14
7.2 TSW at 4 cm	11	17	14
8.1 TSW at 1 cm	11	17	13
8.1 TSW at 2.5 cm	9	15	12
8.1 TSW at 4 cm	10	15	12

Looking at the emergence counts that were taken at 7, 14, and 21 days. There can be an observation made that on day 7 in almost all seed sizes categories the seeds that were seeded the deepest had a higher emergence count. This could be because there was very little moisture within the top ½ inch of soil at the time of seeding. This would give the seed seeded at a larger depth more of an advantage as it has the moisture to be able to successfully germinate and the vigor to break through the crust of the soil to emerge. Between days 7 and 14 there was an accumulation of 39.9mm of precipitation. This was needed due to how dry the soil was because of the lack of moisture. An observation that can be made from the 14-day plant count is that both the XS and S seeds can see a decrease in plant counts with increased depth, this could be a result of the smaller seed size having less vigor to be able to push through the soil to emerge. On the 21-day plant count, there is no obvious differentiation between the plant counts.

The data from the 2022 trial as shown below, it can be seen that the top three treatments for yield are either medium or large seeds that are seeded at a depth of either 2.5m or 4m this could be because the larger the seed the more vigor the seed has to push through the soil and at deeper depths and giving the plant more moisture to grow and put into yield. Looking at the bottom of the table it can be seen that all of the XS seeds are the lower-yielding treatments which are in order of shallowest depth to deepest depth. This is most likely because the XS seed has less vigor to push through the soil than a larger seed. It is also very likely that because of this the plant has less energy to grow as it was more stressed.

**Table 8.** Canola Seed Size vs Depth, 2022

Treatment	Yield (bu/ac)	Height (cm)	TKW (g)	TWT /(g/0.5L)	Moisture (%)	Oil Content (%)
M (TKW) at 4 cm	51	121	4.35	326	5.9	46
L (TKW) at 2.5 cm	49.5	118	4.23	325	6	46.7
L (TKW) at 4 cm	48.9	125	4.34	328	5.6	46.7
S (TKW) at 4 cm	47.3	123	4.52	322	6.2	46.1
L (TKW) at 1 cm	47.1	123	4.63	325	6.1	46.8
S (TKW) at 2.5 cm	44.7	124	4.43	326	5.7	46.9
M (TKW) at 1 cm	44.3	119	4.51	325	6.2	4.6
S (TKW) at 1 cm	43.8	122	4.54	326	6.3	46.3
XS (TKW) at 1 cm	43.6	118	4.58	324	6.1	46.3
XS (TKW) at 2.5 cm	41.9	122	4.49	322	6.2	46.6
M (TKW) at 2.5 cm	40.9	114	4.5	325	6.3	46.3
XS (TKW) at 4 cm	39.2	125	4.35	324	6	46.3
CV:	11.35					

Looking at the data in 2022, it is seen that there is a connection between seed size and seeding depth. This has an impact on seed vigor and emergence. By looking at the chart the data does back up our observation that the large seed has more vigor and handles being seeded deeper better than smaller seeds with less vigor. This not only affected emergence but yield as well. Knowing this information is of value for not only producers but industry members as well. In drought years having a larger seed size and seeding depth could see an increase in yield compared to other treatments. This is due to more access to moisture, better vigor to emerge, and is able to support the plant's growth and yield compared to smaller seed sizes at larger depths.

## **Impact of Varying Rates of Environmentally Smart Nitrogen (ESN) on the Performance of Spring Wheat and Spring Barley in Northeastern Alberta**

**Partners:** Kotowich Evergreen Farms  
Top Gro Agro Ltd.  
County of St. Paul  
Municipal District of Bonnyville  
Canadian Agricultural Partnership  
St. Paul Municipal Seed Cleaning Plant  
Results Driven Agriculture Research

### **Objectives:**

1. To determine the impact of utilizing varying rates of Environmentally Smart Nitrogen (ESN) on spring wheat production in Northeastern Alberta.
2. To determine the impact of utilizing varying rates of Environmentally Smart Nitrogen (ESN) on spring barley production in Northeastern Alberta
3. To determine the economic feasibility of utilizing Environmentally Smart Nitrogen (ESN) in spring wheat production in Northeastern Alberta.
4. To determine the economic feasibility of utilizing Environmentally Smart Nitrogen (ESN) in spring barley production Northeastern Alberta.

### **Background:**

Growth in grain crop yields has been declining in recent years while it is estimated that annual grain crop production will need to increase to around 3 billion tonnes by 2050 to feed a fast-growing human population (FAO 2009). According to the Food and Agriculture Organization (2009), this increase in crop yield will not come from land expansion in developed countries, but ninety percent will be from higher yields and increased cropping intensity.

A large portion of today's current food production numbers is due to the use of commercial fertilizers which consists of Nitrogen (N), Phosphorous (P) and Potassium (K) and Sulphur (S). However, actual N uptake from fertilizer applied to a grain crop is estimated at only around 50%, with the rest lost through environmental events such as volatilization and denitrification. It can be determined that the use of commercial fertilizers will increase in order to meet production demands. The development of effective nutrient (N, P, K and S) management strategies will be key in maintaining and enhancing current grain crop production in Alberta.

The use of enhanced efficiency fertilizers, such as environmentally smart nitrogen or ESN, is one method of reducing N loss during grain crop production. Environmentally smart N is the most widely used slow-release N product on the market for agricultural crops (Walsh and Christiaens, 2014). It is produced through the use of a flexible polymer coating or membrane that protects against loss mechanisms such as volatilization, denitrification or leaching. This coating allows water to imbibe into the granule to create a liquid solution that can then move out of the membrane based on crop N demands and soil temperature. The ability to match fertilizer use to crop requirements could translate into increased yield and overall cost savings to Alberta producers.

**Method:**

The trials were conducted in the County of St. Paul and the MD of Bonnyville using a randomized complete block design (RCBD) with four replications to reduce error. Prior to seeding, a soil sample was collected to determine fertility recommendations and a blend fertilizer was side-banded during seeding.

The wheat variety used was AC Brandon and the barley variety used was CDC Austenson. Five different inclusion rates of ESN as a percent of the total nitrogen in the fertilizer were used: 30%, 50%, 70% and 90%. Additionally, a check plot with no ESN was included for comparison.

**Results:**

Looking at the data in the tables below, the ESN barley trials that were conducted at the same sites, The results in the table show that 70% ESN blend was one of the higher-yielding treatments within both of the ESN trials. The 70% ESN blend at the Fort Kent site yielded 112.8 bu/ac and 116.35 bu/ac at the St. Paul site. Another thing that can be seen looking at the data from this trial is that the barley that was treated with the 70% blend ESN has the highest TKW with the Fort Kent barley TKW at 54.56g and the St. Paul barley at 51.78g

In the 2022 wheat results for both the County of St. Paul and the MD of Bonnyville site which was conducted in Fort Kent that the ESN 50% blend and the check were top two at both sites. We believe that these results may be because of the lack of moisture seen throughout the growing season, there was a lack of moisture and the ESN may not have been as accessible. Our theory is that the ESN may have been made available to the wheat once enough moisture was received and after the growing stages where yield was already predetermined.

**Table 9.** ESN Barley Fort Kent, 2022.

Treatment	Yield (bu/ac)	TWT (g/0.5L)	TKW (g)	Height (cm)
ESN 70% blend	112.9	333.7	54.6	77
ESN 30% blend	108.9	334.5	52.0	79
ESN 50% blend	105.3	334.3	53.9	78
Check	105.1	334.9	53.5	76
ESN 90% blend	105.0	333.7	51.7	76
CV	5.9			

**Table 10.** ESN Barley St. Paul, 2022.

Treatment	Yield (bu/ac)	TWT (g/0.5L)	TKW (g)	Height (cm)
ESN 50% blend	118.6	333.0	50.5	81
ESN 70% blend	116.4	333.3	51.8	83
ESN 30% blend	115.9	330.2	49.2	78
ESN 90% blend	115.3	332.7	51.7	83
Check	107.0	335.9	51.1	83
CV	4.4			

**Table 11.** ESN Wheat Fort Kent, 2022.

Treatment	Yield (bu/ac)	TWT (g/0.5L)	TKW (g)	Height (cm)	Protien (%)
ESN 50% blend	78.9	401.6	38.9	78	9.71
Check	77.5	402.78	39.0	80	9.3
ESN 70% blend	76.5	403.03	39.1	79	9.36
ESN 90% blend	75.9	404.8	40.0	77	9.33
ESN 30% blend	75.4	403.5	39.0	81	9.49
CV	3.5				

**Table 12.** ESN Wheat St. Paul, 2022.

Treatment	Yield (bu/ac)	TWT (g/0.5L)	TKW (g)	Height (cm)	Protien (%)
Check	90.5	408.8	40.4	85	11.6
ESN 50% blend	90.4	407.5	40.1	83	11.16
ESN 90% blend	90.2	407.8	40.4	84	11.46
ESN 70% blend	88.0	409.5	40.5	85	11.42
ESN 30% blend	87.4	407.0	39.9	84	11.32
CV	2.9				

Due to the environmental conditions, the ESN blends may not have been fully utilized by the plants, and this may be the reason for the results that were achieved. This information is still valuable to producers and industry stakeholders as it shows how environmental factors can affect ESN. Also, with the data and information collected over the past three years, producers can compare results and make decisions that are best suited to their operation. This trial was conducted to allow producers to be able to see how varying rates of blended ESN can have an impact on both spring wheat and barley production in Northeastern Alberta.

## **Impact of Soil pH > 7.2 on Crop Yields (Wheat, Yellow Peas and Canola)**

**Partners:** Canadian Agricultural Partnership  
Alberta Agriculture, Forestry and Rural Economic Development  
St. Paul Municipal Seed Cleaning Plant  
Gateway Research Organization  
University of Guelph  
Canola Council of Canada  
Graymont Western Canada Inc  
Results Driven Agriculture Research

### **Objectives:**

1. To determine the annual impact on yield on plots treated with lime to a soil pH >7.2 vs none limed plots for a typical Alberta crop rotation of Canola, HR Wheat and Yellow peas over a three-year period.
2. Evaluate the effectiveness of different liming products.
3. Evaluate the effectiveness of increased soil pH (>7.2) on clubroot disease spore and disease occurrence on the roots (Gro site only)
4. Assessment of soil health at start of trial year 1 and at the end of trial year 3.

### **Background:**

The number of fields infected with clubroot disease in Alberta, are still growing. Clubroot has been diagnosed in fields as far north as the Northern Sunrise County and as far south as Newell County and continues to spread. It has been found over all the prairie provinces.

Clubroot resistant varieties have been developed, launched and some have failed within a few years of becoming available on the market. The resistant has been overcome in close to 200 fields in Alberta (Nicole Fox M.Sc.)

Canola is Canada's most important agricultural sources of revenue generating about 25% of all farm cash receipts. Clubroot disease was first found in canola and can be considered the largest economic threat. Research done by Nicole Fox M.Sc. (The Evaluation of Lime Products as a Clubroot (*Plasmodiophora brassicae*) Management Tool) indicates that a soil pH >7.2 may be a viable tool for disease management. "Different lime products, and hydrated lime in particular, may represent an effective tool to manage *P. brassicae* in highly infested patches in a field, at field entrances and in acidic soils, by reducing clubroot severity on susceptible and resistant hosts. As such, the application of lime may help to supplement the use of genetic resistance, by reducing disease pressure and the potential for pathotype shifts."

In field trials where hydrated lime was used on a clubroot infected field (2018 - Edberg location, Keith Gabert) are showing some promising initial results.

This proposed project seeks to test different liming products, their effectiveness on clubroot disease management, and the impact of a soil pH (>7.2) on yield of HRS wheat, yellow peas and canola over a 3-year time period.

Increasing the soil pH to > 7.2 is not a common practice. Most of the research that has been done in Alberta or Northern British Columbia on soil pH amelioration has been done in the 1970 to early 1990. Since then many new varieties for wheat and peas have been developed and canola has replaced the production of rapeseed.

Most, if not all, of the research done at the time was focused on increasing soil pH by 1 pH unit to about 6 – 6.5. No information is available on crop yield when soil pH is increased to >7.2.

It is unclear what the impact is, if any, of raising the soil pH to >7.2 level on the productivity of other crops. For most crops it seems that the higher pH is just outside their optimum.

Farming practices and disease management tools have changed and greatly impacted the overall productivity of the crops over the last 30 years. Application of chemical fertilizer and sprays continues to have an acidifying effect on the topsoil with, in 2019 about 50% of Alberta soils having a pH of 6.0 and lower (with 15-20% being <5.5pH). In 1970 this was estimated to be 21% of Alberta soils or 2.1 million acres, with 4% having a pH of 5.5 and lower. (source: Doug Penney, Lacombe June 26 2019)

Application of lime has been suggested to also improve the soil health (Plant-Soil Interactions at Low pH: Principles and Management pp 703-710) as yield improvement have been recorded even as soil pH has returned to initial pre-treatment levels.

### **Method:**

Production and yield measurements are gathered for a three-year crop rotation using Canola, Hard Red Wheat, and Yellow Field Peas grown on soil with adjusted pH to >7.2. Soil pH is amended to >7.2 using the following treatments:

1. Check (none applied)
2. 100% hydrated lime
3. 75% hydrated lime & 25% zero grind limestone
4. 50% hydrated lime & 50% zero grind limestone
5. 25% hydrated lime & 75% zero grind limestone
6. 100% zero grind limestone

Before the trial was seeded in 2020, soil samples were collected in the fall of 2019 at depths of 1-3” and 3-6”. This determined the application rate created from the required lime curve that was developed by Element Labs. After the first growing season, soil samples were taken again at 1-3” as well as 3-6” to determine the soil pH, and lime was applied in the fall again to ensure a soil pH of >7.2. Soil health assessments were to be done at the beginning of the trial as well as at the end of the trial to determine any soil health impacts. Soil samples were sent for a soil health assessment but unfortunately, we still have not received the results back from the CARA Soil Health Lab.

This trial was seeded using a complete randomized block design (RCBD) Before seeding, a pre-burn had taken place and a soil test had been taken in the spring and a custom blend for fertilizer was created. The fertilizer blend was side banded during seeding to create the total blend of (90-30-20-20) at 319 lbs/ac for canola, (90-30-20-5) at 284 lbs/ac for hard red wheat, and (11-52-0-0) at 50 lbs/ac for the peas. The yellow peas, Canola and the Red Hard Spring Wheat were seeded on May 27, 2022. Throughout the growing season, notes were taken on emergence, height, lodging, disease pressure, and yield. All three crops were harvested on September 8<sup>th</sup>, 2022.

## **Results:**

In 2022, it observed that for yellow peas in the plots treated with lime, the yield was not hindered by the pH of > 7.2 as the lowest yielding treatment was the check. Within this block, there was a 14 bu/ac difference between the top-yielding treatment in the peas which was the 50% hydrated lime and 50% zero grind limestone, and the check treatment. There was also a 4 bu/ac difference between the top two yielding treatments which are the 50% hydrated lime and 50% zero grind limestone and the 75% hydrated lime and the 25% zero grind limestone.

Looking at the data for Hard Red Spring Wheat, it can be seen that there was not a hugely significant difference between the treatments within the trial. Looking at the yield, the check treatment is one of the lower-yielding treatments within the block. Within the treatments, there is only a three-bushel difference between the top-yielding treatment which was 50% hydrated lime and 50% zero grind limestone, and the lowest-yielding treatment which was the 25% hydrated lime and 75% zero grind limestone. Looking at the protein within the wheat trial there was not a significant difference between proteins within all of the treatments.

With the block containing Canola, it can be seen that there is an 11 bu/ac difference between the top-yielding treatment which was the 100% hydrated lime and the lowest-yielding which was the 25% hydrated lime and the 75% zero grind limestone. Another observation that can be seen from the data is that the top two yielding treatments also had the highest oil content. The 100% hydrated lime had an oil content of 43.29% and the 100% zero grind limestone has an oil content of 43.42%.

All of the lime was utilized within the project and changed the soil from a pH of 5.6 at the beginning of the trial in 2019 to a pH of >7.2. A visual observation that was seen with the plots that had lime applied was that the weed pressure was less compared to the plots and buffers that had no lime applied. There was also no visual lime on the surface of the soil as it was mixed well and the small amount of precipitation that was received helped with the change in pH. Due to this observation, it could be said that the lime was very effective in this trial. Because LARA only does trials on clubroot-free land GRO is observing the effectiveness of the treatment on clubroot-infested fields. We are looking forward to comparing data with GRO to see how changing soil pH to >7.2 not only affects the plant growth and performance but the effect that it has on clubroot.

Overall, looking at all three of the blocks it can be seen that within all of the blocks that the two lowest yielding treatments were the check and 25% hydrated and 75% zero grind limestone. There were also no observations of visible stress or decrease in productivity within all three of the crops that were planted within this trial.

**Table 13.** Liming Canola Plots, 2022.

Treatment	Yield (bu/ac)	Height (cm)	TKW (g)	TWT (g)	Moisture (%)	Oil Content (%)
100% Hydrated Lime	60.66	105	4	310.4	7.5	43.29
100% Zero Grind Limestone	59.67	106	3	310.8	7.1	43.42
75% Hydrated Lime & 25% Zero Grind Limestone	58.50	100	3	310.6	7.4	42.9
50% Hydrated Lime & 50% Zero Grind Limestone	57.70	102	4	308.9	7.5	43.02
Check	57.11	107	3	308.8	7.5	42.57
25% Hydrated Lime & 75% Zero Grind Limestone	49.74	107	4	311.6	7.5	43.02
CV:	9.45					

**Table 14.** Liming Pea Plots, 2022.

Treatment	Yield (bu/ac)	Height (cm)	TKW (g)	TWT (g)	Moisture (%)
50% Hydrated Lime & 50% Zero Grind Limestone	54.67	64	250	413.0	15.1
75% Hydrated Lime & 25% Zero Grind Limestone	50.65	66	250	416.6	15.0
100% Zero Grind Limestone	49.1	66	251	416.1	14.6
100% Hydrated Lime	46.35	68	247	415.5	14.8
25% Hydrated Lime & 75% Zero Grind Limestone	43.51	68	248	417.5	14.9
Check	40.66	64	246	415.9	15.2
CV:	13.42				

**Table 15.** Liming Hard Red Wheat Plots, 2022.

Treatment	Yield (bu/ac)	Height (cm)	TKW (g)	TWT (g)	Moisture (%)	Protein (%)
50% Hydrated Lime & 50% Zero Grind Limestone	95.89	71	37	311.3	14.8	10.58
75% Hydrated Lime & 25% Zero Grind Limestone	94.09	72	38	309.6	15.0	10.42
100% Hydrated Lime	93.89	74	37	310.4	14.9	10.45
100% Zero Grind Limestone	93.56	73	38	310.2	15.0	10.77
Check	93.23	76	37	310.1	15.1	10.52
25% Hydrated Lime & 75% Zero Grind Limestone	92.87	72	37	309.7	14.9	10.63
CV:	4.74					

## Hemp Demonstration

**Partners:** Smoky Lake County  
Innotech Alberta  
Michael Carson

LARA planted an area of Slesesia which was provided by: Dr. Jan Slaski with Innotech Alberta. This demonstration was seeded in May and gave producers a firsthand look at hemp and the structure of the plant.



## **Pest Surveys**

**Partners:** Alberta Agriculture and Forestry  
Lac La Biche County  
County of St. Paul  
MD of Bonnyville  
Canadian Agricultural Partnership  
SARDA Ag Research  
Alberta Wheat Commission  
Alberta Pulse Growers  
Alberta Canola Producers Commission  
Alberta Barley Commission

### **Objectives:**

1. To participate in a complete pest monitoring program for Alberta.
2. To ensure the best, most current pest information is extended in a timely, appropriate manner for Northeastern Alberta producers.
3. To participate in a coordinated network of survey gatherers providing up-to-the-minutes information for Alberta crop producers, media, industry and professionals.

### **Introduction (Portions of this article are taken directly from the “Alberta Pest Monitoring Network Manual”).**

The goal of using Integrated Pest Management (IPM) surveys is to be able to provide enough information for these surveys so that early warnings of an increase in pest population are sent out in Alberta. Some of the pests surveyed in Alberta are Bertha Armyworm, Diamondback Moth, Cabbage Seedpod Weevil, Orange Blossom Wheat Midge, Grasshoppers, Wheat Stem Sawfly, Cutworms, Fusarium Headlight, Fusarium Wilt, Clubroot and Blackleg. For pests that have a short amount of lead-time, the Prairie Pest Monitoring Network provides a dynamic web-based system that updates the risk information on a daily basis. As the surveys are completed and the information is entered, the pest risk map changes to reflect the new information. Being forewarned allows producers and agronomists to be informed about certain pests they should be looking out for so that timely scouting and control tactics can be implemented before crop losses occur. The dynamic nature and timeliness of the information available to the agriculture industry would be a valuable asset to enhance decision making for producers, agronomists, and researchers.

In 2022 LARA participated in the pest surveys which included, Diamondback Moth, Bertha Armyworms, the Orange Blossom Wheat Midge and Pea Leaf Weevil. The regional data that we collected was sent to the provincial authorities. The information collected is compiled and can be found on the Alberta Agricultural and Forestry website Pest Monitoring Network. Producers can see if there are any insect outbreaks that they should be informed about in their area so that a plan for appropriate action can take place in a timely matter.

**Bertha Armyworm:**

Bertha Army worms are one of the most significant pests of canola in Canada. Their impact on crops occurs throughout Manitoba, Saskatchewan, Alberta, and the interior of British Columbia. Severe moth infestations may occur throughout most of this area but are usually limited to the parkland area of the Prairies and the Peace River region of British Columbia and Alberta. Within our partnering Counties and Municipal Districts including the M.D of Bonnyville, Lac La Biche County and the County of St. Paul, all trap sites had numbers well below the first warning level of 300 moths. It is important to continue to monitor Bertha Armyworms in order to catch any population build up that may occur.

In most years, the population of Berthas have been kept low due to unfavourable weather conditions such as cold winters, cool growing seasons, higher amounts of precipitation, and disease. These weather conditions can fail in some dry years with mild winters that might allow population to increase dramatically creating potential for widespread outbreaks. In extreme situations, population more than 1,000 larvae per square metre have been reported, but most commonly you would see populations that can fall between 50-200 larvae per square metre.

Infestation outbreaks can be localized or widespread over a number of acres. In the case of widespread outbreaks, crop losses can be minimized by applying an insecticide but only if the infestation was detected early enough. Failure to detect this insect early can lead to incorrect timing of insecticide application resulting in the possibility of severe damage to your crop. Also, high outbreaks may lead to a shortage of pesticide if suppliers are not aware of the potential infestation.

Bertha Armyworm populations are monitored with the use of pheromone baited traps that are used to attract the adult male moths. Two traps are placed a little way in from the edge of a canola crop and are 50 m apart from each other. The traps are checked once a week and a moth count done each time. The traps are put out in the fields from June-August. Each bertha moth (adult) counted is considered one armyworm larvae.

**Diamondback Moth:**

Diamondback Moths first migrated into North America from Europe over 150 years ago. The insect now occurs throughout North America or wherever the host plant is grown. The diamondback moth larvae typically feed on most plants found in the Brassicaceae family and, in Alberta, canola and mustard are its primary targeted plants. Within our partnering Municipal District of Bonnyville we only had one site for Diamondback Moths and the numbers were well below the economic threshold of 100 to 150 larvae per square metre. This insect is hard to predict what the population could be like for 2023 as it varies on population size in the spring. As well, timing, larvae size, and plant size can contribute to this variable infestation.

The adult moths may overwinter in the prairies but they typically arrive on wind currents in the spring that come from southern or western United States or northern Mexico. Although the Diamondback Moths occur each year throughout the Canadian prairies and north central states,

the severity of the infestation varies from year to year due to the arrival time and population size of the spring migrants.

Infestation of Diamondback moths can be very severe when spring conditions are suitable to the population. The insect damage is typically done by the larvae stage as they feed on the canola plants. They prefer to feed on plant tissues such as stems, leaves, flowers, and developing pods. In some years, millions of dollars in damage can be done so prevention tactics should be considered with drier seeding conditions.

The diamondback moth traps contain pheromones that attract the male moths. These traps are typically placed out during the last week of April (1 week prior to seeding). 2 traps are placed at opposite ends of the field approximately 100 metres apart from each other. They are checked weekly by removing the fly paper from the trap and counting the moths. The traps are left out for six weeks but if population increases at a later time the traps may be left out past that time duration.

### **Orange Blossom Wheat Midge:**

Orange Blossom Wheat Midge is found in most acres around the world wherever the host plant is grown. In recent years, there has been cases of population outbreaks reported in Alberta, Saskatchewan, Manitoba, and several regions of British Columbia.

Infestations of wheat midge can be damaging towards your crop yield and the grade of harvested grain. Wheat midge populations can exist in a low population and begin to build up rapidly in some years when favorable conditions are met. Wheat midge damage can be easily mistaken for frost or drought damage if not properly scouted for at the correct timing.

Damage is typically done by the larval stage as they feed on the developing wheat kernels causing them to shrivel, crack, and become disfigured. This damage is not easily seen as there is no physical external change in discoloration, size, or misshapen seed heads. Analyzing the developing kernels in the glumes is the easiest way to assess damage. Damage to the seed kernels can vary within a single wheat head. There may be a few kernels that might not be fully developed and may be too small and light and they will pass through the combine and be disposed with the chaff. And in other cases, a few kernels may be aborted from the plant entirely. Scouting timing is most critical to be done in the time period between heading and flowering stage because if damage is spotted then proper control actions could be put into place.

During the fall of 2022, LARA sent in 12 composite soil samples taken at a depth of 6 inches throughout our operational area. In total, 5 samples were taken from the MD of Bonnyville, 5 samples from the County of St. Paul and 2 samples from Lac La Biche County. Soil samples taken in the MD of Bonnyville, County of St. Paul and Lac La Biche County showed no infestation. Even though there was no wheat midge found, midge could reappear as they have the ability to stay dormant an extra growing season if ground conditions are not favorable conditions to develop with spring moisture. It is recommended that producers and agronomist plan to monitor fields in 2023 as the wheat heads out especially if there is late seeding or if wet conditions appear in 2023.

**Pea Leaf Weevil:**

The Pea leaf Weevil is a native insect to Europe. Its attacks were first recorded in Alberta in 2000 near Lethbridge, Alberta. This insect mainly targets pulse crops and has been a problem insect in Faba beans since 2014. In 2020, the Pea Leaf Weevil population migrated to more northwestern portions of central Alberta and southern Alberta has now seen lower populations of the insect. Within the MD of Bonnyville, Pea Leaf Weevil damage from the surveys conducted in late May-early June resulted in increase in the presence of insects in 2020. This is something for producers to keep an eye on. Producers who have seen similar trends on their operation, might want to consider using a seed treatment.

Spring weather conditions have a huge impact on timing and severity of Pea Leaf Weevil damage. With warm weather reaching a temperature around 20 degrees Celsius during the time of late April or early May can cause a spike in early arrival within fields. Early arrival can correspond with early insect damage which can decrease yields. Cooler spring conditions can delay arrival of the insect which can lower the risk of yield damage especially if the plant surpasses the six-node stage before the weevil arrives.

The adult Pea Leaf Weevil feeds on the leaves and growing points of the seedlings of legumes/pulses. This feeding leaves notches in a scalloped pattern along the leaf margins. As for the Pea Leaf Weevil larvae, they are root feeders. They target the nitrogen fixing nodules on the roots of the legume plants resulting in partial or complete inhibition of nitrogen fixation by the plant. A good prevention tool to consider when growing pulses is the use of a seed treatment with your seed.

In 2022 LARA conducted 7 pea leaf weevil surveys, 3 surveys in the County of St. Paul, and 4 surveys in the MD of Bonnyville. In both municipalities the surveys were conducted in late May to early June, there was low levels of pea leaf weevil damage found. The low levels are still not at a level of concern to producers. It will be important for producers to watch for the pea leaf weevil over the next few years to determine if it will be a problem in the Lakeland. At this time producers do not need to be using an insecticide seed treatment.

**Methods: Canola Sweeps**

In 2022 LARA also participated in a regional survey where canola sweeps were taken to identify any unidentified insects. We sampled 5 sites in the M.D of Bonnyville, 5 Sites in Lac La Biche County, and 4 sites in the County of St. Paul. These sites were spread out through each county to get better results and the sweeps were taken at the early bloom stage (25% flower). At each site, 10 sweeps were taken and then placed in a sample bag. From the sweeps taken, there were no new alarming insects found in the crop.

**Comments:**

Pest surveys are an important tool to use as it allows you to be notified of any insect outbreak that may occur within the growing season. They allow producers to be aware of insect outbreak potential and purchase seed treatments or another chemical beforehand. They are also useful for chemical representatives as they can estimate how much product they should have on hand for producers to purchase if needed. Regarding 2022 pest surveys, it has been overall a very good year for low insect pressure. All of the results from the surveys have been well below the economic thresholds. The forecast for 2023 in Lakeland should be a relatively good year for low insect pressure. However, it should be in your best practice to continue to monitor the pest surveys as weather conditions may change and be suitable for an insect outbreak of some sort.

# Forage and Livestock Program



### **The producer's resource for forage production, feeding and grazing**

The single most variable cost in livestock production is feed! From grazing in summer on tame and native pastures to feeding in the winter through conventional or extended grazing systems to animal marketing, cost effective production begins and ends with forage/feed. This program aims to aid producers in decreasing their cost of production while increasing their value of production.

#### **The goals of this program are to:**

- Demonstrate effective winter feeding systems in Northeastern Alberta
- Reduce costs associated with winter feeding systems
- Improve crop production efficiency through feed testing, ration-balancing, pasture/grazing management etc.
- Determine the highest yielding and quality annual crops for whole-plant forage production
- Aid producers in annual and perennial forage selection
- Provide producers with current marketing options and risk management strategies

## **Lakeland Forage Association**

The Lakeland Forage Association (LFA) was formed in 1972 to promote the management and use of forage crops, and to identify and pursue the forage crop research needs of Northeastern Alberta. The LFA provides forage demonstrations, extension activities and coordination of forage research. The governing board of directors currently has 13 members who are elected for staggered three-year terms at the LFA annual general meeting. They are responsible for the management of the Olympic Lake Grazing Lease.

The Olympic Lake Lease was obtained by LFA in 1985, has grown to 2000 acres and has been used for two main projects: the Northern Range Enhancement Project (NREP) and the Olympic Lake Heifer Project.

Under the NREP, this lease was used as a demonstration for turning boreal forest land into an enhanced, sustainable rangeland. Range improvements have included clearing and breaking the land, windrowing, and spraying and burning. This pasture has been rotationally grazed for 20 years (currently there are 12 paddocks) and so fencing was also involved in the range improvements. Grazing capacity has almost doubled in the past 20 years. Now that the pasture has been developed the focus has changed from development to increasing pasture longevity and rejuvenating older pastures. Projects with this goal have included yearly rotation of fertilizer application, spraying weeds (trials have included Grazon, Remedy, and Restore) and introducing legumes into the pastures.

The Heifer Project has been tracing the effect of body weight and body condition on heifer fertility for over ten years. The heifers are weighed at the beginning and the end of the grazing season. These measurements are then compared to the fall pregnancy test results. From 2010 to 2013, the heifers were weighed two additional times, when they are switched from tame pasture to native brush pastures around the end of July and then when they switch from these native pastures back to the tame pastures around mid-September.

LFA would like to thank Bob and Wanda Austin who have been managing the Olympic Lake Lease for the past eleven seasons and doing a great job!

In addition to managing the Olympic Lake Lease the LFA acts as the forage and livestock advisory board for Lakeland Agricultural Research Association (LARA).

## Northern Range Enhancement Project

**Partners:** Lakeland Forage Association  
Lac La Biche County  
Bob and Wanda Austin

### Objectives:

1. To monitor the weight of heifers entering and exiting the pasture.
2. To evaluate methods of pasture rejuvenation.
3. To develop a complimentary grazing system, allowing for maximum utilization of tame and native species.

### Background:

The Lakeland Forage Association (LFA) obtained Grazing Lease N. 840055 from the provincial government in 1985. The lease is located in Lac La Biche County near Olympic Lake (NE17-64-14) and was originally 1500 acres. A second lease was obtained by LFA to increase the pasture to 2000 acres. At the time the lease was obtained, the pasture had not been grazed for 15 years and no formal range improvement had taken place.

The LFA has used the Olympic Lake Grazing Lease as a demonstration for turning boreal forest land into an enhanced sustainable rangeland. Four different treatments have been used to increase carrying capacity: 1) clear and break, 2) spray and burn, 3) windrowing and 4) fertilizing. Rotational grazing has been practiced for the past 20 years and management improvements, such as cross-fencing, fertilizing and spraying, have been utilized to increase carrying capacity. The pasture has gone from carrying 998 Animal Unit Months (AUMs) in 1990 to 1607 in 2006. In 2010 1130 AUM's were grazed on the pasture, allowing some recovery from the drought in 2009. The cattle are rotated through the paddocks in a high intensity, low frequency grazing system.

Now that the pasture has been developed the focus has changed to increasing pasture longevity and pasture rejuvenation. Similar to other pastures in Northeastern Alberta, aspen encroachment and old pastures are a problem.

Every year approximately 15 patrons are given allotments for up to 30 heifers and one bull. The grazing season typically runs from mid-June to early-mid October.

In 2022, there was one project at the Olympic Lake Grazing Lease.

1. Heifer project

### *Heifer Project*

### Methods:

The heifers were weighed when they entered the pasture on June 3<sup>rd</sup>, 2021. The Bulls were pulled on July 29<sup>th</sup>, 2021, allowing for a 60-day breeding period. At this time the heifers were weighed for a second time. The heifers were removed from the pasture on September 10<sup>th</sup>, 2021 allowing for adequate grass carryover for the 2022 grazing season. The heifers were weighed for a third and

final time during the heifer take-out day in September. Similar to previous years the heifers were not pregnancy checked. The Pasture received a total of 8.5 inches of rain over the grazing season.

#### Results:

There was a total of 109 days in the grazing season at Olympic Lake Grazing Lease (Table 16, Table 17). The average daily gain (ADG) over the grazing season was 1.26lbs/day (Table 17), which is 0.18lbs/day lower than the 2021 ADG (1.44lbs/day), and 0.29 lbs/day lower than the 2020 ADG (1.55lbs/day).

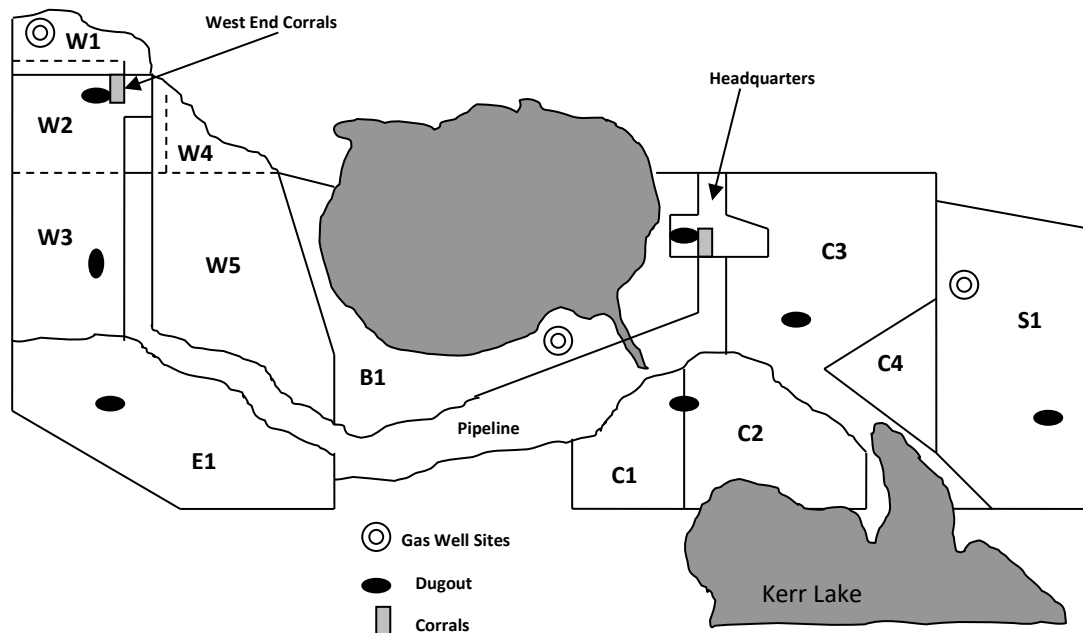
**Table 16.** Grazing rotation for the 2022 grazing season at Olympic Lake Grazing Lease.

Paddock Name	First Graze					Second/Third Graze				
	Date In	Date Out	# of days	# of head		Date In	Date Out	# of days	# of head	
				heifers	bulls				heifers	bulls
Headquarters	03-Jun-22	04-Jun-22	1	388	13	28-Jul-22	29-Jul-22	1	388	12
Headquarters						19-Sep-22	20-Sep-22	1	388	0
W3	04-Jun-22	07-Jun-22	3	388	13	18-Jul-22	22-Jul-22	4	388	12
W3						08-Sep-22	11-Sep-22	3	388	0
W5	07-Jun-22	11-Jun-22	4	388	13	22-Jul-22	24-Jul-22	2	388	12
W5						05-Sep-22	08-Sep-22	3	388	0
W1	11-Jun-22	14-Jun-22	3	388	13	24-Jul-22	28-Jul-22	4	388	12
W2	14-Jun-22	17-Jun-22	3	388	13	01-Sep-22	05-Sep-22	4	388	0
W4	17-Jun-22	20-Jun-22	3	388	13	30-Aug-22	01-Sep-22	2	388	0
PIPELINE	21-Jun-22	24-Jun-22	3	388	13	11-Sep-22	12-Sep-22	1	388	0
C3	24-Jun-22	01-Jul-22	7	388	13	12-Sep-22	15-Sep-22	3	388	0
C1	01-Jul-22	06-Jul-22	5	388	13	17-Sep-22	19-Sep-22	2	388	0
C2	06-Jul-22	14-Jul-22	8	388	13	15-Sep-22	17-Sep-22	2	388	0
C4	14-Jul-22	18-Jul-22	4	388	12					
S1	29-Jul-22	12-Aug-22	14	388	0					
E1	12-Aug-22	30-Aug-22	18	388	0					
Home	20-Sep-22			388	0					
		<b>Total:</b>	<b>76</b>				<b>Total:</b>	<b>32</b>		



**Table 17.** Heifer data by herd for the 2022 grazing season.

	2022 Heifer Weights			Heifer Average Daily Gain (ADG)					
	June	July	September	June 3 – July 28	55 days	July 28-September 20	54 days	June 3 - September 20	109 days
Herd	lbs	lbs	lbs	lbs gained	lbs/day	lbs gained	lbs/day	lbs gained	lbs/day
1	741	862	889	120	2.18	27	0.51	148	1.35
2	833	906	926	73	1.33	20	0.37	93	0.85
3	732	911	960	179	3.25	49	0.91	228	2.09
4	796	866	879	70	1.28	13	0.25	84	0.77
5	823	938	960	114	2.08	23	0.42	137	1.26
6	851	959	992	107	1.95	34	0.62	141	1.29
7	710	848	888	138	2.51	40	0.75	178	1.64
8	889	950	990	61	1.11	40	0.74	101	0.93
9	797	937	972	141	2.56	35	0.65	176	1.61
10	894	994	1018	100	1.82	24	0.44	124	1.13
11	725	802	833	77	1.39	31	0.57	107	0.98
Average	799	907	937	107	1.95	31	0.57	138	1.26



**Figure 1.** Map of the Northern Range Enhancement Project (NREP) pasture system.

## Discussion:

There was a total of 11 patrons grazing cattle at Olympic Lake in 2022 with herd size ranging from 30 heifers and 1 bull to 60 heifers and 2 bulls in partnerships. All red or black angus heifer bulls were used for breeding between June 3<sup>rd</sup> and July 28<sup>th</sup>.

The average herd entry weight at 799 lbs in 2022, 16 pounds less than the 815lb entry weight in 2021, which is likely the result of the 2021 drought creating short feed supplies. The average daily gain (ADG) decreased later in the grazing season, from 1.95lbs/day in June/July period to 0.57lbs/day from July – September. This is the typical ADG trend seen on this pasture, where ADG declines in the later part of the grazing season. Although the pasture received an inch and a half more precipitation than 2020, grass regrowth was still limited by precipitation, especially in from July to September.

The stocking rate at the Olympic Lake Lease has slowly declined since 2009, which has allowed for significant recovery and improvement of the pasture. The historical data for the pasture is summarized in table 18.

The poor amount of precipitation seen the grazing year resulted it for slow pasture regrowth.

**Table 18.** Historical data from Olympic Lake Grazing Lease. 2003-2022.

Year	Grazing Season (days)	# of Head	Weight Gain	ADG	% Open
2022	109	388	138	1.26	N/A
2021	99	386	142	1.44	N/A
2020	117	399	181	1.55	N/A
2019	113	390	152	1.24	N/A
2018	105	410	123	1.17	N/A
2017	123	388	158	1.29	N/A
2016	121	350	141	1.16	N/A
2015	102	280	-	-	N/A
2014	133	271	266	2	28
2013	120	336	205	1.71	17
2012	126	343	139	1.1	9
2011	121	350	223	1.86	14
2010	120	350	170	1.43	14
2009	111	410	124	1.13	19
2008	128	369	224	1.76	14
2007	126	435	130	1.03	18
2006	127	462	-	-	18
2005	127	439	156	1.22	13
2004	127	427	163	1.35	10
2003	131	410	116	0.9	10
Average	119	380	164	1.37	15.3

## Regional Annual Silage Trials

**Partners:** Alberta Agriculture, Forestry and Rural Development  
Battle River Research Group  
Chinook Applied Research Association  
Gateway Research Organization  
North Peace Applied Research Association  
McKenzie Applied Research Association  
West-Central Forage Association  
SECAN  
Association of Albert Co-op Seed Cleaning Plants  
Alberta Brand, Canadian Seed Growers Association  
A & L Canada Laboratories  
Imperial Seeds  
Canadian Agriculture Partnership

The Annual Forage Trial (AFTs) began at LARA in 2008 with the purpose of comparing annual forage crops for whole-plant production when considering both yield and quality. Funding was obtained from the Alberta Beef Producers and the Ag and Food Council. The trial was seeded in four blocks of plots (barley, oats, triticale and alternatives) in three locations (Fort Kent, St. Paul and Lac La Biche).

The trial was expanded in 2009 to form the Regional Silage Trials, a provincial partnership between six applied research and forage associations with 11 plot sites across the province. The Alberta Beef Producers provided funding for this initiative and Alberta Agriculture helped coordinate seed. While many of the associations involved have been growing silage trials for a number of years, this is the first coordinated effort to standardize the protocol, variety selection and data reporting. Provincial protocol was established for five blocks of plots: barley, oats, triticale, pulse and late-seeded.

In 2022, the LARA Regional Annual Silage Trial included six blocks: barley (21 varieties), oats (12 varieties), triticale and wheat (10 varieties), winter/spring intercrop (15 treatments), pulse/cereal intercrop (12 treatments) and alternative (10 varieties).

In partnership with the Association of Alberta Co-op Seed Cleaning Plants and the Alberta Seed Growers Association, the Regional Annual Silage Trial information are annually printed in the Alberta's Seed Guide ([seed.ab.ca](http://seed.ab.ca)). The Regional Silage Trial data for 2021 and 2022 have been printed in the most recent seed guide.

## **Regional Annual Silage Trial**

### **Cereals**

**Partners:** Canadian Agriculture Partnership  
Alberta Agriculture, Forestry and Rural development  
Battle River Research Group  
Chinook Applied Research Association  
Gateway Research Organization  
West-Central Forage Association  
Peace Country Beef and Forage Association  
Mary Carson and Michael Carson

### **Objectives:**

1. To determine the best yielding cereal forage varieties (barley, oats, triticale/wheat) for whole plant forage production in Northeastern Alberta.
2. To determine the best quality cereal forage varieties (barley, oats, triticale, wheat) for cattle feed in Northeastern Alberta.

### **Background:**

An important aspect of crop production is variety selection and, with new varieties continually becoming available, current and comprehensive forage variety yield and quality data is essential for Alberta producers. Previous experience with cereal production and the Regional Variety Trials has shown that there can be a 15% increase in production from selecting the best variety, which, on average, can be an increase of \$25/acre.

Through the use of experience, neighbors and publication such as the Alberta Seed Guide ([seed.ab.ca](http://seed.ab.ca)), we make variety selection decisions to benefit producers. However, there has been a lack of whole-plant annual forage production information to aid us in making cropping decision for forage production.

The purpose of this trial is to supply producers with current and comprehensive annual forage variety yield and quality data for silage, greenfeed or swath grazing in Northeastern Alberta (crop zones 3 and 5) and across the province.

### **Method:**

The cereal trials were grown in three blocks of plots: barley, oats and triticale/wheat, in two locations: LARA Fort Kent (NE25-61-5-W4) and Smoky Lake (SE 14-59-18-W4). The trial blocks were seeded as a randomized complete block design (RCBD) with four replicates to reduce error. The plots measured 1.15 m by 6 m in area.

Agronomic information on the trials can be found in Table 19. The trials were seeded using the LARA five-row zero-till small plot drill and blend fertilizer was side-banded at the time of seeding. The trials in Fort Kent were seeded on May 27, 2022 (oats) and the trials in Smoky Lake were

seeded on May 25, 2022 (barley and triticale/wheat). The trials were sprayed with a 3-point hitch sprayer once during the growing season.

Crop height and stage of maturity was recorded prior to harvest with the LARA alfalfa-Omega self-propelled forage harvester. The total plot weight was recorded and samples were taken to assess dry matter content. Additional composite samples were taken from each variety, frozen and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis was conducted using R statistical software,  $p = 0.05$ .

The following varieties were grown in the Regional Annual Silage Trials in 2022:

### **Barley**

- *CDC Austenson* – 2-row barley variety with semi-smooth awns, short and strong straw and high feed yield.
- *Altorado* – 2-row, spring feed barley with good resistance to lodging and a fair to good resistance to drought conditions.
- *Amisk* – rough awned, 6-row, semi-dwarf general purpose barley with strong straw for decreased lodging potential.
- *Canmore* – high yielding, 2-row general purpose barley variety with good resistance to lodging.
- *CDC Cowboy* – high yielding, 2-row feed barley variety with excellent standability and improved disease resistance.
- *AB Advantage* – 6-row, smooth-awned feed and forage barley with high grain yield and good agronomic performance.
- *Claymore* – 2-row barley variety developed from CDC Copeland x Xena.
- *AB Cattlelac* – semi-smooth awned barley variety with good lodging resistance, good grain yield and excellent disease resistance.
- *AB Wrangler* – 2 row feed grain and silage variety with high tonnage potential, early to medium maturing, moderate disease resistance.
- *Sundre* – high yielding, 6-row barley variety with good disease resistance.
- *CDC Maverick* – 2-row, smooth-awned forage barley with high forage yields and good drought tolerance.
- *AB Hauge* - 2 row hulled general purpose barley with potential for forage production, high protein, low NDF and ADF.
- *CDC Churchill* – high yielding 2-row malt barley variety with lower grain protein than AC Metcalfe and an overall excellent agronomic package.
- *AB Prime* – barley variety developed in Alberta.
- *Esma* – 2-row barley variety with strong yields and agronomic package.
- *Stockford* – hooded, 2-row barley variety suitable for grain production, hay, and forage.
- *AB Tofield* - 6-row, awned forage and feed barley with high yields and good lodging resistance.
- *CDC Renegade* - 2 row smooth awn, mid-height barley with excellent forage yield and great grain yield.
- *CDC Fraser* - 2 row malt variety that is multi-use with high grain and good forage yields.

- *KWS Kellie*- very short, strong strawed 2-row European barley with excellent grain yield.

### **Oats**

- *CDC Baler* – very leafy, forage oat variety.
- *AC Juniper* – early maturing, general purpose oat variety with high yields and strong straw.
- *AC Morgan* – high yielding, later maturing milling oat with good lodging resistance and is commonly used for silage or greenfeed.
- *CDC Haymaker* – later maturing forage oat variety with high forage yields and quality.
- *CS Camden* – milling oat, excellent yield potential, great lodging resistance, short height, and big leaf biomass
- *CDC Arborg* – is a milling oat with good yield potential, early maturing, lodge resistant.
- *Murphy* – widely adapted forage oat with high yields, improved lodging resistance and is well suited for silage, swath grazing or greenfeed.
- *CDC Nasser* – feed oat variety with low lignan hull and high oil content.
- *ORE 3542M* – white hulled milling oat variety with short, strong straw, good lodging resistance and good grain yields.
- *CDC Endure* – oat variety with excellent yield and standability.
- *CDC SO-1* – early maturing, very high digestible brown oat variety with high fat content and does not need to be rolled. Short strong straw for reduced lodging.
- *AAC Douglas* - is a high  $\beta$ -glucan white hulled milling oat with high grain yield potential and excellent groat percentage.

### **Triticale and Wheat**

- *Taza* – reduced awn forage and grain triticale variety with good lodging resistance.
- *Bunker* – early maturing, reduced awn forage variety with great digestibility, high fat content and high silage yields.
- *Sunray* – early maturing, spring triticale variety with improve ergot resistance. Short statured for increased resistance to lodging.
- *AAC Paramount* – soft white spring wheat, midge tolerant, high grain protein, good fit for silage production
- *AAC Awesome* – soft white spring wheat, midge tolerant, high yield, and excellent straw strength, good for silage production.
- *AAC Delight* – spring triticale, reduced awn forage variety with low ergot susceptibility and quality high tonnage.
- *AB Stampeder* – new spring forage triticale variety with reduced awns, shorter stature and increased digestibility.
- *AC Andrew* – soft white spring wheat variety with high yields and short, strong straw.
- *AC Sadash* – semi-dwarf soft white spring wheat variety with high yields, high quality and short, strong straw.
- *KWS Alderon* – high yielding special purpose red spring wheat, short stature, strong straw, late maturing, no awns, does well in cooler growing seasons.

**Table 19.** Agronomic Information 2022.

		# of	Seeding	Seeding	Fertility	Weed	Harvest
Trial	Site	Varieties	Date	Rate	(lbs/ac)	Control	Date
<b>Barley</b>	Smoky Lake	21	25-May-22	250 lbs/ac	No additional fertilizer required as per soil test.	Buctril M	8-Aug-22
<b>Oats</b>	Fort Kent	12	27-May-22	250 lbs/ac	80-30-30-10 @ 290 lbs/ac	Buctril M	12-Aug-22
<b>Triticale/Wheat</b>	Smoky Lake	10	25-May-22	250 lbs/ac	No additional fertilizer required as per soil test.	Buctril M	11-Aug-22

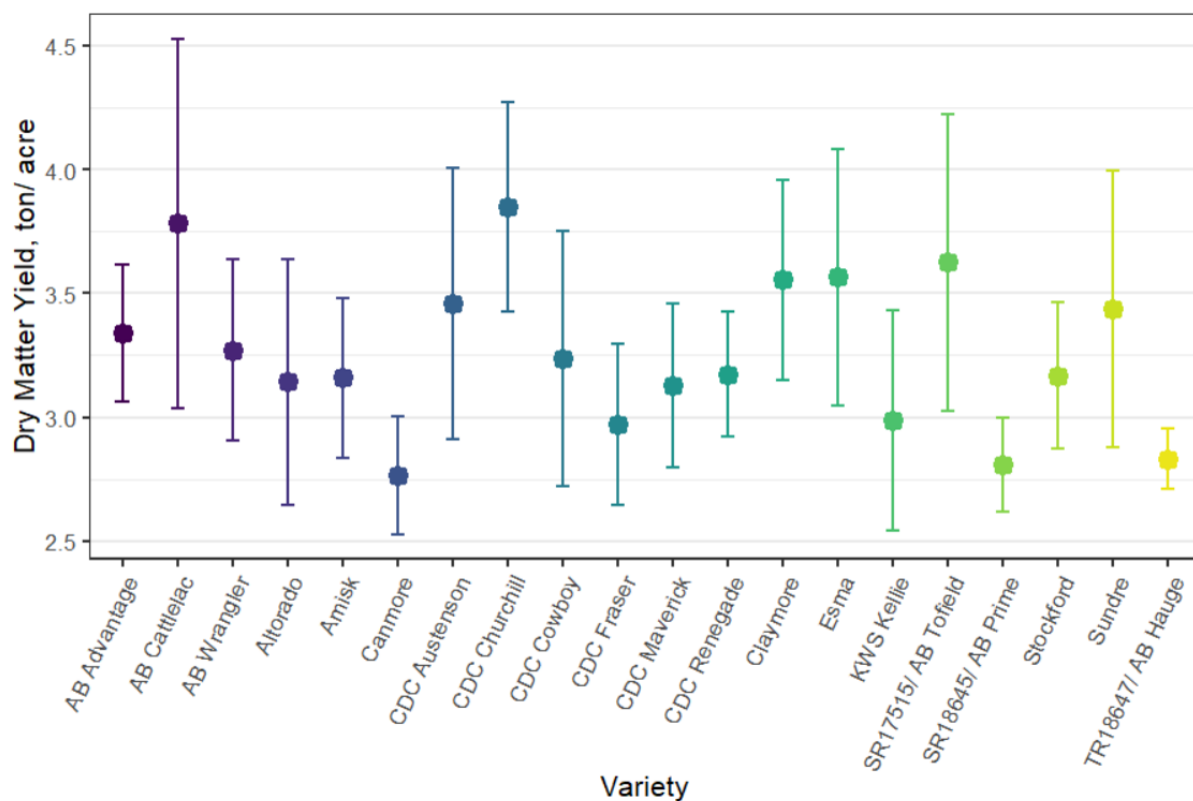
**Results:****Barley**

The barley trials are aimed to be harvested at the soft dough stage. There were 21 barley varieties grown in the trials this year at both locations. There were 3 new 2-row barley varieties added to the trial in 2022, CDC Renegade, CDC Fraser and KWS Kellie.

This year, we only had one barley site, which was in Smoky Lake County. Yield and quality results for the Smoky Lake can be found in Figure 1 and Table 20, respectively. The barley silage variety trial was harvested 75 days after seeding. Average moisture content was 54%.

With the continued dry conditions, we saw lower yields compared to average precipitation years. The average dry matter yield was 3.28 ton/acre in 2022 at Smoky Lake. The highest yielding variety was CDC Churchill at 3.89 ton/ac. AB Cattlelac was a close second at 3.78 ton/ac dry matter yield, however, there was lots of variability in yield with this variety. Overall, there were no significant differences between any of the varieties tested.

In contrast to previous years, we saw significant variability between varieties when considering nutritional quality. For crude protein (CP), the general rule of thumb is 7-9-11 percent for mid-gestation, late-gestation and after calving. Most of the varieties are adequate to meet the nutrients requirements through mid-gestation to late-gestation, with some varieties (AB Advantage, CDC Austenson, Esma and Sundre) having adequate protein content to meet post-calving requirements. Total digestible nutrients (TDN), which is the easiest method to estimate the amount of energy in the feed, was consistent between varieties and generally was adequate to meet the nutritional requirements through mid-gestation to post-calving, following the rules of 55-60-65.



**Figure 1.** RST Barley Smoky Lake dry matter yield, 2022 (ton/acre, 1 ton = 2000 lbs).

**Table 20.** RST Barley Smoky Lake nutritional quality, 2022.

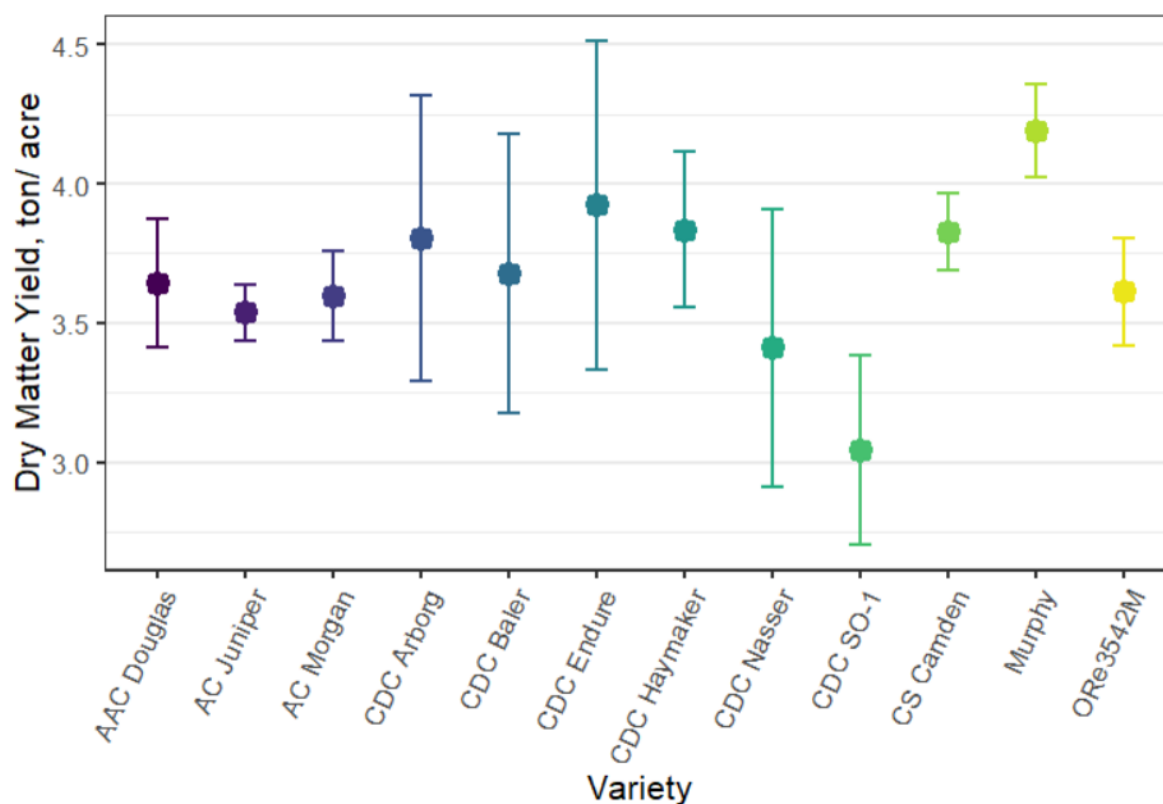
Variety:	Moisture (%)	2022 Quality Results							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
AB Advantage	48.6	11.57	27.17	48.53	67.73	0.33	0.31	1.98	0.11
AB Cattlelac	62.1	8.43	25.24	47.12	69.24	0.45	0.15	1.62	0.23
AB Wrangler	50.8	10.17	21.66	48.71	72.03	0.35	0.27	1.38	0.11
Altorado	49.9	9	30.45	55.63	65.18	0.39	0.3	1.75	0.11
Amisk	49.9	9.58	26.15	47.62	68.53	0.37	0.29	1.92	0.11
Canmore	62.6	8.93	20.76	38.84	72.73	0.47	0.24	1.59	0.15
CDC Austenson	58.4	11.23	16.54	36.09	76.02	0.39	0.22	1.47	0.18
CDC Churchill	50.8	9.93	23.95	43.26	70.24	0.39	0.31	1.43	0.11
CDC Cowboy	53.3	8.96	23.33	42.62	70.73	0.39	0.23	1.52	0.14
CDC Fraser	54.4	8.54	21.81	42.52	71.91	0.33	0.19	1.22	0.12
CDC Maverick	52.6	10.41	24.25	46.55	70.01	0.47	0.18	1.28	0.14
CDC Renegade	54.8	8.92	33.75	55.42	62.61	0.47	0.3	1.69	0.12
Claymore	46.9	8.17	28.5	54.02	66.7	0.48	0.21	1.62	0.11
Esma	40.5	13.16	27.63	49.56	67.38	0.31	0.45	1.97	0.12
KWS Kellie	58.9	10.02	27.95	51.76	67.13	0.47	0.3	1.66	0.13
SR17515/ AB Tofield	58.7	9.81	26.23	47.47	68.47	0.48	0.25	1.92	0.16
SR18645/ AB Prime	48.4	10.96	26.37	48.87	68.36	0.41	0.24	1.43	0.15
Stockford	51.7	8.51	25.44	48.71	69.08	0.42	0.23	1.35	0.1
Sundre	61.2	14.43	35.38	51.76	51.76	0.55	0.17	1.74	0.16
TR18647/ AB Hauge	56.2	9.85	22.29	44.45	71.54	0.39	0.22	1.91	0.11
Average	53.5	10.03	25.74	47.48	68.37	0.42	0.25	1.62	0.13

## Oats

The oat trials are aimed to be harvested at the milk stage. There were 12 oat varieties grown in the trial this year in Fort Kent. The results of oat silage variety trial can be found in Figure 2 and Table 21. The average moisture content at the time of harvest was 66%. AAC Douglas was a new variety that was included in the silage trials this year. The Fort Kent trial was harvested at 77 days after seeding.

This year, the average yield was almost one ton per acre higher than last year. The average dry matter yield of the oat trial in Fort Kent was 3.68 ton/ acre in 2022. The highest yielding variety was Murphy at 4.19 ton/acre of dry matter, which was a significantly higher than the CDC SO-1 yield of 3.05 ton/acre. Murphy was also the highest yielding variety in 2021 at the St. Paul site.

The average CP and TDN in the 2022 oat variety trials were 6.93% and 61.26%, respectively. Several of the varieties grown had CP content that would not meet CP requirements at any stage of gestation for cattle. However, TDN content was generally sufficient to meet requirements until post calving. Although Murphy had the highest yields, it also had the lowest CP and TDN content of all the varieties grown.



**Figure 2.** RST Oats Fort Kent dry matter yield, 2022 (ton/acre, 1 ton = 2000 lbs).

**Table 21.** RST Oats Fort Kent nutritional quality, 2022.

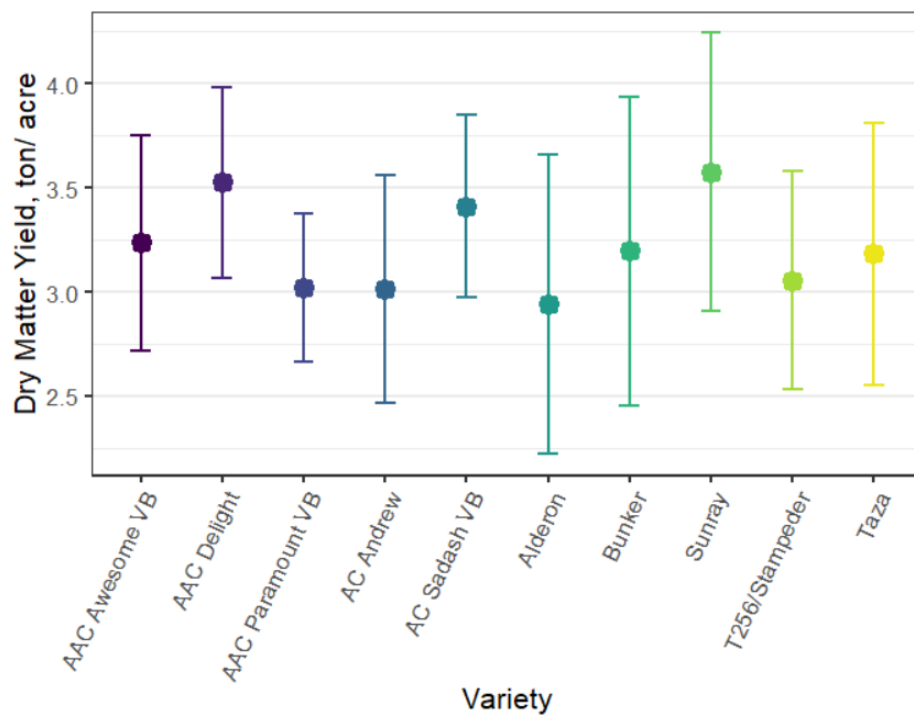
Variety	Moisture (%)	2022 Quality Data							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
<b>ORe3542M</b>	66.23	7.98	35.08	59.41	61.57	0.22	0.21	1.29	0.25
<b>AAC Douglas</b>	66.83	8.65	31.14	55.94	64.64	0.16	0.21	1.16	0.19
<b>CDC Baler</b>	64.78	7.2	36.15	61.45	60.74	0.47	0.25	1.78	0.33
<b>AC Morgan</b>	66.95	6.98	35.02	58.69	61.62	0.33	0.23	1.63	0.21
<b>CDC Endure</b>	65.98	7.05	36.25	59.88	60.66	0.27	0.23	1.77	0.21
<b>CS Camden</b>	67.64	7.46	34.96	58.42	61.67	0.29	0.2	1.37	0.27
<b>CDC Nasser</b>	68.79	6.15	34.65	62.53	61.91	0.21	0.18	1.07	0.2
<b>CDC SO-1</b>	62.66	6.74	30.77	57.17	64.93	0.2	0.21	1.1	0.25
<b>AC Juniper</b>	65.39	6.49	33.69	58.12	62.45	0.31	0.2	1.56	0.24
<b>CDC Haymaker</b>	70.73	6.66	38.73	65.95	58.73	0.32	0.16	1.64	0.26
<b>CDC Arborg</b>	61.29	8.19	27.79	50.06	67.25	0.2	0.27	1.01	0.2
<b>Murphy</b>	68.16	3.65	51.27	78.73	48.96	0.29	0.1	1.68	0.24
<b>Average</b>	<b>66.3</b>	<b>6.93</b>	<b>35.46</b>	<b>60.53</b>	<b>61.26</b>	<b>0.27</b>	<b>0.20</b>	<b>1.42</b>	<b>0.24</b>

### ***Triticale and Wheat***

The triticale and wheat trials are targeted to be harvested at the late milk stage. This year, the triticale and wheat silage variety trials were in Smoky Lake County. There were 5 wheat varieties and 5 triticale varieties in the trials. The results can be found in Figure 3 and Table 22. Harvest occurred 78 days after seeding.

The trials yielded higher in this year in Smoky Lake, then last year in St. Paul at an average of 3.20 tons/acre dry matter yield. Like last year, Sunray was the highest yielding variety at 3.58 tons/ac of dry matter, but this was not significantly different from any of the other varieties in the trial.

In 2022, CP and TDN averaged 12.96% and 63.94%, respectively. CP of every variety in the trial met requirements throughout gestation and post calving. TDN was adequate to meet requirements during the second and third trimester of pregnancy for cattle, but will not meet TDN requirements post calving.



**Figure 3.** RST Triticale Smoky Lake dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 22.** RST Triticale Smoky Lake forage nutritional quality, 2022.

Variety	Moisture (%)	2022 Quality Data							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Sunray	58.16	12.02	32.6	47.65	63.5	0.28	0.27	1.35	0.12
AAC Delight	56.6	11.23	32.25	48.11	63.78	0.18	0.21	1.13	0.08
AAC Paramount VB	53.24	11.64	33.23	45.99	63.01	0.25	0.22	1.68	0.1
AC Andrew	54.41	13.07	34.25	46.58	62.22	0.27	0.31	2.02	0.12
AAC Awesome VB	57.37	11.76	33.71	49.74	62.64	0.24	0.18	1.31	0.13
AC Sadash VB	52.23	14.24	34.03	44.19	62.39	0.32	0.29	2.14	0.12
T256/Stampeder	54.55	13.78	33.66	49.08	62.68	0.28	0.31	1.65	0.14
Bunker	57.16	13.68	32.85	48.82	63.31	0.37	0.33	1.83	0.13
Taza	57.77	11.57	34.82	50.84	61.78	0.21	0.24	1.5	0.1
Alderon	59.96	13.95	31.83	46.48	64.1	0.3	0.27	1.54	0.16
Average	56.1	12.69	33.32	47.75	62.94	0.27	0.26	1.62	0.12

## **Regional Annual Silage Trial**

### **Winter/Spring Cereal Intercrop**

**Partners:** Alberta Agriculture, Forestry and Rural Development  
SECAN  
Chinook Applied Research Association  
West-Central Forage Association  
SARDA Crop Research  
Battle River Research Group  
Canadian Agriculture Partnership

#### **Objectives:**

1. To determine which winter/spring cereal intercrop mixtures are a feasible option when compared to conventional cereal forage crops for whole plant forage production, considering both yield and quality.

#### **Background:**

The intercropping of winter cereals with spring cereals may enhance forage quality and provide limited quantities of high-quality forage that could be used to extend fall grazing. Work done by Baron et al. (1990) found that spring-planted winter cereals can maintain yield and quality late in the summer and into the fall under simulated pasture treatment. This is an important advantage to their use as spring cereal production tends to decline after the end of July (Berkenkamp 1984). Consequently, the combination of spring and winter cereals could provide an ideal yield distribution throughout the growing/grazing season. Advancements in crop breeding technology and new varieties released in recent years has not been tested in spring/winter cereal mixtures. Understanding the regional adaptability of these new varieties in a mixture will be key for Alberta producers to make the most economic decisions for their operations.

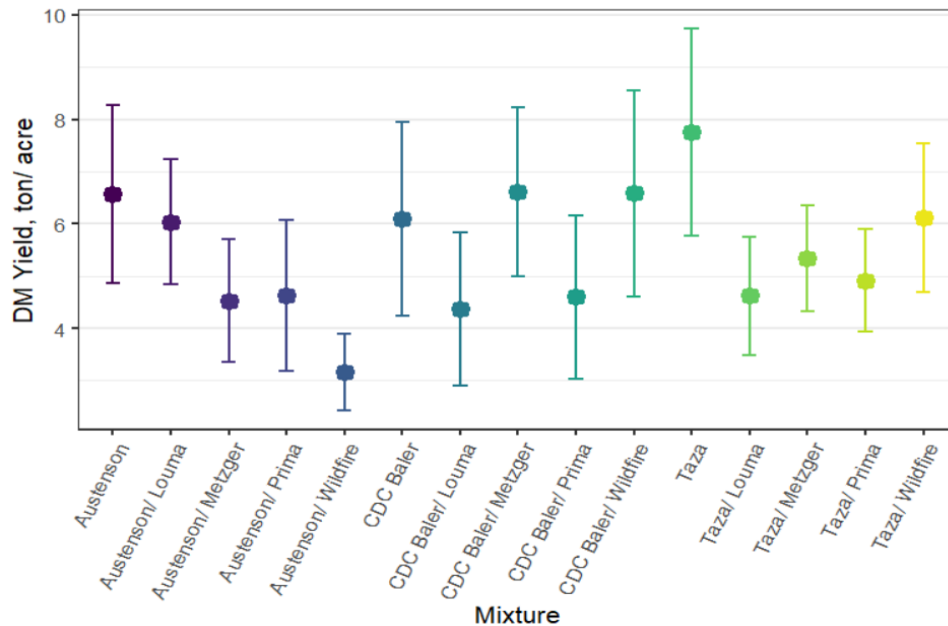
#### **Method:**

The winter/spring cereal intercrop trial was established in Fort Kent and Smoky Lake County and The trial was established at the LARA Fort Kent Research Site (NE25-61-5-W4) on May 26, 2022 and at our Smoky Lake site (SE 14-59-18-W4) on May 25, 2022 in a randomized complete block design (RCBD) with four replicates to reduce error. The plots were seeded with the LARA five-row zero-till small plot drill with fertilizer side banded at the recommended rates as per soil tests. harvested at the recommended stage for the spring cereals.

The following four winter cereal varieties were used in mixtures with Taza triticale, CDC Austenson barley, and CDC Baler oats:

- *AAC Wildfire* – hard red winter wheat, short strong straw, good winter survival, excellent lodging resistance.
- *Prima* – fall rye variety with high yields and is well adapted to Western Canada.
- *Luoma* – winter triticale, has no awns, high yield potential, and good disease resistance.
- *Metzger*- winter triticale, has reduced awn expression, good winter hardiness.

The trial in Fort Kent was harvested at the recommended stage for the spring cereals on August 15, 2022 at 81 days after seeding. Results of the Fort Kent trial can be found in Figure 4 and Table 23. The highest yielding mixtures were CDC Baler with Metzger or Wildfire at 6.61 and 6.59 dry matter tons/acre, respectively. In general, the mixtures with CDC Baler were among the top yielding varieties, however, there was quite a bit of variability in yields.

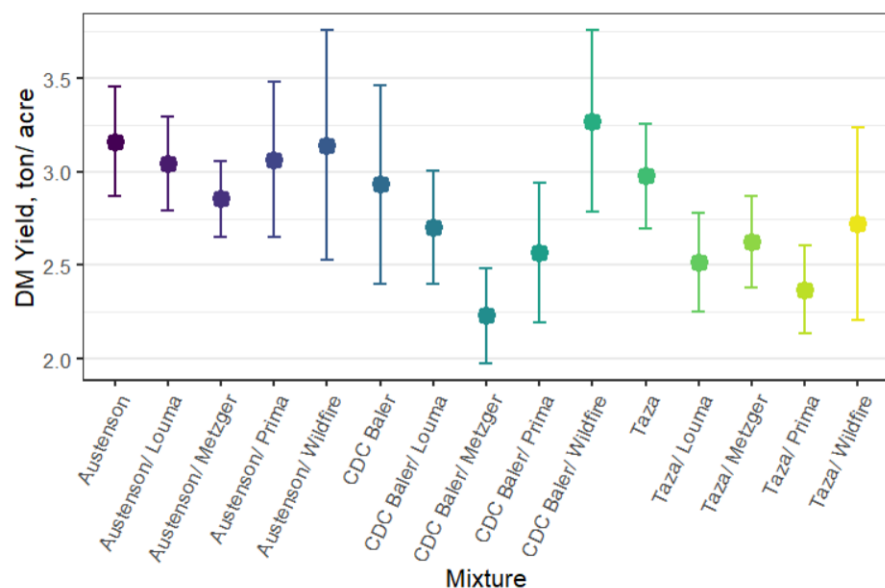


**Figure 4.** RST winter/ spring cereal intercrop dry matter forage yield for Fort Kent in 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 23.** RST Winter/Spring Cereal Intercrop Quality Fort Kent, 2022.

Variety	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Austenson	10.78	38.56	54.86	58.86	0.62	0.11	1.52	0.23
Austenson/ Louma	7.98	30.87	53.96	64.85	0.16	0.18	0.83	0.18
Austenson/ Metzger	6.83	36.95	63.37	60.58	0.22	0.16	0.9	0.22
Austenson/ Prima	5.64	38.39	67.07	58.99	0.27	0.1	1.06	0.25
Austenson/ Wildfire	7.67	37.83	63.36	59.43	0.3	0.15	0.94	0.27
CDC Baler	9.29	30.53	55.83	65.12	0.18	0.19	0.82	0.21
CDC Baler/ Louma	9.01	34.66	61.65	61.9	0.21	0.19	0.93	0.22
CDC Baler/ Metzger	6.82	41.52	70.28	56.56	0.28	0.11	1.06	0.25
CDC Baler/ Prima	9.87	39.96	69.16	57.77	0.25	0.17	0.94	0.26
CDC Baler/ Wildfire	9.7	30.46	55.15	65.17	0.22	0.2	0.93	0.23
Taza	7.28	30.85	56.88	64.88	0.25	0.17	1.03	0.23
Taza/ Louma	9.17	28.28	49.86	66.93	0.17	0.2	1.08	0.18
Taza/ Metzger	7.06	38.36	61.72	59.02	0.3	0.11	1.13	0.31
Taza/ Prima	8.86	35.88	63.2	60.95	0.25	0.18	1.19	0.27
Taza/ Wildfire	7.68	36.01	60.39	60.85	0.16	0.17	0.83	0.16
<b>Average</b>	<b>8.24</b>	<b>35.27</b>	<b>60.45</b>	<b>61.46</b>	<b>0.26</b>	<b>0.16</b>	<b>1.01</b>	<b>0.23</b>

The trial in Smoky Lake was harvested at the recommended stage for the spring cereals on August 11, 2022, at 78 days after seeding. Results of the Smoky Lake RST winter/ spring intercrop trial can be found in Figure 25 and Table 24. Smoky Lake yielded significantly less than the Fort Kent trail. The highest yielding mixtures were CDC Baler or Austenson with Wildfire at 3.27 and 3.14 ton/acre of dry matter, respectively. In general, the mixtures with Wildfire as the winter cereal tended to yield higher than mixtures with the other winter cereals.



**Figure 5.** RST winter/spring cereal intercrop dry matter forage yield for Smoky Lake, 2022 (ton/ac, 1 ton = 2000 lb).

**Table 24.** RST winter/spring cereal intercrop forage quality for Smoky Lake in 2022.

Variety	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
CDC Baler	10.15	29.85	51.85	65.65	0.52	0.3	2	0.19
CDC Baler/ Louma	9.63	29.17	51.14	66.18	0.54	0.25	2.39	0.17
CDC Baler/ Metzger	8.51	31.66	57.03	64.24	0.39	0.21	1.4	0.16
Austenson/ Metzger	8.63	23.64	44.04	70.48	0.35	0.17	1.32	0.14
Austenson/ Louma	9.1	25.27	45.91	69.21	0.41	0.2	1.69	0.15
CDC Baler/ Prima	10.6	31.54	55.64	64.33	0.54	0.35	2.49	0.17
Taza/ Louma	10.44	28.28	51.7	66.87	0.29	0.24	1.64	0.11
Taza/ Metzger	9.67	33.76	58.21	62.6	0.34	0.26	1.72	0.12
Austenson	7.81	28.26	50.33	66.89	0.42	0.16	1.35	0.15
Austenson/ Wildfire	10.54	31.85	55.25	64.09	0.59	0.31	2.71	0.15
Taza	11.08	28.03	49.32	67.06	0.37	0.34	1.66	0.13
Taza/ Prima	10.21	30.58	53.95	65.08	0.46	0.2	1.52	0.19
CDC Baler/ Wildfire	10.44	31.25	55	64.56	0.28	0.32	1.84	0.1
Austenson/ Prima	8.39	32.98	55.89	63.21	0.32	0.23	1.53	0.13
Taza/ Wildfire	10.49	31.46	53.88	64.39	0.33	0.39	1.79	0.11
<b>Average</b>	<b>9.71</b>	<b>29.84</b>	<b>52.61</b>	<b>65.66</b>	<b>0.41</b>	<b>0.26</b>	<b>1.80</b>	<b>0.14</b>

## **Regional Annual Silage Trial**

### **Pulse Mixtures**

**Partners:** Alberta Agriculture, Forestry and Rural Development  
SECAN  
Chinook Applied Research Association  
West-Central Forage Association  
SARDA Crop Research  
Battle River Research Group  
Canadian Agriculture Partnership

### **Objectives:**

1. To determine which pea-cereal mixtures are a feasible option when compared to conventional cereal forage crops for whole plant forage production, considering both yield and quality.

### **Background:**

The most commonly utilized forage crops are typically monocultures of barley, oats or triticale. However, intercrops grown for forage production are gaining popularity. Adding a pulse to a silage mix, such as faba beans or peas can reduce fertilizer costs since they can fix nitrogen thereby increasing soil fertility. Pulses also have high protein content which can boost feed quality, by increasing the amount of crude protein in feed. This is the second year that the pea/cereal trial expanded its pulse species and incorporated a faba bean treatment.

### **Method:**

The trial was established at the LARA Fort Kent Research Site (NE25-61-5-W4) May 31, 2022 and at our St. Paul site (SE16-58-9-W4) on June 1, 2022 in a randomized complete block design (RCBD) with four replicates to reduce error. The plots were seeded with the LARA five-row zero-till small plot drill to a depth of 1.5 – 2” to try and reach an intermediate between cereal and pea recommendations. The peas were inoculated prior to seeding.

Cereal monocultures of CDC Bale oats, Taza triticale and AB Cattlelac barley were established as check treatments for comparison to the pea/cereal mixtures in Fort Kent. At St. Paul, the cereals established were SO-1 oats, Bunker triticale and AB Cattlelac barley. The trials were seeded with 12 treatments and each cereal variety was seeded in a mixture with Aberdeen peas, DL Delicious peas, and DL Tesoro faba beans. The St. Paul location used Meadow peas in place of DL Tesoro faba beans.

Agronomic information on the trial can be found in Table 25. No in-crop herbicide applications were performed for weed control due to the mixture of broadleaf and grassy plants. Therefore, hand-weeding was done where necessary.

The LARA self-propelled forage harvester was used to harvest the plots at the recommended cereal harvest stage + 10 days. The individual plot weights were recorded and samples were taken to assess dry matter content. A composite sample was taken from each variety, frozen and sent to A & L Canada Laboratories for forage analysis. Statistical analysis of the data was conducted using R statistical software,  $P = 0.05$ .

Varieties used in the pulse/cereal trial in 2022:

- *CDC Austenson barley* - 2-row barley variety with semi-smooth awns, short and strong straw, and high feed yield.
- *AB Cattlelac barley*- semi-smooth awned barley variety with good lodging resistance, good grain yield and excellent disease resistance
- *CDC Baler oats* - very leafy, forage oat variety.
- *SO-1 oats*- early maturing, very high digestible brown oat variety with high fat content and does not need to be rolled. Short strong straw for reduced lodging.
- *Taza triticale* – reduced awn forage and grain triticale variety with good lodging resistance.
- *Bunker triticale*- early maturing, reduced awn forage variety with great digestibility, high fat content and high silage yields.
- *Aberdeen peas*– semi leafless yellow field pea variety with high yield and excellent standability.
- *DL Delicious peas*– new semi leafless forage pea with high yields, good standability and early maturity.
- *DL Tesoro faba beans*- high yielding, zero tannin bean variety with great agronomic traits.
- *Meadow peas*- semi leafless yellow field pea, good standability, disease resistance, and yields.

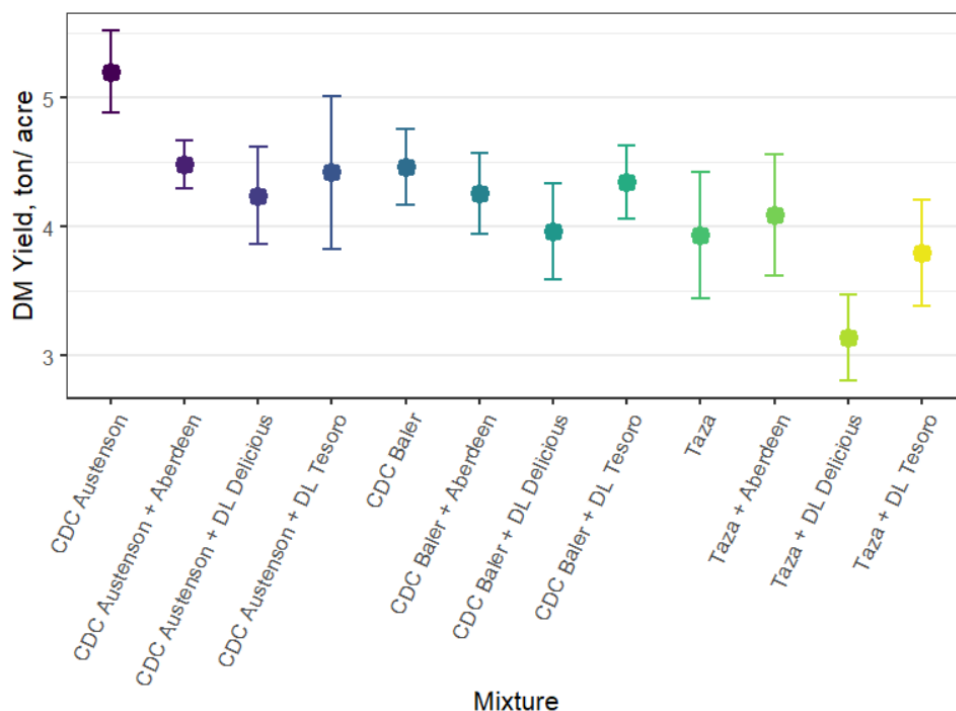
**Table 25.** RST Pea/Cereal Mixture Agronomic Information, 2022.

Site	Date Seeded	Date Harvested	Treatments	Seeding Rate	Fertility
Fort Kent	31-May-22	22-Aug-22	AB Cattlelac	300 plants/m <sup>2</sup>	50% of recommended cereal rate
St. Paul	1-June-22	23-Aug-22	CDC Baler or SO-1	300 plants/m <sup>2</sup>	50% of recommended cereal rate
			Taza or Bunker	370 plants/m <sup>2</sup>	50% of recommended cereal rate
			AB Cattlelac/Aberdeen	150 pl/m <sup>2</sup> , 57 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			AB Cattlelac/DL Delicious	150 pl/m <sup>2</sup> , 5 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			AB Cattlelac/DL Tesoro or Meadow	150 pl/m <sup>2</sup> , 57 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			CDC Baler or SO-1/ Aberdeen	150 pl/m <sup>2</sup> , 57 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			CDC Baler or SO-1 /DL Delicious	150 pl/m <sup>2</sup> , 5 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			CDC Baler/DL Tesoro or SO-1/Meadow	150 pl/m <sup>2</sup> , 57 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			Taza or Bunker/Aberdeen	185 pl/m <sup>2</sup> , 57 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			Taza or Bunker/DL Delicious	185 pl/m <sup>2</sup> , 5 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0
			Taza/DL Tesoro or Bunker/Meadow	185 pl/m <sup>2</sup> , 57 pl/m <sup>2</sup>	50 lbs/acre of 11-52-0-0

## Results:

The trial is aimed to be harvested at the recommended cereal stage plus 10 days to try and account for the increased moisture content of the forage with the inclusion of peas. In previous years, the trial was harvested at the recommended cereal stage. However, the Forage Pea trials conducted at LARA for four years found that optimal yields and quality could be achieved if harvest was delayed by at least 10 days. The results of the pea-cereal trial are summarized in Figures 6 and 7 and Tables 26 and 27. Unfortunately, in cereal mixtures at both sites, DL Delicious was seeded at 10% of the rate that was supposed to be seeded.

The average plot yield at Fort Kent was 4.19 ton/ac dry matter yield. The highest yielding mixture at the Fort Kent site was CDC Austenson/Aberdeen at 4.28 ton/ac dry matter. Mixtures with CDC Austenson and CDC Baler with DL Tesoro were among the top yielding as well. While the CDC Austenson monoculture had the highest yield, this was only significantly different than Taza + DL Delicious.



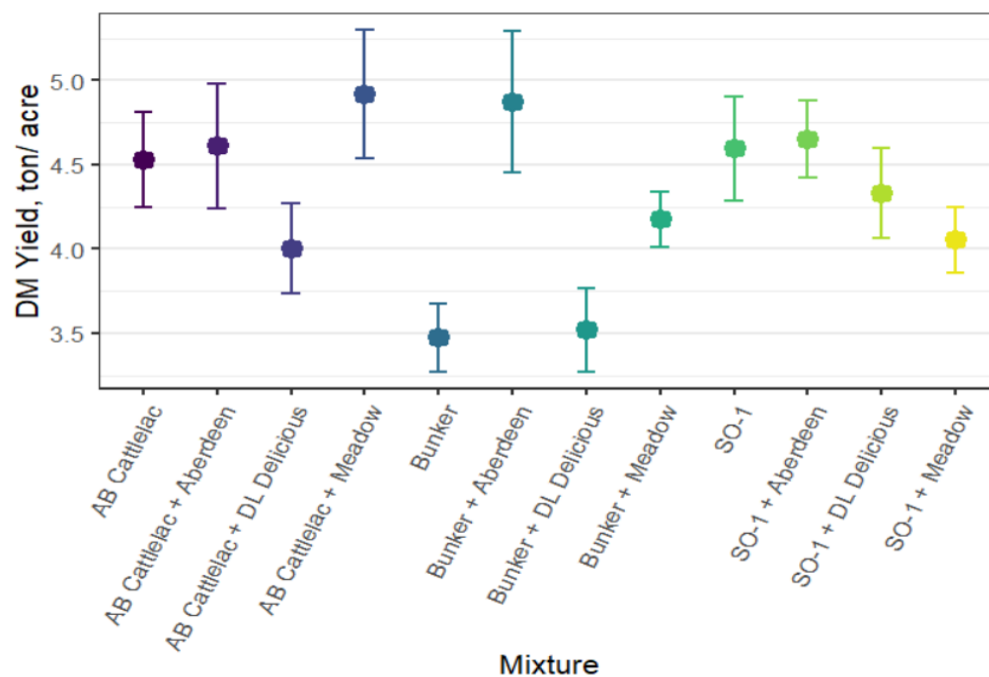
**Figure 6.** RST Pulse/Cereal Mixture Fort Kent dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 26.** RST Pulse/Cereal Mixture Fort Kent forage nutritional quality, 2022.

Variety	Moisture (%)	Quality Results 2022							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
CDC Baler + DL Delicious	61.81	7.78	29.99	51.49	65.54	0.31	0.18	1.44	0.18
CDC Austenson	54.74	8.85	33.32	43.53	62.94	0.46	0.13	1.28	0.21
Taza + DL Tesoro	64.47	8.06	31.81	49.01	64.12	0.31	0.14	1.03	0.21
CDC Baler	60.42	7.88	38.17	52.57	59.17	0.25	0.15	1.21	0.18
CDC Baler + Aberdeen	54.62	7.62	31.6	53.79	64.28	0.48	0.18	1.11	0.26
CDC Austenson + DL Delicious	54.49	7.29	40.43	53.53	57.41	0.39	0.13	1.22	0.24
CDC Austenson + DL Tesoro	56.49	6.1	41.66	65.2	56.45	0.76	0.1	0.92	0.2
Taza	61.49	8.42	35.63	48.14	61.14	0.24	0.17	1.17	0.21
Taza + DL Delicious	53.59	7.42	36.49	58.01	60.47	0.23	0.1	1.29	0.18
CDC Baler + DL Tesoro	68.78	6.41	39.85	52.17	57.86	0.37	0.14	0.97	0.21
CDC Austenson + Aberdeen	58.66	6.85	32.5	52.16	63.58	0.42	0.14	1.41	0.3
Taza + Aberdeen	58.64	7.53	38.44	48.99	58.96	0.38	0.11	1.47	0.23
<b>Average</b>	<b>59.02</b>	<b>7.52</b>	<b>35.82</b>	<b>52.38</b>	<b>60.99</b>	<b>0.38</b>	<b>0.14</b>	<b>1.21</b>	<b>0.22</b>

The average plot yield at St. Paul was 4.31 ton/ac dry matter yield, which was higher than in Fort Kent. The highest yielding mixture at the St. Paul site was Cattlelac + Meadow at 4.92 ton/ac dry matter. Bunker + Aberdeen was a close second at 4.87 ton/ac. Cattlelac + Meadow and Bunker + Aberdeen had a significantly higher yield than Bunker and Bunker + DL Delicious.

One of the primary reasons for including pulses in a silage mixture is for the potential boost in protein. In contrast to previous years of this trial, we did not see a significant improvement in nutritional quality with pulses included in the mixture. This may have been the result of the dry growing conditions experienced later in the summer.



**Figure 7.** RST Pulse/Cereal Mixture St. Paul dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 27.** RST Pulse/Cereal Mixture St. Paul forage nutritional quality, 2022.

Variety	Moisture (%)	Quality Results 2022							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Bunker + Meadow	48.92	7.53	34.24	53.32	62.23	0.95	0.2	1.66	0.29
SO-1 + Aberdeen	61.01	8.78	35.22	56	61.46	0.7	0.21	1.79	0.28
SO-1 + DL Delicious	50.54	7.12	34.98	59.35	61.65	0.34	0.17	1.49	0.24
AB Cattlelac + DL Delicious	47.2	6.44	29.88	50.18	65.62	0.37	0.18	1.47	0.21
AB Cattlelac + Meadow	48.91	9.43	29.59	47.27	65.85	0.66	0.21	1.67	0.19
SO-1 + Meadow	48.44	7.25	31.48	54.32	64.38	0.48	0.27	1.97	0.17
AB Cattlelac + Aberdeen	51.34	8.08	35.48	55.87	61.25	0.89	0.17	1.8	0.28
Bunker + DL Delicious	52.44	8.68	31.55	51.92	64.32	0.28	0.3	1.3	0.18
Bunker	49.39	7.93	33.16	56.02	63.07	0.28	0.2	1.5	0.15
Bunker + Aberdeen	53.47	7.22	32.33	52.02	63.71	0.42	0.23	1.25	0.17
SO-1	48.9	7.33	34.92	60.41	61.7	0.24	0.14	1.52	0.16
AB Cattlelac	53.23	6.88	34.02	56	62.4	0.63	0.12	1.8	0.24
<b>Average</b>	<b>51.15</b>	<b>7.72</b>	<b>33.07</b>	<b>54.39</b>	<b>63.14</b>	<b>0.52</b>	<b>0.20</b>	<b>1.60</b>	<b>0.21</b>

## **Regional Annual Silage Trial**

### **Alternative Crops**

**Partners:** West-Central Forage Association  
Chinook Applied Research Association  
Peace Country Beef and Forage Association  
Battle River Research Group  
North Peace Applied Research Association  
Canadian Agriculture Partnership  
Imperial Seeds

### **Objectives:**

1. To determine the best yielding alternative forage crops for whole plant forage production in Northeastern Alberta.
2. To determine the best quality alternative forage crops for cattle feed in Northeastern Alberta.

### **Background:**

The most utilized forage crops are typically monocultures of barley, oats or triticale. Despite this, there are other annuals available that could provide an alternative crop for forage production or to extend the grazing season. The use of corn has significantly increased in recent years as a method of extending the grazing season. However, alternative annual crops can provide a break in disease from cereal production or as a break in perennial cropping rotation while still providing a forage crop.

The inclusion of ‘alternative’ or ‘high nutritive value’ forages, including chicory and plantain that are known for increased energy and protein content and reduced neutral detergent fiber (NDF), in the rations of beef cattle could have an environmental, economical and production benefit to Alberta producers. Currently, research has focused on assessing the yield and quality of cocktail mixtures that contain from 2 to 20 different species with very little data available on individual species. As well, there has been limited research focusing on replicated trials to establish baseline information on these forage species. Consequently, most current recommendations to producers on the use of these crops is coming from anecdotal sources.

Recent research from New Zealand on the use of ‘alternative’ crops in sheep and cattle diets is showing promising results in feed intake and environmental impacts. A study on chicory and plantain has shown the potential of reduced environmental impacts of these forages through decreased rumen ammonia and urine nitrogen in dairy cattle. These results are supported by similar research on plantain-fed dairy heifers. Another study has showed high consumption of forage beet, kale and kale-oat mixtures by grazing dairy cows and almost complete consumption of forage beet.

The purpose of this trial is to provide current and comprehensive regional yield and quality data on annual ‘alternative’ forage species and varieties for silage, greenfeed and grazing producers across Alberta and Saskatchewan to improve on-farm feed production and efficiency.

**Method:**

The trial was established at the LARA Fort Kent Research Site (NE25-61-5-W4) on May 26, 2022, and at our St. Paul site (SE16-58-9-W4) on June 1, 2022, in a randomized complete block design (RCBD) with four replicates to reduce error. The plots were seeded using the LARA five-row Fabro zero-till drill to a depth of ½ inch.

Soil tests were taken in the spring at both sites and a blend fertilizer (80-30-30-10) was side-banded during seeding at 290 lbs/ac. The trial was hand-weeded during the growing season when necessary. There was no in-crop herbicide application in these trials.

Crop height and stage of maturity was recorded prior to harvest with the LARA alfalfa-omega self-propelled forage harvester. The total plot weight was recorded, and samples were taken to assess dry matter content. Additional composite samples were taken from each treatment, frozen and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis of the data was conducted using R statistical software,  $P = 0.05$ .

The following alternative crops were used for the trial in 2022:

- *Japanese Millet* – annual, warm season grass that is commonly grown as a late season green forage. The most rapidly growing of the millet, its fibrous root system makes it an excellent smother crop, erosion protector and trap crop. Highly tolerant of frequent cutting, is fairly drought tolerant once established and tolerant of wet soils.
- *Sorghum Sudan Grass* – tall, fast-growing, heat-loving warm season grass is unrivaled for adding organic matter to worn-out soils. High biomass production and can be a good soil aerator particularly if mowed/cut at least once during the growing season. High seeding rates can allow for excellent weed suppression and can be used as a good crop to break the life cycle of disease pests.
- *Forage Brassica* – fast-growing, high yielding and high-quality forages that are excellent for use in fall pastures. Protein content can range from 18 to 25%. Can be difficult to ensile due to high moisture content but holds quality late into the season.
- *Forage Kale* – fast growing, very competitive against annual weeds, can be planted in the spring or fall time in pastures and cover crops, fast germination rate, winter hardy brassica, and has good feed value.
- *DoubleMax Radish* – Late maturing, forage radish with a long slender taproot.
- *Forage Turnip* – cold and drought tolerant, can be planted late in the season if wanting to graze in the fall, good feed quality for feeding livestock.
- *Plantain* – highly palatable herb with a fibrous root system that establishes rapidly under the right conditions. Highly tolerant to heat, good pest tolerance and has a high mineral content. Plantain will last 2 to 3 years under grazing conditions.
- *Chicory* – short-lived, leafy herb with a high feed value for livestock. Can be incorporated into rotational grazing systems with good summer forage yields. Has a deep taproot that can support growth in dry conditions and breaks up soil compaction.
- *Phacelia* – unique cover crop species with a very intense soil conditioning effect in the top two inches of the soil. Not a deep-rooted plant, but can be very effective to aggregate soil

particles into the crumbly aggregate structure. Fast growing with purple flowers that is excellent as a beneficial insect plant.

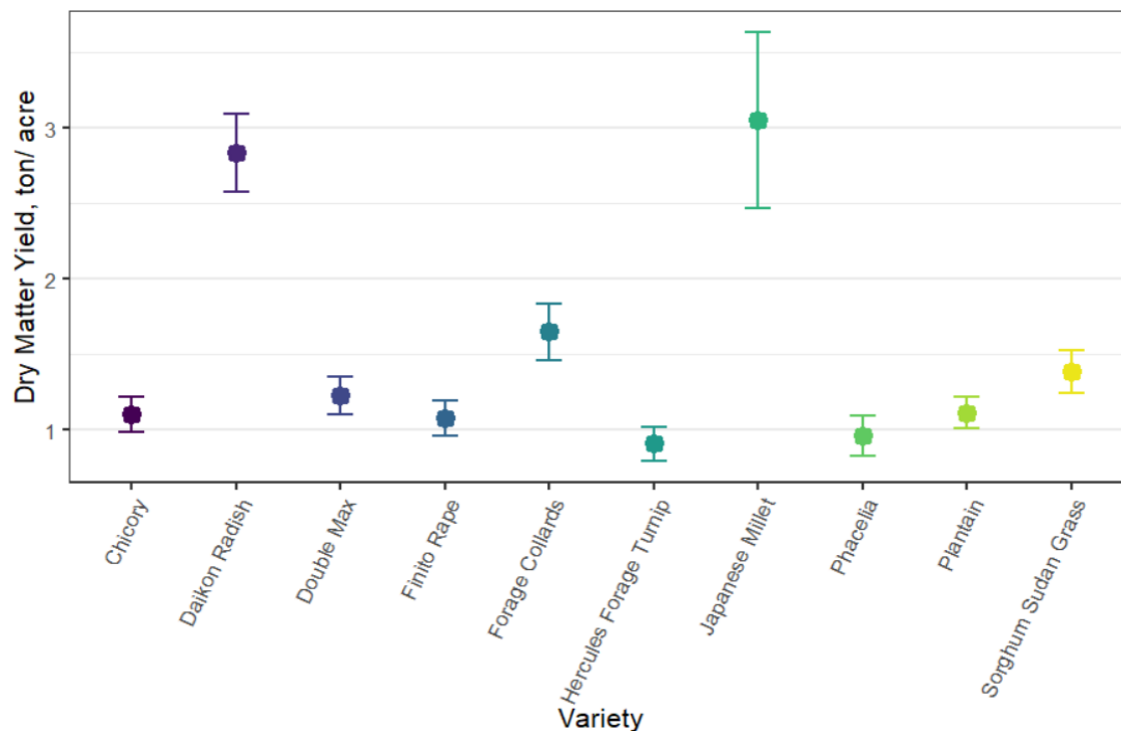
- *Daikon Radish*– deep rooted forage radish with a large root. Can help break up tough, compacted soil, improve water infiltration, and stores nitrogen.

### **Results:**

The trial was harvested at the industry recommended stage for each individual crop. The yield and quality results from the trial are summarized in Table 28 and 29. The trial at the Fort Kent Site (LARA) was harvested on August 29, 2022. Unfortunately, due to equipment breakdowns the St. Paul site was harvested on two dates: August 23, 2022 and August 28, 2022.

The 2022 alternative trial yielded higher on average than in 2021. The Fort Kent site yielded lower than the St. Paul site due to extensive flea beetle damage. At Fort Kent, Japanese millet and Daikon radish had the highest dry matter forage yield at 3.05 ton/ac and 2.84 ton/ac, respectively. The lowest yielding varieties in Fort Kent were Hercules forage turnip at 0.91 ton/ac and phacelia at 0.96 ton/ac. At the St. Paul site, Double Max radish was the highest yielding variety at 4.70 ton/ac dry matter. Chicory, plantain, and Sorghum Sudan grass were the lowest yielding varieties at 0.82 ton/ac, 0.61 ton/ac, and 0.73 ton/ac, respectively.

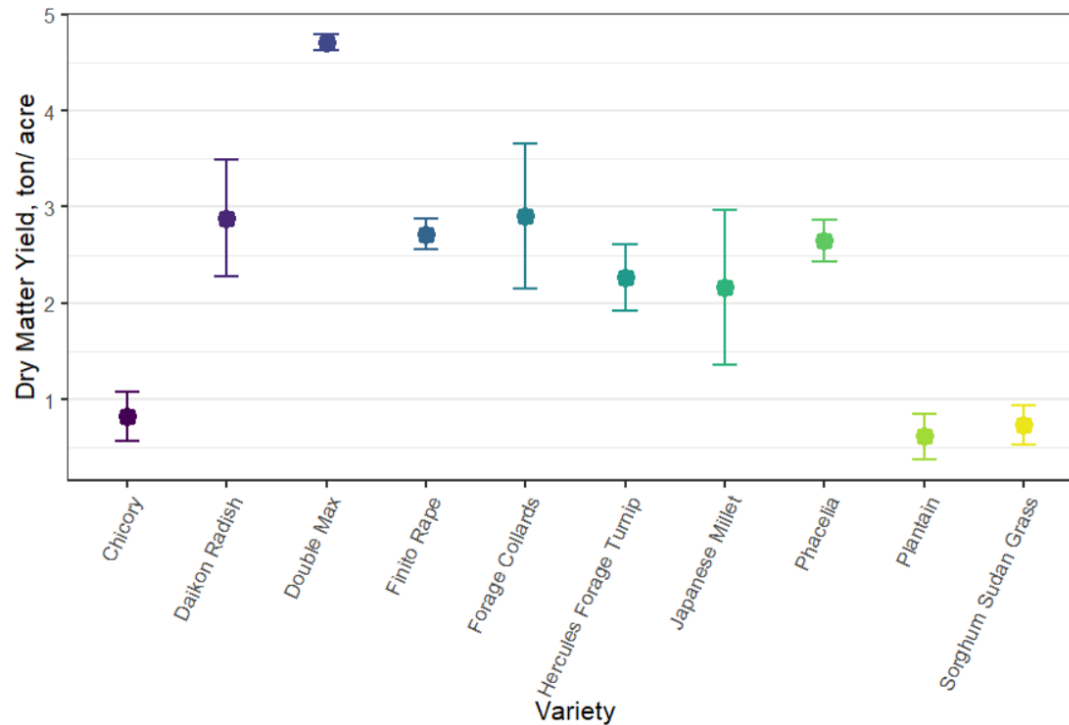
The species with the highest CP content in Fort Kent was Finito rape at 16.74%, followed by forage collards at 16.37%. Chicory had the highest crude protein at 19.85% in St. Paul. Alternative forage species are well known for their high nutritive quality, which has led to their use in cocktail mixtures to boost nutritional content of cattle feed. Many varieties grown, except for the forage radishes, Japanese millet and Sorghum Sudan grass are adequate to meet cattle CP requirements through gestation and into lactation. Due to the species high nutritional value of these species, it is recommended to include them in cattle rations in combination with at least one cereal species.



**Figure 8.** RST Alternative crops Fort Kent dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 28.** RST Alternative crops Fort Kent forage nutritional value, 2022.

Variety:	Moisture (%)	2022 Quality Results							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Hercules Forage Turnip	73.76	12.84	22.61	31.1	71.29	1.28	0.19	2.37	0.63
Chicory	73.98	11.89	22.91	34.2	71.05	1.1	0.13	1.65	0.44
Sorghum Sudan Grass	65.49	9.98	27.96	52.85	67.12	0.69	0.14	1.69	0.42
Phacelia	69.14	12.86	35.06	46.77	61.59	1.66	0.2	2.44	0.72
Finito Rape	82.37	16.74	15.26	21.3	77.01	1.59	0.27	2.76	0.73
Forage Collards	78.26	16.37	17.2	26.47	75.5	1.37	0.23	2.61	0.63
Plantain	72.71	11.19	32.43	46.13	63.64	0.79	0.17	1.47	0.43
Double Max	79.36	11.4	37.07	46.99	60.02	1.22	0.2	2.16	0.62
Japanese Millet	70.33	10.19	30.44	58.56	65.19	0.5	0.15	1.69	0.5
Daikon Radish	77.18	9.17	42.76	51.24	55.59	0.93	0.12	1.58	0.47
Average	74.26	12.26	28.37	41.56	66.80	1.11	0.18	2.04	0.56



**Figure 9.** RST Alternative crops St. Paul dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 29.** RST Alternative crops St. Paul forage nutritional value, 2022.

Variety:	Moisture (%)	2022 Quality Results							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Daikon Radish	83.89	11.14	44.83	54.29	53.98	1.28	0.26	3.2	0.41
Hercules Forage Turnip	85.07	12.49	21.18	22.89	72.4	2.37	0.29	4.05	0.51
Chicory	84.75	19.85	27.59	37.31	67.41	1.62	0.27	4.23	0.44
Plantain	78.01	14.12	36.71	46.91	60.3	1.91	2.59	2.59	0.43
Phacelia	71.98	12.34	35.72	44.91	61.07	2.82	0.26	3.26	0.72
Sorghum Sudan Grass	71.29	9.39	32.77	59.35	63.37	0.47	0.34	1.94	0.28
Japanese Millet	72.6	10.49	31.27	59.22	64.54	0.77	0.33	2.56	0.42
Forage Collards	82.77	15.28	23.03	26.16	70.96	1.67	0.37	3.39	0.38
Finito Rape	84.47	17.45	19.93	22.42	73.37	2.33	0.39	3.73	0.52
Double Max	79.57	8.06	50.56	61.91	49.44	1.16	0.2	2.71	0.3
Average	79.44	13.06	32.36	43.54	63.68	1.64	0.53	3.17	0.44

## **Longevity of Perennial Forage Varieties and Mixes Evaluation Trial**

**Partners:** Alberta Beef Producers  
Canadian Agriculture Partnership  
Alberta Agriculture, Forestry and Rural Development  
Chinook Applied Research Association  
Foothills Forage and Grazing Association  
North Peace Applied Research Association  
Gateway Research Organization  
Battle River Research Group  
West-Central Forage Association  
Mackenzie Applied Research Association  
SARDA Crop Research  
Peace Country Beef and Forage Association

### **Objectives:**

1. To provide unbiased, current, and comprehensive regional data regarding the establishment, winter survival, yield and economics of specific species and varieties of perennial forage crops.
2. To identify perennial crop species/varieties that demonstrate superior establishment, hardiness, forage yield and nutritional quality characteristics in different eco-regions of Alberta.
3. To assess any benefits from growing mixtures of selected species.

### **Background:**

Perennial forages include a diverse range of grasses and legumes that are utilized by livestock producers for a wide variety of purposes – from hay and greenfeed to summer pasture and winter grazing through stockpiled forage. They make up one of the largest sources of livestock feed on the prairies and the wide diversity in growth characteristics makes them ideal for many purposes.

According to Alberta Agriculture’s Agriprofits Benchmarks, two thirds the cost of maintaining a cow is comprising pasture, stored feed, and bedding. Consequently, managing the perennial forage supply and having access to high quality and high yielding forage varieties is extremely important to producers.

Historically there has been a gap in perennial forage production knowledge in Alberta and regionally specific variety information. There is significant variation in Alberta’s ecoregions and varieties that are developed and tested in one location or region will likely not perform the same in another region such as those experienced in Northeastern Alberta.

To help bridge this gap in perennial forage information, the perennial forage trial was developed to test cultivars that have been recently developed but have had limited regional evaluation to provide producers with valuable, region-specific data. The province wide project data will be available to all producers in Alberta.

**Method:**

The trial was seeded as three blocks of plots: legumes, grasses, and grass/legume mixtures at the LARA Fort Kent Research Site (NE25-61-5-W4) in a randomized complete block designs (RCBD) with four replicates to reduce error. The legume and legume mixture trials were seeded on June 7, 2016 and the grass trial was seeded on June 2, 2016. Unfortunately, due to slow and patchy establishment, the grass and grass/legume trials were reseeded on June 19, 2017. Table 30 illustrates the forage varieties seeded in each trial.

**Table 30.** Perennial Forage Trial Varieties seeded, 2016-2017.

Grasses	Legumes	Grass/Legume Mixtures
<b>Fleet Meadow Brome</b>	20-10 Alfalfa	Fleet/Yellowhead
<b>AC Admiral Hybrid Brome</b>	44-44 Alfalfa	AC Knowles/Yellowhead
<b>Success Hybrid Brome</b>	Assalt ST Alfalfa	Success/Yellowhead
<b>Knowles Hybrid Brome</b>	Dalton Alfalfa	Fleet/Spredor 5
<b>Greenleaf Pubescent Wheatgrass</b>	Halo Alfalfa	AC Knowles/Spredor 5
<b>Kirk Crested Wheat Grass</b>	PV Ultima Alfalfa	Success/Spredor 5
<b>AC Saltlander Green Wheatgrass</b>	Rangelander Alfalfa	Fleet/AC Mountainview
<b>Tom Russian Wilde Rye</b>	Rugged Alfalfa	AC Knowles/AC Mountainview
<b>Killarney Orchard Grass</b>	Spreader 4 Alfalfa	Success/AC Mountainview
<b>Grinstad Timothy</b>	Spredor 5 Alfalfa	
<b>Fojtan Festulolium</b>	Yellowhead Alfalfa	
<b>Courtney Tall Fescue</b>	AC Mountainview Sainfoin	
	Nova Sainfoin	
	Oxley 2 Cicer Milkvetch	
	Veldt Cicer Milkvetch	

Prior to seeding, soil tests were taken, and a blend fertilizer was developed (30-22-10-12) and side-banded with the grass trial at seeding. Due to the nitrogen fixing ability of legumes, the legume and grass/legume trial was seeded with 50 lbs/ac of 11-52-0-0 side-banded at seeding. All legumes were inoculated prior to seeding and seeding took place with the LARA Fabro five-row zero-till small plot drill with 9" row spacing. Plots measured 1.15m x 6m in area.

To determine percent emergence and establishment, plant counts were conducted 7, 14 and 21 days after seeding as the number of plants in 3 separate ¼ m squared areas in each plot. Another count was taken 70 days after seeding.

No yield or quality data was taken on the trial in the year of establishment. Since the legume trial was established in 2016, yield and quality data were taken in 2017. Yield and quality data was taken on all three trials from 2018 to 2022.

The seeding rates of each variety are shown in table 31.

**Table 31.** Perennial Forage Trial Seeding Rates, 2016-2017.

Species	Variety	Seeding Rate (lbs/ac)
<b>Meadow Brome</b>	AC Armada	14
	Fleet	14
<b>Hybrid Brome</b>	Success	12
	Knowles	12
<b>Wheatgrasses</b>		
<b>Pubescent</b>	Greenleaf	10
<b>Crested</b>	Kirk	6
<b>Green</b>	Saltlander	9
<b>Russian Wildrye</b>	Tom	8
<b>Fojtan Festulolium</b>		20
<b>Orchard Grass</b>	Killarney	10
<b>Tall Fescue</b>	Courtney	9
<b>Timothy</b>	Grinstad	4
<b>Alfalfa</b>	AC Grazeland	8
	Dalton	8
	20-10	8
	Halo	8
	Rangelander	8
	Rugged	8
	Spredor 4	8
	Spredor 5	8
	Yellowhead	8
	PV Ultima	8
	44-44	8
<b>Sainfoin</b>	AC Mountainview	30
	Nova	30
<b>Cicer Milk Vetch</b>	Veldt	13
	Oxley 2	13

The emergence counts and plant count results for the legume, grass and grass/legume mixture trials can be found in table 3, table 4 and table 5, respectively. The higher moisture experienced in 2017 allowed for excellent establishment of the grass and grass/legume trials. However, excessive moisture sitting on the legume site resulting in plots 113 and 114 dying out (Nova Sainfoin and AC Mountainview Sainfoin).

To assess winter survival, plant counts were taken on the legume trial on June 26, 2017, and the results are illustrated in table 32. The alfalfa variety Assalt ST showed the greatest impact of winter on plant survivability with a 56% decrease in plant stand from August of 2016 to June of 2017. Rangelander alfalfa showed a 35% decrease in plant stand while Yellowhead alfalfa and Oxley Cicer Milkvetch only showed a 6% and 8% decrease, respectively. The rest of the varieties showed an increase from 2016 to 2017.

Historically, sainfoin has shown poor survivability in central and northern climates but showed an 18% increase for the new AC Mountainview and a 76% increase for the older variety Nova.

**Table 32.** Perennial Forage Project Legume Emergence and Plant Counts, 2016-2017.

Variety	Emergence Counts (plants per 1/4 m)			Plant Count	Plant Count	Change
	21-Jun-16	28-Jun-16	05-Jul-16	26-Aug-16	26-Jun-17	(%)
20 - 10	0.00	1.45	3.99	4.92	5.83	18
44 - 44	0.09	1.15	4.32	4.67	7.17	54
Assalt ST	0.00	0.65	2.68	4.58	2.00	-56
Dalton	0.00	0.33	3.09	4.67	5.50	18
Halo	0.00	0.69	4.44	5.33	6.50	22
PV Ultima	0.00	1.02	4.38	5.83	6.42	10
Rangelander	0.10	1.50	3.74	5.50	3.58	-35
Rugged	0.04	0.99	2.97	4.67	6.17	32
Spredor 4	0.00	0.68	3.48	4.83	5.92	23
Spredor 5	0.00	0.43	5.02	5.25	5.58	6
Yellowhead	0.00	1.07	3.57	5.92	5.58	-6
AC Mountainview	0.00	0.79	4.61	5.50	6.50	18
Nova	0.00	1.12	2.72	3.50	6.17	76
Oxley 2	0.00	1.03	3.86	4.33	4.00	-8
Veldt	0.00	0.54	4.15	4.75	5.67	19

The emergence counts of the grass and grass/legume mixture trial are illustrated in table 32 and table 33, respectively.

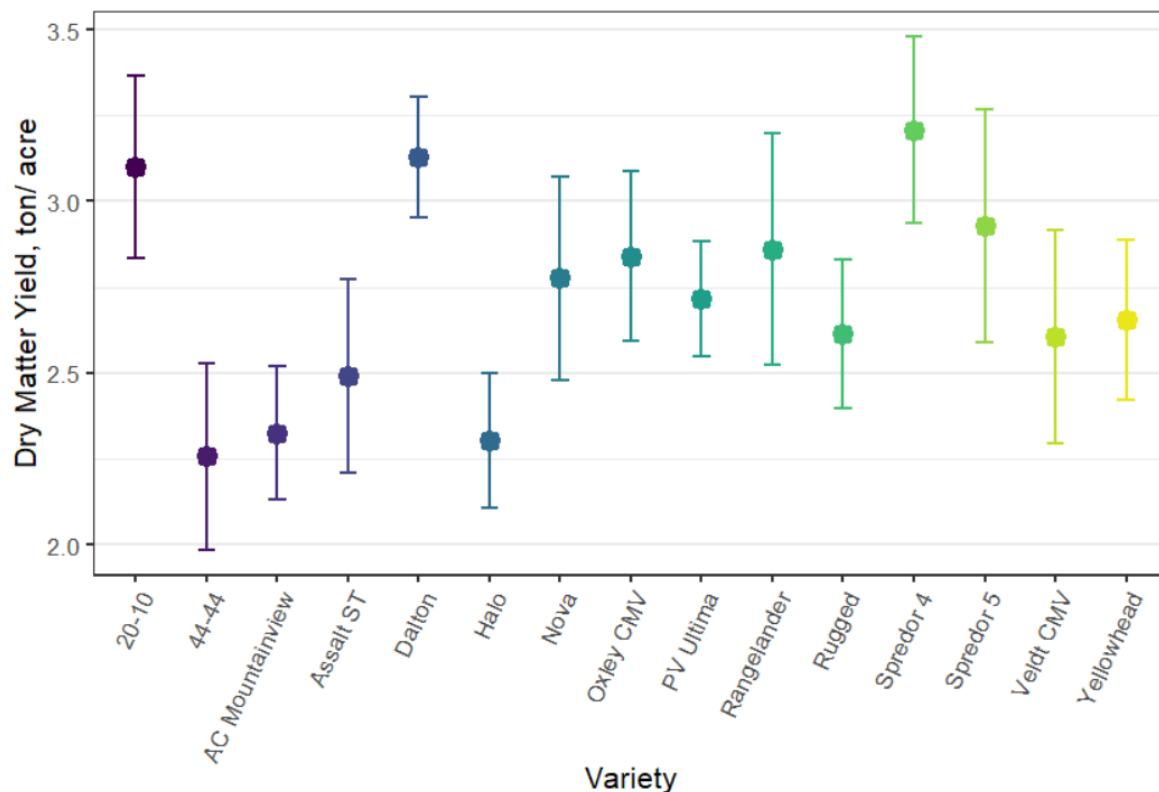
**Table 33.** Perennial Forage Project Grasses Emergence Counts, 2017-2018.

Variety	Emergence Counts (pls per 1/4 m)		
	Day 7	Day 14	Day 21
Fleet MB	0.00	8.41	7.50
AC Admiral HB	0.00	5.58	5.50
Success HB	0.00	9.00	6.75
Knowles HB	0.00	7.33	4.58
Greenleaf PWG	0.00	10.50	7.58
Kirk CWG	0.00	4.85	1.50
AC Saltlander GWG	0.00	8.41	6.83
Tom RWR	0.00	9.00	13.08
Killarney OG	0.00	15.83	10.25
Grinstad Tim.	0.00	15.92	15.33
Fojtan Festulolium	0.00	28.83	26.58
Courtney TF	0.00	13.00	10.33

**Table 34.** Perennial Forage Project Grass/Legume Emergence, 2017-2018.

Treatment	Emergence Counts (plants per 1/4 m)					
	Day 7		Day 14		Day 21	
	Grasses	Legumes	Grasses	Legumes	Grasses	Legumes
Fleet MB/Yellowhead	0.00	0.00	3.08	3.17	5.83	2.08
AC Knowles/Yellowhead	0.00	0.00	2.67	3.33	3.75	3.50
Success HB/Yellowhead	0.00	0.00	4.58	4.00	4.67	3.42
Fleet MB/Spredor 5	0.00	0.00	4.67	2.67	4.50	2.50
AC Knowles MB/Spredor 5	0.00	0.00	3.67	2.08	3.42	3.75
Success HB/Spredor 5	0.00	0.00	3.75	3.17	3.58	3.17
Fleet MB/AC Mountainview	0.00	0.00	3.00	2.75	2.58	4.17
AC Knowles HB/AC Mountainview	0.00	0.00	4.16	1.66	2.58	3.08
Success HB/AC Mountainview	0.00	0.00	3.00	2.88	2.67	3.58

The legume trial was harvested on July 22, 2022. The yield and quality results summarized from 2020-2022, can be found in Figure 10 and Table 35. Only the third and fourth rep were harvestable due to the first 2 reps experiencing winter kill and severe drought in the first few years after seeding. Therefore, the data presented has no statistical merit.

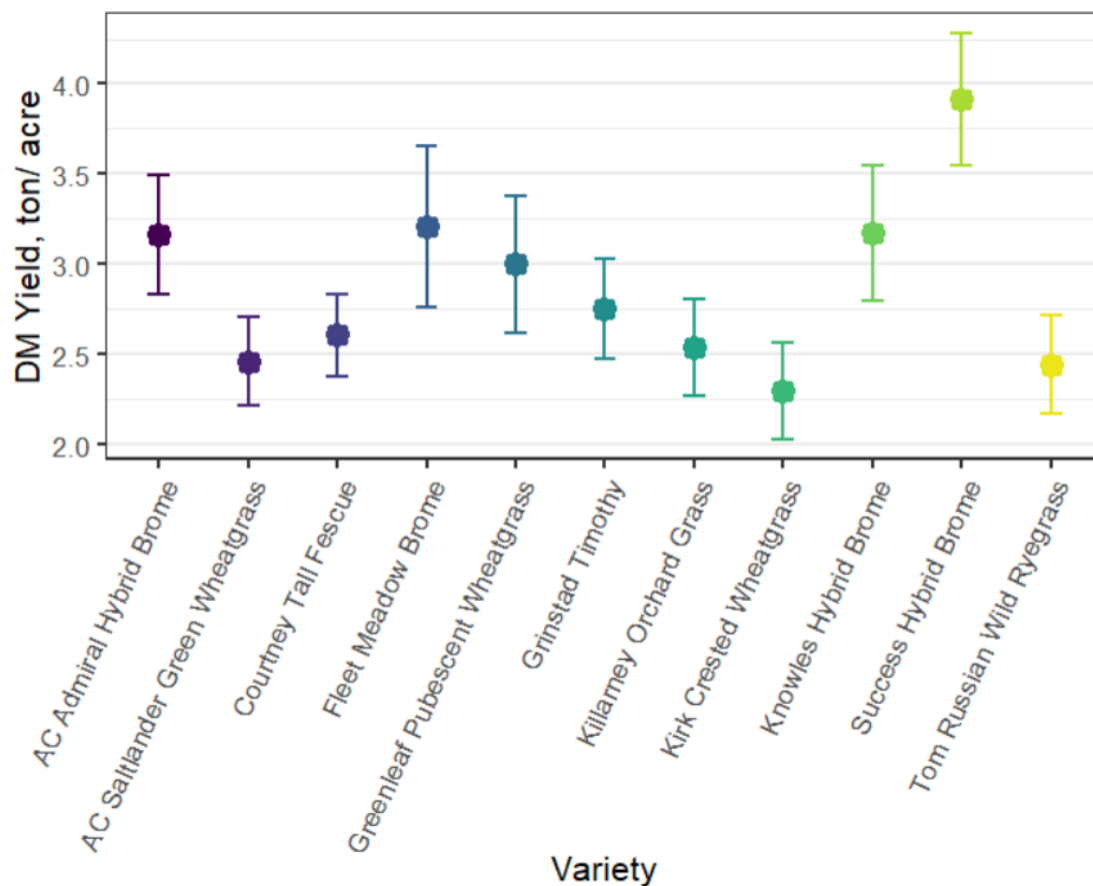


**Figure 10.** Perennial Forage Project Legumes dry matter yield, 2020-2022 (ton/acre, 1 ton = 2000 lbs).

**Table 35.** Perennial Forage Project Legumes nutritional quality, 2020-2022.

Variety	2020-2022 Average Quality				
	CP (%)	ADF (%)	TDN (%)	Ca (%)	P (%)
20-10	15.6	41.6	56.3	1.6	0.17
44-44	18	38.2	59	1.54	0.2
AC Mountainview	13.2	46.2	52.9	1.18	0.17
Assalt ST	16.7	40.7	57.2	1.18	0.17
Dalton	16.1	42.8	55.9	1.38	0.18
Halo	18	37.7	59.6	1.64	0.18
Nova	16.9	39.6	58	1.7	0.16
Oxley CMV	16.1	42.3	56.6	1.11	0.18
PV Ultima	17.3	39.8	57.9	1.78	0.2
Rangelander	18.2	38.5	58.9	1.6	0.16
Rugged	17.2	39.9	57.8	1.61	0.18
Spredor 4	17.3	40.5	57.4	1.53	0.19
Spredor 5	17.4	40	57.8	1.75	0.2
Veldt CMV	15	44.1	54.5	1.65	0.17
Yellowhead	17	41.5	56.6	1.48	0.2
<i>Average</i>	<b>16.67</b>	<b>40.89</b>	<b>57.09</b>	<b>1.52</b>	<b>0.18</b>

The grass trial was harvested on July 29, 2022. The average yield and quality results from 2020-2022 can be found in Figure 12 and Table 36. The average yield of the trial was 2.87 ton/acre. The highest yielding variety was Success Hybrid Brome at 3.92 ton/acre dry matter. Fleet meadow brome was the next highest yielding variety at 3.21 ton/ac but was followed closely by Knowles and AC Admiral hybrid bromes at 3.18 and 3.16 ton/acre, respectively. The lowest yielding variety was Kirk crested wheatgrass at 2.3 ton/acre dry matter. Unfortunately, Fojtan Festulolium died out completely within the first two years of the original trial so was removed from the data tables.

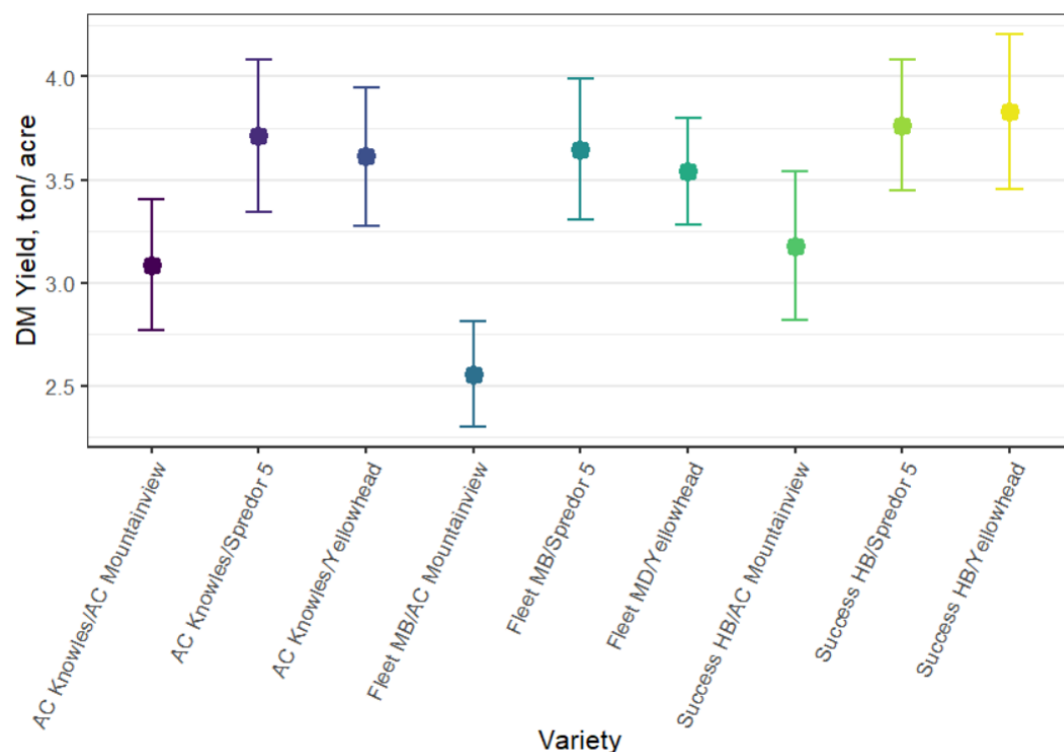


**Figure 11.** Perennial Forage Project Grasses dry matter yield, 2020-2022 (ton/acre, 1 ton = 2000 lbs).

**Table 36.** Perennial Forage Project Grasses average nutritional quality, 2022-2022.

Variety	2020-2022 Average Quality				
	CP (%)	ADF (%)	TDN (%)	Ca (%)	P (%)
AC Admiral Hybrid Brome	10.9	44.9	53.9	0.4	0.2
AC Saltlander Green Wheatgrass	12.4	42.7	55.6	0.38	0.18
Courtney Tall Fescue	10.8	45.4	53.5	0.45	0.16
Fleet Meadow Brome	11.7	44.1	54.6	0.59	0.22
Greenleaf Pubescent Wheatgrass	10.6	40.6	57.3	0.32	0.17
Grinstad Timothy	10	39.2	58.3	0.33	0.15
Killarney Orchard Grass	10.4	44.8	54.1	0.39	0.19
Kirk Crested Wheatgrass	10.4	43.9	54.7	0.49	0.18
Knowles Hybrid Brome	9.68	39.4	58.2	0.35	0.15
Success Hybrid Brome	9.66	40.9	57	0.4	0.18
Tom Russian Wild Ryegrass	12.2	45.9	53.2	0.42	0.19
<i>Average</i>	<b>10.79</b>	<b>42.89</b>	<b>55.49</b>	<b>0.41</b>	<b>0.18</b>

The grass/legume mixture trial was harvested on July 28, 2022. The highest yielding mixture was Success Hybrid Brome/Yellowhead alfalfa at 3.83 ton/acre, followed closely by Success Hybrid Brome/Spredor 5 at 3.76 ton/acre. These two mixtures yielded significantly more than AC Knowles/AC Mountainview and Fleet/AC Mountainview. The lowest yielding mixtures included AC Mountainview sainfoin, likely due to the percent composition significantly decreasing over the years since trial establishment.



**Figure 12.** Perennial Forage Project Grass/Legume mixture dry matter yield, 2020-2022 (ton/acre, 1 ton = 2000 lbs).

**Table 37.** Perennial Forage Project Grass/Legume mixture nutritional quality, 2020-2022.

Variety	2020-2022 Average Quality				
	CP (%)	ADF (%)	TDN (%)	Ca (%)	P (%)
AC Knowles/AC Mountainview	10.6	39.1	58.5	0.38	0.13
AC Knowles/Spredor 5	10.9	39.3	58.4	0.38	0.14
AC Knowles/Yellowhead	11	43.1	55.3	0.42	0.12
Fleet MB/AC Mountainview	10.5	42.8	55.6	0.43	0.14
Fleet MB/Spredor 5	12.2	45.5	53.5	0.62	0.16
Fleet MD/Yellowhead	13.1	33.5	54.9	0.36	0.11
Success HB/AC Mountainview	8.74	39.4	58.2	0.28	0.12
Success HB/Spredor 5	11.4	41.4	56.6	0.48	0.13
Success HB/Yellowhead	11.4	42	56.2	0.41	0.14
<i>Average</i>	<b>11.09</b>	<b>40.68</b>	<b>56.36</b>	<b>0.42</b>	<b>0.13</b>

Table 38 illustrates the change in botanical composition of the mixture trial from 2018 to 2022. No significant change in composition was seen in the alfalfa/grass mixtures. However, the sainfoin/grass mixtures have changed significantly as the majority of the sainfoin has died out over the past 4 years.

The trials have consistently been harvested in July or August of each growing season, allowing sufficient time for regrowth before the first killing frost. It is recommended for sainfoin to allow at least 50 growing days between the last cut and first killing frost to promote stand longevity.

Another recommendation to promote stand longevity in sainfoin is to allow seed set every two years, which has not been done with this trial.

**Table 38.** Percent Composition of Mixture Trial, 2018-2021.

Mixture	% Composition			
	2018		2021	
	Legumes	Grasses	Legumes	Grasses
Fleet MD/Yellowhead	27	73	44	56
AC Knowles/Yellowhead	53	47	31	69
Success HB/Yellowhead	44	56	39	61
Fleet MB/Spredor 5	27	73	32	68
AC Knowles/Spredor 5	34	66	11	89
Success HB/Spredor 5	48	52	36	64
Fleet MB/AC Mountainview	80	20	0	100
AC Knowles/AC Mountainview	86	14	0	100
Success HB/AC Mountainview	66	34	10	90

## **Evaluation of Perennial Forage Mixtures for Hay or Pasture**

**Partners:** Canadian Agriculture Partnership  
Alberta Agriculture, Forestry and Rural Development  
Chinook Applied Research Association  
Foothills Forage and Grazing Association  
North Peace Applied Research Association  
Gateway Research Organization  
Battle River Research Group  
West-Central Forage Association  
Mackenzie Applied Research Association  
SARDA Crop Research  
Peace Country Beef and Forage Association

### **Objectives:**

1. To provide unbiased, current and comprehensive regional data regarding the establishment of, persistence, dry matter, yield, nutrition quality and economics of a number of perennial grasses and legume combinations when compared to pure stands of selected species intended for grazing and hay-land.
2. To deliver comprehensive information related to regional establishment, persistence, dry matter yield, quantity and economics of a number of perennial grasses and legume mixtures.

### **Background:**

The recent survey on the economic, productive and financial performance of the Alberta cow-calf operation indicate that two thirds of the total cost of maintaining Alberta's cow herd is comprised of pasture (both native and seeded), stored feed and bedding (Oginsky and Boyda, 2018) The majority of the annual feed requirement comes from mixed stands of perennial grasses and legumes, therefore managing these forage resources is very important. Across Alberta most questions Agricultural Research Associations (ARA's) have received from producers wishing to improve their pastures and hayland are related to combinations of grass and legume species. Very few requests are for pure stands.

Most perennial seed sold by fame supply companies is sold either as a custom or stock blend. Unfortunately, the majority of perennial forages research to date has focused on pure stands instead of mixes. The recent concerted program of research/demonstrations on high legume pastures by AFF, ARA's and Ag Canada, which was devoted to improving producers understanding of the roles played by legumes in forage production systems, has helped initiate producer's interest in optimizing the use of legumes in forage and livestock systems. Producers are now aware that grass-legume mixes are key to increase yield and profit/acre. Of great importance is the availability of newer non-bloating legume varieties, in particular sainfoin and cicer milkvetch.

The importance of legumes in grass mixtures cannot be overemphasized. In addition to nitrogen benefits, potential yield and quality improvements, legume/grass combinations may also provide

benefits in soil structure and carbons storage. A mixture of species more closely mimics natural forages than pure stands. There can be symbiotic benefits from differences in root structures, water and mineral use efficiencies, regrowth and snow trap potential.

Establishing and maintaining a successful hayland and grazing stand requires significant investment and good management. Selecting varieties which are easy to establish and are resilient while providing high yield and quality can improve net returns for agricultural producers. Results from this project will help tailor appropriate blends of perennial forage species to a particular regional and improve cattlemen's ability to make a good management decision.

Generation of information at points across the project will complement the Perennial Forage Variety Evaluation and Demonstration at multiple sites in Alberta (ABP/ALMA File No. FRG 19.15) project completed in 2018. It will also contribute directly to three goals of the Alberta Beef Forage and Grazing Center (ABFGC), including reducing winter feeding cost, reducing backgrounding cost and improving late summer/fall pasture.

Regional knowledge generated in the project will be shared with local cattlemen through a variety of means, ensuring management decisions contribute to a strong future for individual operations and agricultural industry in general.

#### **Reference:**

- *AgriProfit\$ 2013-2017 Economic, Production and Financial Performance of Alberta Cow/Calf Operations.*
- <https://open.alberta.ca/dataset/78f2072-bdb5-40be-a7df-a0a44a760017/resource/c19ad19f-22a8-46c0-b05a-0a604c4b0814/download/cowcalfbenchmarks2017.pdf>
- *Alberta Agriculture and Forestry Alberta Forage Manual (Agdex 120/20-1)*
- 18 Schelllenberg, Michael P. 2013. <http://www.beefresearch.ca/factsheet.cfm/drought-tolerant-forage-mixtures-55>
- *Beef Cattle Research Council Research. 2015. Determining Optimal Forage Species Mixtures.* <http://www.beefresearch.ca/factsheet.cfm/determining-optimal-forage-species-mixtures-152>
- *Beef Cattle Research Council 2015. Breeding Forage Varieties,* <http://www.beefresearch.ca/research-topic.cfm/breeding-forage-varieties -13>
- *ABP File No.FRГ 19.15 Perennial Forage*

#### **Method:**

The trial was seeded as three blocks of plots: legumes, grasses and grass/legume mixtures at the LARA Fort Kent Research Site (NE25-61-5-W4) in a randomized complete block designs (RCBD) with four replicates to reduce error. The legume and legume mixture trials were seeded on June 7, 2021, and the legume trial was seeded on June 2, 2021. The legume trial was not able to be established due to extreme dry conditions.

No harvest data was taken in the year of establishment to allow for adequate establishment of all varieties, particularly due to the dry conditions. The first harvest was taken in the summer of 2022.

**Table 39.** Perennial Forages seeded, 2021.

Mixtures	Legumes
Fleet/AC Yellowhead	Spyder
AC Success/Yellowhead/AC Mountainview/Veldt	PV Ultima
Legumeaster	Rugged
AC Knowles/Yellowhead	Phabalous
AC Success/Spredor 5	Rambler
Fleet/Greenleaf/AC Yellowhead	44-40
Salinemaster	AC Yellowhead
Fleet/AC Yellowhead/AC Mountainview/Veldt	AAC Glenview
Fleet/AC Yellowhead/AC Mountainview	20--10
Fleet/Spredor 5	Halo
AC Knowles/Spredor 5	Veldt
AC Success/Yellowhead	Rangelander
AC Success/Greenleaf/AC Yellowhead	Spreader 4
AC Success/AC Yellowhead/AC Mountainview	AC Mountainview
	AC Grazeland
	Spredor 5
	Dalton
	Halo 2
	Oxley 2
	Assalt

**Table 40.** Perennial Forage Mixtures Emergence Counts, 2021.

Variety	Emergence Counts (plants per 1/4m)					
	7 Days		14 Days		21 Days	
	Legumes	Grasses	Legumes	Grasses	Legumes	Grasses
Fleet/AC Yellowhead	0	0	2	13	6	20
AC Success/Yellowhead/AC Mountainview/Veldt	0	0	4	6	6	5
Legumeaster	0	0	5	2	13	10
AC Knowles/Yellowhead	0	0	3	4	8	11
AC Success/Spredor 5	0	0	2	2	6	8
Fleet/Greenleaf/AC Yellowhead	0	0	3	11	4	22
Salinemaster	0	0	1	7	5	15
Fleet/AC Yellowhead/AC Mountainview/Veldt	0	0	3	4	9	17
Fleet/AC Yellowhead/AC Mountainview	0	0	3	7	8	15
Fleet/Spredor 5	0	0	2	8	4	14
AC Knowles/Spredor 5	0	0	4	11	7	15
AC Success/Yellowhead	0	0	5	2	5	7
AC Success/Greenleaf/AC Yellowhead	0	0	3	6	4	16
AC Success/AC Yellowhead/AC Mountainview	0	0	1	1	8	10

**Table 41.** Perennial Forage Legumes Emergence Counts, 2021.

Variety	Emergence Counts		
	7 Days	14 Days	21 Days
Spyder	0	17	20
PV Ultima	0	23	21
Rugged	0	31	32
Phabalous	0	18	15
Rambler	0	29	31
44-40	0	18	19
AC Yellowhead	0	18	19
AAC Glenview	0	18	17
20--10	0	19	30
Halo	0	18	22
Veldt	0	18	18
Rangelander	0	27	28
Spreader 4	0	28	33
AC Mountainview	0	13	18
AC Grazeland	0	26	26
Spredor 5	0	21	23
Dalton	0	36	34
Halo 2	0	19	28
Oxley 2	0	8	14
Assalt	0	13	18

Unfortunately, there is only one year of trial data for the legumes and mixture treatment block. There was no data for the grass treatment block of the trial since it was unable to be seeded. Plots were very weedy due to the extremely dry conditions in 2021 and 2022. Extensive amounts of time were spent hand weeding; however, yield was still impacted by weediness. Plot yield was further affected by poor emergence and establishment due to the plots being seeded during the 2021 dry conditions. Overall emergence and establishment were quite patchy. More plants emerged in spring 2022 due to snow melt moisture, but since these plants were in the first year of establishment, they did not contribute much to yield.

Overall, there was no difference in dry matter yield between mixture treatments. Yield was very variable across treatments due to drought and weediness. Only having one year of data added further difficulty in establishing differences between mixtures. Therefore, difference in yield was not clear. Fleet meadow brome with Spredor 5 or Yellowhead alfalfa had the highest yields at ton/ac dry matter yield.

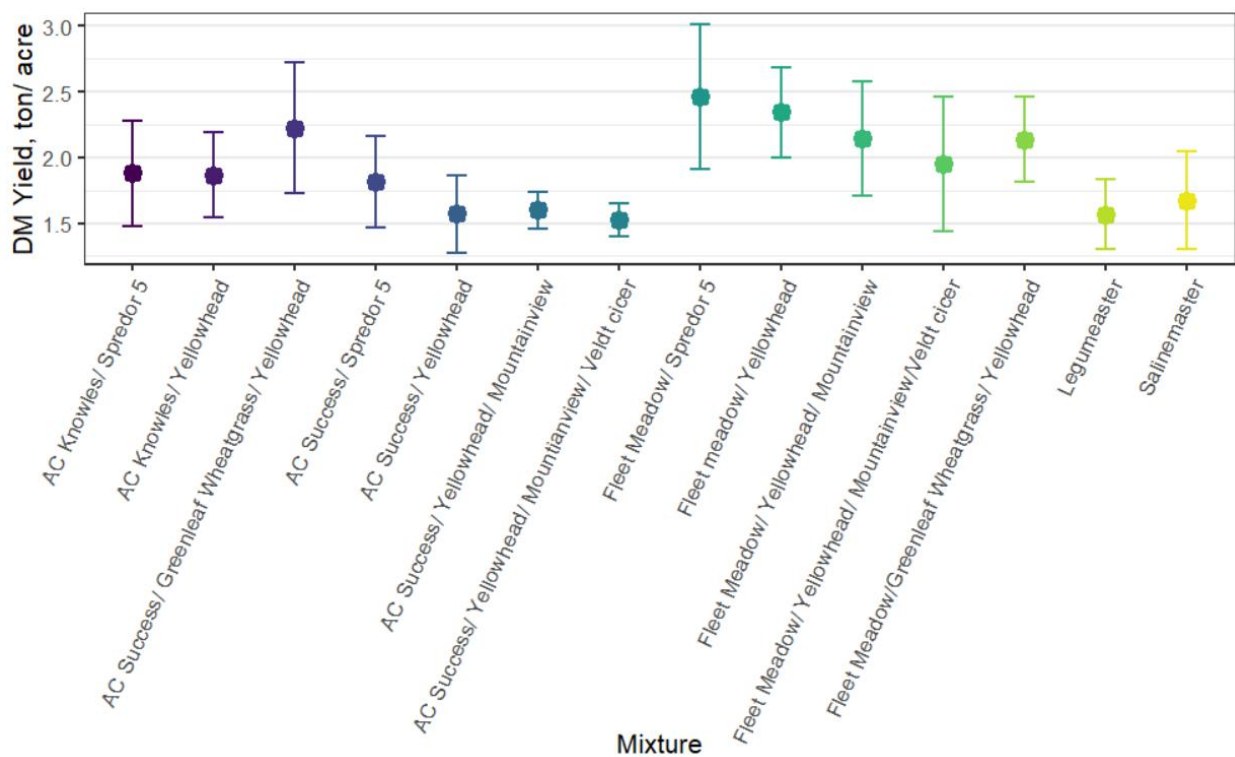
Legumaster had lower NDF and higher CP and Ca values than many of the other mixtures. This can be attributed to Legumaster mixture containing only legumes, which tend to have higher CP and Ca and better digestibility values than pure grass stands or mixtures with grasses.

In the legumes, there was no difference in dry matter yield between varieties based on post-hoc comparisons. Yield was variable between treatments due to dry conditions, weediness and having only one year of data.

The mixture treatments had higher dry matter yield than the single variety of legume treatments. There was no significant difference in CP content between the legumes or mixtures. TDN and K were higher, and ADF was lower in the mixtures than in the legume only treatment. NDF was lower and Ca, P and Mg were higher in the legume treatments than in the mixtures. The general

rule of thumb requirements in beef cattle nutrition is 7% protein in mid-gestation, 9% protein in late gestation and 11% after calving and during lactation. When considering TDN, the general rule of thumb is 55% in mid-gestation, 60% in late gestation and 65% after calving. In general, CP was adequate to meet cow requirements throughout gestation and after calving for all varieties of legumes and mixtures. However, TDN requirements for most varieties in both legume and mixture treatments only met mid-gestation requirements.

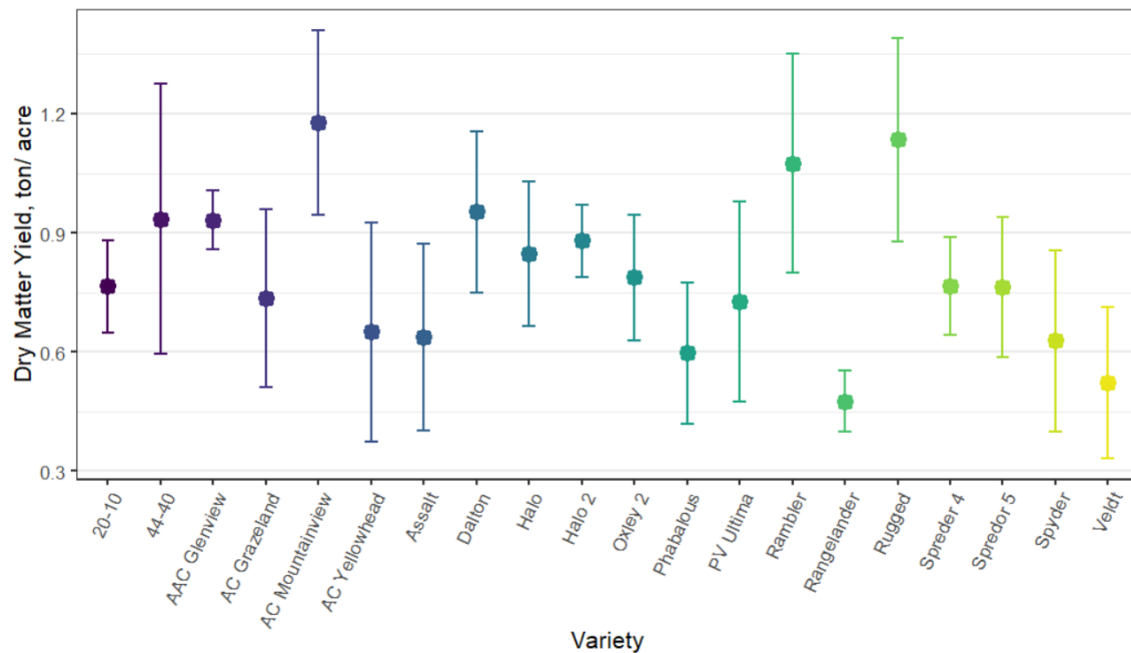
Although there was only one year of data, results indicate that there are clear benefits to forage mixtures over stands with only legumes. The increase in yield and energy content, without sacrificing protein content has major economic benefits to producers. Additionally, legume/grass combinations may also provide benefits in soil structure and carbon storage. A mixture of species more closely mimics natural forages than pure stands. There can be symbiotic benefits from differences in root structures, water and mineral use efficiencies, re-growth and snow trap potential.



**Figure 13.** Perennial Forage Mixtures dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 42.** Perennial Forage Mixtures forage nutritional value, 2022.

Variety	2022 Average Quality							
	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
AC Success/ Yellowhead/ Mountainview	13.98	38.45	50.97	58.95	0.9	0.17	1.54	0.71
Fleet meadow/ Yellowhead	11.76	38.9	57.18	58.6	0.47	0.16	2.26	0.41
AC Success/ Yellowhead/ Mountainview/ Veldt cicer	11.49	38.74	53.35	58.72	0.58	0.15	1.69	0.51
Legumeaster	15.35	37.9	47.26	59.38	1.14	0.17	1.43	0.76
AC Knowles/ Yellowhead	10.96	40.92	55.29	57.02	0.52	0.16	1.62	0.54
AC Success/ Spredor 5	12.8	40.79	52.09	57.12	0.78	0.18	1.98	0.82
Fleet Meadow/Greenleaf Wheatgrass/ Yellowhead	13.51	36.04	51.28	60.82	0.63	0.16	1.72	0.54
Salinemaster	12.13	34.17	52.73	62.28	0.4	0.15	1.79	0.37
Fleet Meadow/ Yellowhead/ Mountainview/Veldt cicer	12.65	37.4	54.56	59.77	0.5	0.12	1.77	0.47
Fleet Meadow/ Yellowhead/ Mountainview	12.01	37.87	56.08	59.4	0.48	0.14	1.96	0.47
AC Knowles/ Spredor 5	11.91	39.2	52.83	58.36	0.64	0.13	1.51	0.53
Fleet Meadow/ Spredor 5	11.8	37.15	54.09	59.96	0.71	0.14	1.73	0.5
AC Success/ Greenleaf Wheatgrass/ Yellowhead	13.54	38.47	55.2	58.93	0.6	0.16	1.37	0.53
AC Success/ Yellowhead	10.79	38.42	53.34	58.97	0.57	0.17	1.62	0.5
<i>Average</i>	<b>12.48</b>	<b>38.17</b>	<b>53.30</b>	<b>59.16</b>	<b>0.64</b>	<b>0.15</b>	<b>1.71</b>	<b>0.55</b>



**Figure 14.** Perennial Forage Legumes dry matter yield, 2022 (ton/ac, 1 ton = 2000 lbs).

**Table 43.** Perennial Forage Mixtures forage nutritional value, 2022.

Variety	2022 Average Quality							
	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Spyder	12.39	41	49.31	56.96	1.01	0.19	1.18	0.63
PV Ultima	14.07	38.49	47.37	58.92	1.17	0.16	1.09	0.66
Rugged	11.71	41.4	51.25	56.65	0.98	0.16	1.53	0.58
Phabalous	12.17	40.42	50.45	57.41	0.84	0.14	1.13	0.6
Rambler	12.6	39.6	48.24	58.05	0.96	0.17	1.18	0.71
44-40	13.55	40.8	51.23	57.12	0.83	0.15	1.51	0.64
AC Yellowhead	12.94	40.11	49.58	57.65	0.98	0.18	1.42	0.73
AAC Glenview	9.49	42.21	51.97	56.02	1.23	0.18	1.37	0.97
20-Oct	12.97	40.96	49.01	56.99	1.09	0.2	1.63	0.79
Halo	14.2	38.52	47.2	58.89	1.06	0.16	1.12	0.72
Veldt	11.18	42.02	49.16	56.17	1.06	0.24	1.82	0.96
Rangelander	11.89	41.12	48.16	56.87	1.08	0.2	1.58	0.74
Spredor 4	11.13	42.45	50.33	55.83	0.89	0.19	1.39	0.64
AC Mountainview	10.32	42.29	53.73	55.96	1.1	0.17	1.32	0.77
AC Grazeland	13.54	39.2	48.16	58.36	1.11	0.16	1.14	0.73
Spredor 5	11.36	41.86	50.43	56.29	1.07	0.24	2.03	0.81
Dalton	8.59	45.12	54.54	53.75	0.87	0.16	1.78	0.77
Halo 2	11.63	41.63	50.97	56.47	0.96	0.18	1.48	0.71
Oxley 2	9.72	44.71	54.85	54.07	0.66	0.2	1.83	0.73
Assalt	13.16	38.84	47.25	58.64	1	0.2	1.39	0.74
<i>Average</i>	<b>11.93</b>	<b>41.14</b>	<b>50.16</b>	<b>56.85</b>	<b>1.00</b>	<b>0.18</b>	<b>1.45</b>	<b>0.73</b>

## **Evaluation of Early Seeded Winter Cereals as a Drought Mitigation Strategy**

**Partners:** Canadian Agriculture Partnership  
Results Driven Agriculture Research

### **Objectives:**

- 1) Provide unbiased, regional information regarding the establishment, dry matter yield and nutritional quality of early spring seeded winter cereals for production as livestock feed in Northeastern Alberta.
- 2) To compare the establishment, dry matter yield and nutritional quality of early spring seeded winter cereals (soil temperatures between 2-6°C) with winter cereals seeded at soil temperatures above 10°C.
- 3) To determine the additional forage yield achieved throughout the summer by seeding winter cereals early (soil temperatures between 2-6°C) in a simulated grazing environment.

### **Background:**

The Lakeland region of Alberta experienced one of the driest years since 2002, leaving many agricultural producers scrambling for feed and water resources for livestock and harvesting crops that were yielding as low as 30% of normal yields. As a result, many pastures were overgrazed last fall as producers searched for ways of extending available feed sources. Overgrazed pastures end to produce less the following year and require additional management strategies that include reduced grazing days to ensure long-term recovery.

Winter cereals seeded in fall have been shown to provide an early season grazing opportunity for livestock producers. This could allow for delayed turnout into stressed perennial pastures, thus providing more recovery time for those forages. A second option is to seed winter cereals in the spring, which prevents the cereals from entering a reproductive stage, meaning that these winter cereals would remain vegetative through summer and fall. Current research into spring seeded winter cereals has focused on seeding during typical seeding times when temperatures are over 10°C.

Recent research conducted by Agriculture and Agri-Food Canada in Lethbridge has shown that as long as soil temperatures are between 2-6°C, spring wheat can be sown and produce commendable yields when compared to spring wheat sown when soil temperatures are over 10°C. This research was replicated by seven Applied Research Associations (ARAs) across Alberta over a four-year period and found similar results. Seeding early during drought conditions could allow these cereals to utilize early spring moisture from snow melt that might not be available later in the spring. However, this concept has not yet been evaluated for use in winter cereals for forage production.

Previous studies found that spring-planted winter cereals can maintain yield and quality late in the summer and into the fall under simulated pasture treatments. This is an important advantage to their use as spring cereal production tends to decline after the end of July.

## **Method:**

The project was be seeded at the LARA Fort Kent Research Site located in the Municipal District of Bonnyville. The project will be seeded in a randomized complete block design (RCBD) with four replicates to reduce error. Treatments included 2 varieties of winter triticale, 2 varieties of winter wheat and 2 varieties of fall rye for a total of 6 treatments in the trial. Metzger and Luoma were the selected winter triticale varieties. Pintail and Wildfire were the selected winter wheat varieties. Prima and Hazlet were the selected fall rye varieties.

Plots were 1.15 m wide by 7.5 m in length. Harvested area was a minimum of 6 m squared. Sufficient alley space was left between replications to allow movement of harvest and site maintenance machinery and to avoid traffic on the plots.

Varieties were seeded to a depth 1.5 inches due to dry soil conditions. The ultra early seeding date took place on April 29, 2022, with soil temperatures at 2°C. The regular seeding date took place on May 27, 2022, which aligns with normal seeding times for the region. Soil temperatures were 12°C at the normal seeding date. The appropriate fertilizer was applied based on soil tests taken in the fall of 2021. Fertilizer was side-banded at seeding.

The site received a pre-seed burn-off to control any weeds prior to seeding. In crop spraying occurred approximately 3-4 weeks after seeding with Buctril M. Hand weeding occur when necessary to control any weeds that were not killed by the herbicide, such as grassy weeds.

Harvest took place each plot was at least 30 cm tall on average. Forage shorter than this was could not efficiently be harvested with the forage harvester due to the nature of the flail. The first harvest occurred approximately eight weeks following seeding for each treatment. Regrowth on the plots was harvested throughout the summer when regrowth was at least 30 cm tall.

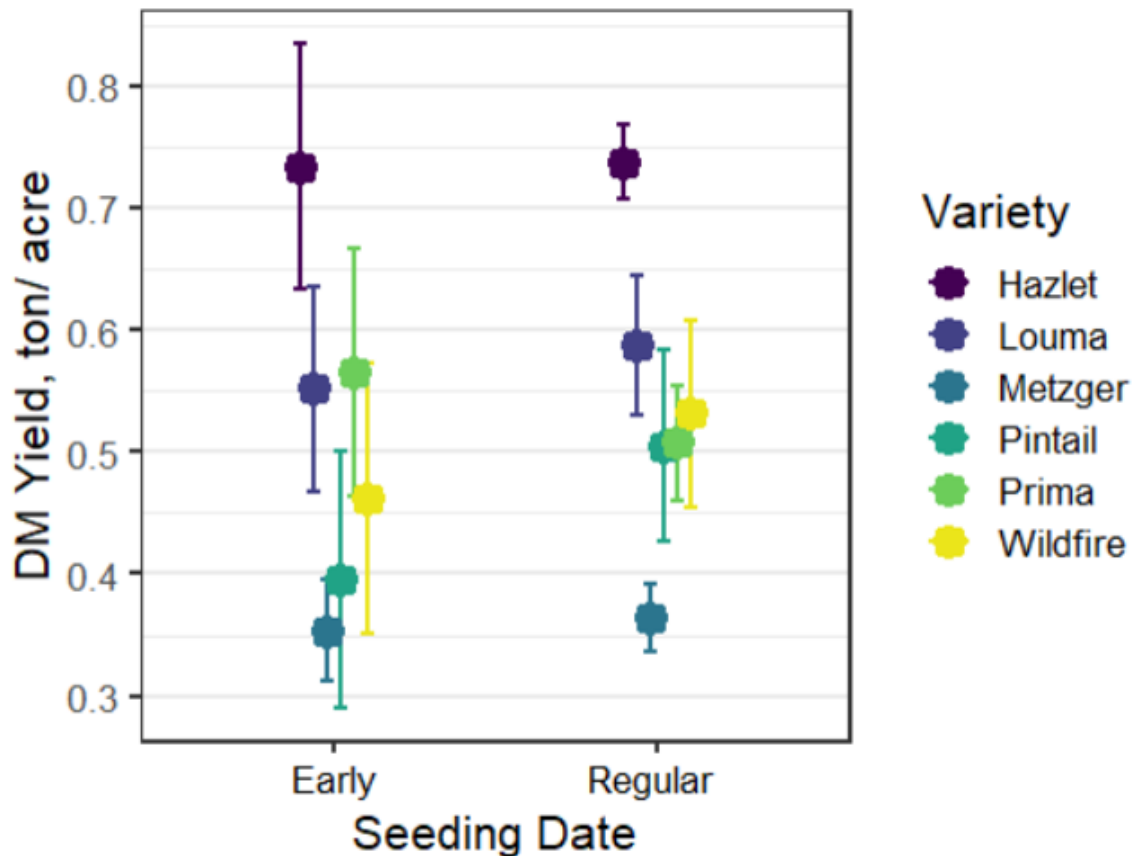
## **Results:**

The first harvest both the early and regular seeded treatments was between seven and eight weeks after seeding. After the first harvest, early seeded regrowth was harvested in three weeks. The third harvest was seven weeks after the second harvest. Regular seeded regrowth was harvested seven weeks after the first harvest.

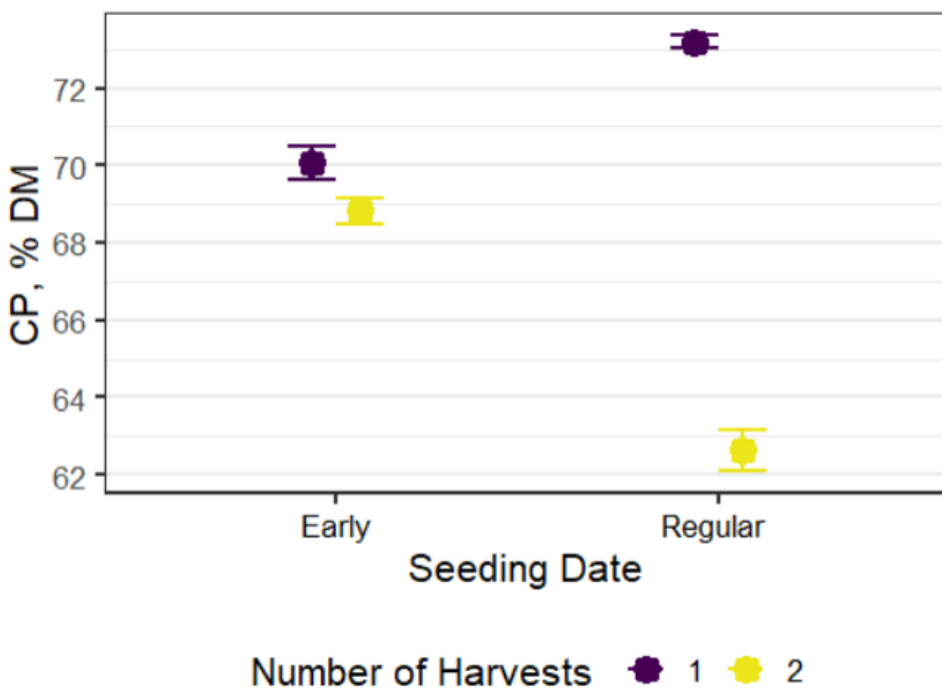
Overall, the early seeded treatment produced more total yield than the regular seeded treatment. Plot yield per harvest was not different between the early and late seed treatments, or harvest number. Therefore, the increased total yield in the early seeded treatment can be attributed to the extra harvest. Hazlet and Louma were the top two yielding varieties. Hazlet produced significantly more yield than Metzger, Pintail, Prima, and Wildfire.

Crude protein was not different between varieties, but the early seeded treatment had higher CP content than the regular seeded treatment. The first harvest had higher CP than subsequent harvests. Total digestible nutrients were significantly higher in the first harvest than in subsequent harvests but were not different between varieties or seeding dates.

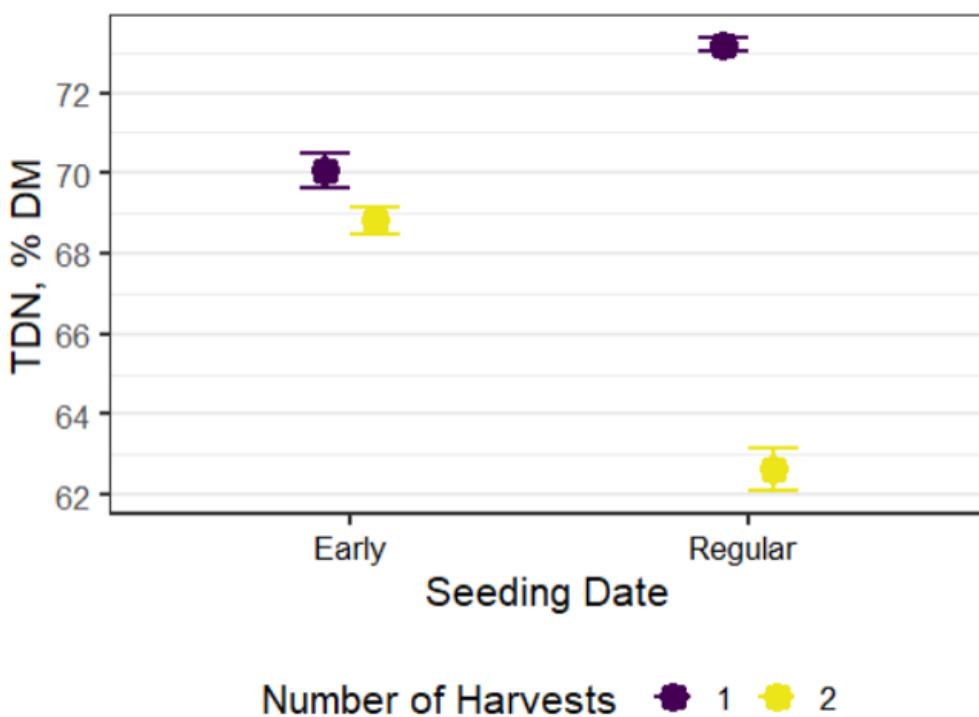
During periods of dry conditions, early seeded winter cereals can be a viable alternative grazing resource. By seeding early, more grazing periods can be obtained with higher CP forage over regular seeding dates. This can be used as an alternative feed source during drought years reducing grazing pressure on perennial pastures, the need to buy dry feed or the need to rent alternative pasture. The year after a drought, this could be used as a method to defer grazing on drought-stressed pastures until later in the grazing season and provide more rest for these pastures throughout the summer. Furthermore, by seeding early the winter cereals can take advantage of any early growing season moisture that might occur before regular seeding dates.



**Figure 15.** Average dry matter forage yield for each variety by seeding date treatment (ton/ac, 1ton = 2000lbs).



**Figure 16.** Average crude protein (CP, %) by harvest number and seeding date treatment.



**Figure 17.** Average total digestible nutrient (TDN, %) by harvest number and seeding date treatment.

## **Long-Term Impact on Soil Biological, Physical and Chemical Health of Four Extended Grazing Strategies in Northeastern Alberta**

**Partners:** Bar LD Ranch  
Canadian Agriculture Partnership  
Chinook Applied Research Association  
Peace Country Beef and Forage Association  
Alberta Agriculture and Forestry

### **Objectives:**

1. To determine the long-term impact of four winter grazing strategies on soil physical, chemical and biological health.
2. To determine the long-term impact of four winter grazing strategies on plant productivity and nutritive quality.
3. To determine the economic feasibility of four winter grazing strategies.
4. To compare the environmental impact (soil and forage) and economics of four winter grazing strategies.

### **Background:**

Overwintering beef cows is a major cost in cow-calf production systems across the western Canadian prairies. Producers are looking to decrease winter feeding costs by utilizing extensive feeding systems including bale grazing, swath grazing, stockpiled forage and corn grazing. These systems can utilize both annual and perennial forage crops. Not only do extensive grazing systems reduce winter feeding costs through lower machinery use, fuel consumption and manure handling costs, but these systems can also have a beneficial impact on soil nutrients and plant productivity (Jungnitsh et al. 2011; Kelln et al. 2012).

Jungnitsh et al. (2011) showed a marked gain in nutrient cycling efficiencies and pasture growth using in-field feeding systems when compared to drylot feeding systems. The study also showed higher protein content in forages with in-field feeding compared to hauled manure or compost with a total of 34% of original feed N and 22% of original feed P imported into the fields with extended grazing systems. Similar results were found by Kelln et al. (2012) comparing nitrogen and phosphorous amounts and distribution in swath grazing, straw-chaff bunch grazing and bale grazing. This study also assessed subsequent crop biomass and found a greater positive impact in the extended feeding systems when compared to raw manure and compost manure application.

With the higher concentration of nutrients accumulated in winter feeding sites, care needs to be taken to avoid nutrient overloading. Gburek and Sharpley (1998) stressed the potential environmental risk of exceeding the soil and vegetations phosphorous capacity leading to dissolved phosphorous runoff with precipitation. King et al. (2017) showed a significant increase in nitrate export from applications of solid cattle manure during spring melt when compared to a non-manured control. Extended feeding systems show a greater accumulation on nutrients from excreta at feeding sites (Kelln et al. 2012; Jungnitsh et al. 2011).

Although current studies provide a detailed look into the short-term impact of winter grazing systems on soil nutrients and plant biomass, there is a lack of data assessing the long-term impacts (3+ years) of winter grazing systems on soil health and plant biomass.

In recent years, there has become an increased focus on soil health. Soil health can be defined as “the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals and humans” (USDA). Recent research into extended grazing strategies and their impact on soil has focused on nutrient cycling, particularly Nitrogen (N) and Phosphorous (P). Although this is an important part of soil health, very little has been investigated into the impact on soil biological health. Much of this has been due to a lack of laboratory testing capabilities in North America to determine soil biology including soil microorganisms. With the opening of Chinook Applied Research Association’s (CARA) Soil Health Lab, Alberta now has the ability to determine soil biological health.

### **References:**

Gburek, W.J. and Sharpley, A.N. 1998. Hydrologic controls on phosphorous loss from upland agricultural watersheds. *J. Environ. Qual.* 27.

Jungnitsh, P.F., Schoenau, J.J., Lardner, H.A. and Jefferson, P. 2011. Winter feeding beef cattle on the western Canadian prairies: impacts on soil nitrogen and phosphorous cycling and forage growth. *Agric. Ecosyst. Environ.* 141 (1-2): 143-152.

Kelln, B. and Lardner, H.A. 2012. Effects of beef cow winter feeding systems, pen manure and compost on soil nitrogen and phosphorous amounts and distribution, soil density and crop biomass. *Nutr. Cycl. Agroecosyst.* 92: 183-194.

King, T., Schoenau, J. and Elliott, J. 2017. Relationship between manure management application practices and phosphorous and nitrogen export in snowmelt run-off water from black chernozem Saskatchewan soil. *Sust. Agric. Res.* 6: 03-114.

### **Method:**

The following four extended grazing strategies will be assessed:

1. Bale grazing
2. Swath grazing cereals
3. Grazing stockpiled forage
4. Corn grazing

A detailed historical record of each field used for the treatments was compiled prior to confirming project sites. Similar records will be kept throughout the duration of the project including, seeding costs, fertility costs, baling costs, number of head grazed, days grazed etc. Anecdotal summaries from each participating producer will be kept to demonstrate how each producer felt the system performed on their operation.

### *Soil Sampling*

Soil sampling for the project will utilize CARA's Soil Health Sampling Protocol. Physical soil health parameters will be assessed on site, biological parameters assessed at the CARA Soil Health Lab and soil samples will be sent to an accredited laboratory for analysis of chemical soil health parameters.

Soil health parameters tested will include:

- |                               |                      |
|-------------------------------|----------------------|
| 1. Physical analysis          | 3. Chemical Analysis |
| a. Compaction                 | a. Organic matter    |
| b. Bulk density               | b. N,P,K             |
| c. Texture                    | c. Micro Nutrients   |
| d. Water infiltration         |                      |
| 2. Biological analysis        |                      |
| a. Active carbon              |                      |
| b. Soil microbial respiration |                      |
| c. Active and total bacteria  |                      |
| d. Active and total fungi     |                      |
| e. Nematode functional groups |                      |
| f. Protozoa functional group  |                      |

Sampling began in the fall of 2019, and occurred each spring and fall from 2020-2022.

### *Forage Sampling*

Forage samples were collected in early summer and fall, frozen and sent to an accredited laboratory for analysis utilizing best management practices for sampling. Over the years there was a slight increase in crude protein (CP) content of forage on areas that had been bale grazed the previous winter. Brix levels, which measure sugar content of forage, and serves as an indicator of plant health were also higher in areas where a bale had been placed the previous winter.

## Forage Crop Guidelines and Forage Analysis Summary

The single largest variable cost in maintaining a cow herd is feed. Understanding cow nutrient requirements and ration balancing can help to reduce costs associated with over and under feeding (tables 44 and 45). Previous studies estimate that feeding a balanced ration can save as much as \$0.25/hd/day. Consequently, feed tests are critical to ensuring that rations are based on the actual feed being fed.

This year was an interesting and frustrating year for making good quality feed for overwintering your cattle. The Dry weather made it difficult to time the proper crop staging making it a shorter growing season as well as there being a shortage on feed.

Every year LARA sends in multiple feed samples for quality analysis on our trials and demonstrations. In addition, we also offer feed testing services for producers in our area for a fee.

Available to all producers is a forage probe that can be borrowed at any time. Contact LARA to see when it is available: 780.826.7260.

**Table 44.** Forage intake guidelines (as percent of body weight).

	<b>Straw and Poor Quality Forage</b>	<b>Medium Quality Forage</b>	<b>Excellent Quality Forage</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
<b>Growing and Finishing Cattle</b>	1.0	1.8 - 2.0	2.5 - 3.0
<b>Dry Mature Cows and Bulls</b>	1.4 - 1.6	1.8 - 2.0	2.3 - 2.6
<b>Lactating Cows</b>	1.6 - 1.8	2 - 2.4	2.5 - 3.0

\* as taken from CowBytes

**Table 45.** Minimum Energy and Crude Protein Requirements for Beef Cattle.

<b>Animal</b>	<b>CP (%)</b>	<b>ADF (%)</b>	<b>TDN (%)</b>
<b>Cows</b>			
<b>Mid-Pregnancy</b>	8	59	50
<b>Late Pregnancy</b>	9	50	55
<b>Lactation</b>	10-12	31.5 - 45.7	56 - 63
<b>Growing Cattle</b>			
<b>400 - 600 lbs - low ADG</b>	11-12	24-39	60-65
<b>400 - 600 lbs - high ADG</b>	12-14	<31	68-75
<b>600 - 800 lbs - low ADG</b>	10-11	<31	60-65
<b>600 - 800 lbs - high ADG</b>	12-13	<31	68-75
<b>&gt;800 lbs</b>	9-12	<31	68-75
<b>Finishing Cattle</b>			
<b>900 - 1000 lbs</b>	10-11	<31	68-75
<b>&gt;1000 lbs</b>	9-10	<31	68-75
<b>Wintering Bulls</b>	9	37-53.5	53-60

# LARA 2023 FEED TESTING PRICE LIST



## PRICES PER SAMPLE

Basic NIRS (FN1)	\$30
Basic NIRS with Minerals (FN1WM)	\$35
Full NIRS with Minerals (FN2WM)	\$40
Add Nitrates to above tests	+\$10
Nitrates Only	\$25
Grains and Mixed Feeds (FD3R)	\$50
Complete Equine with Sugars (F2H)	\$50

**LARA WILL NO LONGER BE PROVIDING 2 FREE FEED SAMPLES  
PER PRODUCER**

**IF TEST IS NOT SPECIFIED BASIC NIRS WILL BE USED.  
SAMPLES WILL NOT BE SENT IF THERE IS NO PHONE NUMBER OR EMAIL  
ADDRESS WITH THE SAMPLES.**

*Samples will be sent on the 1st and 3rd Monday of every month.  
Results will be available 10-15 business days after samples are sent.  
Cash, Cheque, or E-Transfer Accepted.*



Questions please call (780) 826-7260

## **Rancher Researcher Project**

**Partners:** Canadian Agriculture Partnership  
Chinook Applied Research Association  
Foothills Forage and Grazing Association  
North Peace Applied Research Association  
Gateway Research Organization  
Battle River Research Group  
West-Central Forage Association  
Mackenzie Applied Research Association  
Grey Wooded Forage Association  
Peace Country Beef and Forage Association  
Alberta Beef Forage and Grazing Centre (Alberta Beef Producers, Alberta Agriculture and Forestry, Agriculture and Agri-Food Canada)

### **Objectives:**

1. Provide a framework and process to assist in the adoption of technologies which provide benefit to cattle operations in Alberta.
2. Assess the impact of adoption of specific technologies on 20 operations utilizing financial and production data.
3. Enhance the adoption process of technologies which benefit ranch operations.

### **Background:**

The uptake of new technologies has typically been slow within ranching operations. There are many reasons why this happens including but not limited to, a lack of awareness of specific innovations, lack of knowledge of how and what impacts the practice change may have or perhaps a lack of financial and/or manpower resources to put the tools to use. Despite the data which already exists related to productivity and profitability many ranchers have not been motivated to utilize the tools for making decisions within their operations.

This is an expansion of a Rancher/Researcher Pilot project which monitored the adoption of up to 3 innovations by 8 ranchers in south central Alberta. Selection of specific innovations was determined by the individual ranchers. Several targeted areas were evaluated, including soil, forage and economic parameters, for assessment of the impact the innovations made to the individual ranch operations. The ranchers were provided with the opportunity to consult with various scientists to further their understanding of the new technologies. They were encouraged to participate in Alberta Agriculture's Agriprofits program, which although onerous, provided enlightening results for their operations.

The pilot project demonstrated that an enhanced understanding of the ranch operation (GOLD indicators, long term goals, available resources, etc.) can improve and how an innovation will have a positive impact. Ranch participants also acknowledged the importance of collecting and utilizing production and financial data when making decisions on management change.

While the information gleaned from the pilot was valuable, there was an identification of gaps which can impede consideration of the number of innovations available to the ranching community. This project builds on the experience from the pilot and will improve the successful adoption of various technologies by including a detailed initial interview with the ranchers to help determine selection of technologies relevant to their operation (rather than self-selected innovations), facilitated linkage with appropriate topic specialist as well as require a financial investment for the new technology. Ranchers will be made aware of the benefits of detailed monitoring of both production and financial ranch metrics. They will be encouraged to participate in Agriprofits. Ranchers from both the pilot and expansion projects will be expected to support the adoption process by providing testimonials and mentorship related to their experience, enhancing peer to peer KTT.

# Environment and Regenerative Agriculture



## **Impact of Stem Mining Weevil (*Hadropontus litura*) population density on Canada Thistle Suppression**

Canada thistle (*Cirsium arvense*) is an aggressive, colony-forming perennial weed which reproduces by both seeds and horizontal creeping root systems. It is listed under the Alberta Weed Control Act as noxious. Canada thistle has a high tolerance to many different environmental conditions and is highly competitive with other vegetation. It is prevalent in many locations such as riparian areas that do not allow for chemical or mechanical control methods.

The adult lifespan of the Stem Mining Weevil, *Hadropontus litura*, is approximately 10 months as they overwinter in the soil and leaf litter, and emerge in the spring to feed on rosette leaf foliage and stem tissue. Eggs are laid in May and June in the mid vein of the leaf and eggs hatch 9 days later. The larva mine down the stem into the root collar consuming plant tissues.

The majority of previous research on *Hadropontus litura* has been dependant on geographic location. On the west coast of British Columbia and California the weevils have not been very successful compared to the Midwest including Montana. Montana has similar climate to Alberta; therefore, weevils may be effective across the region.

*Hadropontus litura* offers a viable option for Canada thistle suppression in sensitive areas or in conjunction with other control options. The success of *Hadropontus litura* on suppression of Canada thistle will demonstrate:

- Use of a biological control as an alternate means of pest control;
- A possible reduction in chemical use; and
- Weed control in sensitive areas where other traditional methods are not able to be utilized



In 2012, as part of the provincial ARECA Environmental Team protocol, LARA released 1260 adult weevils across 4 sites at various population levels. Each site had a Canada thistle population density of 5 – 10 plants per square meter. Sites were revisited in 2013 to 2017 to monitor for plant damage and presence of weevils. Adults were found this past year and notable damage to the plants was observed.

### Demonstration Solar Watering System

In 2022 LARA purchased a new portable solar watering system through funding from Alberta Environment and Parks. This system can be placed in any surface water source for the use of watering livestock.

This system is available for a free trial and allows the producer a chance to see if an alternative watering system will work for their situation. Call the LARA office to book the system if you are interested.

### LARA Watershed Resiliency and Restoration Program

Watersheds are unique, come in many shapes and sizes and can cross many different land uses. The simple definition of a watershed is the area of land that catches precipitation, and drains into a wetland, stream, river or groundwater. The riparian zone is the interface between the upland and a water course. This area is heavily influenced by water, how and where it flows and is reflected in the plants, soil characteristics and wildlife that are found there. Riparian areas have a large role in water quality, quantity and biodiversity. They provide eight key functions to: trap and store sediment; build and maintain banks and shorelines; store water; recharge aquifers; filter and buffer water; reduce and dissipate energy; create primary production; and maintain biodiversity by providing habitat for plants, wildlife and fish. These Ecological Services benefit people, other living organisms, and the overall functioning of interconnected natural systems within watersheds. Conservation and restoration of wetlands and riparian areas in Alberta are needed for sustainably functioning watersheds. The accomplishments of the funding that ran from 2018-2021 can be seen in the infographic to the right.



### OFFSITE WATERING SYSTEMS

16 Offsite Watering Systems Installed



### RIPARIAN FENCING

14.15 miles of riparian fencing were put in to protect water sources



### WATER COURSE CROSSINGS

3 water course crossings were installed to protect water bodies from erosion

### WETLAND ENHANCEMENT

Two pond levelers were installed to mitigate effects of beavers, along with 84 acres reseeded along riparian areas



One wintering site relocation was funded.

## Environmental Farm Plans

The environment is becoming a more prominent issue. It is a large factor in marketing agriculture and food products in today's global markets. Consumers are demanding more transparency and are demanding high quality and safe products. Reputation of food safety is critical to retain and gain access to domestic and international markets.

Environmental Farm Plans (EFP) provide a tool for producers to assess their own operation and identify environmental risks, current standards, areas for improvement and also highlight what they are doing well.

Having a completed EFP allows producers to access different funding opportunities, such as the Growing Forward Stewardship Program. It is also useful in product branding that demonstrates specific environmental standards. There is a ten-year mandatory renewal period for all EFPs. If your EFP is older than 10 years old you will have to renew it to be eligible for funding opportunities.



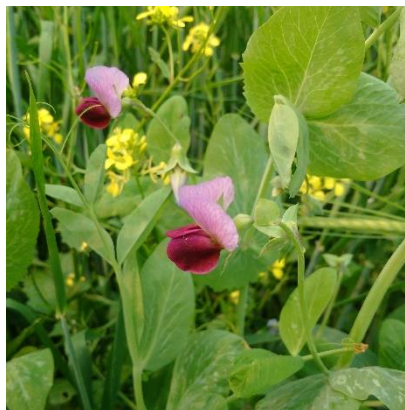
### The EFP Process

An EFP can be completed with one-on-one session(s). The EFP first identifies the soil and farm site characteristics. Following this, the producer completes only the relevant chapters that apply to their operation; such as wintering sites, fertilizer, pesticides, crop management etc.

Upon completion the EFP is submitted to a Technical Assistant for review. Once reviewed, the EFP will be returned along with a letter of completion.

The EFP is a living document and should be reviewed and updated periodically. As of April 1, 2018, there is a mandatory 10-year renewal period for an EFP.

If you wish to complete an EFP or have any questions regarding EFP please contact the LARA office at 780-826-7260.



### **Riparian Health Assessments**

The riparian zone is the interface between the upland and a water course. This area is heavily influenced by water, how and where it flows and is reflected in the plants, soil characteristics and wildlife that are found there. Riparian areas have a large role in water quality, quantity and biodiversity. They provide eight key functions to: trap and store sediment; build and maintain banks and shorelines; store water; recharge aquifers; filter and buffer water; reduce and dissipate energy; create primary production; and maintain biodiversity by providing habitat for plants, wildlife and fish.

This Riparian Health Assessment is a tool designed to evaluate the selected site. It can provide a foundation to build an action plan and identify priorities. The assessment provides a snapshot in time and to be an effective tool for monitoring should be done on the same riparian area several years apart.

If you are interested in having a riparian health assessment completed on your land, please contact the LARA office.



## **Alberta Soil Health Benchmark Monitoring Project**

**Partners:** Chinook Applied Research Association  
Battle River Research Group  
Farming Smarter  
Foothills Forage and Grazing Association  
Gateway Research Organization  
Grey Wooded Forage Association  
Mackenzie Applied Research Association  
North Peace Applied Research Association  
Peace Country Beef and Forage Association  
West Central Forage Association  
Food Water Wellness Foundation  
Canadian Agriculture Partnership  
Alberta Agriculture and Forestry

### **Objectives:**

1. Improve the understanding of soil health parameters amongst Alberta producers.
2. Establish a soil health benchmark database representing points across Alberta.
3. Monitor how management practices affect soil health parameters during a 3-year time frame.

### **Background:**

There is an increasing interest in the link between soil health, plant health and ultimately food quality. Society is also concerned with carbon both in the air and soil. Since carbon and soil health are very closely connected, management practices which improve carbon sequestration may result in a healthy soil and nutritious food products.

The status and functionality of a soil should be measured not only by its chemical (fertility) properties but also for its physical and biological properties. Chemical components of soil have been intensively evaluated by commercial soil testing labs in Canada. Chemical fertility recommendations have been based on this knowledge. The role of soil biology, however, is not well understood and physical characteristics have not been monitored. Evaluation of biological soil characteristics has only become available during the past few years in laboratories in the United States and more recently eastern Canada. Existing biological tests have not been calibrated and monitored specifically for Alberta soils. CARA's Soil Health Lab, under the direction of Dr. Yamily Zavala, provides a unique service in evaluating soil health constraint indicators. A biological and physical baseline developed within the province will provide a framework which can help define strategies for managing and improving the productive capacity, and sustainability, of our soils. A diverse micro-biological underground community may contribute to an overall healthier soil by improving soil aggregation, soil water infiltration and storage as well as improved

carbon sequestration. The improved aggregation stability will also contribute to enhanced carbon sequestration levels in the soil. Healthy soils produce healthy plants resulting in a higher quality food product.

Understanding soil health will give Alberta producers a valuable tool for use in making strategic management decisions on their farms and ranches. Sustainable productivity of a soil is a function of physical, chemical and biological soil functions. While chemical (mineral) characteristics are well documented through traditional soil testing, physical and biological components are not.

This project will assess and document soil health indicators at a minimum 220 locations per year across Alberta. Information from soil samples collected for various other projects, including the Rancher Researcher Pilot (8 Alberta Ranches), the Carbon Pasture Management Project (9 sites in Alberta) and Strategies to Reduce Fertility Inputs and Improve Soil Health and C-Sequestration in Mixed Crop/Livestock Systems (Fairview and Sedalia) will added to the data base. Individual farmer submissions to CARA's Soil Health Lab will also be included in the benchmark inventory. This will result in a base of information from points all across the province which will be a new tool for our agricultural industry.

In addition to the collection and evaluation of soil samples, land owners will be coached in the understanding of soil health in general as well as the analysis related to his/her location. The benchmarks will enable these producers to evaluate their management practices with respect to soil health. Farmers will also have the unique opportunity to be trained and have access to some of the lab equipment within CARA's Soil Health Lab for use in the evaluation of their own soil.

### **Method:**

- 20 soil samples will be collected by each participating group in each of 2018 through 2022; the project will allow for farmers to include additional samples in the benchmark inventory if they wish at their own expense
- No specific land use criteria will be used for site selection other than a willing and interested landowner who has good records of management history for the site; it is anticipated the 1210 samples will be a cross-section of crop, forage and native pasture under various management regimes
- CARA's Soil Health Sampling Protocol will be utilized in the collection of all samples
- Staff from all associations will be trained for collection of samples and site information
- Each association will have a Soil Health Sampling Kit
- GPS coordinates will be recorded for each site
- Site history will be documented
- Parameters that will be analyzed:
- Physical (on-site or at CARA Lab):
  - wet aggregation stability (Cornell University protocol)
  - compaction (penetrometer on site)

- bulk density (by weight/volume measurement)
- texture (Bouyoucos hydrometer method)
- Biological (CARA Lab Food Soil Web protocol except as noted)
  - active carbon (Cornell University protocol)
  - C:N ratio (will be done in collaboration with U of A)
  - soil microbial respiration (Cornell University protocol)
  - active & total bacteria
  - active & total fungi
  - nematode functional groups
  - protozoa functional groups
- Chemical (commercial labs)
  - organic matter, pH, EC, etc.
  - N, P, K
  - Micro nutrients
- All information will be entered into a data base
- Information related to specific sites will be shared with the cooperating producers by association staff
- In addition to 220 new sites per year for years 2018-2020, sites were re-visited 3 years after the benchmark and sampled again in 2021 and 2022 to monitor the impact of management activities

### **Discussion:**

Soil sampling began in 2019 and was wrapped up in 2022. Results are still pending from the CARA Soil Health Lab.

# Extension



## **2022 Lakeland Agricultural Research Association Extension Activities**

### **Intercropping Webinar Series**

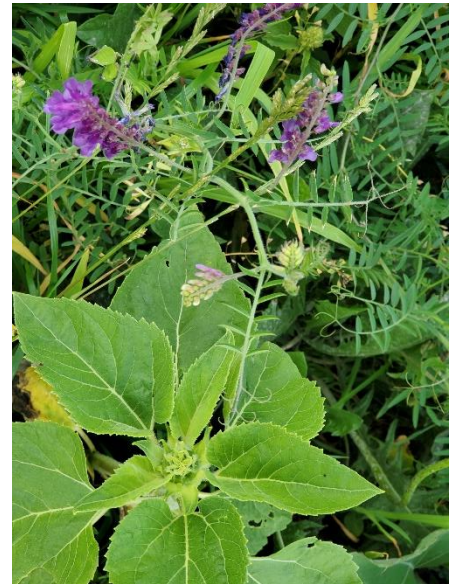
On February 8<sup>th</sup>, 10<sup>th</sup> and 17<sup>th</sup> LARA partnered with Peace County Beef and Forage Association and North Peace Applied Research Association for an intercropping webinar series. The series featured the impacts on nutrient and diseases; challenges and success with producer experiences; and the latest research in intercropping. 77 producers attended the webinars live.

### **Agronomy Update**

Twelve producers attended the agronomy update featuring a disease update with Michael Harding, market update with Ryan Furtas and an insect update with Shelley Barkley.

### **LARA Research Update and AGM**

The Annual Research Update and AGM was held on March 1<sup>st</sup>, at the Ashmont Agriplex. LARA staff presented information on the 2021 research and extension programs such as the variety trials, fertility trials, ultra early seeded wheat, perennial forages, soil health and forage variety trials. 41 producers attended.



### **Alberta Verified Beef Production + Training**

On March 8<sup>th</sup> LARA hosted the Alberta Verified Beef Production + training via zoom. 34 producers attended the session.

### **Cover Crops and Cows**

LARA hosted Kevin Elmy to discuss how cover crops and cows work together, improving soil health and improving nutritional forage quality. Twenty-five producers attended.

### **Succession Planning**

126 producers attended Finding Fairness in Farm Transitions with Elaine Froese. LARA partnered with WCFA, BRRG, NPRA and FFGA to host Elaine and help farms better prepare for succession planning.

### **Working Well Workshop**

On March 23<sup>rd</sup>, thirty producers attended the working well webinar. Here they learned about their wells, and to increase their understanding of groundwater and driller's reports, common water well problems, rural water treatments, and proper well maintenance. Attendees also learned how to shock chlorinate their wells.

### **On Farm Slaughter Operation Licenses**

On March 30<sup>th</sup> LARA hosted a webinar for producers to learn about what is new with on farm slaughter regulations and how it can apply to their operations. 67 producers attended the webinar.

### **Apivar Resistance**

15 producers learned about how to better manage for Varroa mites (*Varroa destructor*) and the increasing instances of apivar resistance.

### **How to Grow Hemp – Seed, Spray and Walk Away**

Seven producers learned about how to grow hemp, hemp contracts and the potential for adding to their operation rotations.

### **Connect for Food**

On April 13<sup>th</sup> a workshop with Connect For Food was held in Flat Lake and 27 participants discussed how to develop our local food economy.

### **Nicole Masters**

LARA hosted a webinar with Nicole Masters to learn about increasing profitability through soil health and reduced inputs. Sixty-five producers attended the webinar to find out how to make microbes work for them.

### **Fort Kent Summer Field Day**

On July 21<sup>st</sup> LARA hosted its Fort Kent summer field day at the LARA office. It featured our regional cereal variety trials, flax, cover crops, liming and crop rotation trial, and ultra-early wheat trial. Thirty-seven producers attended the day.

### **Increasing Forage Efficiency and Reducing Costs While Improving Soil Health Using Annual and Perennial Forages**

Dr. Kevin Sedivec joined LARA and 11 producers at Mallaig Unity Hall and on Silver Spruce Farms on July 26<sup>th</sup>. This was a day to discover how to improve forages in an integrated livestock and cropping system. Half the day was spent in the field and the other half with presentation in the hall.

### **Lac La Biche Summer Field Day**

On July 27<sup>th</sup> The Lac La Biche Summer Field Day was held in Craighend. Sixteen producers attended the presentations and plot tour which featured Grant Lastiwka and Kevin Elmy. The day also covered the impacts of seeding rate and depth on canola production and dugout management.

### **St. Paul Summer Field Day**

On August 4<sup>th</sup> LARA hosted its summer field day. Twenty-six producers attended to tour our regional variety trials, ESN wheat and barley trials, regional silage trials and alternative pea/cereal silage trial. Guest presenters included Trent Whiting from SeCan and Dr. Durunna from Lakeland College.



### **Discover Organics**

Discover Organics! Moving from Organic to Biodynamic: Diversification and Increasing Resilience. This workshop was held in Owl River and included a farm tour of Sand Springs Ranch. The tour covered multispecies rotations, heritage wheat variety breeding, heirloom barley, peas for pork, grass finishing program, potato production and seed production and so much more. This was held on August 9<sup>th</sup>.

### **Smoky Lake Summer Field Day**

On August 10<sup>th</sup> the Smoky Lake Summer Field Day was held in Smoky Lake. Twenty-four producers attended the presentations and plot tour.



### **Jimmy Emmons: Long Live the Soil**

Long Live the Soil was held in Fort Kent on August 16<sup>th</sup>. The day featured presentations from Jimmy Emmons and included getting dirty in soil pits in the LARA Cover Crop Demonstration site. Eighteen producers attended the event.

### **Connect For Food**

Grow What We Eat, Eat What We Grow! These workshops aimed to localize our food economy were held in three locations. On October 19<sup>th</sup>, thirty producers attended at The Gathering Place near Smoky Lake. On November 8<sup>th</sup>, forty-five producers attended the workshop in Ardmore. In Lac La Biche, twenty-five producers attended at Portage College on November 16<sup>th</sup>.

### **CowBytes Workshop**

Twenty producers attended the CowBytes workshop in Goodridge to learn the basics of the program and key principles of ration balancing with ruminant nutritionist Barry Yaremci.

### **Perennial Forage Webinar Series**

Producers learned about seeding perennial forages, forage stand rejuvenation, forage species selection and management of perennial forages for grazing and haying with Grant Lastiwka and Dr. Kevin Sedivec. This webinar series was held on November 8, 15, 22 and 29<sup>th</sup> via zoom.

### **When Stress is More Than a Season**

Lesley Kelly of Do More Ag and High Heels and Canola Fields joined us at the Ashmont Agriplex on November 17<sup>th</sup>.

### **Young Farmer Social**

Thirty-six young farmers attended our young farmer social for a night of networking and special presentation from Lesley Kelly on November 18<sup>th</sup> at the Ashmont Agriplex.

## **Innovation on The Ranch**

Fifty-seven producers attended Innovation on the Ranch in Ashmont on November 23<sup>rd</sup>, to see new technologies for increasing profitability and efficiencies on their operations. Speakers included Dr. Susan Markus, Dr. Brenda Ralston, Andrea Hanson, Markus Weber, Dr. Ed Bork, Alexandra Harland, Dr. John Basarab, Dr. John McKinnon, Neil Thorsteinson and Jason Wright. The day included presentations on virtual fencing, drones, GPS eartags, lidocaine infused castration bands, long action grass implants, neonatal vitamin and mineral supplementation, and tools such as offsite watering systems and range ward products.



## **Joel Williams Webinar**

Thirty producers attended the Joel Williams webinar on November 24<sup>th</sup> to learn what's new in soil health. The webinar covered cover crops, plant species diversity, intercropping, and nitrogen interactions with soil organic matter.

## **Growing Profit From the Ground Up**

On December 16<sup>th</sup>, forty producers attended the Growing Profit from the Ground Up workshop in Flat Lake. The day featured Jay Fuhrer, Jimmy Emmons, and Dr. Kris Nichols to delve deeper into regenerative agricultural practices and the benefits of soil health.

## **Classroom Agriculture Program (CAPs)**

Kellie Nichiporik is the zone 8 Classroom Agriculture Program Coordinator. A few classes received presentations, and the program will be back running fully in 2023.

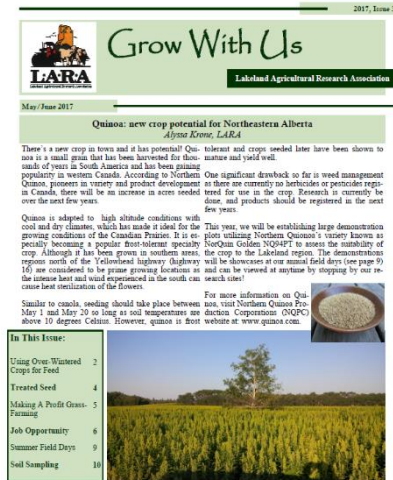
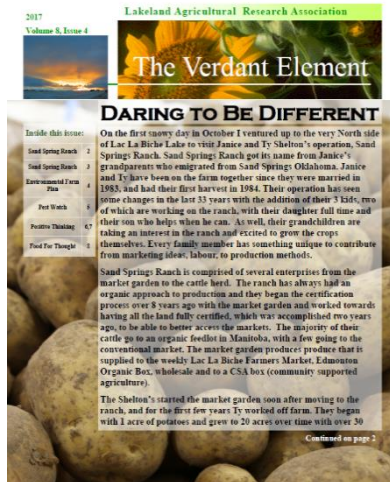
## **Social Media**

LARA is very active on Facebook, Twitter, and Instagram. We also have a YouTube channel where many of our webinars can be found, as well as other recommended videos.



## Newsletter

Along with articles in LARA's bimonthly *Grow With Us* newsletter, this year four editions of *The Verdant Element* were produced and distributed to 2100 farm mailboxes in the MD of Bonnyville, County of St. Paul, Smoky Lake County and Lac La Biche County.



# Horticulture Program



## **LARA Garden**

The past couple years have been challenging for our garden. Weather has been the biggest factor, giving that we have either had an abundance or decided lack of moisture.

### **Potatoes**

Our potato patch included some “new” varieties along with a well-known variety (Kennebec). Yields, disease problems will be measured.

Satina is a smooth, yellow-skinned potato. The flesh is yellow and juicy - when cooked, it has a mild buttery flavor.

Jennifer is a mid-season variety with white skin and flesh. - good for roasting, boiling and mashing.

Prince of Orange has a smooth dark red skin and yellow flesh with a creamy buttery taste.

Soraya is a new yellow variety with good yields. It has good resistance to scab and dry rot. It has excellent storage life.

Red Thumb is a small (6-7 cm) fingerling potato with red skin and shallow eyes. Firm flesh is marbled pink and white.

German Butterball is a midseason variety - producing large, yellow fleshed tubers. It is renowned for its superb taste.

Red Thumb pictured below.



### **Tomatoes**

Bobcat produces bright red fruits—approximately 200 –250 gm. Bobcat is an early, beefsteak variety.

Primo Red is an early beefsteak variety. It produces large, red, mild-tasting fruits and has good resistance to various diseases.

Tough Boy is a smaller (100—150 gm) gold tomato. This is an indeterminate plant—staking required.

Celebrity is an indeterminate variety producing large (250 gm) red fruits. Celebrity has excellent disease resistance.

Cherry Falls produces bright red, sweet cherry tomatoes on cascading vines. This variety is ideal for container growing.

Lemon Boy is an indeterminate variety producing large bright yellow fruits.

Rapunzel produces large quantities of sweet red cherry tomatoes.

Rapunzel



Bobcat



Aunt Molly's Ground Cherry— have a sweet, tropical taste. The fruits can be eaten raw or used in preserves, jams, pies, etc. Indoor starting is required.



## Peppers

Fat n Sassy—a heavy yielding, red bell pepper.

Ring of Fire—the name says it all. This is an extremely hot pepper. Fruits are 12 to 15 cm long.

Mad Hatter—unique shape and a rich, sweet flavor.



Mad Hatter



Ring of Fire

## Novelty

Birdhouse Gourd— a fun addition—grow your own birdhouses!

Tavor Artichoke - this is an annual plant. Must be started indoors. They should produce several edible buds.

Pinnacle Spaghetti Squash - a bright yellow, mid-size (3 lb) squash. Excellent nutty flavor.



## Pumpkins

Specter –a white pumpkin; liberally sprinkled with warts.

Dilly of a Jack –a “monster” pumpkin—highly variable in shape and size.

Jack Sprat—a small (3 lb) pumpkin; excellent for pies or decorating.



Racer Plus—an early, mid-size (15 lb) pumpkin. A semi-bush plant—allows for higher density planting.



Panorama Bee Balm - a sweet-scented flower to attract the pollinators (bees, butterflies).



# Appendices



## Definition of Common Feed Nutrient Terms

<b>ADF</b>	Acid Detergent Fibre – the least digestible portion of roughage. ADF content is used to determine digestibility and energies.
<b>AIP</b>	Available Insoluble Protein – the portion of the total available protein which is not soluble in the rumen fluid, but is still available to the cow.
<b>AP</b>	Available Protein – the portion of the total protein which is available to the animal if the animal could completely digest the feed.
<b>BP</b>	Bypass Protein – ingested protein that is not degraded in the rumen.
<b>CP</b>	Crude Protein – the total protein contained in feeds as determined by measuring nitrogen content.
<b>DE</b>	Digestible Energy – the amount of energy consumed minus the amount of energy lost in feces.
<b>GE</b>	Gross Energy – measure of total caloric energy of a feedstuff.
<b>IP</b>	Insoluble Protein – the portion of protein which digestive juices or similar solutions cannot dissolve.
<b>ME</b>	Metabolizable Energy – equal to DE minus energy lost in urine, feces and in methane for ruminants.
<b>NDF</b>	Neutral Detergent Fibre – measures cellulose, hemi-cellulose, lignin, silica, tannin and cutin; used as an indicator of feed intake.
<b>NEG</b>	Net Energy for Gain – amount of energy for gain above that which is required for maintenance; used for balancing rations for ruminants.
<b>NEM</b>	Net Energy for Maintenance – amount of energy required to maintain an animal with no change in body weight or composition.
<b>RFV</b>	Relative Feed Value – an index for assessing quality based on the ADF and NDF levels of a feed. As fibre values increase the RFV of forages decreases.
<b>SP</b>	Soluble Protein – the portion of protein which digestive juices of ruminant can dissolve.
<b>TDN</b>	Total Digestible Nutrients – a term which is estimated from the ADF content and is used to describe the digestible value of a feed.

## Forages and Cattle Nutrient Requirements

**Table 1.** Composition of Some Common Feedstuffs.

Feedstuff	Percent of DM Basis								
	DM	CP	ADF	NDF	TDN	Ca	P	K	Mg
<b>Alfalfa Hay Early</b>	90.5	19.9	31.9	39.3	60	1.63	0.21	2.56	0.34
<b>Alfalfa Hay Late</b>	90.9	17	38.7	48.8	55	1.19	0.24	1.56	0.27
<b>Alfalfa Silage</b>	44.1	19.5	37.5	47.5	63	1.32	0.31	2.85	0.26
<b>Barley Grain</b>	88.1	13.2	5.77	18.1	88	0.05	0.35	0.57	0.12
<b>Barley Straw</b>	91.2	4.4	48.8	72.5	40	0.3	0.07	2.36	0.23
<b>Barley Silage</b>	37.2	11.9	33.9	56.8	60	0.52	0.29	2.57	0.19
<b>Corn Silage Mature</b>	34.6	8.65	26.6	46	72	0.25	0.22	1.14	0.18
<b>Oat Grain</b>	89.2	13.6	14	29.3	77	0.01	0.41	0.51	0.16
<b>Oat Straw</b>	92.2	4.4	47.9	74.4	50	0.23	0.06	2.53	0.17
<b>Oat Silage</b>	36.4	12.7	38.6	58.1	59	0.58	0.31	2.88	0.21
<b>Oat Hay</b>	90.7	9.5	38.4	63	53	0.32	0.25	1.49	0.29
<b>Smooth Brome Early Pasture</b>	26.1	21.3	31	47.9	74	0.55	0.45	3.16	0.32
<b>Smooth Brome Hay Mid-bloom</b>	87.6	14.4	36.8	57.7	56	0.29	0.28	1.99	0.1
<b>Rye Grass Pasture</b>	22.6	17.9	38	61	84	0.65	0.41	2	0.35
<b>Orchard Grass Hay Early Bloom</b>	89.1	12.8	33.8	59.6	65	0.27	0.34	2.91	0.11
<b>Orchard Grass Early Pasture</b>	27.4	10.1	35.6	57.6	57	0.23	0.17	2.09	0.33
<b>Timothy Hay</b>	89.1	10.8	35.2	61.4	59	0.51	0.29	2.41	0.13

Source: NRC 1996. Nutrient Requirements of Beef Cattle (7<sup>th</sup> Ed.) National Academy Press, Washington D.C.

**Note:** The values that are presented in the above table are intended for producers to determine if the results of their own feed tests are within normal ranges. The most accurate way to determine if feeds are meeting nutrient requirements of specific groups of cattle is to feed test.

**Table 2.** Tolerance Information for Some Perennial Legumes.

Legumes	Acidity	Alkalinity	Salt	Drought	Winter
	Tolerance	Tolerance	Tolerance	Tolerance	Hardiness
<b>Alfalfa</b>	Moderate	High	Moderate	Very High	Moderate-High
<b>Cicer Milkvetch</b>	Low	Moderate	Low-Moderate	Moderate-High	Very High
<b>Alsike Clover</b>	Moderate	Moderate	Low-Moderate	Low-Moderate	High
<b>Red Clover</b>	Low	Moderate	Low	Low-Moderate	Moderate-High
<b>Sainfoin</b>	Low	Low	Low-Moderate	Moderate	Moderate
<b>Birdsfeet Trefoil</b>	High	Moderate	High	Moderate	Low-Moderate
<b>Sweetclover</b>	Low	High	Moderate	Moderate-High	Moderate

**Table 3.** Tolerance Information for Some Perennial Grasses.

	Acidity	Alkalinity	Salt	Drought	Winter
Grasses	Tolerance	Tolerance	Tolerance	Tolerance	Hardiness
<b>Meadow Brome</b> grass	Moderate	Moderate	Low-Moderate	Moderate-High	Moderate
<b>Smooth Brome</b> grass	Moderate	Moderate	Low-Moderate	Moderate-High	Moderate-High
<b>Reed Canary</b> grass	High	Moderate	Moderate-High	Moderate-High	Low-Moderate
<b>Creeping Red Fescue</b>	High	Moderate	Moderate-High	Moderate-High	High-Very High
<b>Meadow Fescue</b>			Moderate	Low	Moderate
<b>Tall Fescue</b>	High	Moderate	Moderate-High	Moderate	Moderate
<b>Creeping Foxtail</b>	High	Low	Low	Low-Moderate	High-Very High
<b>Meadow Foxtail</b>	Moderate		Low	Low	High
<b>Orchard</b> grass	Moderate	Low	Low-Moderate	Moderate	Moderate
<b>Italian Ryegrass</b>	High	Low	Moderate	Low	Low
<b>Perennial Ryegrass</b>	High	Low	Moderate	Low	Low
<b>Timothy</b>	Very High	Low	Low	Low	Moderate
<b>Crested Wheat</b> grass		Moderate	Moderate	Very High	Very High
<b>Intermediate Wheat</b> grass	Low	Moderate	Moderate	Moderate	Moderate
<b>Northern Wheat</b> grass	Moderate	High	Moderate	Very High	Moderate
<b>Slender Wheat</b> grass		High	Moderate-High	Moderate	High
<b>Tall Wheat</b> grass		Very High	Very High	High	Moderate
<b>Western Wheat</b> grass	Moderate	Moderate	Very High	Moderate - High	Moderate
<b>Russian Wildrye</b>	Low	Moderate	High	Very High	High
<b>Altia Wildrye</b>			High	Very High	High
<b>Dahurian Wildrye</b>			High	Moderate-High	Moderate-High

**Table 4.** Nutrient Requirements for Beef Cattle.

	Daily	Dry Matter	Crud Protein		TDN			
	Gain	Intake		% of		% of	Ca	P
	(lbs)	(lbs)	lbs/day	DM	lbs/day	DM	(%)	(%)
<b>600 lb</b> Calves	1.5	1308	1.32	9.5	9.4	68.5	0.32	0.21
<b>950 lb</b> Bred Heifers	0.9	19	1.5	8	10.3	54.1	0.27	0.02
<b>1200 lb</b> Cows Mid Pregnancy	-	20.8	1.4	6.9	10.1	48.8	0.19	0.19
<b>1200 lb</b> Cows Late Pregnancy	0.9	22.3	1.7	7.8	11.8	52.9	0.26	0.21
<b>1000 lb</b> 2 yr. Heifer With Calf	0.5	20.8	2.1	10.2	12.9	61.9	0.31	0.23
<b>1200 lb</b> Cow Nursing Calf (1st 3-4 months)	-	23	2.1	9.3	12.1	55.5	0.27	0.22

Source: NRC 1984. Nutrition Requirements of Beef Cattle (6<sup>th</sup> Ed.) National Academy Press, Washington, D.C.



