Lakeland Agricultural Research Association

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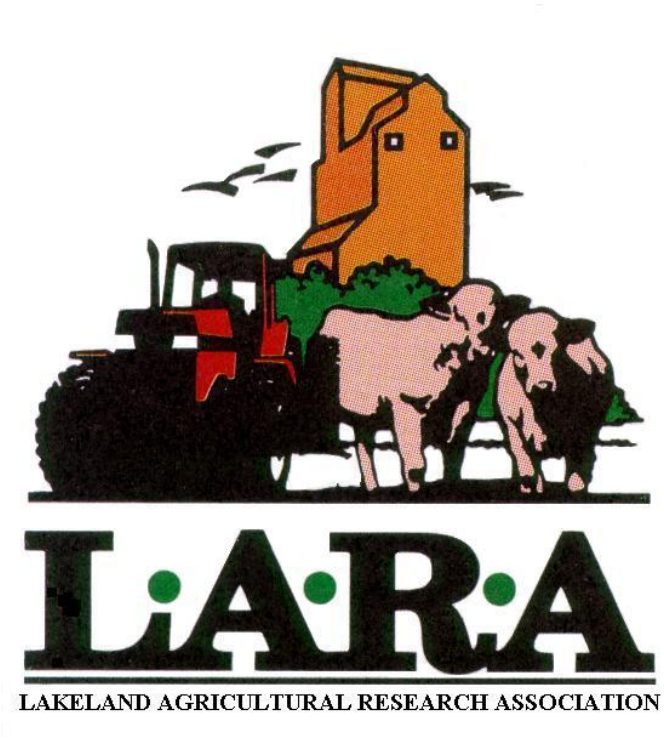
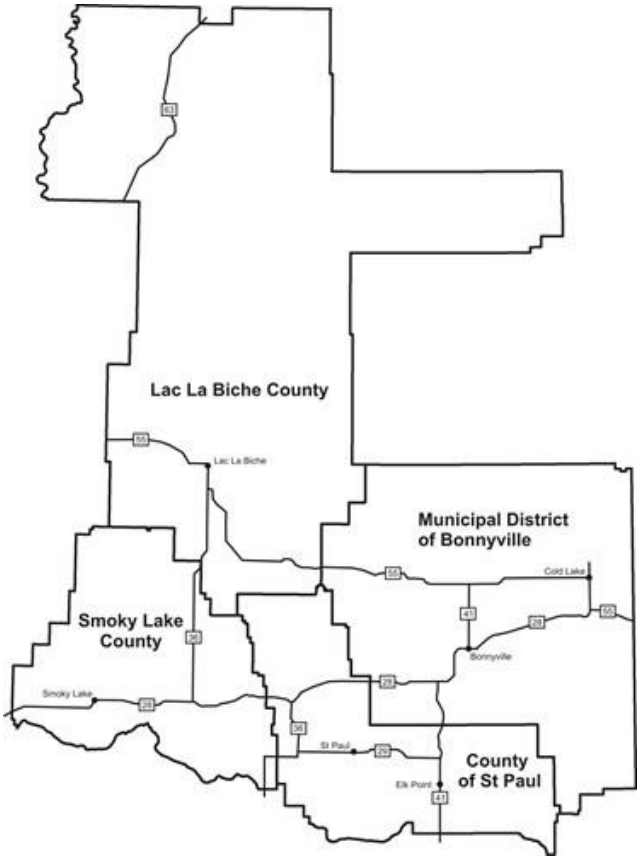


Vision Statement:
To be a leader in applied research and extension in Alberta

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 an applied agricultural research association that serves the MD of Bonnyville, County of St. Paul, Lac La Biche County and Smoky Lake County. We are a member of the Agricultural Research and Extension Council of Alberta (ARECA). Our goal is to conduct applied research, demonstrations and extension programs that provide valuable and unbiased information to local producers.



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.

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Message from the Chair

My first year of being the chairperson on the LARA board has been an interesting one!

2019 will be a year we won't soon forget. A very dry spring turned into a very wet summer and an even wetter fall. Farmers just could not catch a break due to the almost constant rain during the summer. It was good for the pastures but not for the farmers trying to get their hay put up in good condition.

The haying season was followed by the 'Harvest from Hell'. Lots of crops were taken off with very high moisture content and grain dryers were running nonstop. The weather would improve for a few days, swathers and combines would once again be ready to roll, then down would come the rain. This weather pattern stayed with us all through the fall and right into winter. The harvesters finally had to give up on getting anymore crop off, but farmers are a resilient bunch and they will get the crops off in the spring!

Our research team faced many challenges as well when it came time to harvest all the plots and they had to become inventive with ideas on how to dry the harvested produce.

I would like to give a huge thank you to our Managers, Alyssa and Kellie as well as all of the LARA staff. You guys are our greatest asset and your commitment and dedication are what makes LARA one of the top research associations in Alberta!

They are always looking for ways to help our farmers and ranchers by providing interesting informative topics and research.
*planting and harvesting the many plots of many different varieties throughout the 4 partnering Municipalities and Counties.
*finding grants that are available.
*organizing and hosting many workshops throughout all 4 of our partnering Municipalities and Counties.
*putting together and publishing 'Grow With Us' and 'The Verdant Element'.
*planning and organizing our Farmer Appreciation Supper as well as the AGM, plus much much more!
They make our job as a board easy and enjoyable.

I want to thank Lac La Biche County, MD of Bonnyville, County of St. Paul and Smoky Lake County for their continuing support. It is very much appreciated.

Last but not least, thank you to the board of directors for your commitment to LARA and for your time and knowledge. It has been a pleasure serving with you all!

I am looking forward to 2020 and as any other optimistic farmer, hoping it will be a good one!

Wanda Austin

Forage and Livestock Program Report

The close of 2019 saw the completion of my seventh year here at LARA!

This past year brought with it another tough harvest, with many producers harvesting well into November and a number of acres still remain unharvested. A dry spring caused delayed emergence in many crops, particularly canola, and then a cool, wet summer delayed crop maturity leading to a later harvest.

The adverse weather conditions did not only cause issues on the cropping side of agriculture in the Lakeland. We saw a rise in hay price, challenging forage quality issues with haying happening well into September.

On the research side, we began a four-year project assessing the impact of four winter grazing strategies on soil health in partnership with Bar LD Ranch in the MD of Bonnyville. Some new barley varieties have recently been released, including AC Cattlelac and AB Advantage, both performed exceptionally well in our Regional Silage Trials.

I want to say a huge thank you to everyone who participated in the research and extension programming at LARA this past year and to the exceptional staff, hard-working and dedicated board of directors and the many local producers who continue to support our programming. I am looking forward to another successful year in 2020!

Sincerely,

Alyssa Krawchuk

Cropping Program Report

Entering my first year as a full-time employee at LARA I am happy to say that it was a successful year. This year there were plots grown in Fort Kent, Mallaig, St. Paul and Smoky Lake.

This year has been a tough and interesting year for crops due to environmental conditions. With drought like conditions in late April to June to exceptional rainfall throughout the summer causing challenges of uneven emergence and maturity issues with crops, resulting in a long and tough harvest season.

I would like to thank everyone who participates in our extension events and field tours at LARA, our board of directors and local producers who are fantastic to work with. Our exceptional staff here at LARA along with the summer staff who work with us in the summer to keep everything running smoothly and looking great. I am looking forward to another successful year in 2020.

Amanda Mathiot
Cropping Program

AESA Program Report

I am beyond happy to say goodbye to 2019 and hope for a way better 2020. What can be said for 2019 besides the weather was terrible, the economy was not much better and harvest was beyond a challenge. This year, for those that made it out to our summer events would have noticed my very fashionable accessory, the air cast. Not to say that clomping around in it was not a joyous time, but it made for a very challenging time to go outside, and accomplish anything.

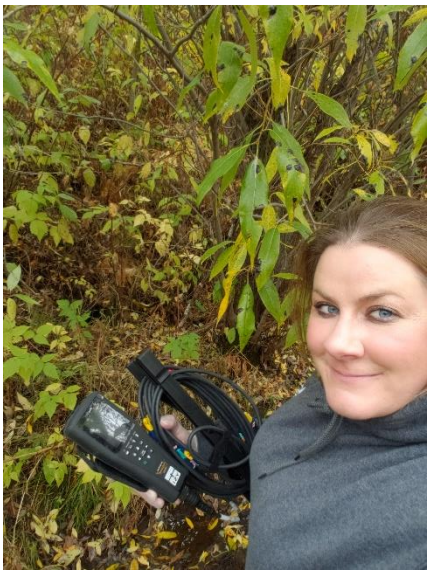
Good riddance 2019, hello 2020 possibilities. This year will be my 11th year at LARA and I am very excited for another year of interesting speakers, provoking thoughts, and better weather. Not to mention the hope of inspiriting young minds regarding the agricultural industry through the Classroom Agriculture Program (CAP). CAP is celebrating 35 years and usually about 1,400 grade fours in the Lakeland take part in the program to learn more about where their food comes from.

2020 will also be the last year of the LARAWRRP program to fund projects such as offsite waterers, riparian fencing, and watershed improvements. Wetlands and riparian areas provide so many great functions for the environment, the watershed and for the critters and humans that are using the land. As well, clean water can increase animal gains significantly so it also has an economic bonus. Check out the LARA website or call me for more information on the program.

I am really looking forward to hosting the Soil Health Academy this summer as well as many of the other events that are in the works for the upcoming year. I want to thank those of you who have come out to our 2019 events and shown interest in environmental stewardship.

Cheers to a great 2020!

Kellie Nichiporik P. Ag.
Environmental Program Manager



2019 Board of Directors

Chair:	Wanda Austin
St. Paul County Rep:	Cliff Martin Kevin Wirsta (alternate)
Lac La Biche County Rep:	George L'Heureux Darlene Beniuk (alternate)
MD of Bonnyville Rep:	Marc Jubinville Mike Krywiak (alternate)
Smoky Lake County Rep:	Danny Gawalko Johnny Cherniwchan (alternate)
Producer Reps:	Murray Scott – MD of Bonnyville Ulf Herde – MD of Bonnyville Louis Dechaine – County of St. Paul Carl Agnemark – 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
Lakeland Forage Association Rep:	Luc Tellier Chairman, LFA

2019 Staff

Manager and Forage and Livestock Program:	Alyssa Krawchuk
Cropping Program:	Amanda Mathiot
Agronomy Technician:	Stephanie Bilodeau
Environmental Program:	Kellie Nichiporik
Administration/Horticulture:	Charlene Rachynski
Full Time Staff:	Vic Sadlowski Dustin Roth
Summer Staff:	Mienna Starosielski
LFA Pasture Managers:	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 2018 another successful year.

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

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

Industry and Producer Commissions
Alberta Beef Producers
Alberta Pulse Growers Commission
Alberta Wheat Commission
Alberta Barley Producers Commission
Alberta Canola Producers Commission
Canola Council of Canada

Associations & Societies
North Peace Applied Research Association
McKenzie Applied Research Association
Gateway Research Organization
Battle River Research Group
Grey Wooded Forage Association
West-Central Forage Association
Foothills Forage and Grazing Association
Peace County Beef and Forage Association
Chinook Applied Research Association
Agricultural Research and Extension Council of Alberta
Bonnyville Agricultural Society
Alberta Lake Management Society
Beaver River Watershed Alliance
Moose Lake Watershed Society
St. Paul Agriculture Society

Agri-Businesses & Collaborators
AFSC Insurance
Agland St. Paul
Canadian Seed Growers Association, AB
Western Committee on Crop Pests
UFA – St. Paul and Vermilion
St. Paul Municipal Seed Cleaning Plant
FP Genetics
Crop Production Services
Cows and Fish
Bonnyville Veterinary Clinic
Bonnyville Municipal Seed Cleaning Pl.
Association of AB Seed Cleaning Plants
Caouette & Sons
Northern Quinoa Production Corp.
Mistol Seeds
La Co-op Federee Oats
B-C Ranch
Union Forage
Friendly Acres Seed Farm
Chuiko Ranch

Producers
Philip Amyotte
Robert Semeniuk
Luc Tellier
Barb and Doug Shapka

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

Lakeland Agricultural Research Association Projects and Activities – 2019

Research and Demonstration Projects

Cropping Program

Regional Variety Trials – Cereals
- -CWRS Wheat
- -CPRS Wheat
- -GP & SWS Wheat
- -Oats
- -Barley
- -Triticale

Regional Variety Trials – Pulses
- -Green Field Peas
- -Yellow Field Peas
- - Faba Beans

Impact of Seeding Date on Spring Wheat
LARA Regional Variety Trial
Top Dressing Nitrogen in Wheat
Use of ESN in Spring Cereals
- -Wheat and Barley

Use of ESN in Canola
Canola Performance Trial
Liming and Crop Rotations
Pest Monitoring

Forage and Livestock Program

Regional Silage Trials
- -Barley
- -Triticale
- -Pea-Cereal Mixture
- - Oats

Perennial Forage Project
- -Grass/Legume Mixture
- -Grasses
- -Legumes

Nutritional Quality of Silage Bales
Winter Grazing Strategies and Soil Health
Fall Grazing Cover Crops
Northern Range Enhancement Project
- -Heifer Project

Environmental Program

Canada Thistle Stem Mining Weevils
Riparian Health Assessments
Surface Water Quality Sampling
Alberta Soil Health Benchmarking Project

Extension Activities

Workshops and Seminars

Working Well Workshop
Holistic Management
Clubroot! What Now?
Farmer Appreciation Night
Moose Lake Watershed Society AGM
Finding Extra Profit in Wetlands, Cattle and Crops
Cover Crops with Kevin Elmy Day 1
Cover Crops with Kevin Elmy Day 2
Verified Beef Production +, BIXS and Sustainable Beef Production
Annual General Meeting and Research Update
Hemp Workshop
Livestock Vaccinating, Prescriptions and Improving Your Livestock Operation Seminar
SafeTALK
Jim Gerrish 1 Day Introductory Grazing Management School
Fort Kent Summer Field Day
St. Paul Summer Field Day
Beavers in Our Landscape
Smoky Lake Summer Field Day
Dugout Workshop
New Crops and New Markets
Gabe Brown: Regenerative Farming and Ranching Workshop
Feed What You Need
What the Flux?

Education Events

Inside Education Showcase
Shoreline Cleanup
Lakeland Regional Career Expo
Classroom Agriculture Program
Walking with Moose
X-Stream Science

Demonstrations

Solar Watering System
Growing Pulses Agronomic Demo
Germination and Seeding Rate Demo
Wheat Variety Demo

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 by LARA.

Smoky Lake County Ag Service Board

Agricultural Pest Act

- 4 Agricultural Pest Inspectors Appointed
- 101 Clubroot Fields Inspected - 4 Positives
- 23 Fields Inspected for Virulent Blackleg in Canola
- 3 Bertha armyworm locations Monitored throughout the County for Alberta Agriculture
- 2 Swede Midge of Canola traps monitored for Agri-food Canada
- 25 Grasshopper Surveys completed for Alberta Agriculture
- 5 Fields Sampled for Fusarium Head Blight in Wheat
- 93 Dams Blasted
- 251 Beaver Tails Brought in
- 6 New Water Stabilizers Installed
- 12 1080 pills distributed
- 108 Bottles of strychnine sold
- 284 Problem Beavers removed
- 505 Pocket Gopher Tails Brought in
- 0 Rat Calls investigated

WEED CONTROL ACT

- 4 Weed Inspectors Appointed
- 3 Weed Enforcements
- 50% of Municipal Rights of way's were sprayed for control of Noxious Weeds
- 2 Location sprayed for Prohibited noxious weeds
- 221 Introduction Letters Sent
- 312 Inspections Completed
- All County Roads Mowed once

Soil Conservation Act

- 2 Soil Conservation Inspectors Appointed
- 0 Soil Conservation letter issued
- Monitoring for different types of Soil erosion that occurs throughout growing season

M.D. OF BONNYVILLE A YEAR IN REVIEW

Another challenging year for Agriculture, cool wet conditions set quite a delay come harvest time. With many counties in the Peace as well as our neighboring counties declaring "Agricultural Disasters for 2019" we managed to get most of our crops off before the snow fell. A look back on the 2019 season, we surveyed 321 canola fields and have detected three more positive clubroot fields within our MD borders bringing our total to 10 positive fields to date, we have sent one sample in for pathotype testing as it was a clubroot resistant variety grown in that field. Blackleg was also on our radar, both clubroot and blackleg thrive in moisture and we definitely had plenty of moisture this year. Choosing good resistant varieties may be the key when seeding in the spring.

Grasshoppers, Bertha Army Worms and Lygus were all in low numbers again this year, we are predicting low numbers for 2020 growing season as well. But be sure to keep an eye out if we have a warm spring. We completed another biological release of Canada Thistle Stem Mining Weevils this year. These little guys help us to control Canada thistle in our environmentally sensitive areas.

We are seeing an increase in a few of our prolific noxious weeds, scentless chamomile, oxeye daisy and white cockle are on our top watch list this year as they can cause yield losses in cereal, pulse, forage and oilseed crops. These weeds are often found in moist, disturbed areas such as roadsides, farmyards, sloughs, cropland, pastures, utility rights-of-way, shelterbelts, drainage ditches and waste areas. Some other noxious weeds to keep an eye out for are Common Tansy and Yellow Toadflax. Be proactive and remove them before they go to seed. Once established they are very difficult to control. This spring we will be hosting a white cockle workshop so keep an eye out for upcoming dates. We will also be looking at getting some input on improving our Emergency Response for Livestock Plan as well this year.

Wow what a great Agricultural and Rural Beautification tour we had this year with more than 100 people joining us for our local tour which included: Michaud Buffalo farm, McClean Hobby farm, E-Tree tree farm, Clean/Dry/Drain demonstration, lunch at Kinosoo Ski Hill as well as visiting our Acreage and Farmstead Beautification Winners.

The coyote and wolf reduction program continued into 2019-20 season, we are also working on a scent post survey for the second year of the 3 year project – this gives us data to help us make decisions and ensure we sustain a healthy population. We are pleased to say we are still rat free and will continue to help keep them out of Alberta.

Wishing all producers, a successful upcoming growing season.

Matt and Janice

Lac La Biche County Agriculture Review 2019

Lac La Biche County Agricultural Service Board appreciates the working relationship it has with Lakeland Agricultural Research Association. Through this relationship, the local ASB delivers extension services to agricultural producers in the County.

In 2019, 56 canola fields were inspected for Clubroot and one field tested positive. The County is participating in a multi-year canola surveillance research to better understand the movement of clubroot spores in Northeast Alberta. The Lamont County-led project is on-going, and results will be shared with producers, as they become available. The ASB is also working on a new Clubroot Management Agreement in place of Clubroot a by-law. Public consultation of the draft agreement is ongoing.

The County's three weed inspectors surveyed over 300 sites and found noxious and prohibited noxious weeds at 74 of these sites. The weeds were controlled by mechanical, cultural and chemical methods. Two weed notices were issued. About 1600 km of municipal roads, ditches and right of ways was mowed in 2019, with some areas getting a second pass.

The Community Garden was fully subscribed. However, due to environmental and other conditions, harvest rate was at 75 %. Due to excessive moisture conditions resulting in harvest constraints, the County officially declared a state of agricultural disaster this year.

Over 210 people attended the highly successful 2019 Agriculture Appreciation Day. The County's Agricultural department completed various provincial surveys, including a canola blackleg and five grasshopper surveys. Two hundred and ninety-seven (297) problematic beavers were trapped this year and their dams removed.

Lac La Biche County is beautiful by nature and trees are essential part of this. Hence, this year, the ASB delivered over 745 tree seedlings to ratepayers. Unsold trees were donated to individuals and community non-profit groups. Darrell and Janelle Richards of Plamondon received the 2019 Rural Beautification Award, for having the most beautiful farmstead in the County.

The ASB rented out agricultural equipment to 87 ratepayers for a combined total of 120 days. A Wilmar fertilizer spreader was added to the ASB rental fleet in 2019. The spreader can also be used to spread ash.

The ASB organized three clubroot workshops and one hemp and livestock seminars. The County's Agricultural Service Board provided two bursaries to two natural resource management students at Portage College.

The year ended well with Jim and Evelyn Malbeuf of Malbeuf Farms in Lac La Biche County receiving the 2019 BMO Farm Family Award. Overall, 2019 was a successful year and preparations are underway to make 2020 a better one. We wish all Producers a successful 2020.

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

County of St. Paul Agricultural Service Board 2019

The County of St. Paul appreciates working with LARA as we try and help agriculture flourish in our County and in our region. LARA is an integral part of how the County strives to serve our producers and find innovation in agriculture.

2019 was a very challenging year with no moisture in early spring then excess moisture right through to winter. Producers are left with large amounts of unharvested acres as a result. The County declared a 'State of Agricultural Disaster' in response to our unusual weather with hopes it would raise awareness of our plight. The provincial and federal governments have so far just directed us to existing programs as ways to deal with our disaster. The County is not alone as several other Counties around the province have also declared or are ready to declare should conditions in spring prove unfavorable.

10 new fields of clubroot were found in the County of St. Paul this year. Our new policy determines the degree of clubroot that is in each field. If you are found to have low amounts of clubroot in the field, you get a pest notice that states no canola for 2 years. If you are found to have high amounts of clubroot you get a pest notice that states, no canola for 3 years. This brings our policy in line with some new information on the persistence of clubroot in the soil. The County policy endeavors to keep the spores of clubroot in our soil low so there is a minimal chance of clubroot spreading from field to field.

Himalayan Balsam continues to be our 'Enemy Number One' in the County of St. Paul. We have discovered outbreaks around Lottie Lake and Vincent Lake. The plant tends to grow in moist areas by streams or lakes. The plant grows over 6 feet tall and has red, hollow stems. The flowers 'explode' when touched and can shoot seed over 10 feet. The flowers are pink and white and flower from late May till it freezes. Their long flowering makes it a preferred site for native pollinators. Their shallow roots also destabilize the ground where native plants would keep it solid with deep roots.

Our new Beaver Incentive Program paid registered ratepayers $15/beaver tail in 2019 to help bring our beaver population under control. The program runs in spring and fall and limits the amount of beavers that can be pulled from any one quarter of land. This year we took in about 700 beavers for the program. The County tries to target areas where beavers are affecting our infrastructure. The County can help in various ways with your beaver issues. For a fee of $200/dam we can come and blow dams with dynamite. This is provided it can be done safely and that anyone that may be affected downstream is contacted.

The County takes dog complaints very seriously. If you live in the County and own a dog, please become familiar with our dog bylaw. If you keep your dog on your property and it does not bark excessively, we will never contact you! When we find a stray dog, we will post it on the St Paul Animal Shelter's lost and found page and on our own Facebook page so if you happen to lose your dog check there. Most of our unclaimed dogs are picked up by local animal rescues.

Thank you to all of our producers for making this a great place to live and work! If you have any concerns please give us a call.

Keith Kornelsen
Agricultural Fieldman
County of St. Paul

Cropping Program

The producer's resource for pulses, oilseeds and cereals

The total crop production in Alberta has increased over the past five years and will continue to increase in the future. Much of this can be attributed to increased yields, which has been achieved through continuing research into crop agronomics (new varieties, best management practices etc).

With increased competition for land and high input costs, producers are looking to optimize production and maximize profits on their acres. LARA strives to help producer make the most of limited resources by improving agronomic practices, utilizing new technology and understanding the value of production.

The goals of this program are to:

- Aid producers in crop and variety selection
- Increase crop diversity through crop selection and variety selection
- Determine and demonstrate the viability of specialty crops in the Lakeland
- Demonstrate current and emerging agronomic practices
- Improve on-farm agronomic practices
- Address local agronomic concerns through demonstration and extension

Regional Variety Trials

Partners: Alberta Agriculture and Forestry
Alberta Wheat Commission
St. Paul Municipal Seed Cleaning Plant
County of St. Paul
Lac La Biche County
MD of Bonnyville
Agricultural Research and Extension Council of Alberta
Agriculture and Agri-Food Canada
Crop Production Services
FP Genetics
Philip Amyotte

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 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.

Methods:

The cereal plots for the Regional Variety Trials were seeded at the LARA Fort Kent Research Site (NE25-61-5-W4) and in the County of St. Paul (SE-13-60-10-W4) Agronomic information about the RVTs grown by LARA in 2019 are listed in Table 1. The trials were seeded using the LARA five-row Fabro zero-till small plot seeder. The plots were 1.15m x 6m in area with a 9" row spacing. All trials were seeded to a randomized complete block design with four replicates for pulses and three replications for cereals to reduce error.

Soil samples were taken in spring prior to seeding to check soil fertility and a blend fertilizer was side-banded at seeding for optimum yields. Pre-seeding burn-off and in-crop herbicides were utilized for weed control. Notes on lodging and height were taken during the growing season. The plots were harvested using a Wintersteiger small plot combine and information on yield, bushel weight, 1000 kernel weight and protein were recorded.

Although the varieties in the trials are set by the ABCGAC and seed companies, there is opportunity for local input.

Lodging is rated on a scale of 1-9 where 1 is perfectly erect and 9 is completely flat.

Table 1. Regional Variety Trial Agronomic Information, 2019.

Test	Site	# of Varieties	Seeding Date	Seeding Rate	Fertility	Harvest Date	Rain (mm)
Barley	Fort Kent	19	16-May-19	270 pl/m2	125 lbs/ac 70-30-30-5	01-Oct-19	233.8
Barley	St. Paul	19	14-May-19	270 pl/m2	125 lbs/ac 70-30-30-5	03-Oct-19	266.3
CPSR Wheat	Fort Kent	8	16-May-19	330 pl/m2	125 lbs/ac 70-30-30-5	04-Oct-19	233.8
CPSR Wheat	St. Paul	8	14-May-19	330 pl/m2	125 lbs/ac 70-30-30-5	03-Oct-19	266.3
CWSP & CWSWS Wheat	Fort Kent	7	16-May-19	330 pl/m2	125 lbs/ac 70-30-30-5	02-Oct-19	233.8
CWSP & CWSWS Wheat	St. Paul	7	14-May-19	330 pl/m2	125 lbs/ac 70-30-30-5	03-Oct-19	266.3
CWRS Wheat	Fort Kent	36	16-May-19	330 pl/m2	125 lbs/ac 70-30-30-5	07-Oct-19	238.4
CWRS Wheat	St. Paul	36	14-May-19	330 pl/m2	125 lbs/ac 70-30-30-5	03-Oct-19	266.3
Oats	Fort Kent	11	23-May-19	300pl/m2	125 lbs/ac 70-30-30-5	10-Oct-19	239.6
Oats	St.Paul	11	23-May-19	300pl/m2	125 lbs/ac 70-30-30-5	04-Oct-19	233.7
Triticale	Fort Kent	4	16-May-19	310 pl/m2	125 lbs/ac 70-30-30-5	04-Oct-19	233.8
Triticale	St. Paul	4	14-May-19	310 pl/m2	125 lbs/ac 70-30-30-5	03-Oct-19	266.3
Green Field Peas	St. Paul	8	09-May-19	Various (88 pl/m2)	50 lbs/ac 11-52-0-0	12-Oct-19	308.8
Yellow Field Peas	St. Paul	18	09-May-19	Various	50 lbs/ac 11-52-0-0	12-Oct-19	308.8
Faba beans	St. Paul	6	09-May-19	Various	50 lbs/ac 11-52-0-0	Unharvested	308.8

Barley

The RVT barley trials were established at two locations, one in the County of St. Paul (SE-13-60-10-W4) and one at the LARA Fort Kent Research Site (NE25-61-5-W4). Similar to previous years, all varieties had an overall higher yield at the St. Paul site likely as a result of differences in soil structure and quality as well as the environmental conditions between the locations during the growing season, particularly moisture. Rainfall at the Fort Kent site was 231.4 mm while the rainfall at the St. Paul site was higher at 274.9 mm. The yield data for Fort Kent and St. Paul are shown in table 2 and table 3, respectively.

An experimental and not yet registered variety, TR17163, yielded in the top two of locations this year. This is a brand-new variety and it is the first year that it has been grown at LARA. The variety is looking to be both exciting and promising for Barley producers in Northeastern Alberta region. The average among all of these varieties in Fort Kent was 117 bu/ac and 117 bu/ac in St. Paul.

Overall the Barley did very well this year considering the growing conditions and we hope to continue having success growing barley in 2020!

Table 2. RVT Barley Data Fort Kent, 2019

Variety	Yield (bu/ac)		% of Metcalfe	TWT (lbs/bu)	TKW (g)	Height (cm)
SR17519	131	a	133	306.37	49	92
TR17163	131	a	133	321.37	54	94
AB Advantage	128	ab	130	311.73	52	111
TR15155	126	ab	128	320.53	50	89
SR17515	126	ab	128	310.1	44	96
CDC Austenson	124	ab	126	330.37	53	89
TR16629	123	ab	125	317.7	53	103
CDC Goldstar	121	abc	123	321.47	52	94
TR17639	119	a-d	121	319.4	50	92
AAC Synergy	116	a-d	118	317.93	52	91
AB Cattlelac	116	a-d	118	312.87	46	101
Claymore	113	a-d	115	316.7	49	90
CDC Copper	110	a-d	112	309.4	50	90
CDC Copeland	110	a-d	112	310.43	50	97
AAC Connect	110	a-d	111	313.43	53	91
TR16742	107	bcd	108	31.97	50	80
Altorado	106	bcd	108	319.6	54	87
Oreana	100	cd	102	312.7	51	70
AC Metcalfe	98	d	100	313.4	49	92
CV = 6.54						

Table 3. RVT Barley Data St. Paul, 2019

Variety	Yield (bu/ac)	% of Metcalfe	TWT (lbs/bu)	TKW (g)	Height (cm)
TR17163	130	123	333	56	84
CDC Copper	130	123	326	53	78
Altorado	125	118	331	53	75
TR17639	124	117	329	52	82
Oreana	123	116	334	55	64
TR15155	122	116	324	49	67
TR16742	122	116	323	50	69
TR16629	122	115	330	54	86
CDC Austenson	121	115	335	56	82
AAC Synergy	121	114	321	51	77
Claymore	120	113	332	54	75
CDC Copeland	118	111	327	54	90
SR17519	111	105	318	47	81
AB Cattlelac	109	104	328	49	94
AAC Connect	107	102	326	52	76
AC Metcalfe	106	100	325	48	73
CDC Goldstar	104	99	329	51	81
SR17515	104	98	320	47	84
AB Advantage	102	96	328	55	101
CV = 10.11					

CPSR & CCHNR Wheat

The Canadian Prairie Spring Red (CPSR) and Canada Northern Hard Red (CCNHR) were also wheats grown in both Fort Kent (NE-25-61-5-W4) and St. Paul (SE-13-60-10-W4). AC Foremost was a variety that excelled in both locations yielding 118bu/ac in Fort Kent and 108 bu/ac in St. Paul. AC Foremost is well known for its standability as it has a shorter stem length.

Looking at both sites they overall did well, one observation that was made between both is that the cereals in Fort Kent had some lodging where none of the cereals in St. Paul lodge. All varieties in the class did well with an average stand of 86 cm in Fort Kent and 76 in St. Paul. The yield data from CPSR & CCHNR wheat from Fort Kent and St. Paul are in tables 4 and 5, respectively.

Table 4. CPSR & CCHNR Wheat Data Fort Kent, 2019.

Variety	Yield (bu/ac)		% of Carberry	% of AAC Brandon	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein (%)
AC Foremost	118	a	118	125	373.97	39.41	85.70	9.00
AAC Penhold	117	a	117	125	386.60	44.28	83.70	13.30
HY2077	117	a	117	124	389.87	35.85	87.00	13.20
AAC Castle	110	a	110	117	383.33	48.45	86.30	14.10
Carberry	100	b	100	106	386.30	42.65	89.30	14.30
HY2068	96	b	96	102	379.53	37.35	87.70	13.20
AAC Brandon	94	b	94	100	386.30	41.56	83.00	14.60
CDC Terrain	84	c	84	89	370.07	42.89	87.70	13.40
CV = 5.09								

Table 5. CPSR & CCHNR Wheat Data St. Paul, 2019.

Variety	Yield (bu/ac)	% of Carberry	% of AAC Brandon	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein (%)
CDC Terrain	109	124	122	371.87	51.68	83.70	12.70
AC Foremost	108	123	121	372.17	46.49	71.70	11.78
AAC Castle	104	118	117	353.10	53.37	79.00	12.87
HY2077	103	117	116	350.07	40.61	70.70	12.58
HY2068	96	110	108	330.13	38.84	77.30	11.97
AAC Penhold	90	103	101	378.30	48.20	74.00	13.02
AAC Brandon	89	101	100	349.47	45.81	75.30	13.38
Carberry	88	100	99	351.57	42.01	76.00	13.71
CV = 9.91							

CWRS & CWHWS Wheat

The Canadian Western Red Spring (CWRS) AND Canadian Western Hard White Spring (CWHWS) were grown in Fort Kent (NE-25-61-5 W4) and St. Paul (SE-13-60-10-W4). The CWRS and CWHWS wheat trial is the largest trial that LARA manages with 36 different varieties in this class. Data for Fort Kent can be found in Table 6. Table 7 illustrates the data that was obtained in St. Paul; however, the data is not statistically sound due to the high variability as shown with a CV of 23. One variety that did well in both Fort Kent and St. Paul was CDC Select yielding 100bu/ac in Fort Kent and 94 bu/ac in St. Paul. This variety

was not in our 2018 CWRS & CWHWS trial. The average protein in Fort Kent was 14.0% and St. Paul was 13.2%.

Overall the trial did well and we are looking forward to growing this trial in the 2020 season. The yield data for the CWRS and the CWHWS for Fort Kent and St. Paul are in tables, respectively.

Table 5. CWRS & CWHWS Wheat Data Fort Kent, 2019.

Variety	Yield (bu/ac)		Brandon %	Carberry%	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein (%)
CDC Landmark VB	104	a	129	133	395.53	39.86	93.70	13.84
SY Gabbro	103	ab	127	131	393.67	45.13	100.30	14.14
CS Jake	100	abc	124	128	390.93	38.02	98.30	14.66
CDC Select	100	a-d	124	127	392.37	40.65	106.30	14.31
AAC Viewfield	99	a-e	123	126	388.97	37.58	85.30	14.44
PT252	96	a-f	119	122	390.67	39.62	97.70	14.08
Ellerslie	95	a-g	117	121	381.73	37.21	102.30	14.25
PT652	94	a-h	116	120	388.07	38.20	100.00	13.30
PT596	94	a-i	116	119	387.97	37.62	104.30	13.87
BW5031	93	a-i	115	118	386.17	43.28	93.00	13.80
BW1064	93	a-i	115	118	395.93	39.09	102.70	14.02
SY Chert	93	a-i	115	118	389.97	38.79	97.70	13.66
AAC Jatharia VB	92	b-j	114	118	399.27	43.61	103.70	14.69
SY Torach	92	b-k	114	117	385.13	34.02	96.30	14.51
BW5028	91	b-k	113	116	390.37	40.44	94.00	13.10
Sheeba	91	c-k	112	116	388.43	39.36	105.00	14.01
AAC Wheatland VB	90	c-l	112	115	389.77	39.65	96.00	13.11
AAC Magnet	90	c-l	111	114	385.33	40.97	86.30	15.24
Bolles	89	c-l	110	113	386.10	39.44	91.30	13.87
AAC Cirrus	89	c-l	110	113	394.20	36.22	96.70	14.06
CS11200214-17	88	d-m	109	112	383.90	38.38	101.70	13.14
CDC Go	88	d-m	109	112	378.63	42.44	92.70	14.19
PT598	88	e-m	109	112	386.10	37.10	91.30	13.42
CS Tracker	87	e-m	108	111	384.17	38.28	100.30	15.02
PT488	85	f-n	106	109	386.73	40.08	108.30	14.19
AAC Starbuck	84	g-n	104	107	385.83	38.57	86.00	14.04
AAC Leroy VB	83	h-o	103	105	386.13	37.93	98.70	13.51
AAC Warman VB	83	h-o	102	105	393.10	39.64	100.70	13.68
SY Obsidian	82	i-o	102	104	386.17	41.44	99.30	13.53
AAC Brandon	81	j-o	100	103	388.67	40.46	93.00	13.95
Stettler	81	k-o	100	103	384.80	38.78	96.00	14.07
CS 11200104-11	80	k-o	100	102	380.07	40.01	88.70	14.71
Carberry	79	l-o	97	100	386.13	39.61	93.30	14.35
AAC Alida VB	77	mno	95	98	378.03	36.86	103.00	14.02
Parata	74	no	92	94	392.53	37.64	94.70	15.23
BW5056	72	o	90	92	382.97	40.17	95.00	14.46
CV	8.12							

Table 7. CWRS & CWHWS Wheat Data St. Paul, 2019.

Variety	Yield (bu/ac)	Brandon %	Carberry%	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein (%)
CDC Select	94	140	154	374.54	44.74	91.70	13.52
AAC Jatharia VB	94	140	154	370.60	46.34	91.30	13.17
PT652	93	138	153	366.77	35.53	92.10	13.61
SY Gabbro	89	132	145	363.83	48.20	88.60	13.58
Bolles	89	132	145	345.24	44.46	79.20	13.64
AAC Cirrus	87	129	142	379.67	38.85	84.30	13.12
Ellerslie	81	121	133	372.33	40.82	88.30	14.14
CS Tracker	81	120	133	364.40	39.73	84.30	14.92
AAC Wheatland VB	80	120	132	358.23	43.28	78.70	13.10
PT488	79	118	130	369.49	43.56	90.20	14.20
PT596	79	117	129	380.13	39.10	90.30	14.28
SY Obsidian	77	114	126	364.43	43.61	85.30	12.64
Sheeba	77	114	126	375.93	39.73	83.70	13.01
SY Torach	77	114	126	358.30	36.32	75.70	13.32
SY Chert	77	114	126	373.23	41.08	86.70	12.12
AAC Leroy VB	77	114	126	375.20	41.74	86.00	12.61
AAC Starbuck	76	113	125	365.73	40.60	77.10	12.54
AAC Alida VB	75	112	123	369.07	42.08	81.00	12.39
CS Jake	74	109	121	358.40	41.28	84.30	14.33
BW1064	72	108	119	383.90	40.88	88.00	12.97
CS 11200104-11	71	105	116	366.97	42.05	72.00	13.25
CS11200214-17	70	105	115	351.80	40.89	84.00	12.39
BW5028	69	103	114	380.43	41.08	80.30	11.88
PT598	69	103	113	382.80	40.57	71.70	13.21
PT252	69	102	113	370.97	43.56	77.60	12.72
AAC Warman VB	68	101	112	375.20	40.09	87.70	12.20
AAC Brandon	67	100	110	362.87	43.46	76.70	13.82
BW5056	66	99	109	375.73	46.88	79.00	12.37
AAC Magnet	66	98	108	379.73	42.96	83.30	13.99
Stettler	66	98	108	373.47	40.60	85.00	13.31
BW5031	66	98	108	381.07	43.61	80.00	12.07
CDC Landmark VB	65	97	107	390.87	43.56	79.70	13.59
AAC Viewfield	65	97	107	385.70	42.34	69.70	12.84
CDC Go	63	94	103	372.49	50.08	72.20	14.14
Carberry	61	91	100	371.10	40.76	80.00	13.38
Parata	60	90	99	393.77	38.60	86.00	14.68
CV	23.81						

CWSP & CWSWS Wheat

The Canadian Western Special Purpose (CWSP) and Canadian Western Soft White Spring (CWSWS) were two classes which were grown in Fort Kent (NE-25-61-5-W5) and St. Paul (SE-13-60-10-W4). These two classes are recommended to be used when looking to make cereal/wheat silage. Data from the Fort Kent site can be found in Table 8 and Table 9 shows the data for St. Paul. GP214 and Pasteur were two of the higher yielding varieties at both sites.

The variety Carberry which is one of the checks is the lowest yielding variety at both the sites. The yield data from the CWSP & CWSWS wheat trials in Fort Kent and St. Paul are in tables 8 and 9, respectively.

Table 8. CWSP & CWSWS Wheat Data Fort Kent, 2019.

Variety	Yield (bu/ac)		Brandon %	Carberry%	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein (%)
Pasteur	124	ab	141	142	390.77	46.12	93	10.91
GP214	121	ab	138	138	367.50	46.65	86	10.67
AC Andrew	115	b	131	132	377.70	41.08	92	10.59
AC Sadash	113	bc	129	129	380.63	36.91	93	10.16
AAC Paramount	105	c	120	121	372.50	37.17	95	10.64
AAC Brandon	88	d	100	101	393.07	44.38	92	13.43
Carberry	87	d	99	100	391.63	43.03	90	13.92
CV = 5.09								

Table 9. CWSP & CWSWS Wheat Data St. Paul, 2019.

Variety	Yield (bu/ac)		Brandon %	Carberry%	TWT (lbs/bu)	TKW (g)	Height (cm)	Protien (%)
GP214	151	a	161	172	312.70	45.84	77	10.21
AC Sadash	148	a	159	169	331.47	42.65	82	10.42
Pasteur	145	a	156	166	333.93	47.40	85	10.69
AAC Paramount	144	a	155	165	327.73	44.23	87	10.21
AC Andrew	126	b	135	145	350.53	44.36	80	10.60
AAC Brandon	93	c	100	107	343.77	43.79	77	13.30
Carberry	87	c	94	100	347.70	43.61	78	13.16
CV = 5.66								

Triticale

The Triticale trial this year was grown in Fort Kent (NE-25-61-5-W4) and in St. Paul (SE-13-60-10-W4). The RVT triticale is the smallest trial held at LARA consisting of four different varieties which is an increase from previous years. The results for the Fort Kent and St. Paul sites can be found in table 10 and table 11, respectively. Triticale is one of the higher yielding cereals variety trials over the past 11 years. Brevis at 162bu/ac and T265 143bu/ac were two of the higher yielding varieties at the sites.

Overall, the triticale did well this year and we hope to continue having success growing triticale in the future. The yield from the triticale trial are in tables 10 and 11, respectively.

Table 10. Triticale Data Fort Kent, 2019.

Variety	Yield (bu/ac)	% of Brevis	TWT (lbs/bu)	TKW (g)	Height (cm)
T256	143	101	350.10	51.55	105.30
T267	141	100	335.77	47.68	108.00
Brevis	141	100	361.83	52.01	109.30
T270	139	98	368.83	53.84	107.30
CV = 2.02					

Table 11. Triticale Data St. Paul, 2019.

Variety	Yield (bu/ac)	% of Brevis	TWT (lbs/bu)	TKW (g)	Height (cm)
Brevis	162	100	361.83	52.01	87.00
T270	160	99	368.83	54.72	96.70
T256	152	93	350.10	51.55	89.30
T267	147	90	335.77	47.68	86.00
CV = 6.35					

Oats

The Oats trials this year were grown in Fort Kent (NE-61-5-W4) and St. Paul (SE-13-60-10-W4). The results of the Fort Kent site and St. Paul site can be found in table 12 and table 13, respectively. OT3087 was one of the top yielding varieties at both sites yielding 151 bu/ac in Fort Kent and 167bu/ac in St. Paul.

Table 12. RVT Oats Data Fort Kent, 2019.

Variety	Yield (bu/ac)		% of Dancer	TWT (lbs/bu)	TKW (g)	Height (cm)
CS Camden	156	a	134	274.13	42.04	119.70
OT3087	151	ab	129	286.53	42.07	117.70
OT2122	145	abc	124	271.03	41.93	120.70
CFA 1502	145	abc	124	289.13	39.39	117.70
CDC Arborg	141	bcd	120	289.40	41.71	131.30
OT3097	141	bcd	120	284.73	40.16	128.00
AC Mustang	136	cde	116	294.53	39.61	142.30
ORE 3541 M	127	def	109	288.40	38.95	120.30
CDC Ruffian	121	ef	103	299.20	38.49	116.70
CDC Dancer	117	f	100	284.43	37.47	125.00
ORE3542 M	116	f	99	293.17	40.57	122.30
CV = 6.41						

Table 13. RVT Oats Data St. Paul, 2019.

Variety	Yield (bu/ac)	% of Dancer	TWT (lbs/bu)	TKW (g)	Height (cm)
OT3087	167	149	265.52	47.24	111.30
CDC Arborg	159	142	252.50	47.34	110.30
OT2122	157	141	251.60	45.48	106.00
OT3097	152	136	259.32	45.30	110.70
CFA 1502	142	127	267.30	45.35	100.70
CS Camden	142	126	253.23	44.84	102.30
Ac Mustang	138	123	274.90	42.48	119.00
ORE 3541 M	137	123	266.97	43.58	101.00
ORE 3542 M	134	119	258.25	46.16	100.30
CDC Ruffian	112	100	268.57	44.87	102.00
CDC Dancer	112	100	272.70	42.09	111.70
CV = 14.40					

Green and Yellow Field Pea's

The field peas were grown in St. Paul with both green and yellow pea's being assessed. There were 8 green pea varieties and 18 yellow pea varieties grown. We had difficulty this year with harvesting the peas due to very poor standability. The average height of the green peas was 86 cm and the yellow pea's 88 cm.

N13073-17 is the highest yielding of the green pea at 60bu/ac. N13068-1 yielded the highest among the yellow pea's at 69bu/ac. Both of these varieties are experimental and are not yet registered, looking at the yield they surpassed the check by 11% in green peas and 32% in yellow peas. We are looking forward to growing field peas again in 2020.

The yield data for the green and yellow field peas are shown in table 14 and 15, respectively.

Table 14. RVT Green Field Pea Data St. Paul, 2019.

Variety	Yield (bu/ac)	% of CDC Spruce	TWT (lbs/bu)	TKW (g)	Height (cm)	
N13073-17	60	111	405.03	221	84	ab
CDC Spruce	54	100	405.85	263	89	ab
CDC Limerick	53	98	403.75	239	91	ab
Blueman	52	96	404.05	230	94	ab
CDC Forest	51	94	402.5	238	88	ab
N13073-19	50	92	402.23	248	79	b
12CP3032	48	90	403.65	218	82	ab
AAC Comfort	41	76	408.38	230	82	ab
CV = 13.29						

Table 15. RVT Yellow Field Pea Data St. Paul, 2019.

Variety	Yield (bu/ac)		% of Lewochko	TWT (lbs/bu)	TKW (g)	Height (cm)
N13068-1	69	a	132	403.25	220.20	92.30
N13029-10	58	abc	112	405.15	201.24	94.30
CDC Inca	56	abc	107	407.23	229.82	91.30
CDC Ardill	56	abc	107	405.88	183.23	84.30
CDC Lewochko	52	abc	100	407.95	207.18	98.00
N13057-5	51	abc	99	410.60	222.93	91.80
CDC Canary	50	bc	96	406.23	224.44	92.00
AAC Delhi	48	bc	92	410.35	239.60	86.80
AAC Lacombe	48	bc	91	410.30	242.41	86.80
N13057-4	47	bc	91	405.30	251.16	88.00
CDC Amarillo	47	bc	90	408.13	265.01	95.50
P00730-118	47	bc	90	405.73	211.77	95.30
AAC Barrhead	46	bc	88	407.55	245.58	82.30
N13022-7	45	bc	87	407.33	222.61	82.80
CDC Meadow	44	bc	84	406.68	234.88	82.00
CDC Spectrum	40	bc	77	405.95	207.37	88.50
LN4228	36	c	69	407.40	231.52	79.80
AAC Chrome	35	c	67	405.10	233.69	85.80
CV = 17.71						

Faba Beans

Unfortunately, there are no results for the Faba Beans this year because of having longer days to maturity and failure to harvest due to weather conditions.

Impact of Top-Dressing Nitrogen on the Yield and Protein Content of Spring Wheat

Partners: M.D. of Bonnyville
Smoky Lake County
St. Paul Municipal Seed cleaning Plant
Nutrien Ag Solution
Robert Semeniuk
Canadian Agricultural Partnership

Objectives:

1. To demonstrate the impact of topdressing fertilizer on the agronomic performance and yield of wheat grain in Alberta.
2. To demonstrate the impact of topdressing timing on the agronomic performance and yield on wheat grain in Alberta.
3. To demonstrate the impact of agronomic performance and yield with nitrogen stabilizer and without nitrogen stabilizer.
4. To demonstrate the impact of topdressing rate on the agronomic performance and yield of wheat in Alberta.

Background:

The use of topdressing fertilizer treatments in wheat throughout Alberta can improve agronomic performance and yield by supplying extra, necessary nutrients. Several producers in the Lakeland region of Alberta are aware of the option to top-dress and are set up to do it (with sprayers) however, are shy to try it because of cost, and the fact that it's not proven to a point where profitability can be achieved. As technology advances, producers are always looking for new ways to make their crops more profitable.

Current studies have shown the beneficial impact that top dressing nitrogen on spring wheat can have on both yield and protein depending on the stage of the crop at the time of application. Applying earlier in the growing season could improve overall yields while applying after heading can have a significant impact on final protein content of the harvested grain.

To help showcase the impacts of topdressing nitrogen fertilizers on the performance, yield and protein of spring wheat, LARA established two sites to test the application of 28-0-0-3 at various crop stages.

Method:

The Treatments were seeded on the May 13,2019 in Fort Kent (NE-25-61-5-W5) and May 17, 2019 in Smoky Lake in a complete randomized block design (CRBD) with four replications in Fort Kent and Smoky Lake to reduce error. Prior to seeding, soil test was taken and fertilizer blends (70-30-30-5) were side banded at time of seeding. The trial was seeding using LARA Fabro five row zero-till small plot drill and the individual plots measured 1.15m x 6.5m in area

The appropriate plots were hand sprayed with nitrogen at the different stages with different rates at 3-5 leaf, flag leaf, flowering stage and milk stage. An in-crop was sprayed to control secondary growth of weeds, overall the site was very clean. Notes on lodging and height were taken during the growing season and the trial in Fort Kent was harvested on October 1, 2019 and October 2, 2019 in Smoky Lake.

The treatments applied during the course of the trial are listed below. All treatments were applied with a nitrogen stabilizer.

1. Check
2. Topdressing 28-0-0-3 blend at 5 gal/ac at 3-5 leaf
3. Topdressing 28-0-0-3 blend at 10 gal/ac at 3-5 leaf
4. Topdressing 28-0-0-3 blend at 15 gal/ac at 3-5 leaf
5. Topdressing 28-0-0-3 blend at 20 gal/ac at 3-5 leaf
6. Topdressing 28-0-0-3 blend at recommended 10 gal/ac at flag leaf
7. Topdressing 28-0-0-3 blend at recommended 10 gal/ac at flowering stage
8. Topdressing 28-0-0-3 blend at recommended 10 gal/ac at milk stage

Results:

The results from the Fort Kent and the Smoky Lake trial can be found in table 1 and 2 respectively. Both sites did exceptionally well and were very successful in their results. The treatments which were top-dressed earlier during the plant's growth period at the 3-5 leaf stage showed an increase in yield. The treatments which were top-dressed from the flag leaf on did not overall show an increase in yield but there was a noticeable increase in protein. At both sites, the treatments which were top-dressed at flowering and milk stage showed the largest increase in protein.

Overall, we were impressed with the results of this trial and we are looking forward to doing more with top-dressing in 2020.

Table 1. Top Dressing Nitrogen on Spring Wheat Data Fort Kent, 2019.

Treatment	Yield (bu/ac)		% of Check	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein %
10 gal/ac at 3-5 leaf	63	a	108	382.5	38	9	13.33
20 gal/ac at 3-5 leaf	61	ab	105	374.4	36	82	13.63
15 gal/ac at 3-5 leaf	61	ab	105	376.9	36	82	13.51
10 gal/ac at flowering	60	ab	103	382.4	39	80	13.9
10 gal/ac at flag leaf	59	ab	102	380.7	36	77	13.23
5 gal/ac at 3-5 leaf	58	ab	100	378.3	38	79	13.41
Check	58	ab	100	384.2	38	81	13.74
10 gal/ac at milk stage	54	b	94	374.5	35	80	14.26
CV =5.55							

Table 2. Top Dressing Nitrogen on Spring Wheat Data Smoky Lake, 2019.

Treatment	Yield (bu/ac)	% of Check	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein %
15 gal/ac at 3-5 leaf	61	120	388.3	39	78	11.92
20 gal/ac at 3-5 leaf	54	107	382.4	37	76	12.01
5 gal/ac at 3-5 leaf	53	105	388.8	42	76	11.86
10 gal/ac at 3-5 leaf	52	103	388.3	41	79	11.85
10 gal/ac at flag leaf	51	102	387.8	40	76	12.56
Check	51	100	390.1	40	78	11.84
10 gal/ac at flowering	49	97	387.9	39	74	14.06
10 gal/ac at milk stage	49	96	387.6	39	75	14.02
CV =13.57						

Canola Performance Trial

Partners: Canola Council of Canada
Alberta Canola Producers Commission
Saskatchewan Canola Development Commission
Manitoba Canola Growers Association
County of St. Paul
Philip Amyotte

Objectives:

1. To detail agronomic characteristics of new varieties and proven varieties in a specific geographic area.
2. To provide information on new varieties to local producers.

Background:

The canola performance trials (CPT) represent the next generation in variety evaluations for Western Canadian canola growers. The three Prairie canola grower groups – Alberta Canola Producers Commission, Saskatchewan Canola Development Commission and the Manitoba Canola Growers Association – fund the program. The Canola Council of Canada delivers the program on their behalf. Trials provide relevant and unbiased performance data that reflects actual production practices, and comparative data on leading varieties and newly introduced varieties.

The CPT trial test canola varieties in both small plot and field scale trials. In 2019 there were 31 small plots which showcased 19 standard canola varieties and 12 straight cut varieties. There were also 60 field scale trials in 2019 seeded in Western Canada, within these trials there were 12 standard varieties, 37 straight cut and 11 clubroot resistant varieties. The complete results of the different varieties can be found can be found https://www.canolaperformancetrials.ca/.

Method:

The trial was seeded on May 23, 2019 in Mallaig in a randomized complete block design (RCBD) with four replications to reduce error. Prior to seeding soil test were taken and a fertilizer blend (80-30-30-15) was side banded on at the time of seeding. The seeding rate for the CPT trial is dependant on the thousand kernel weight of the seed and is adjusted accordingly. The trial was seeded using the LARA Fabro five-row, zero till small plot drill. Each individual plot is measured 1.15 m x 6.5 m in area.

The trial was hand sprayed for in-crop on June 28, 2019 at the 3-4 leaf stage. The trial was harvested October 11, 2019 Due to the excess amount of moisture, the dry down of the trial was very slow causing the crops to come off at a higher moisture percent than desired above 13% moisture. The bags with samples were air dried to a lower moisture before processing.

Results:

The results of the CPT trial are summarized in table 1.

Compared to 2018, this years CPT trial was not as successful due to environmental conditions. The CPT took a long time to germinate due to drought conditions in the spring, and was a long and slow harvest

due to the weather in September and October. The average yield in 2019 was 44bu/ac compared to last years average yield of 71bu/ac.

Table 1. Canola Performance Trial Results, 2019.

Variety	Yield (bu/ac)		TWT (lbs/bu)	TKW (g)
L252	60	a	311.40	3.59
45CM39	52	b	290.85	3.91
45M35	47	bc	312.03	3.61
540 G	47	bc	298.48	3.54
45H33	47	bc	296.30	3.44
D3155C	46	bc	298.98	3.23
L230	46	bc	312.23	3.76
DL 187300 TF	46	bc	296.20	3.44
75-65 RR	46	bc	312.40	3.73
L241	42	bc	296.43	4.19
DL 1634 RR	42	bc	289.95	4.01
6090 CR	42	bc	302.08	3.94
581 GC	42	bc	289.78	3.42
6076 CR	41	bc	295.83	3.84
CS2600 CR-T	41	bc	319.40	3.70
75-42 CR	41	bc	308.40	3.80
DL 171680 RR	41	bc	287.17	3.51
45CS40	38	c	289.65	3.98
CS2300	38	c	296.70	4.42
P501L	37	c	294.08	4.00
74-44 BL	37	c	309.55	3.71
CV	11.86			

Impact of varying rates of Environmentally Smart Nitrogen (ESN) on Yield and Quality of Canola

Partners: County of St. Paul
Top Gro Agro Ltd.
Canadian Agricultural Partnership
Philip Amyotte

Objectives:

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

Background:

Environmentally Smart Nitrogen (ESN) has been widely used in canola production across western Canada. ESN is nitrogen encased in a polymer coating that protects the nitrogen from losses of volatilization, denitrification and leaching, allowing nitrogen to be released based on the plants needs and soil temperature. The added cost of utilizing ESN compared to urea has shown positive benefits to canola yields in most situations. However, there are still questions on the use of ESN in northeastern Alberta.

To investigate the impacts of ESN on canola yield and quality, LARA established the ESN trial in the County of St. Paul.

Method:

The trial was established using a randomized complete block design with four replications to reduce error and was seeded on May 23, 2019. Each plot measured 1.5 m wide by 6.5 m long. The canola was placed at the depth of ½ inch and the ESN was side-banded during seeding. Prior to seeding, a soil test was taken to determine fertility requirements and a blend fertilizer was provided by Top Gro Agro Ltd. The ESN was included at varying rates of total nitrogen in the fertilizer blend at 30%, 50%, 70% and 90% with a check at 0% ESN. The Fertilizer blend was put down at 200 lbs/acre.

The trial was in-crop sprayed once during the growing season on June 26, 2019 with Liberty at the 3-4 leaf stage. The trial was harvested on October 11, 2019. Due to the environmental conditions experienced throughout the growing season in 2019, the trial was harvested tough with a higher moisture content and was dried prior to sample processing.

Results:

The results of the trial can be found summarized in table 1. The plots that were side-banded with 90% ESN inclusion had the highest yield at 47 bu/ac out of all the application rates of ESN, while the check plot yielded the lowest at 37 bu/ac. This is consistent with current research and anecdotal sources on the benefits of including ESN in canola fertility treatments.

The oil content of the varying treatments also showed a positive benefit of the use of ESN in canola fertilizer applications. The inclusion of ESN in the fertilizer blend saw a 25% increase in oil content to an

average of 50.1 compared to 46.1 in the check. However, there was not much variability between the rates of ESN inclusion.

When assessing the grades, the check plots were given a grade of 2c due to the fact that there were cleavers seeds present in the plot which could have also contributed to the higher greens. Overall, the trial did really well.

Table 1. Yield and Quality of Canola, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	1000 KW (g)	TWT (g)	Oil Content (%)	Grade
90% ESN	47	11	3.72	291	49.9	1 c (2% gr)
70% ESN	45	10	3.93	296	50.3	1 c (2% gr)
30% ESN	43	11	3.84	293	50.2	1 c (2% gr)
50% ESN	40	10	3.73	292	50.1	1 c (1.6% gr)
Check	37	12	3.86	293	46.1	2 c (3% gr)
Average	42	11	3.82	293	49.3	
CV	10.95					

Impact of varying rates of Environmentally Smart Nitrogen (ESN) on the performance Spring Wheat and Spring Barley in Northeastern Alberta

Partners: Philip Amyotte
Robert Semeniuk
MD of Bonnyville
County of St. Paul
Top Gro Agro Ltd.
Canadian Agricultural Partnership
St. Paul Municipal Seed Cleaning Plant

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 tones 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 with 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 MD of Bonnyville, County of St. Paul and Smoky Lake County 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 Stettler and the barley variety used was CDC Metcalfe. 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. All trials were seeded in May and harvested in October.

Results:
The results of wheat trials in Smoky Lake, St. Paul and Fort Kent are illustrated in tables 1, 2 and 3, respectively. Data varied between sites likely as a result of different environmental conditions experienced throughout the growing season with some sites receiving more rain than others. At the Smoky Lake site and St. Paul site, the 30% ESN and 50% ESN treatments were among the higher yielding treatments, although they were not significantly higher than the other ESN inclusion rates.

When considering protein, the 50% ESN treatment at both the Smoky Lake site and St. Paul site had the highest protein content.

Table 1. ESN Wheat Smoky Lake, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	Yield (g/plot)	Height (cm)	TKW	TWT	Protein %
Check	55	15.04	2525.63	71	40.50	386.95	12.61
30% ESN	56	14.96	2589.97	74	40.22	389.10	12.61
50% ESN	57	14.85	2669.67	78	41.10	390.92	13.08
70% ESN	54	14.79	2517.11	75	40.81	389.75	12.48
90% ESN	54	14.94	2462.14	72	39.24	385.45	12.98
CV	6.46						

Table 2. ESN Wheat St. Paul, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	Yield (g/plot)	Height (cm)	TKW	TWT	Protein %
Check	59	21.84	2478.4	81	44.35	352.15	12.47
30% ESN	65	21.17	2731.4	83	44.94	354.13	12.22
50% ESN	64	20.37	2746.2	82	46.42	358.75	12.59
70% ESN	64	20.97	2704.4	82	44.69	353.08	12.40
90% ESN	63	20.47	2719.2	84	44.34	359.28	12.40
CV	7.05						

Table 3. ESN Wheat Fort Kent, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	Yield (g/plot)	Height (cm)	TKW	TWT	Protein %
Check	64	14.22	2961.82	81	38.74	385.10	12.9
30% ESN	61	14.59	2815.03	83	38.67	385.77	13.1
50% ESN	63	14.36	2920.21	82	38.48	386.90	12.7
70% ESN	61	14.14	2790.23	82	39.24	384.12	12.8
90% ESN	61	14.56	2820.57	84	38.76	385.60	12.9
CV	4.56						

The results of the barley trials in Smoky Lake, St. Paul and Fort Kent can be found in tables 4, 5 and 6, respectively.

Table 4. ESN Barley Smoky Lake, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	Yield (g/plot)	Height (cm)	TKW	TWT
Check	64	17.70	2460.61	71	49.85	320.27
30% ESN	67	17.63	2598.28	69	50.65	321.95
50% ESN	63	17.68	2432.35	71	51.35	323.52
70% ESN	66	17.68	2532.67	70	51.76	321.85
90% ESN	68	17.85	2622.84	71	51.09	320.82
CV	5.67					

Table 5. ESN Barley St. Paul, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	Yield (g/plot)	Height (cm)	TKW	TWT
Check	119	13.30	4352.13	77	48.46	301.40
30% ESN	119	12.78	4498.25	74	49.46	315.75
50% ESN	111	13.30	4149.89	74	48.88	312.65
70% ESN	114	12.75	4248.59	74	47.86	311.80
90% ESN	117	12.95	4346.10	76	48.27	310.95
CV	7.72					

Table 6. ESN Barley Fort Kent, 2019.

Treatment	Yield (bu/ac)	Moisture (%)	Yield (g/plot)	Height (cm)	TKW	TWT
Check	66	16.55	2509.79	83	51.59	319.50
30% ESN	64	16.43	2481.89	86	52.12	323.67
50% ESN	55	16.43	2132.76	87	52.63	325.50
70% ESN	65	16.40	2502.15	89	52.92	324.57
90% ESN	55	16.30	2299.24	87	51.55	322.62
CV	9.62					

LARA Regional Variety Trial: Cereals

Partners: Canterra Seeds
SeCan
Bar LD Ranch
St Paul Municipal Seed Cleaning Plant
MD of Bonnyville
Jaque Plante

Objectives:

1. To provide regional data on oats, barley and wheat varieties to local producers.
2. To produce long-term data for local producers.

Background:

This trial was based off of the Regional Variety Trials. One draw back to the RVT trials is that a majority of the varieties are in the testing stage and are not registered or available for producers to purchase and grow on their own operations. LARA started the LARA RVT in Fort Kent this year, the varieties chosen were selected based on previous trials grown at LARA and from the input of local producers.

Methods:

The varieties were seeded on May 23, 2019 in a complete randomized block design (RCBD) with four replications to provide accuracy throughout at the Fort Kent Research site (NE-25-61-5-W4). Prior to 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 (70-30-30-5) at recommended rates. The trial was seeded using the LARA Fabro five-row, zero till small plot drill and seeded plots measured at 1.15m x 6.5 m in area. Notes on lodging and height were taken during the growing season and the trial was harvested on October 10, 2019.

Results:

The LARA RVT was grown to give producers a comparison between regional variety trials and common varieties grown in the area, allowing producers to see the difference in performance, including yield and height. The LARA RVT did well this year as it showed accurate and consistent data between the different varieties of cereals.

The results of the LARA RVT trial are summarized in table 1.

The highest yielding varieties were both oats varieties which yielded over 200 bu/ac, which was significantly higher than both the wheat and the barley varieties. The highest yielding barley variety was CDC Austenson at 137 bu/ac although this was not significantly higher than some of the other barley varieties. The highest wheat variety was AAC Crossfield at 101bu/ac which was 13/bu ac higher than the next highest yielding variety which was AAC Connery.

If you have grown a different variety of cereals then the ones in the table below and would like to see it grown in this trial. Please feel free to contact the office at 780-826-7260 and ask for Alyssa or Amanda.

Table 1. Performance data of LARA RVT Trial, 2019.

Type	Variety	Yield (bu/ac)		TWT (lbs/bu)	TKW (g)	Height (cm)	
Oats	**CS Camden**	213	a	265.43	40	113	b
Oats	**CDC Haymaker**	206	a	244.33	48	129	a
Barley	**CDC Austenson**	137	b	271.04	50	89	cd
Barley	**CDC Coalition**	128	bc	318.83	48	81	d
Barley	**Canmore**	118	bcd	323.4	34	89	cd
Barley	**Seebe**	106	b-e	324.2	47	100	c
Wheat	**AAC Crossfield**	101	cde	381.48	36	93	c
Barley	**CDC Maverick**	96	cde	327.38	50	110	b
Wheat	**AAC Connery**	88	de	383.23	41	94	c
Wheat	**AAC Indus**	75	e	362.35	40	97	c
	CV	13.95					

Impact of Soil Temperature and Seeding Rate on Spring Wheat Performance

Partners: Alberta Wheat Commission
Alberta Agriculture and Forestry
MD of Bonnyville
Clair Langlois

Objectives:

1. To determine the impact on the performance and protein content of two varieties of spring wheat when using varying soil temperatures instead of calendar date to determine time of seeding.
2. To determine the impact on the performance and protein content of two varieties of spring wheat when using three different seeding rates on two different seeding dates (ultra-early and normal).

Background:

Current research has been focusing on the opportunity to seed wheat at an earlier date based on soil temperature than typically considered normal. Research let by Brian Beres of Agriculture and Agri-Food Canada (AAFC) has shown that there is no yield drag observed when planting into soil temperatures of 2-6 degrees Celsius as long as the soil surface is not frozen. These trials indicate that seeding early may require a higher seeding rate for the greatest benefit.

One of the primary risks of seeding early is the threat of early frost. However, wheat seedling up to about the 5-6 leaf stage can survive short periods of cold temperatures as low as -8 degrees Celsius. At these temperatures, some leaves may be damaged but the whole plant will recover.

Despite the frost risk, there are many positive benefits of seeding wheat early, including:

1. Ability to harvest crops earlier than wheat seeded at higher soil temperatures. This could be particularly important in years similar to 2019 which saw a delay in crop development and harvest stretching well into November.

Although there has been plenty of research looking into the possibility of seeding wheat early, there has been a lack of assessment on the impact of protein content. To help investigate this concept further, LARA partnered with other Applied Research and Forage Associations across the province, Alberta Agriculture and Forestry and the Alberta Wheat Commission to seed two varieties of wheat at two different seeding dates. The two varieties chosen were: AAC Connery is considered an early maturing variety while AAC Brandon, although earlier maturing than some varieties, is later maturing the AAC Connery.

The two seeding dates were:

1. Ultra-Early: when the ground is first able to carry equipment and soil temperatures are between 2-6 degrees Celsius.
2. Normal: seeded at least 10-14 days later or when 'normal' seeding window occurs for the area (soil temperature between 10-12 degrees Celsius).

Method:
The trial was established at the LARA Fort Kent Research Farm (NE25-61-5-W4) in a randomized complete block design with four replications to reduce error. The "Ultra-Early" seeding date was seeded on April 12, 2019 with snow still on the ground and soil temperatures at +4 degrees Celsius. No pre-seed herbicide was applied due to minimal weed germination prior to seeding. The "regular" seeding date was seeded on May 13, 2019 using the same RCBD as the first seeding date. Soil temperatures were around +11 degrees Celsius at the time of seeding.

The treatments seeded are outlined below:

1. AAC Connery Light Rate = 71.29 g/plot
2. AAC Connery Medium Rate = 106.93 g/plot
3. AAC Connery High Rate = 142.57 g/plot
4. AAC Brandon Light Rate = 68.06 g/plot
5. AAC Brandon Medium Rate = 102.09 g/plot
6. AAC Brandon High Rate = 136.12 g/plot

In-crop herbicide applications were applied in both blocks of plots based on weed pressure and any weeds not controlled by the application were hand pulled when necessary.

Plant counts were taken two weeks after planting to determine germination rate and head cuttings were taken to determine physiological maturity. The "Ultra-Early" trial was harvested on September 16, 2019 and the "Regular" trial was harvested on October 1, 2019.

Results:
The pre-harvest emergence data for both trials are summarized in table 1. Although not significant, on average, higher emergence rates were seed in the "Ultra-early" trial for all treatments except the light rate of AAC Connery. As expected with both trials, the high seeding rates had the greatest emergence followed by the medium rate and then the low rate.

The ultra-early trial did experience a few significant frost events (below -6 degrees Celsius) a couple of nights in April and early May (see picture). However, recovery was quick and no lasting damage was noted on the emerged leaves.

Table 1. Pre-harvest emergence data, 2019.

	Regular Trial		Ultra-Early Trial
Treatment	**Stand Count**	**Treatment**	**Stand Count**
AAC Brandon High Rate	53	**AAC Connery High Rate**	56
AAC Connery High Rate	49	**AAC Brandon High Rate**	51
AAC Brandon Medium Rate	38	**AAC Brandon Medium Rate**	47
AAC Connery Medium Rate	35	**AAC Connery Medium Rate**	43
AAC Connery Light Rate	32	**AAC Connery Light Rate**	32
AAC Brandon Light Rate	28	**AAC Brandon Light Rate**	29

After conducting the emergence counts, it was expected that the higher emergence rates with the higher seeding rates would translate into a yield boost at the end of the year. However, in both trials, the high seeding rates were not necessarily the highest yielding treatments. The harvest data for the regular seeding date and ultra-early seeding date are illustrated in tables 2 and 3, respectively.

Overall, the regular seeding date trial yielded an average of 5 bu/ac higher than the ultra-early seeded trial. AAC Connery, considered an early maturing variety, yielded higher than AAC Brandon in the ultra-early seeded trial while AAC Brandon yielded higher than AAC Connery, on average, in the regular seeding date trial.

Final protein content of the harvested grain varied significantly between the two trials with an average of 13.15% in the regular seeding date trial compared to an average of 12.27% in the ultra-early seeded trial (0.88% lower). However, there was no significant difference in protein content within each individual trial.

Another point to note is that the 1000 kernel weight (1000 KW) dropped significantly moving from a regular seeding date to the ultra-early seeding date and there was also a slight drop in test weight in the ultra-early trial.

Table 2. Regular seeding date harvest data, 2019.

Treatment	Yield (bu/ac)	Height (cm)	Moisture (%)	TWT (lbs/bu)	1000 KW (g)	Protein (%)
AAC Brandon High Rate	70	83	15.50	389.60	40.35	13.08
AAC Connery Medium Rate	70	89	15.10	387.98	40.73	13.38
AAC Brandon Light Rate	69	85	15.40	385.18	39.51	13.01
AAC Brandon Medium Rate	69	82	15.30	384.53	38.61	12.83
AAC Connery Light Rate	69	91	15.10	387.58	40.02	13.56
AAC Connery High Rate	69	89	15.00	390.23	41.15	13.06
Average	69	87	15.23	387.52	40.06	13.15
CV	4.65					

Table 3. Ultra-Early seeding date harvest data, 2019.

Treatment	Yield (bu/ac)	Height (cm)	Moisture (%)	TWT (lbs/bu)	1000 KW (g)	Protein (%)
AAC Connery Medium Rate	69	81	14.36	384.48	30.18	12.16
AAC Connery High Rate	69	83	14.50	380.85	29.24	11.91
AAC Brandon High Rate	64	77	14.45	380.03	29.92	12.45
AAC Connery Light Rate	62	81	14.58	379.58	29.87	12.36
AAC Brandon Medium Rate	59	77	14.41	375.43	30.31	12.32
AAC Brandon Light Rate	58	77	14.17	378.53	29.45	12.44
Average	64	79	14.41	379.82	29.83	12.27
CV	7.76					

Ultra-Early Wheat trial on May 2, 2019.

Ultra-Early Wheat Trial on July 4, 2019

Demonstrations:

Wheat Variety Demonstration

Partners: Smoky Lake County
Robert Semeniuk
Alberta Agriculture and Forestry

Objectives:

1. To demonstrate the performance (yield and growth) of select wheat varieties in Smoky Lake County.

Discussion:

In this demonstration, twenty different wheat varieties were seeded on May 17, 2019 using the LARA Fabro small plot drill at 1" depth. Prior to seeding, a soil sample was taken to determine fertility requirements and a blend fertilizer was side-banded at 125 lbs/ac during seeding. The demonstration as in-crop sprayed with Buctril M once on June 17, 2019 and harvested on October 2, 2019.

The results of the demonstration are illustrated in table 1. AAC Brandon was the highest yielding variety at 95 bu/ac, well above the next highest yielding variety, Carberry, at 87 bu/ac. The two lowest yielding varieties are experimental varieties not yet available for commercial production.

Table 1. Yield of Wheat Varieties Smoky Lake, 2019.

Variety	Yield (bu/ac)	TWT (lbs/bu)	TKW (g)	Height (cm)	Protein (%)
AAC Brandon	95	350.60	38.00	75	9.76
Carberry	87	344.40	32.92	77	9.09
AAC Jatharia VB	86	363.60	35.48	77	9.59
AAC Warman VB	84	351.00	35.92	82	9.95
AAC Alida VB	82	370.10	33.84	77	9.92
CDC Go	71	379.40	36.64	77	10.58
HY2077	70	384.00	41.08	82	11.85
CDC Select	70	375.20	41.52	73	10.35
Bolles	69	370.70	35.60	69	11.11
Sadash	63	364.80	42.76	68	10.97
HY2068	62	384.60	44.08	81	12.16
Ellerslie	62	384.10	40.80	83	11.94
Parata	59	380.30	35.40	86	12.22
AAC Foremost	57	394.20	38.12	94	11.28
Stettler	56	372.40	34.00	83	11.70
AAC Andrew	55	394.00	38.76	92	10.84
AAC Paramount	55	387.30	37.12	93	10.68
Pasteur	54	384.80	41.12	80	11.48
GP214	52	386.80	41.32	75	11.55
PT596	51	382.00	35.00	86	12.57

Demonstrations:

Alternative Crops: Quinoa

Partners: Northern Quinoa
M.D of Bonnyville

Objectives:

1. To asses the growth and establishment of quinoa in Northeastern Alberta.
2. To asses the yield and quality of quinoa in Northeastern Alberta.

Background:

With soil borne diseases such as clubroot, producers are often looking for alternative crops that can fit into their rotation and bring a profit. Quinoa is a small grain cereal which is very versatile and has health benefits as it is considered a complete source of protein.

Quinoa thrive in high altitude conditions and adapts well to the growing conditions of the Canadian Prairies. Quinoa favors our cool and dry climate which is similar to the climate in South America where quinoa originates. Regions north of highway 16 are prime candidates for growing quinoa but their higher temperatures can cause sterilization and reduce yields.

Seed bed preparation is very important when growing quinoa, Because the seed is very small the seedling can become stressed if there is too much competition and perform poorly due to weeds, heavy stubble or trash. Picking a field which is clean will help the quinoa prosper as there are no registered herbicides. Another consideration when choosing a field to grow quinoa is what the crop rotation looks like for the field. Field history and what herbicide have been applied is important as quinoa is susceptible to multiple residual herbicides. Quinoa should also not be seeded into a field which was in canola the previous year due to increased risk of volunteers which will compete with the seedlings.

Discussion:

In partnership with Northern Quinoa based out of Saskatoon, SK LARA seeded three trials which assessed throughout the growing season. The trials were seeded in May and we utilized best management practices that were established for canola such as fertilizer recommendations. The Quinoa did well during the growing season with insect pressure continuing to be an issue this year, causing consistent crop scouting required to ensure timely pest control.

The trials were featured in our Fort Kent Summer Field Tour, where Derek Fladd Research Coordinator with Northern Quinoa came and discussed the production of quinoa in Western Canada.

Derek Fladd with Northern Quinoa at the Fort Kent Summer Field Day.

Quinoa getting close to being fully mature.

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.

Method:

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 2019, LARA participated in the pest surveys which included, Diamondback Moth, Bertha Armyworms, and the Orange Blossom Wheat Midge. The regional data that we collected was then sent to the provincial authorities. The information collected is compiled and can be found on Alberta Agriculture and Forestry website under the 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.

Methods:

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 infestation 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 County's 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. The harsh cold winter of 2018-2019 with a high amount of snow and the cooler growing season with high amounts of precipitation could have had an impact on these low numbers. Approaching the growing year of 2020, the cold winter with a minimal amount of snow that we are currently experiencing in this region may lower the chance of an outbreak of this pest. But staying alert with these surveys and scouting your fields is always a good precaution to take in case of an outbreak.

In most years the population of Bertha's 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 insufficient 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 are done each time. The traps are put out in the fields from Jun-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 2020 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 dryer 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 asses damage. Damage to the seed kernels that 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 2019, 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 within the MD of Bonnyville and the County of St. Paul showed lot numbers of cocoons in the soil. Similarly, the samples taken in Lac La Biche County saw low signs of Wheat Midge eggs. Consequently, the risk for Wheat Midge outbreaks in 2020 is considered low, but producers should still be aware, keep updated with pest surveys and still scout for them in your crop as wet years can cause an increase in Wheat Midge populations.

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 2019, 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 a very low population but the insects are still present. Similarly, the County of St. Paul saw some insect pressure but overall numbers/damage remains low with the exception of one field found within the county. The Prairie Pest Monitoring Network surveyed out RVT Pulse site in the County of St. Paul, showing some Pea Leaf Weevil damage on the Green and Yellow Field Peas and Faba Bean trial. However, the damage was well below the economic threshold of one or more feeding notches on 30 % of the clam leaf pairs. Producers for the 2020 growing season should not need to be concerned in purchasing seed treatments for this insect.

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 patter 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 pules is the use of a seed treatment with your seed.

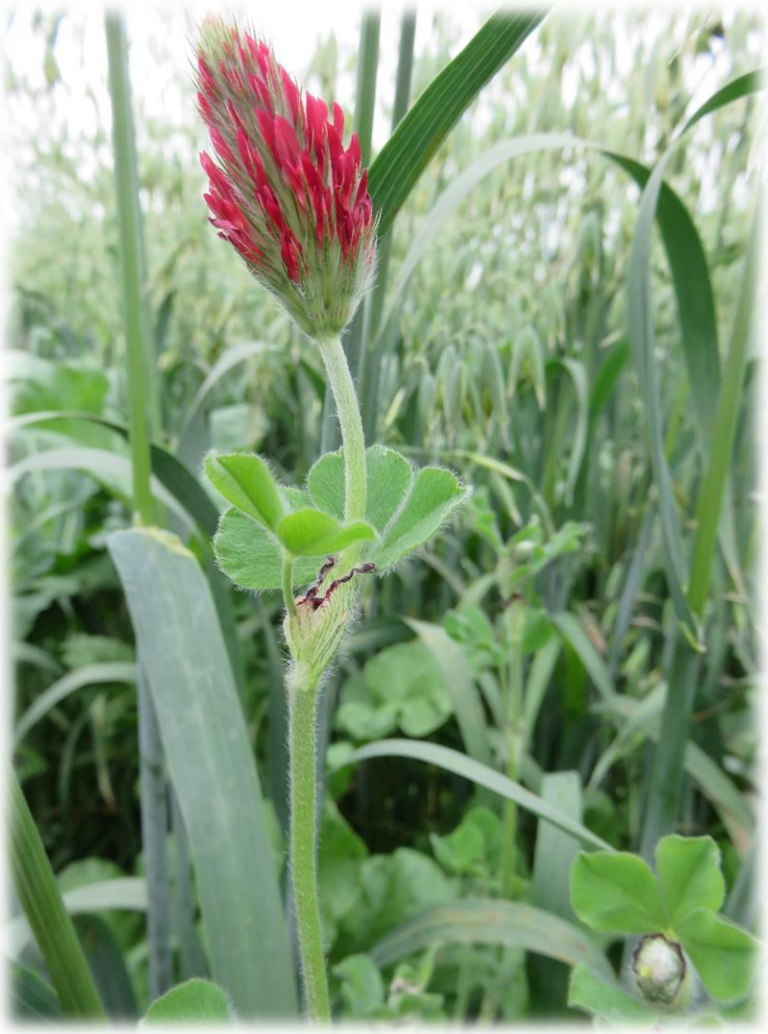
Canola Sweeps

In 2019, LARA also participated in a regional survey where canola sweeps where taken to identify any unidentified insects. We sampled 4 sites in the M.D of Bonnyville, 2 Sites in Lac La Bice County, and 5 sites in the County of St. Paul. These sites were spread out through each county to get better results and the sweeps where taken at the early bloom stage (25% flower). At each site, 10 sweeps where taken and then placed in a sample bag. From the sweeps taken, there was 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 other 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 2019 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 2020 in the 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 sorts.

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 ten 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 2019, 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 6th, 2019. The bulls were pulled on July 31st, 2019, 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 27th, 2019 allowing for adequate grass carryover for the 2020 grazing season. The heifers were weighed for a third time at the time of take-out

in September. Similar to previous years, the heifers were not pregnancy checked. The pasture received a total of 13 inches of rain over the grazing season.

Results:

There was a total of 113 days in the grazing season at Olympic Lake Grazing Lease (table 1, figure 1). The average daily gain (ADG) over the grazing season was 1.24 lbs/day (table 2), which is higher than that seen in 2018 of 1.17 lbs/day but lower than the ADG seen in 2017 of 1.29 lbs/day.

Table 1. Grazing rotation for the 2019 grazing season at Olympic Lake Grazing Lease.

Pasture Rotation - Olympic Lake 2018										
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	Jun-6	Jun-7	1	390	11	Sep-26	Sep-27	1	388	0
Pipeline	Jun-7	Jul-8	1	390	11					
W3	Jun-8	Jun-14	6	390	11	Sep-6	Sep-10	4	387	0
W5	Jun-14	Jun-18	4	390	13	Sep-10	Sep-14	4	387	0
W1	Jun-18	Jun-22	4	390	13	Sep-16	Sep-18	2	387	0
W4	Jun-22	Jun-24	2	390	13	Sep-14	Sep-16	2	387	0
W2	Jun-24	Jun-28	4	390	13	Sep-18	Sep-20	2	387	0
C2	Jun-28	Jul-4	6	390	13	Sep-20	Sep-22	2	387	0
C3	Jul-4	Jul-11	7	390	12	Sep-22	Sep-24	2	388	0
C4	Jul-11	Jul-16	5	390	12	Sep-24	Sep-26	2	388	0
C1	Jul-16	Jul-25	9	390	13					
Pipeline	Jul-25	Jul-28	3	390	13					
Headquarters	Jul-28	Jul-31	3	390	13					
S1	Jul-31	Aug-14	14	384	0					
B1	Aug-14	Aug-16	2	388	0					
E1	Aug-16	Sep-6	21	388	0					
		Total:	**92**				**Total:**	**21**		

Table 2. Heifer data by herd for the 2019 grazing season.

	2018 Heifer Weights			Heifer Average Daily Gain (ADG)					
	June	August	September	June 6 – July 31	55 days	July 31 - September 27	58 days	June 6 - September 67	113 days
Herd	lbs	lbs	lbs	lbs gained	lbs/day	lbs gained	lbs/day	lbs gained	lbs/day
1	864	996	1045	132	2.40	49	0.84	181	1.59
2	873	986	1032	113	2.05	46	0.79	159	1.41
3	818	936	1006	118	2.15	70	1.21	188	1.66
4	761	852	914	91	1.65	62	1.12	153	1.35
5	800	855	900	55	1.00	45	0.78	100	0.88
6	863	965	1032	102	1.85	67	1.16	169	1.50
7	732	858	913	126	2.29	55	0.95	181	1.60
8	631	781	845	150	2.73	64	1.10	214	1.89
9	704	816	869	112	2.04	53	0.91	165	1.46
10	806	844	887	38	0.69	43	0.74	81	0.72
11	773	824	862	51	0.93	38	0.66	89	0.79
Average	784	883	937	99	1.63	54	0.93	152	1.24

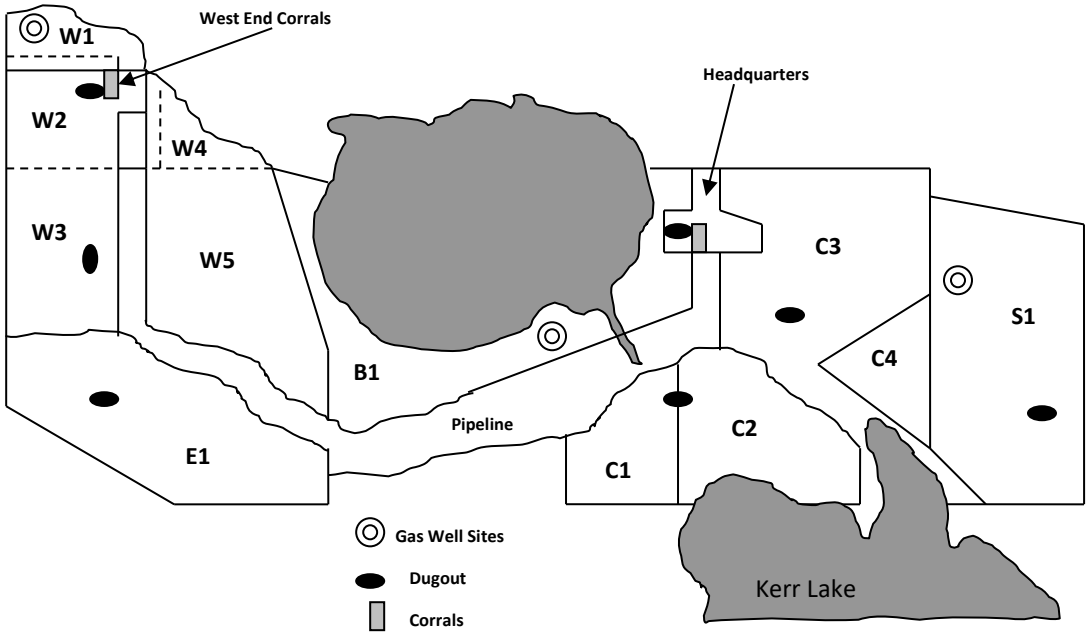


Figure 1. Map of the Northern Range Enhancement Project (NREP) pasture system.

Discussion:

There was a total of 11 patrons grazing cattle at Olympic Lake in 2019 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 6th and July 31st.

The average herd entry weight at 784 lbs was the same as that seen in 2018 and higher than the entry weight of 777 lbs seen in 2017 which is likely the results of the breed and age of the heifers. The herd weight gain ranged from 81 lbs to 214 lbs over the grazing season with an average of 152 lbs, which is 29

lbs higher than 2018 and 6 lbs less than 2017. The length of the grazing season was longer in 2019 than 2018 due to a decrease in herd size and high moisture throughout the season allowing for greater grass growth. The average daily gain (ADG) decreased between August and September to 0.63 lbs/day from 163 lbs/day seen from June to August. This has consistently been seen throughout the years although the drop in ADG will vary.

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 3.

The high moisture during the grazing season allowed for excellent pasture growth.

Table 3. Historical data from Olympic Lake Grazing Lease. 2003-2018.

Year	Grazing Season (days)	# of Head	Weight Gain	ADG	% Open
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	2.00	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	124.63	373.71	171.42	1.41	14.5

Regional Annual Silage Trials

Partners: Alberta Agriculture and Forestry
Battle River Research Group
Chinook Applied Research Association
Gateway Research Organization
North Peace Applied Research Association
Smoky Applied Research and Demonstration Association
West-Central Forage Association
SECAN
Association of Albert Co-op Seed Cleaning Plants
Alberta Brand, Canadian Seed Growers Association
A & L Canada Laboratories
Philip Amyotte
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 2019, the LARA Regional Annual Silage Trial included four blocks: barley (15 varieties), oats (9 varieties), triticale and Wheat (8 varieties) and pulse (9 treatments).

In partnership with the Association of Alberta Co-op Seed Cleaning Plants and the Alberta Seed Growers Association, the Regional Annual Silage Trial information will appear in the spring 2020 Alberta's Seed Guide (seed.ab.ca).

Regional Annual Silage Trial
Cereals

Partners: Canadian Agriculture Partnership
Alberta Agriculture and Forestry
Battle River Research Group
Chinook Applied Research Association
Gateway Research Organization
Smoky Applied Research and Demonstration Association
West-Central Forage Association
Farming Smarter
Peace Country Beef and Forage Association
Philip Amyotte

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), 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 location: St. Paul (SW30-60-9-W4) and Fort Kent (NE25-61-5-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 1. 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 16, 2019 (barley and triticale/wheat) and May 23, 2019 (oats) and the trials in

St. Paul were seeded on May 14, 2019 (barley and triticale/wheat) and May 15, 2018 (oats). The trials were sprayed with a 3-point hitch sprayer once during the growing season.

Total rainfall for St. Paul site was 268 mm and the Fort Kent site was 199 mm.

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 ARM 9, p = 0.05.

The following varieties were grown in the Regional Annual Silage Trials in 2019:

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 Coalition* – high yielding, 2-row feed barley variety.
- *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.
- *AC Cattlelac* – semi-smooth awned barley variety with good lodging resistance, good grain yield and excellent disease resistance.
- *CDC Bow* – 2-row, hulled malting barley with good agronomic performance and grain quality that is widely adapted across western Canada.
- *SR17515* – 6-row feed and forage barley.
- *SR17519* – 6-row feed and forage barley.
- *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.
- *TR17369* – 2-row feed barley.

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.
- *CDC Seabiscuit* – high yield milling oat variety with good straw strength for reduced lodging.

- *CDC SO-1* – early maturing, very digestible brown feed oat variety with a high fat content and does not need to be rolled. Short strong straw for reduced lodging.
- *Murphy* – widely adapted forage oat with high yields, improved lodging resistance and is well suited for silage, swath grazing or greenfeed.
- *CDC Nasser* – new feed oat variety with low lignant hull and high oil content.
- *ORE 3542 M* – new white hulled milling oat variety with short, strong straw, good lodging resistance and good grain yields.

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.
- *Tyndal* – early maturing, reduced awn forage and silage variety with good lodging resistance.
- *T256* – new spring forage triticale variety with reduced awns, shorter stature and increased digestibility.
- *Bunker* – early maturing, reduced awn forage variety with great digestibility, high fat content and high silage yields.
- *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.

Table 1. Agronomic Information 2019.

Trial	Site	# of Varieties	Seeding Date	Seeding Rate	Fertility (lbs/ac)	Weed Control	Harvest Date
Barley	Fort Kent	15	16-May-19	250 lbs/ac	35-15-10-0 @ 114 lbs/ac	Buctril M	07Aug-19
	St. Paul	15	14-May-19	250 lbs/ac	35-15-10-0 @ 114 lbs/ac	Buctril M	15-Aug-19
Oats	Fort Kent	9	23-May-19	250 lbs/ac	35-15-10-0 @ 114 lbs/ac	Buctril M	19-Aug-19
	St. Paul	9	24-May-19	250 lbs/ac	35-15-10-0 @ 114 lbs/ac	Buctril M	23-Aug-19
Triticale/Wheat	Fort Kent	8	16-May-19	250 lbs/ac	35-15-10-0 @ 114 lbs/ac	Buctril M	19-Aug-19
	St. Paul	8	14-May-19	250 lbs/ac	35-15-10-0 @ 114 lbs/ac	Buctril M	23-Aug-19

Results:

Barley

The barley trials are aimed to be harvested at the soft dough stage. There were 15 barley varieties grown in the trials this year at both locations. Five new variety was added to the trial in 2019 including SR17515, SR17519 and TR17369, which are experimental varieties not yet released but are being developed for forage use. AC Cattlelac and AB Advantage where also added and are showing great promise for forage production and livestock feed. The yield and quality results of the Fort Kent and St. Paul trials can be found in table 2 and table 3, respectively. The Fort Kent trial was harvested 83 days after seeding and the St. Paul trial was harvested 93 days after seeding. High rainfall during seeding allowed for quick establishment

of the trials at both sites. Average moisture content of the Fort Kent trial was 60% and the St. Paul trial was 53%.

In contrast to previous years, the varieties yielded similarly at both locations with an average yield at the St. Paul location of 3.61 ton/acre compared to an average yield in Fort Kent of 3.91 ton/acre. We have typically seen higher yields at the St. Paul location, which was likely due to differences in soil type as well as prevailing environmental conditions during the growing season. The highest yielding variety in Fort Kent was CDC Bow at 4.37 ton/acre, which was significantly higher than the remaining varieties. The highest yielding variety in St. Paul was AC Cattlelac at 4.09 ton/acre. AC Cattlelac is a newly released variety that producers can purchase and it yielded in the top three in the Fort Kent location as well at 4.15 ton/acre. CDC Austenson is known for its high forage yields and has become a commonly grown barley variety in the Lakeland. The new varieties being developed yielded well overall with TR17369 yielding the highest of the three at 3.80 ton/acre in St. Paul and 4.12 ton/acre in Fort Kent.

Quality remained consistent between the two locations this year. When considering crude protein (CP), the general rule of thumb is 7-9-11 percent for mid-gestation, late-gestation and after calving for crude protein (CP). The majority of the varieties are adequate to meet these nutrient requirements to mid-gestation, however, many fall short for after calving when requirements increase substantially. Similarly, total digestible nutrients (TDN), which is the easiest method of estimating the energy content of a feed, is adequate to meet requirements through the late-gestation and into calving following the rules of 55-60-65 percent.

Table 2. RST Barley Fort Kent, 2019 (ton/acre, 1 ton = 2000 lbs).

						2019 Quality Results							
Variety	DM Yield (ton/ac)		DM Yield (% Austenson)	Height (cm)	Lodging (1-9)	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
CDC Bow	4.37	a	113	95	2	10.31	26.79	49.93	68.03	0.34	0.25	1.14	0.22
Amisk	4.24	ab	110	85	1	8.77	31.41	55.57	64.43	0.48	0.17	1.71	0.13
AC Cattlelac	4.15	ab	107	103	1	9.30	28.57	54.27	66.64	0.37	0.18	1.46	0.12
TR17369	4.12	ab	106	91	1	10.32	29.16	55.66	66.18	0.32	0.25	1.37	0.22
CDC Cowboy	4.01	ab	104	118	7	8.84	28.21	52.45	66.92	0.33	0.16	1.54	0.11
Claymore	4.01	ab	104	91	1	9.85	32.10	58.48	63.89	0.35	0.26	1.23	0.25
AB Advantage	3.96	ab	102	110	1	8.63	29.43	52.80	65.97	0.39	0.18	1.59	0.12
CDC Maverick	3.93	ab	102	113	7	10.47	29.93	56.47	65.58	0.20	0.28	1.27	0.20
CDC Austenson	3.87	ab	100	92	1	9.57	28.17	55.12	66.96	0.36	0.15	1.56	0.10
CDC Coalition	3.86	ab	100	81	1	11.37	23.86	47.23	70.31	0.21	0.24	1.26	0.18
Sundre	3.77	ab	97	92	1	9.55	27.90	52.34	67.17	0.38	0.19	1.46	0.12
SR17515	3.70	ab	96	96	1	10.64	31.37	56.49	64.46	0.33	0.27	1.31	0.27
Canmore	3.65	ab	94	88	2	8.64	28.85	54.85	66.43	0.37	0.15	1.56	0.09
SR17519	3.62	ab	94	93	1	10.94	25.72	49.14	68.86	0.38	0.26	1.46	0.25
Altorado	3.44	b	89	83	1	10.41	30.28	55.62	65.31	0.27	0.24	1.16	0.21
Average	3.91			95		9.84	28.78	53.76	66.48	0.34	0.22	1.41	0.17
CV	8.89												

*lodging rated on a 1-9 scale where 1 is erect and 9 is completely flat.

**average moisture content at the time of harvest was 60%.

Table 3. RST Barley St. Paul, 2019 (ton/acre, 1 ton = 2000 lbs).

						2019 Quality Results							
	DM Yield		DM Yield	Height	Lodging	CP	ADF	NDF	TDN	Ca	P	K	Mg
Variety	(ton/ac)		(% Austenson)	(cm)	(1-9)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
AC Cattlelac	4.09	a	105	89	1	11.40	27.40	49.57	67.56	0.34	0.25	1.39	0.26
Claymore	4.05	a	104	75	1	8.39	32.33	60.95	63.71	0.35	0.17	1.44	0.10
CDC Austenson	3.91	b	100	75	1	10.89	26.88	50.47	67.96	0.22	0.23	1.17	0.19
Canmore	3.88	b	99	77	1	10.67	28.89	53.66	66.39	0.30	0.22	1.25	0.22
CDC Bow	3.87	b	99	80	1	8.09	28.58	51.42	66.64	0.43	0.15	1.49	0.10
Altorado	3.84	b	98	71	1	8.86	32.40	60.61	63.66	0.44	0.15	1.61	0.10
TR17369	3.80	b	97	82	1	8.13	27.36	49.00	67.59	0.36	0.14	1.44	0.08
AB Advantage	3.66	b	94	96	1	10.00	25.93	47.94	68.70	0.22	0.24	1.24	0.18
CDC Cowboy	3.46	b	88	88	1	10.52	28.13	51.21	66.99	0.27	0.26	1.31	0.21
Amisk	3.42	b	87	71	1	11.62	24.91	45.52	69.50	0.35	0.26	1.29	0.22
CDC Maverick	3.40	b	87	91	1	8.48	29.01	52.81	66.30	0.34	0.16	1.37	0.10
SR17519	3.36	b	86	77	1	8.71	30.64	57.68	65.03	0.40	0.19	1.66	0.13
CDC Coalition	3.35	b	86	67	1	8.68	30.43	54.78	65.20	0.36	0.19	1.87	0.11
SR17515	3.34	b	85	81	1	8.57	29.58	54.66	65.86	0.45	0.14	1.74	0.14
Sundre	3.27	b	84	80	1	10.45	32.41	60.15	63.65	0.41	0.25	1.49	0.26
Average	3.65			80		9.56	28.99	53.36	66.32	0.35	0.20	1.45	0.16
CV	11.5												

*lodging rated on a 1-9 scale where 1 is erect and 9 is completely flat.

**average moisture content at the time of harvest was 53%.

Oats

The oat trials are aimed to be harvested at the milk stage. There were 9 oat varieties grown in the trials this year in Fort Kent (NE25-61-5-W4) and St. Paul (SW30-60-9-W4). The results of the Fort Kent trial can be found in table 4 and the results of the St. Paul trial can be found in Table 5. The average moisture content at the time of harvest in Fort Kent was 67% and in St. Paul was 65%. This is the second year that the experimental variety ORE 3542 M has been included in the trial, which is not yet available for commercial production. New to the trial this year was CDC Nasser.

The varieties yielded higher at the Fort Kent site with an average yield of 4.90 ton/acre compared to the St. Paul site at 4.42 ton/acre. CDC Haymaker yielded in the top three at both sites, which has become a fairly common forage oat variety developed to replace CDC Baler and is highly distinguishable throughout the growing season due to its large, wide leaves. CDC Baler is still widely grown and was the highest yielding variety at the St. Paul site with a yield of 5.09 ton/acre. CDC Seabiscuit is a milling oat variety that is known for generally high forage yields and strong straw although it is not widely grown in Northeastern Alberta. The new variety, CDC Nasser yielded 4.53 ton/acre in St. Paul and 4.46 ton/acre in Fort Kent.

The new variety, Ore3542 M, was the lowest yielding variety at the St. Paul site at 3.66 ton/acre but was among the top three highest yielding varieties in Fort Kent at 5.21 ton/acre.

The Fort Kent trial was harvested 88 days after seeding and the St. Paul trial was harvested 91 days after seeding.

Table 4. RST Oats Fort Kent, 2019 (ton/acre, 1 ton = 2000 lbs).

						2019 Quality Results							
	DM Yield		DM Yield	Height	Lodging	CP	ADF	NDF	TDN	Ca	P	K	Mg
Variety	(ton/ac)		(% Murphy)	(cm)	(1-9)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
CDC Seabiscuit	5.56	a	125	122	1	10.66	27.74	54.15	67.29	0.15	0.20	1.34	0.19
CDC Haymaker	5.29	ab	119	129	1	10.10	32.61	63.63	63.50	0.16	0.21	1.61	0.21
ORE 3542 M	5.21	ab	117	115	1	10.33	29.54	54.53	65.89	0.14	0.21	1.30	0.20
AC Morgan	5.16	ab	116	123	1	12.32	28.69	54.63	66.55	0.18	0.22	1.41	0.24
CDC Baler	4.93	ab	111	151	1	9.86	33.99	63.59	62.42	0.15	0.20	1.57	0.21
CDC SO-1	4.76	ab	107	118	1	10.68	29.07	57.55	66.25	0.13	0.22	1.22	0.20
CDC Nasser	4.46	b	100	132	1	10.26	34.30	63.02	62.18	0.16	0.20	1.55	0.22
Murphy	4.45	b	100	143	7	10.19	34.72	59.86	61.85	0.19	0.19	1.59	0.24
AC Juniper	4.32	b	97	112	1	11.12	30.88	59.90	64.84	0.16	0.22	1.54	0.22
Average	4.90		110	127		10.61	31.28	58.98	64.53	0.16	0.21	1.46	0.21
CV	8.51												

*lodging rated on a 1-9 scale where 1 is erect and 9 is completely flat.

**average moisture content at the time of harvest was 67%.

Table 5. RST Oats St. Paul, 2019 (ton/acre, 1 ton = 2000 lbs).

						2019 Quality Results							
	DM Yield		DM Yield	Height	Lodging	CP	ADF	NDF	TDN	Ca	P	K	Mg
Variety	(ton/ac)		(% Murphy)	(cm)	(1-9)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
CDC Baler	5.09	a	105	137	1	9.79	33.61	64.38	62.72	0.26	0.16	1.52	0.14
Murphy	4.87	ab	100	137	1	9.82	35.76	63.36	61.04	0.24	0.15	2.05	0.13
CDC Haymaker	4.71	abc	97	120	1	10.38	32.80	62.03	63.35	0.27	0.18	1.82	0.13
CDC Nasser	4.53	abc	93	123	1	9.25	32.27	61.56	63.76	0.25	0.15	1.53	0.14
CDC SO-1	4.37	bc	90	114	1	9.84	28.84	56.19	66.43	0.22	0.18	1.58	0.13
CDC Seabiscuit	4.34	bc	89	115	1	10.57	31.13	60.09	64.65	0.25	0.16	1.63	0.12
AC Juniper	4.15	cd	85	110	1	10.33	31.19	59.59	64.60	0.29	0.17	1.79	0.15
AC Morgan	4.10	cd	84	117	1	10.57	31.93	57.42	64.03	0.27	0.18	1.66	0.13
ORE 3542 M	3.66	d	75	105	1	9.75	32.44	64.29	63.63	0.20	0.18	1.67	0.12
Average	4.42		91	120		10.03	32.22	60.99	63.80	0.25	0.17	1.69	0.13
CV	6.76												

*lodging rated on a 1-9 scale where 1 is erect and 9 is completely flat.

**average moisture content at the time of harvest was 65%.

Triticale and Wheat

The triticale and wheat trials are targeted to be harvested at the late milk stage. This year, three soft white wheat varieties were added to the trial due to an increase in the number of producers utilizing the crop for silage production. There were five spring triticale varieties grown in the trials this year and three soft white wheat varieties. T256 is a recently developed triticale variety from the Lacombe Research Station that focuses on increased digestibility due to reduced awns and lower lignin content. The results of the Fort Kent and St. Paul trials can be found in table 6 and table 7, respectively. Average moisture content at the time of harvest at the Fort Kent site was 52% and at the St. Paul site was 53%. The Fort Kent trial was harvested 95 days after seeding and the St. Paul trial was harvested 101 days after seeding.

The trials yielded fairly similar at both sites with an average yield of 4.31 ton/acre at the St. Paul site and an average yield of 4.43 ton/acre in Fort Kent. The three wheat varieties yielded an average of 4.09 ton/acre in Fort Kent and 4.43 ton/acre in St. Paul. AAC Awesome was the highest yielding variety in St Paul at 4.54 ton/acre and the highest yielding variety was Sunray in Fort Kent at 4.98 ton/are.

The quality remained fairly consistent with an average CP content of 10.02% in Fort Kent and 10.48% in St. Paul. Overall, both sites are adequate to meet beef cattle nutrient requirements.

Table 6. RST Triticale Fort Kent, 2019 (ton/ac, 1 ton = 2000 lbs).

						2019 Quality Results							
	DM Yield		DM Yield	Height	Lodging	CP	ADF	NDF	TDN	Ca	P	K	Mg
Variety	(ton/ac)		(% Taza)	(cm)	(1-9)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Sunray	4.98	a	109	103	1	10.78	23.44	45.99	70.64	0.15	0.26	1.08	0.14
T256	4.65	ab	102	98	1	9.44	30.27	55.43	65.32	0.15	0.24	1.08	0.15
Bunker	4.61	ab	101	120	1	10.70	29.15	54.64	66.19	0.13	0.24	1.21	0.14
Taza	4.57	ab	100	107	1	10.87	28.20	53.96	66.93	0.13	0.26	1.10	0.13
AAC Awesome	4.49	ab	98	90	1	9.59	29.47	54.77	65.94	0.14	0.21	1.24	0.14
AAC Delight	4.32	ab	95	103	1	9.88	31.38	58.02	64.45	0.12	0.21	0.90	0.12
AC Sadash	3.92	b	86	83	1	9.25	27.00	48.81	67.87	0.13	0.24	1.28	0.14
AC Andrew	3.87	b	85	83	1	9.61	30.97	56.12	64.77	0.17	0.24	1.20	0.18
Average	4.43			98		10.02	28.74	53.47	66.51	0.14	0.24	1.14	0.14
CV	9.84												

*lodging rated on a 1-9 scale where 1 is erect and 9 is completely flat.
**average moisture content at the time of harvest was 52%.

Table 7. RST Triticale St. Paul, 2019 (ton/ac, 1 ton = 2000 lbs).

						2019 Quality Results							
	DM Yield		DM Yield	Height	Lodging	CP	ADF	NDF	TDN	Ca	P	K	Mg
Variety	(ton/ac)		(% Taza)	(cm)	(1-9)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
AAC Awesome	4.54	a	102	86	1	10.11	22.07	42.59	71.71	0.16	0.19	1.28	0.11
Taza	4.47	a	100	100	1	10.42	25.10	49.35	69.35	0.14	0.22	1.20	0.10
Bunker	4.42	a	99	101	1	10.21	30.35	56.98	65.12	0.17	0.21	1.31	0.11
AC Andrew	4.38	a	98	81	1	9.83	25.77	51.51	68.83	0.14	0.17	1.52	0.09
AC Sadash	4.37	a	98	95	1	10.72	25.00	49.74	69.24	0.16	0.23	1.38	0.09
Sunray	4.36	a	98	89	1	11.21	25.35	49.15	69.15	0.23	0.23	1.57	0.12
AAC Delight	4.25	a	95	98	1	10.52	24.80	48.40	69.58	0.14	0.22	1.07	0.09
T256	3.66	b	82	89	1	10.83	24.37	48.29	69.92	0.17	0.22	1.16	0.13
Average	4.31			92		10.48	25.35	49.50	69.11	0.16	0.21	1.31	0.11
CV	7.59												

*lodging rated on a 1-9 scale where 1 is erect and 9 is completely flat.
**average moisture content at the time of harvest was 53%.

Regional Annual Silage Trial
Pulse Mixtures

Partners: Alberta Agriculture and Forestry
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. 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. The use of 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 peas into the production of an annual cereal crop can provide multiple benefits over the use of a monoculture crop. Fertilizer costs could be reduced due to the ability of peas to fix nitrogen which could also impact overall soil fertility. Peas have a high protein content and will therefore add protein to the overall forage quality.

Method:

The trial was established at the LARA Fort Kent Research Site (NE25-61-5-W4) on May 22, 2019 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 Baler oats, Taza triticale and CDC Austenson barley were established as check treatments for comparison to the pea/cereal mixtures. The trial was seeded with 9 treatments and each cereal variety was seeded in a mixture with CDC Jasper peas or CDC Meadow peas.

Agronomic information on the trial can be found in table 1. 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 alfalfa-omega self-propelled forage harvester was used to harvest the plots at the recommended cereal harvest date + 10 days. The individual plot weights were recorded and samples were taken to assess dry matter content. An additional composite sample was taken from each variety, frozen

and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis of the data was conducted using ARM 9, p = 0.05.

The following varieties were used in the pea/cereal trial in 2017:

- *CDC Austenson barley* - 2-row barley variety with semi-smooth awns, short and strong straw and high feed yield.
- *CDC Baler oats* - very leafy, forage oat variety.
- *Taza triticale* – reduced awn forage and grain triticale variety with good lodging resistance.
- *CDC Jasper peas* – forage pea variety with small seed size, good grain yield and high relative feed value.
- *CDC Meadow peas* – consistently high yielding, competitive yellow field pea variety with good lodging resistance.

Table 1. RST Pea/Cereal Mixture Agronomic Information, 2018.

	Date	Date	Rain			
Site	**Seeded**	**Harvested**	**(mm)**	**Treatments**	**Seeding Rate**	**Fertility**
Fort Kent	22-May-19	14-Aug-19	199	Austenson	300 plants/m2	50 % of recommended rate*
				Baler	300 plants/m2	50 % of recommended rate*
				Taza	370 plants/m2	50 % of recommended rate*
				Austenson/Meadow	150 pl/m2, 57 pl/m2	50 lbs/acre of 11-52-0-0
				Baler/Meadow	150 pl/m2, 57 pl/m2	50 lbs/acre of 11-52-0-0
				Taza/Meadow	185 pl/m2, 57 pl/m2	50 lbs/acre of 11-52-0-0
				Austenson/Jasper	150 pl/m2, 57 pl/m2	50 lbs/acre of 11-52-0-0
				Baler/Jasper	150 pl/m2, 57 pl/m2	50 lbs/acre of 11-52-0-0
				Taza/Jasper	185 pl/m2, 57 pl/m2	50 lbs/acre of 11-52-0-0

* 57 lbs/ac

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 table 2, figure 1 and figure 2.

Similar to the results seen in 2018, the majority of the mixture treatments yielded higher than the monoculture treatments in the trial. The highest yielding mixtures were Taza/CDC Meadow at 3.57 ton/acre and CDC Austenson/CDC Jasper at 3.57 ton/acre.

The inclusion of peas in a silage mixture can add up to 1.5% crude protein over cereal silage alone.

Table 2. RST Pea/Cereal Mixture Fort Kent, 2019 (ton/ac, 1 ton = 2000 lbs).

						2019 Quality Results							
	DM Yield	DM Yield	Pulse Height	Cereal Height	Lodging	CP	ADF	NDF	TDN	Ca	P	K	Mg
Variety	(ton/ac)	(% Murphy)	(cm)	(cm)	(1-9)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Taza/CDC Meadow	3.57	133	95	100	6	11.98	33.01	53.46	63.19	0.66	0.22	1.25	0.21
CDC Austenson/CDC Jasper	3.57	133	100	77	4	14.34	36.49	55.91	60.47	0.83	0.29	1.38	0.28
CDC Baler/CDC Meadow	3.46	129	93	119	5	11.80	38.55	60.32	58.87	0.80	0.25	1.64	0.26
Taza/CDC Jasper	3.46	129	104	106	2	12.14	35.98	59.53	60.87	0.58	0.25	1.28	0.21
CDC Austenson/CDC Meadow	3.17	118	95	76	7	12.04	40.12	58.90	57.65	1.08	0.24	1.33	0.33
CDC Baler	2.88	107		128	1	8.67	32.40	62.56	63.66	0.21	0.25	1.62	0.16
CDC Baler/CDC Jasper	2.87	107	96	121	6	11.38	38.28	62.71	59.08	0.60	0.24	1.59	0.24
CDC Austenson	2.68	100		78	1	8.79	28.86	55.72	66.42	0.25	0.23	1.10	0.16
Taza	2.38	89		104	1	8.95	33.19	61.66	63.04	0.16	0.28	1.29	0.13
Average	3.12	116	97			11.01	35.48	59.66	61.26	0.56	0.25	1.40	0.22
CV	16.57												

* average moisture at the time of harvest for the pea-cereal treatments was 67% and the cereal treatments was 57%.

Perennial Forage Project

Partners: Alberta Beef Producers
Canadian Agriculture Partnership
Alberta Agriculture and Forestry
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 the Alberta Agriculture's Agriprofits Benchmaks, two thirds the cost of maintaining a cow 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, in particular, regionally specific variety information. There is significant variation in Alberta's ecoregions and varieties that 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 1 illustrates the forage varieties seeded in each trial.

Table 1. Perennial Forage Trial Varieties seeded, 2016-2017.

Grasses	Legumes	Grass/Legume Mixtures
Fleet Meadow Brome	20-10 Alfalfa	Fleet/Yellowhead
AC Admiral Hybrid Brome	44-44 Alfalfa	AC Knowles/Yellowhead
Success Hybrid Brome	Assalt ST Alfalfa	Success/Yellowhead
Knowles Hybrid Brome	Dalton Alfalfa	Fleet/Spredor 5
Greenleaf Pubsecent Wheatgrass	Halo Alfalfa	AC Knowles/Spredor 5
Kirk Crested Wheat Grass	PV Ultima Alfalfa	Success/Spredor 5
AC Saltlander Green Wheatgrass	Rangelander Alfalfa	Fleet/AC Mountainview
Tom Russian Wilde Rye	Rugged Alfalfa	AC Knowles/AC Mountainview
Killarney Orchard Grass	Spreder 4 Alfalfa	Success/AC Mountainview
Grinstad Timothy	Spredor 5 Alfalfa	
Fojtan Festulolium	Yellowhead Alfalfa	
Courtney Tall Fescue	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 in 2018 and 2019.

The seeding rates of each variety are shown in table 2.

Table 2. Perennial Forage Trial Seeding Rates, 2016-2017.

Species	Variety	Seeding Rate (lbs/ac)
Meadow Brome	AC Armada	14
	Fleet	14
Hybrid Brome	Success	12
	Knowles	12
Wheatgrasses		
Pubescent	Greenleaf	10
Crested	Kirk	6
Green	Saltlander	9
Russian Wildrye	Tom	8
Fojtan Festulolium		20
Orchard Grass	Killarney	10
Tall Fescue	Courtney	9
Tmothy	Grinstad	4
Alfalfa	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
Sainfoin	AC Mountainview	30
	Nova	30
Cicer Milk Vetch	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 3. 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 3. 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
Spreder 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 3 and table 4, respectively.

Table 4. 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 5. 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 August 12, 2019 at an average moisture content of 69%. The yield and quality results can be found in table 6.

Table 6. Perennial Forage Project Legumes Data, 2019 (ton/acre, 1 ton = 2000 lbs).

Variety	DM Yield (ton/acre)		Moisture (%)	2019 Quality Data							
				CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Rangelander	4.36	a	66	14.57	45.06	50.56	53.80	1.19	0.22	2.83	0.20
Yellowhead	4.30	ab	67	14.42	42.63	52.94	55.69	1.05	0.21	2.64	0.20
20-10	3.79	ab	67	15.94	42.14	49.51	56.07	1.18	0.20	2.44	0.18
Veldt	3.76	ab	69	15.61	41.20	47.44	56.81	1.21	0.23	3.33	0.25
Spreder 4	3.62	ab	69	14.03	43.04	52.25	55.37	1.13	0.21	2.66	0.18
Spreder 5	3.62	ab	70	12.91	49.06	58.89	50.68	1.19	0.20	2.49	0.20
Dalton	3.35	ab	69	13.29	45.93	54.91	53.12	0.96	0.18	2.54	0.18
Rugged	3.23	ab	69	16.02	41.94	53.93	56.23	1.12	0.20	3.11	0.20
Nova	3.23	ab	69	13.21	44.71	56.49	54.07	1.11	0.21	2.51	0.21
Halo	3.21	ab	69	16.14	41.74	50.79	56.38	1.38	0.24	2.77	0.22
44-44	3.14	ab	69	14.10	45.19	55.01	53.70	1.07	0.21	2.54	0.19
Oxley 2	3.11	ab	74	13.84	45.41	49.47	53.53	0.93	0.23	3.52	0.19
Assalt ST	2.83	ab	70	13.76	43.47	52.68	55.04	1.28	0.22	2.74	0.23
PV Ultima	2.83	ab	70	14.70	42.72	52.20	55.62	1.18	0.21	2.75	0.22
AC Mountainview	2.46	b	70	15.21	40.51	51.25	57.34	1.28	0.20	2.22	0.22
Average	3.39		69	14.52	43.65	52.55	54.90	1.15	0.21	2.74	0.20
CV	20.18										

The grass trial was harvested on July 27, 2019at an average moisture content of 55%. The yield and quality results can be found in table 7. Unfortunately, Killarney Orchard Grass, Fojtan Festulolium and Courtney Tall Fescue experienced severe winter kill from 2017 to 2018 and from 2018 to 2019 and could not be harvested either year. Similar to last year, the highest yielding variety was Success Hybrid Brome at 4.67 ton/ac, a winter hardy, long-lived perennial forage grass developed in Saskatchewan. Greenleaf Pubescent Wheatgrass was the highest yielding wheatgrass in the trial at 3.58 ton/ac followed by AC Saltlander Green Wheatgrass at 3.40 ton/ac. The lowest yielding variety was Tom Russian Wildrye at 2.21 ton/ac.

Table 7. Perennial Forage Project Grasses Data, 2019 (ton/acre, 1 ton = 2000 lbs).

Variety	DM Yield (ton/acre)		Moisture (%)	2019 Quality Data							
				CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Success	4.67	a	56	9.99	34.60	65.73	61.95	0.35	0.13	1.56	0.28
Knowles	3.70	b	56	10.34	32.77	62.25	63.37	0.38	0.15	1.49	0.29
Fleet	3.68	b	54	11.81	36.26	61.34	60.65	0.49	0.20	2.27	0.35
Greenleaf	3.58	b	57	11.19	35.28	70.11	61.42	0.30	0.14	1.35	0.22
AC Saltlander	3.40	bc	54	10.23	34.27	65.88	62.20	0.30	0.13	1.44	0.19
Grinstad	3.28	bcd	48	9.06	37.58	64.79	59.63	0.26	0.18	1.34	0.21
AC Admiral	2.81	bcd	57	10.99	34.32	61.79	62.16	0.49	0.20	2.11	0.35
Kirk	2.29	cd	56	9.57	35.23	66.68	61.46	0.26	0.16	1.21	0.22
Tom	2.21	d	61	12.88	37.49	65.39	59.70	0.45	0.17	1.93	0.45
Average	3.29		55	10.67	35.31	64.88	61.39	0.36	0.16	1.63	0.28
CV	16.75										

The grass/legume mixture trial was harvested on August 2, 2019 at an average moisture content of 64%. The yield and quality results are summarized in table 8. Similar to previous years, the mixtures with Yellowhead and Spreder 5 alfalfa yielded higher than the mixtures with AC Mountainview Sainfoin. Through previous trials, sainfoin establishment and longevity has been highly variable in the area, although the new sainfoin varieties are doing better. Over the winter of 2018/2019, a significant portion of the AC Mountainview winter killed in the mixture plots.

The inclusion of legumes increases the overall quality of the feed produced. In particular, protein content is increased from 11.68% to 14.24% on average. When mineral content is assessed, the legumes increase Ca content to an average of 0.60% from 0.28%.

Table 8. Perennial Forage Project Grass/Legume Mixture Data, 2019 (ton/acre, 1 ton = 2000 lbs).

Variety	DM Yield (ton/acre)		Moisture (%)	2019 Quality Data CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Success/Spreder 5	3.64	a	64	12.16	36.95	57.95	60.12	0.65	0.16	1.53	0.36
Knowles/Yellowhead	3.59	ab	62	11.56	37.58	59.48	59.63	0.50	0.18	1.68	0.31
Success/Yellowhead	3.33	ab	66	12.68	37.68	59.75	59.55	0.75	0.19	1.76	0.40
Fleet/Spreder 5	2.94	ab	66	13.62	37.97	59.53	59.32	0.72	0.20	2.16	0.42
Knowles/Spreder 5	2.83	ab	64	12.32	36.82	58.04	60.22	0.62	0.17	1.78	0.34
Success/Mountainview	2.74	ab	60	9.05	34.86	62.21	61.74	0.43	0.16	1.50	0.27
Fleet/Yellowhead	2.57	ab	72	13.11	43.20	56.37	55.25	0.76	0.26	2.59	0.41
Knowles/Mountainview	2.51	ab	58	10.02	34.56	63.59	61.98	0.43	0.16	1.78	0.29
Fleet/Mountainview	2.02	b	61	10.64	39.89	65.21	57.83	0.60	0.18	2.01	0.36
Average	2.91		64	11.68	37.72	60.24	59.52	0.61	0.18	1.87	0.35
CV	22.96										

Nutritional Quality of High Moisture Silage Bales for Livestock Feed

Partners: AgZone Inc.
Chalut Family
Canadian Agriculture Partnership

Objectives:

1. To determine the long-term nutritional quality of various crops (canola, faba beans, field peas, barley, barley-oat mixture, corn and soybeans) harvested as high moisture silage bales.

Background:

High moisture silage bales are forages that are baled at a higher moisture than a forage to be stored as a dry hay – typically between 40% to 60% moisture. These bales are sealed in a plastic wrap which remains intact until they are opened for use. This wrap creates an airtight seal and, coupled with high moisture, promotes the fermentation process that preserves the forage quality. This process is also known as baleage and can be produced from any forage, grass or crop that is conventionally used for silage.

With the wide variability seen in environmental conditions the past few years in the Lakeland, the opportunity to put up high quality dry hay is limited. Many producers have or are considering the use of baleage as a viable option.

Some advantages of baled silage include:

- Requires one-half to one-third the drying time of hay.
- Leaf loss in the field is only 5 to 10 percent compared to over 25 percent with dry hay.
- Decreases feed loss due to increased palatability over dry hay.
- Provides flexibility in harvest time when compared to dry hay.
- Less leaf loss when fed than dry hay.

Despite the many advantages of using baled silage over dry hay, there are some disadvantages that include:

- Bale weight increases drastically as moisture increases.
- Increased bale weight could pose issues with handling.
- Bales at higher moisture (over 60%) will have minimal fermentation and are prone to freezing.
- Bales at lower moisture (under 40%) will not ferment and have a higher risk of developing mould.
- Costs may be higher than chopped silage due to cost of plastic.
- Bales can spoil if airtight plastic covering is punctured.

To help assess the suitability of various forage options, LARA partnered with AgZone Inc.to make high moisture silage bales with corn, field peas, faba beans, soybeans, canola, barley, grass, alfalfa-grass mixture and an oat-barley mixture.

Discussion:

The crops were seeded in early June to recommended best management practices using the LARA 12-row ConservaPak air seeder. The fields were in-crop sprayed based on weed pressure with registered herbicides and a fungicide treatment was applied to all fields when required.

The crops were cut on September 24th, 2019 and left to dry overnight prior to baling on September 25th, 2019. The bales were then wrapped and sorted. The bales were left to allow for fermentation to begin prior to forage samples were taking using the LARA forage probe. Samples were frozen and sent to A & L Canada Laboratories for wet chemistry analysis. The results of the nutrient analysis can be seen in table 1.

Table 1. High Moisture Silage Bale Nutritional Quality, 2019.

	DM	Moisture	CP	ADF	NDF	TDN	Ca	P	K	Mg
Crop	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
Faba Beans	26.63	73.37	15.75	35.25	47.60	61.44	0.37	0.21	1.23	0.26
Corn	25.18	74.82	13.62	34.36	54.77	62.13	0.25	0.23	1.31	0.28
Canola	32.94	67.06	11.01	42.37	48.43	55.89	1.00	0.32	1.82	0.37
Barley	40.36	59.64	12.34	27.66	43.92	67.25	0.25	0.23	1.22	0.21
Soybeans	30.88	69.12	15.27	34.62	40.74	61.93	1.28	0.31	1.52	0.93
Peas	34.31	65.69	22.24	27.73	34.14	67.30	0.80	0.3	1.37	0.30
Oat/Barley Mix	47.50	52.50	9.84	32.45	48.92	63.62	0.27	0.22	1.33	0.18
Lowland grass mix	55.26	44.74	10.73	35.71	53.23	61.08	0.54	0.24	1.12	0.38
Alfalfa Mix	62.06	37.94	11.35	37.32	51.78	59.83	1.24	0.18	1.41	0.30

Corn bale prior to wrapping.

Wrapped barley-oat mixture bale.

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 investigates 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
    a. Compaction
    b. Bulk density
    c. Texture

    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 groups
3. Chemical analysis
    a. Organice matter
    b. N, P, K
    c. Micro nutrients

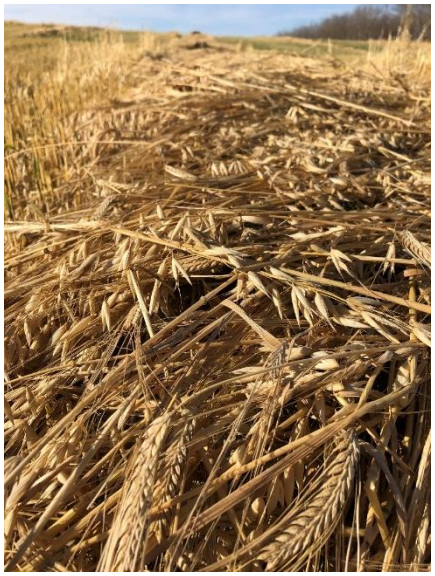
Over the next three years, each site will be sampled in the fall and spring of each grazing season with sampling beginning in the fall of 2019.

Forage Sampling

Forage samples will be collected, frozen and sent to an accredited laboratory for wet chemistry analysis utilizing best management practices for sampling.

Discussion:

The project began with fall sampling of all four strategies for soil health parameters at Bar LD Ranch located in Bonnyville, Alberta. Results will be made available in early 2020.



Barley/Oat swaths, fall 2019.

Standing corn, fall 2019

Cover Crop Mixtures for Fall/Winter Grazing Livestock

Partners: Canadian Agriculture Partnership
Bar LD Ranch
Mistol Seeds
Nutrien Ag Solutions

Objectives:

1. Improve swath grazing methods through different cocktail mixtures.

Background:

The single most variable cost in maintaining a cow herd is feed, with winter feeding costs being amongst the highest. Consequently, many producers are using extended grazing strategies such as swath grazing, which has proven very effective in Northeastern Alberta.

Typical swath grazing blends include spring cereals and sometimes pulses in boost the protein content. Recently, there has been an increasing number of producers utilizing cocktail mixtures that include turnips, kale, radishes and perennial clovers. Benefits of these mixtures include:

1. Use of brassicas and tubers have a large impact on soil health through varying root systems adding organic matter to the soil.
2. Significant nutritional benefits to cattle grazing brassicas and tubers, particularly through increased energy and protein. Blends such as the Union Forage Swath Grazing Blend are designed to increase protein, energy level and digestibility of the feedstuff.

Method:

This demonstration trial consisted of three different cocktail swath grazing mixtures seeded on the same field with the same soil type. The blends are outlined below:

1. Typical blend used at Bar LD Ranch consisting of any seed leftover from seeding. In this case, a mixture of brown oats, barley peas, soft white wheat and hard red spring wheat.
2. Leftover seed blend plus Union Forage's Barkant turnip.
3. Leftover seed blend plus Union Forage swath grazing mix consisting of goliath forage rape, hunter turnip and green globe turnip.

These different mixtures were floated on and a blend of 33-7-10-6-7 fertilizer at 2.7 tonnes/acre was applied. After being floated on, the mixture was then passed over with a high-speed disc set at 2 inches deep. Finally, the mixtures were land rolled. All three mixtures were seeded June 18, 2019 and swathed on September 3, 2019. The first mix, being strictly the leftover seed blend was applied at 110 lbs/acre. The second mix, being the Barkant turnips were seeded at 10 lbs/acre with 70 lbs/acre of the leftover seed blend. The third mix, being the swath grazing mix was seeded at 5 lbs/acre with 80 lbs/acre of the leftover seed blend.

All three 20 acre plots of the different mixtures were grazed separately using an electric wire to control animal movement. The same herd of 300 cows grazed all three plots. The plots with only the leftover seed

lasted 5 days. The plots with the turnips and swath grazing mix each lasted 4 days. Even though the field with just the leftover seed blend lasted longer, the benefits that are gained from having the extra nutrients in the soil from the brassicas far outweighs the extra grazing day. The soil samples will be provided in the spring of 2020 and can be found in the LARA newsletter at that time.

Discussion:

Overall, the results were very satisfying. The brassicas did very well and the field stayed impressively clean. A few changes that would make mixtures like this more effective would be a better seeding method along with a recommended seeding rate. To have a better seeding method, floating it on would still be ideal however, the swath grazing mix and turnips were mixed while the cereal was being augured into the nurse truck. Since the brassica and turnip seeds are only the size of canola seeds, they mostly sifted to the bottom causing a high density in the first few passes where the floater went. If the floater truck had a canola box, or separate box that could be applied at its' own rate simultaneously a more even distribution would be achieved.

A more recommended seeding rate will be highly considered the next time a swath grazing mix is applied because this last year, the leftover seed mix was applied at about 20% more than recommended because of scepticism that the new mixtures would not pan out. Now, knowing that the mixtures work very well, the recommended seeding rate for both the brassicas/turnips and the leftover seed will be applied.

Forage Crop Quality Summary – 2019

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 1 and 2). 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 wet weather extended the haying season and caused the majority of hay available to have at least one rain shower.

Every year LARA sends in multiple feed samples for quality analysis on our trials and demonstrations. In addition, we offer two free feed tests for each producer in our operational area and results from those tests are also included this summary in table 3, 4 and 5.

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

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

* as taken from CowBytes

Table 2. Minimum Energy and Crude Protein Requirements for Beef Cattle.

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

Table 3. Quality Analysis Summary of Dry Hay Samples, 2019.

Crop Type	CP	ADF	NDF	TDN	Ca	P	K	Mg
Dry Hay	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Alfalfa/Grass Hay	12.98	45.72	59.11	53.28	1.27	0.17	1.18	0.22
Alfalfa/Grass Hay	13.26	46.96	66.82	52.32	0.98	0.20	1.29	0.16
Alfalfa/Grass Hay	13.57	43.91	63.65	54.69	0.78	0.15	0.98	0.17
Alfalfa/Grass Hay	13.40	39.31	57.23	58.28	1.15	0.15	1.60	0.28
Alfalfa/Grass Hay	12.27	36.86	54.30	60.19	1.03	0.12	1.43	0.25
Alfalfa/Grass Hay	13.43	38.17	56.86	59.17	0.81	0.15	1.41	0.21
Alfalfa/Grass Hay	10.42	43.90	55.27	54.70	0.84	0.17	1.47	0.15
Alfalfa/Grass Hay	10.54	38.66	56.02	58.78	0.68	0.17	1.44	0.16
Alfalfa/Grass Hay	13.26	46.96	66.82	52.32	0.98	0.20	1.29	0.16
Alfalfa/Grass Hay	13.57	43.91	63.65	54.69	0.78	0.15	0.98	0.17
Alfalfa/Grass Hay	10.80	42.19	60.41	56.03	0.93	0.18	1.98	0.18
Alfalfa/Grass Hay	9.68	43.80	65.46	54.78	0.51	0.19	1.79	0.14
Alfalfa/Grass Hay	13.37	41.25	57.89	56.77	1.01	0.21	1.56	0.24
Alfalfa/Grass Hay	14.92	26.62	45.40	65.83	1.96	0.16	1.51	0.38
Alfalfa/Grass Hay	13.66	39.31	55.17	58.28	1.02	0.14	1.60	0.23
Alfalfa/Grass Hay	12.91	42.32	60.10	55.93	0.96	0.12	1.30	0.25
Alfalfa/Grass Hay	13.46	43.08	59.60	55.34	0.93	0.21	1.64	0.17
Alfalfa/Grass Hay	15.75	38.63	53.32	58.81	1.44	0.18	1.94	0.31
Alfalfa Hay	15.12	38.72	54.74	58.74	1.14	0.27	1.92	0.23
Alfalfa Hay	13.62	38.45	57.30	58.92	1.17	0.19	1.39	0.25
Alfalfa Hay	14.32	34.91	54.77	61.71	0.93	0.20	1.70	0.26
Alfalfa Hay	15.14	33.17	48.59	63.06	1.18	0.27	1.70	0.27
Alfalfa Hay	9.59	32.47	50.09	63.61	1.18	0.13	1.21	0.32
Alfalfa Hay	17.91	33.60	40.40	62.73	1.76	0.16	1.93	0.23
Alfalfa Hay	13.17	38.66	52.65	58.78	1.02	0.17	1.58	0.18
Alfalfa Hay	16.26	34.39	47.37	62.11	1.91	0.16	1.60	0.26
Grass Hay	11.77	35.78	53.48	61.03	0.71	0.12	1.35	0.16
Grass Hay	10.99	39.58	57.47	58.07	0.80	0.09	0.99	0.15
Grass Hay	12.00	42.37	63.42	55.89	0.80	0.17	1.23	0.16
Grass Hay	10.76	39.71	59.20	57.97	0.92	0.15	1.42	0.19
Grass Hay	7.93	44.28	64.99	54.41	0.98	0.10	1.35	0.21
Grass Hay	10.57	41.15	57.03	56.84	0.93	0.18	1.62	0.20
Grass Hay	11.26	38.91	62.25	58.59	0.60	0.20	2.06	0.20
Grass Hay	9.48	45.14	65.49	53.74	0.64	0.16	1.51	0.18
Grass Hay	13.87	36.95	48.97	60.12	1.07	0.13	1.66	0.25
Grass Hay	11.35	36.75	56.59	60.27	0.60	0.15	1.77	0.18
Grass Hay	10.91	42.60	59.66	55.71	0.70	0.10	1.14	0.21
Grass Hay	12.54	46.47	62.86	52.70	0.86	0.20	1.63	0.21
Grass Hay	12.02	35.20	54.08	61.48	0.83	0.11	1.28	0.21
Grass Hay	10.91	42.71	60.61	55.63	0.76	0.16	1.55	0.16

Table 4. Quality Analysis Summary of Annual Crop Samples, 2019.

Crop Type	CP	ADF	NDF	TDN	Ca	P	K	Mg
Annual Crops	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
Oat Greenfeed	8.05	37.64	56.86	59.58	0.27	0.23	2.11	0.15
Oat Greenfeed	9.66	49.41	68.82	50.41	0.42	0.26	1.85	0.14
Oat Greenfeed	6.11	33.77	55.07	62.59	0.31	0.19	2.09	0.11
Oat Greenfeed	6.64	44.99	64.86	53.85	0.40	0.19	2.14	0.16
Oat Greenfeed	6.68	35.52	54.88	61.23	0.23	0.20	0.89	0.14
Oat Greenfeed	10.26	43.84	68.72	54.75	0.49	0.32	3.01	0.17
Oat Greenfeed	11.18	50.33	63.69	49.69	0.58	0.00	1.75	0.16
Oat Greenfeed	10.13	35.46	48.52	61.28	0.22	0.24	1.15	0.10
Oat Greenfeed	10.87	31.14	45.47	64.64	0.24	0.21	2.27	0.10
Oat Greenfeed	9.26	37.39	47.33	59.77	0.24	0.24	1.74	0.13
Barley Greenfeed	5.70	41.87	62.75	56.28	0.23	0.21	0.76	0.13
Barley Greenfeed	11.06	40.25	57.32	57.55	0.57	0.21	1.41	0.17
Cocktail Mixture	6.93	36.89	52.55	60.16	0.39	0.16	1.52	0.12
Cocktail Mixture	11.90	39.51	49.56	58.12	0.21	0.20	1.71	0.11
Cocktail Mixture	17.72	37.18	51.63	59.94	0.70	0.42	2.88	0.28
Standing Corn	11.83	28.59	59.45	66.63	0.19	0.23	0.96	0.12
Standing Corn	8.43	28.66	50.01	66.57	0.24	0.23	1.11	0.15
Standing Corn	9.21	30.27	50.49	65.23	0.19	0.29	1.06	0.14
Standing Corn	9.71	29.02	48.52	66.29	0.28	0.31	1.37	0.11
Standing Corn	7.71	30.69	51.85	64.99	0.22	0.30	1.13	0.13
Standing Corn	7.74	26.99	46.97	67.87	0.13	0.27	0.96	0.13
Standing Corn	7.52	30.15	50.67	65.41	0.25	0.26	0.86	0.15
Standing Corn	8.95	32.53	54.32	63.56	0.23	0.23	1.03	0.14
Standing Corn	8.51	29.21	49.15	66.15	0.29	0.23	1.01	0.16
Standing Corn	8.09	28.29	48.04	66.86	0.17	0.23	0.98	0.13
Standing Corn	7.54	32.28	53.36	63.75	0.24	0.09	0.95	0.19
Standing Corn	7.50	31.03	52.63	64.73	0.14	0.25	1.00	0.17
Standing Corn	9.48	30.15	52.27	65.41	0.24	0.28	0.99	0.16
Oat Straw	5.49	55.40	79.80	45.74	0.20	0.05	1.46	0.11
Pea Straw	5.47	63.10	74.57	39.75	1.80	0.06	0.74	0.06
Pea Straw	10.53	56.93	69.56	44.55	1.29	0.17	0.86	0.24
Pea Straw	8.90	52.70	64.76	47.85	1.07	0.09	1.10	0.17
Wheat Straw	6.98	53.13	79.13	47.51	0.17	0.14	0.79	0.29

Table 5. Quality Analysis Summary of Silage Samples, 2019.

Crop Type	CP	ADF	NDF	TDN	Ca	P	K	Mg
Silage and baleage	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Alfalfa bale silage	20.42	30.61	38.09	65.05	2.10	0.25	2.25	0.25
Alfalfa bale silage	16.51	32.98	44.53	63.21	2.05	0.17	2.17	0.34
Alfalfa bale silage	21.65	29.79	34.78	65.69	1.46	0.14	1.53	0.34
Grass Bale Silage	13.64	36.67	53.24	60.33	1.07	0.20	2.26	0.36
Grass Bale Silage	11.43	45.79	62.64	53.23	1.10	0.24	2.33	0.17
Clover Silage	12.29	41.45	61.60	56.84	1.02	0.12	1.62	0.26
Barley Silage	9.71	35.79	56.44	61.02	0.30	0.28	2.02	0.21
Barley Silage	7.78	33.76	55.09	62.60	0.33	0.19	0.84	0.22
Barley Silage	9.04	32.77	52.79	63.37	0.31	0.23	1.37	0.13
Barley Silage	12.04	37.62	52.73	59.59	0.67	0.14	1.24	0.25
Barley Silage	10.39	28.89	46.90	66.39	0.19	0.18	0.78	0.14
Barley Silage	12.61	42.49	66.65	55.80	0.34	0.44	3.21	0.17
Barley Silage	8.64	41.08	58.74	56.90	0.30	0.16	1.35	0.18
Barley Silage	12.38	37.00	54.40	60.08	0.23	0.29	2.17	0.21
Barley Silage	10.32	34.55	52.56	61.99	0.45	0.22	1.30	0.21
Oat Silage	16.53	37.66	49.65	59.56	0.91	0.22	1.62	0.23
Corn Silage	11.87	44.00	61.10	54.62	0.28	0.24	1.44	0.25
Oat Bale Silage	11.14	37.87	59.50	59.40	0.35	0.24	3.37	0.14
Grass/Alfalfa bale silage	17.82	39.81	47.56	57.89	1.98	0.20	2.31	0.37

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 2006 LARA constructed a portable solar watering system with funding from the Alberta Stewardship Network. The unit, on a pull trailer, contains solar panels, trough, pump, batteries, float and hoses. It can water 150 head of cattle with a 15 foot lift, or 200 head with a 10 foot lift. It can be used for any surface body of water such as a dugout or creek.

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.

Until December 2020, LARA has funding available for: offsite watering systems, riparian fencing, watercourse crossings, and wetland enhancements such as pond levelers, exclusion fencing and riparian plantings. Funding is limited so apply early before it runs out.

Forms and information for the program are available online at: http://www.laraonline.ca/farming-resources/environmental/funding-opportunities/

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.

This year 20 producers completed Environmental Farm Plans.

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.

Moose Lake Watershed Society

The Moose Lake Watershed Society (MLWS) is a Watershed Stewardship Group. It was founded in 2002 as the Moose Lake Water for Life committee, and became a society in 2008. This group was formed to address the health of Moose Lake, increase public knowledge and interest, and improve water quality as well as fish and wildlife habitat. This group is made up of volunteers. If you want to get involved with the MLWS please contact the Moose Lake Watershed Society or the LARA office.

The MLWS continued working with the schools to deliver Walking With Moose to grade 5 students in the area. Walking with Moose allows grade five students to be further educated about the ecosystem of Moose Lake, supplementing their curriculum, learning about biodiversity, healthy shorelines and forest ecology. The students spend half a day where they collect animals and organisms and place them in containers where they are identified and then returned to their habitat. The students also learn about water quality, wetlands and larger animals that live along the shore such as birds and fish. The other half of the day is spent being guided by the Municipal District of Bonnyville staff, LARA staff, BRWA staff and volunteers, and hike though the dry pine forest, learning about wildlife signs and tracks, vegetation such as lichens and dwarf mistletoe, and the forest ecosystem including potential threats such as the pine beetle and fire. This was the 11th year of Walking with Moose with over 300 children going through the program.

This year with funding from Alberta Ecotrust, the MLWS purchased an algal sensor to use with the YSI probe which is used for Walking With Moose to determine a few water quality parameters. It is also used for tributary monitoring.

With funding from the Municipal District of Bonnyville, the MLWS was fortunate to have core samples taken around the lake. Results were presented at "*What The Flux?*" in December. All MLWS data, reports and projects are available on the LARA website.

Moose Lake Watershed Tributary Monitoring

The Moose Lake Watershed Society conducted tributary monitoring four times throughout the summer. The locations were: Valere Creek, Wood Creek, Yelling Creek, Mooselake River, Thinlake River at Highway 28, and Thinlake River near Franchere Bay. Yelling Creek and Wood Creek were not sampled on occasion due to extremely low water levels. The five dates sampled were: April 10, May 17, June 21, August 2, and September 27. The water was tested once for routine chemical parameters as well as nutrients and all other samplings were only for nutrient contents.

Phosphorous is one of the main driving forces of algae blooms in water bodies. Phosphorous can be in high concentrations due to fertile soils, but can be compounded in the environment by fertilizer use, septic leaks, chemicals and soil erosion. Nitrogen is also needed for plant growth, but generally limits terrestrial plants versus aquatic species that are much more dependent on phosphorous. High amounts of these nutrient lead to algal blooms and cyanobacterial blooms in our water bodies. These can have detrimental effects on fish populations as the blooms increase water temperature, decrease dissolved oxygen content and increase turbidity. Cyanobacteria (blue-green algae) can also be toxic to humans and wildlife which can cause skin irritation to liver damage to even death within a short period after consumption.

Reducing our impacts on the watershed by responsible use of chemicals and fertilizers, keeping vegetation in place and preventing soil erosion and protecting/enhancing our riparian areas can help improve water quality and our ecosystem.

Date of Sampling	Weather Conditions
April 10	10°C overcast
May 17	17°C sunny
June 21	16°C partly cloudy
August 2	27°C sunny
September 27	0°C overcast, very windy

Mooselake River

Parameter	Units	April 10	May 17	June 21	August 2	September 27
Dissolved Organic Carbon	mg/L	16	19	28	19	22
Ammonia-N total	mg/L	0.062	<0.015	0.047	0.038	0.37
Total Kjeldahl Nitrogen	mg/L	1.8	1.6	1.5	2	2.4
Dissolved Phosphorous	mg/L	0.21	0.036	0.074	0.025	0.074
Total Phosphorous	mg/L	0.32	0.077	0.092	0.082	0.2
Total Dissolved Solids	mg/L	240	580	560	560	540
Total Suspended Solids	mg/L	5.3	2	2.7	5.3	24
pH			8.6		9.17	8.28

Thinlake River Highway 28

Parameter	Units	April 10	May 17	June 21	August 2	September 27
Dissolved Organic Carbon	mg/L	17	18	34	28	25
Ammonia-N total	mg/L	0.13	0.13	1.1	0.03	0.22
Total Kjeldahl Nitrogen	mg/L	1.9	1.7	2.7	2.2	3.4
Dissolved Phosphorous	mg/L	0.2	0.11	0.37	0.097	0.096
Total Phosphorous	mg/L	0.3	0.18	0.53	0.22	0.64
Total Dissolved Solids	mg/L	260	390	770	700	1000
Total Suspended Solids	mg/L	8	17	6	12	26
pH			8.22		7.87	8.24

Thinlake River (Franchere Bay)

Parameter	Units	April 10	May 17	June 21	August 2	September 27
Dissolved Organic Carbon	mg/L	18	21	33	19	20
Ammonia-N total	mg/L	0.052	<0.015	0.33	0.035	0.076
Total Kjeldahl Nitrogen	mg/L	1.9	1.7	1.9	3.2	1.9

Dissolved Phosphorous	mg/L	0.2	0.16	0.42	0.014	0.043
Total Phosphorous	mg/L	0.29	0.22	0.46	0.11	0.15
Total Dissolved Solids	mg/L	260	440	520	550	540
Total Suspended Solids	mg/L	4.7	4	10	45	6.7
pH			8.16		7.83	9.32

Valere Creek

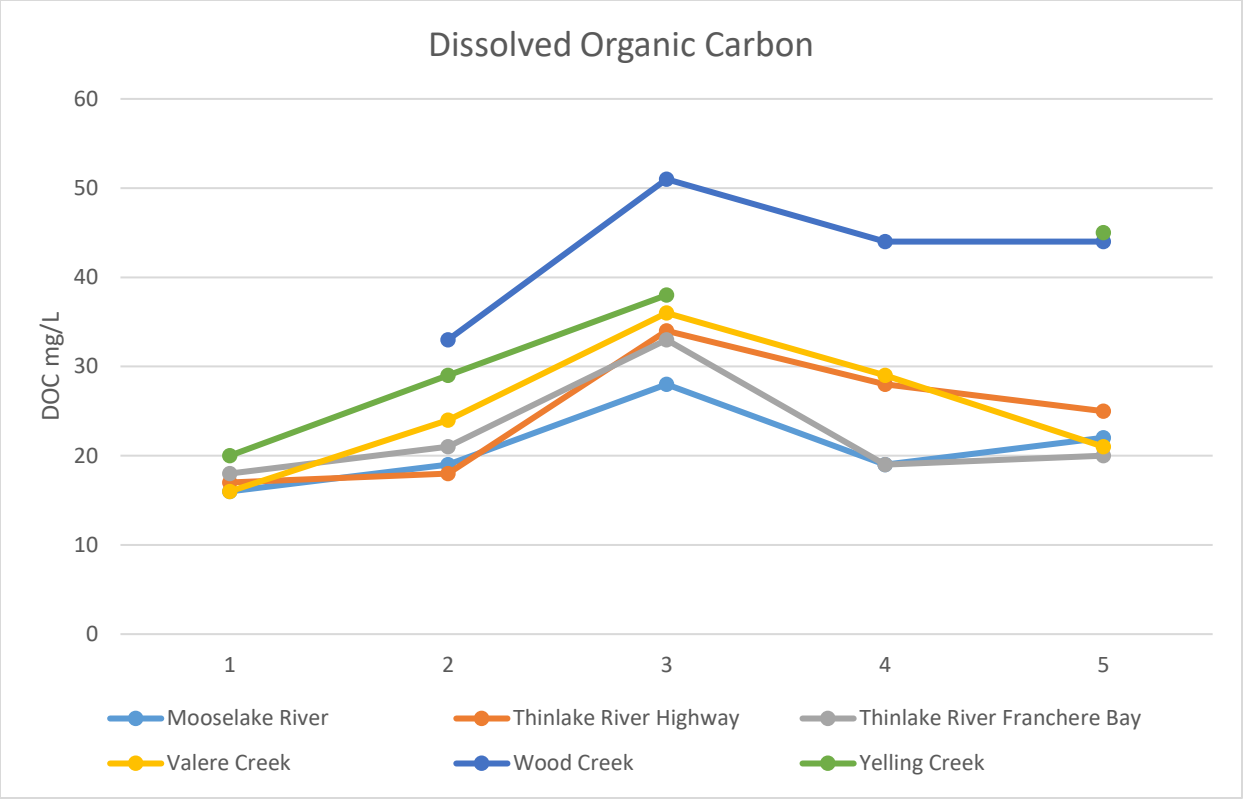
Parameter	Units	April 10	May 17	June 21	August 2	September 27
Dissolved Organic Carbon	mg/L	16	24	36	29	21
Ammonia-N total	mg/L	0.026	0.038	0.3	0.05	0.14
Total Kjeldahl Nitrogen	mg/L	1.87	1.8	2.3	2.4	2.7
Dissolved Phosphorous	mg/L	0.35	0.39	0.48	0.54	0.1
Total Phosphorous	mg/L	0.39	0.52	0.6	0.57	0.31
Total Dissolved Solids	mg/L	250	480	560	560	570
Total Suspended Solids	mg/L	3.3	3.3	6.7	15	15
pH			8.19		7.89	9.17

Wood Creek

Parameter	Units	April 10	May 17	June 21	August 2	September 27
Dissolved Organic Carbon	mg/L		33	51	44	44
Ammonia-N total	mg/L		0.042	0.15	0.26	0.11
Total Kjeldahl Nitrogen	mg/L		2.8	3.9	4.4	3.1
Dissolved Phosphorous	mg/L		0.93	1.6	1.6	0.55
Total Phosphorous	mg/L		1	1.7	1.8	0.99
Total Dissolved Solids	mg/L		350	440	430	510
Total Suspended Solids	mg/L		7.3	15	8.7	8.7
pH			8.21			8.43

Yelling Creek

Parameter	Units	April 10	May 17	June 21	August 2	September 27
Dissolved Organic Carbon	mg/L	20	29	38		45
Ammonia-N total	mg/L	0.046	0.048	0.046		0.16
Total Kjeldahl Nitrogen	mg/L	2	2.1	2.1		8
Dissolved Phosphorous	mg/L	0.36	0.22	0.37		0.21
Total Phosphorous	mg/L	0.46	0.47	0.59		3.1
Total Dissolved Solids	mg/L	250	500	520		770
Total Suspended Solids	mg/L	4.7	4	4		30
pH			8.09			


Dissolved Organic Carbon
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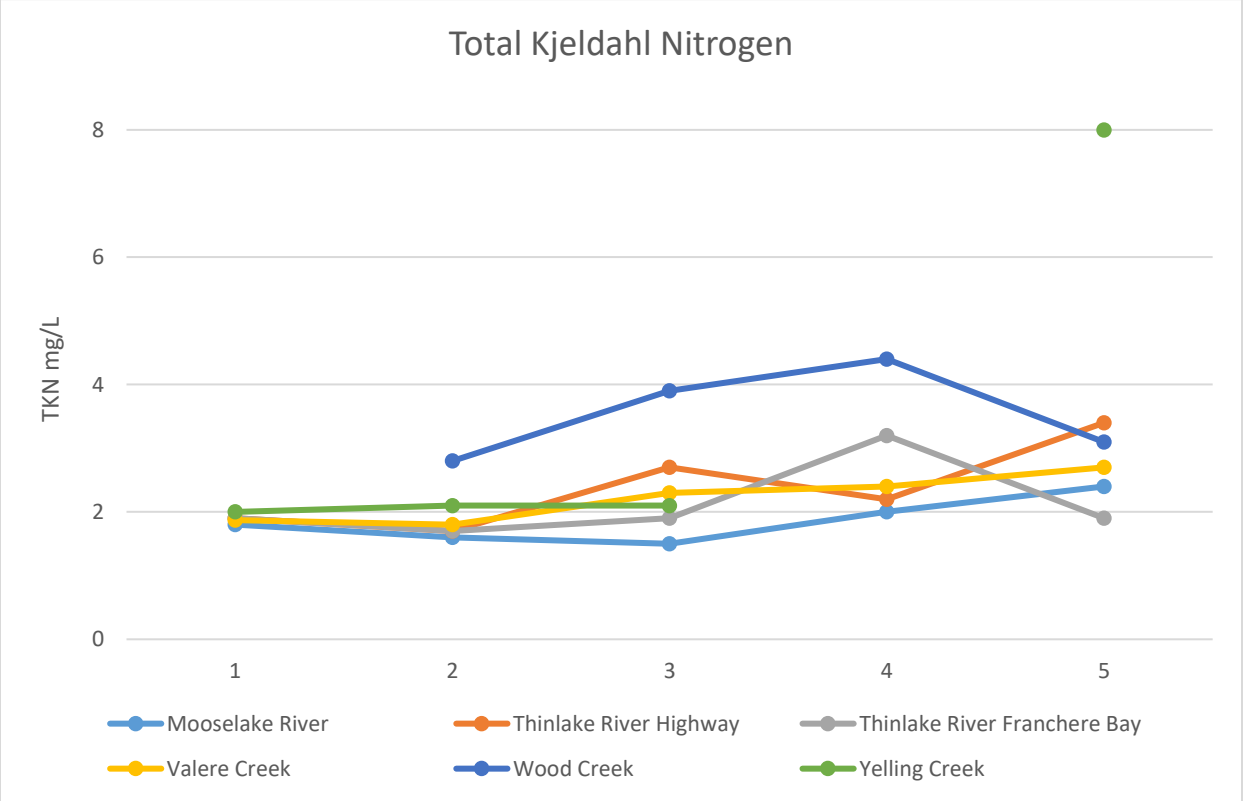
Mooselake River
Thinlake River Highway
Thinlake River Franchere Bay
Valere Creek
Wood Creek
Yelling Creek


Total Kjeldahl Nitrogen
TKN mg/L
8
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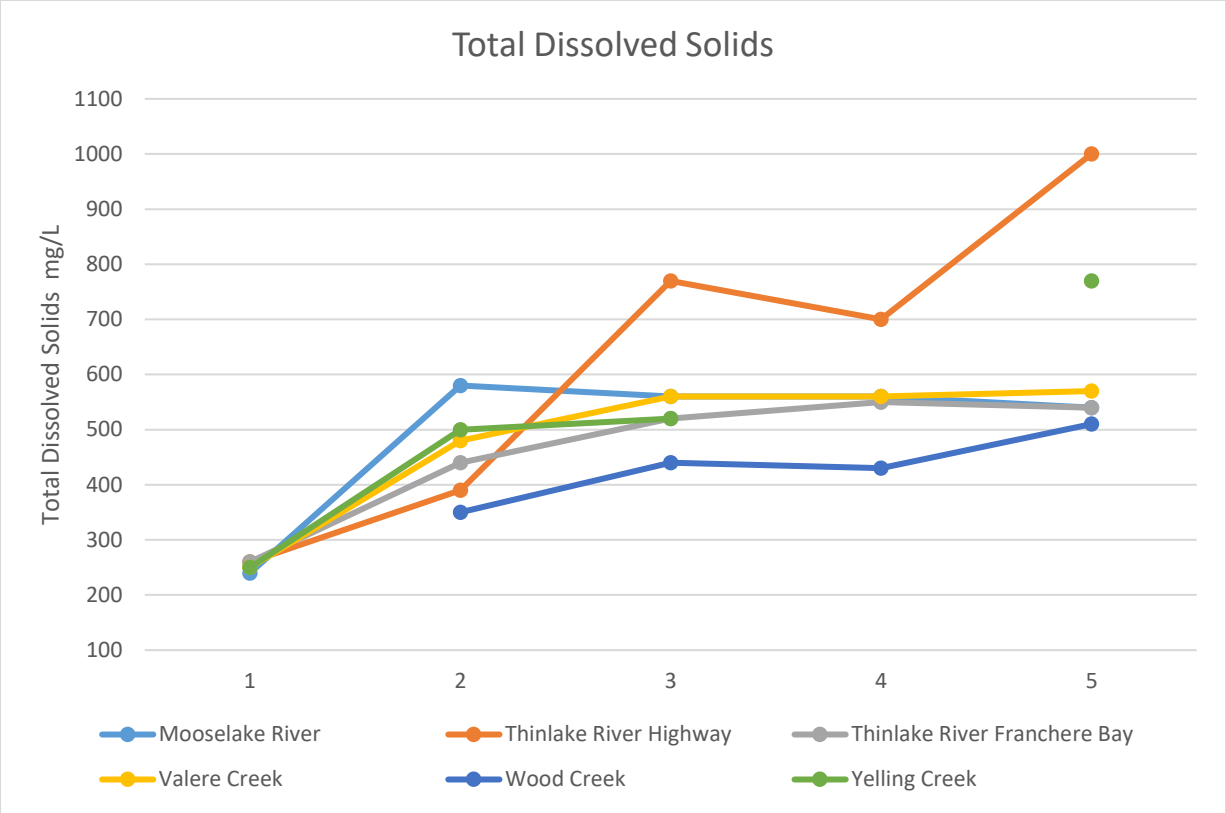
Mooselake River
Thinlake River Highway
Thinlake River Franchere Bay
Valere Creek
Wood Creek
Yelling Creek


Total Dissolved Solids
Total Dissolved Solids mg/L
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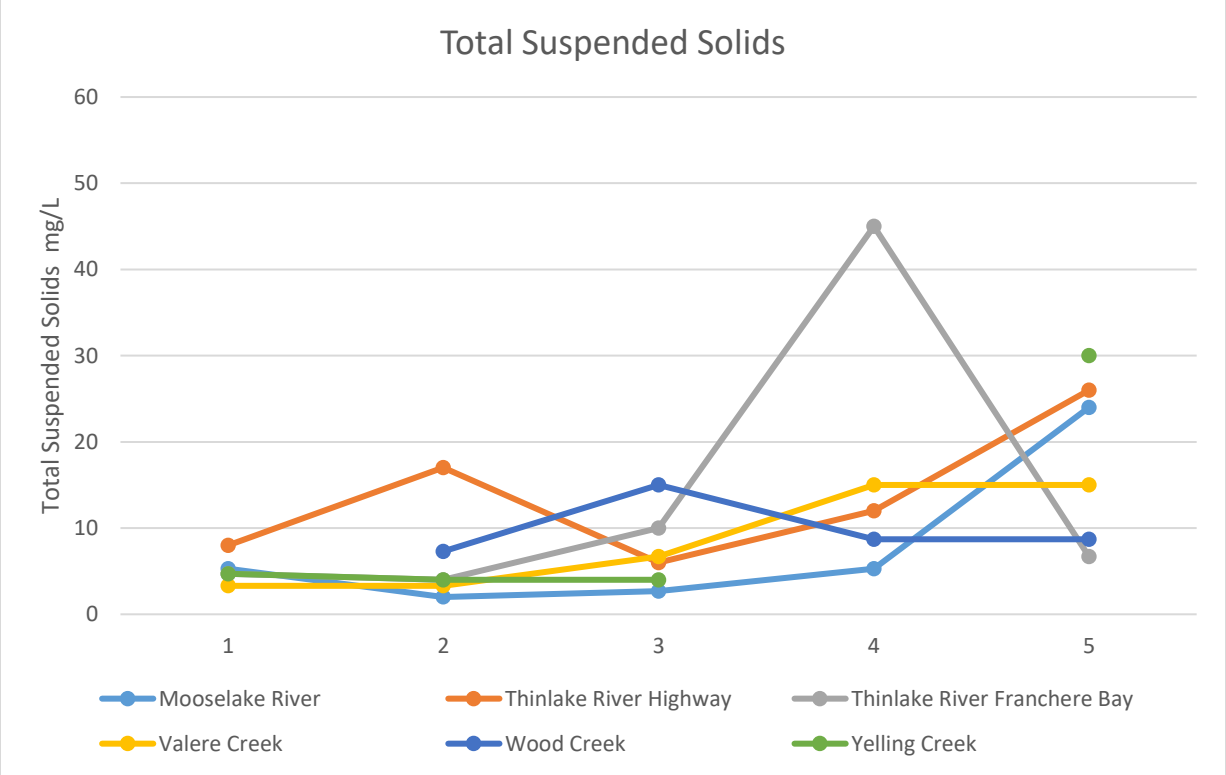
Mooselake River
Thinlake River Highway
Thinlake River Franchere Bay
Valere Creek
Wood Creek
Yelling Creek


Total Suspended Solids
Total Suspended Solids mg/L
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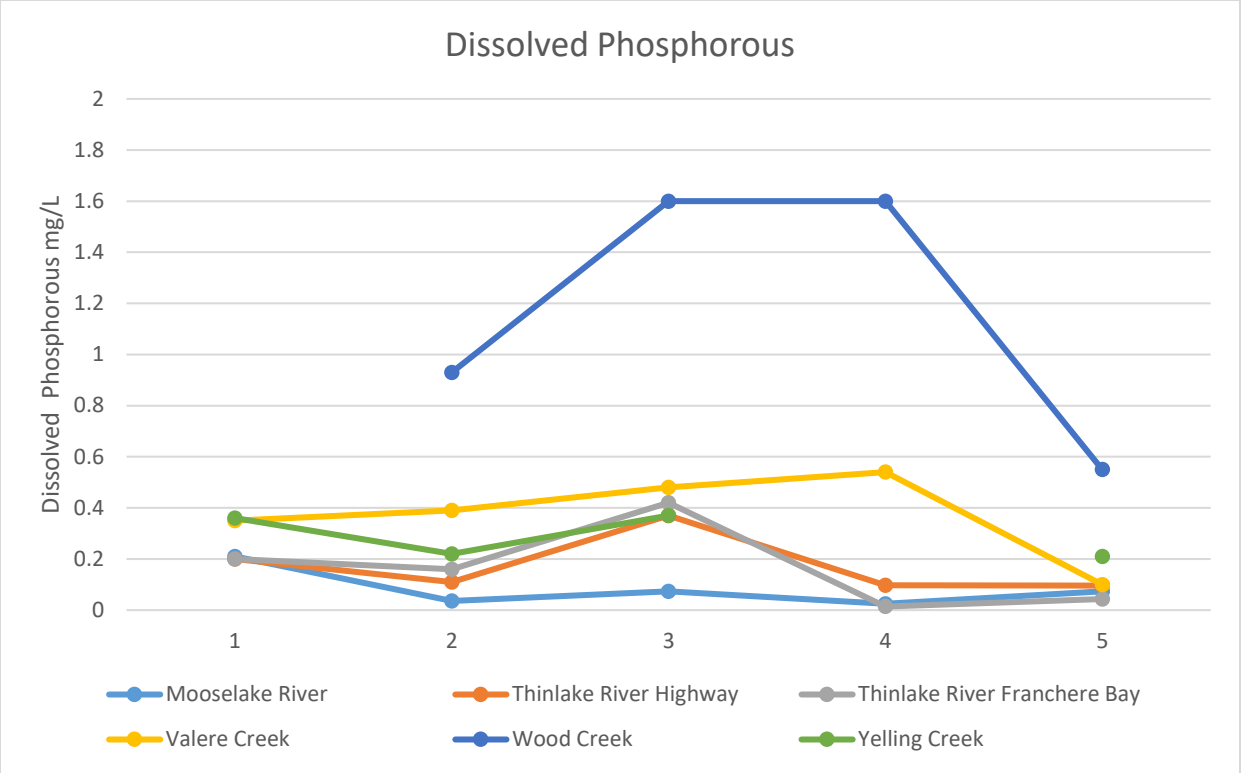
Mooselake River
Thinlake River Highway
Thinlake River Franchere Bay
Valere Creek
Wood Creek
Yelling Creek


Dissolved Phosphorous
Dissolved Phosphorous mg/L
2
1.8
1.6
1.4
1.2
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0.8
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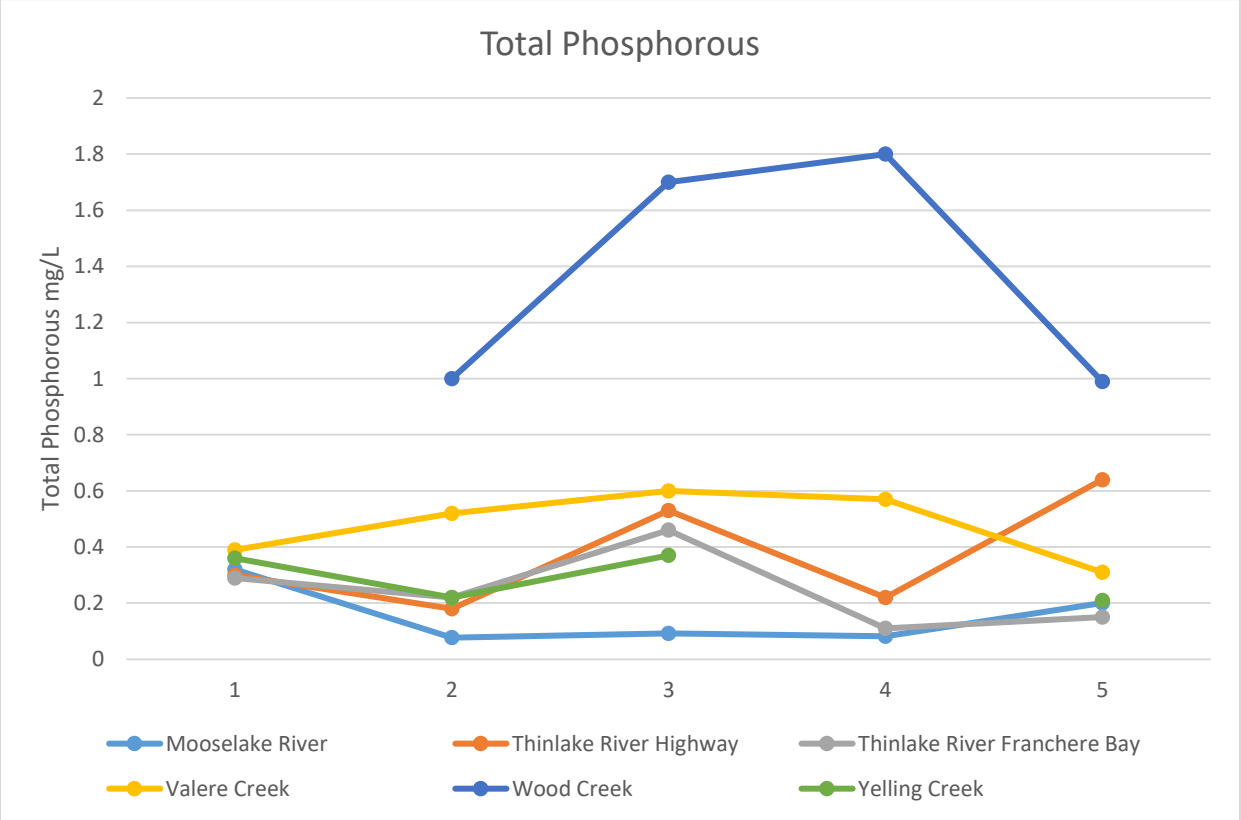
Mooselake River
Thinlake River Highway
Thinlake River Franchere Bay
Valere Creek
Wood Creek
Yelling Creek


Total Phosphorous
Total Phosphorous mg/L
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Mooselake River
Thinlake River Highway
Thinlake River Franchere Bay
Valere Creek
Wood Creek
Yelling Creek

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 be 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 will be 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 will continue into 2020. If you are interested in being a part of the Soil Health Benchmarking Project, please contact the LARA office at 780.826.7260.

Water infiltration test on pasture, fall 2019.

Extension

2019 Lakeland Agricultural Research Association Extension Activities

Farmer Appreciation Night

On February 8th LARA hosted a Farmer Appreciation Night for area producers. The event was held at the Glendon RCMP hall with supper followed by entertainment by Ben Crane. There were 297 producers who attended the evening.

Working Well Workshop

On February 14th a working well workshop was held at Lac Bellevue Hall. Thirty seven people came to learn 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.

Moose Lake Watershed Society Annual Meeting

On February 20, 2019 forty four people attended the Moose Lake Watershed Society Annual Meeting to discuss water concerns, current conditions and what the Society had accomplished. A special presentation was given by Dr. Holz on internal loading and phosphorous in the watershed. The Alberta Lake Management Society presented the sampling results and LakeWatch program for Moose Lake.

Clubroot! What Now?

On February 21st forty six producers attended the workshop at Flat Lake Hall. Presentations from Brad Goudy, Dan Orchard, Kent Lamoureux and Alyssa Krone covered an update on clubroot, growing and marketing faba beans, and other potential crops for the area, clubroot resistant varieties and an update on clubroot in the Lakeland.

LARA Research Update and AGM

The Annual Research Update and AGM was held on February 26th at the Ukrainian National Hall in Smoky Lake. LARA staff presented information on the 2018 research and extension programs such as the variety trials, fertility trials, forage peas, silage baling, quinoa, cover crops and forage variety trials. Presentations by Rongrong Xiang on the FEAP program and Yvonne Weinmeier with AFSC were also given. There were 22 producers in attendance.

Finding Extra Profits in Wetlands, Cattle and Crops

On March 1st the finding extra profits in wetlands, cattle and crops workshop was held at the Smoky Lake Agriplex. Eighteen producers attended the day featuring presentations from Cows and Fish, Nature Conservancy Canada, ALUS Canada and Ducks Unlimited.

Cover Crops

Kevin Elmy from Cover Crops Canada presented on how cover crops can diversify the cropping rotation and improve soil health, and how to select blends based on your operations needs on March 6th. Twenty six producers attended the first day of the workshop. On March 8th twenty

four producers attended a second workshop at Flat Lake Hall on how to implement cover crops on their operations.

Verified Beef Production +, BIXS and Sustainable Beef Production
On March 12th in Elk Point, 25 producers attended the workshop to be VBP+ trained, and learned how to earn credits through the Canadian Beef Sustainability Acceleration pilot.

Hemp Workshop
Sixty eight producers attended the hemp workshop in St. Paul on March 26th. The day featured presentations from Dr. Jan Slaski on hemp agronomics, True North Cannabis on CBD markets, Canadian Rockies Hemp Corporation on their fibre processing facility, Chris Boudreault on hemp co-ops, Brian Rozmahel provided a producer perspective, and Wayne Wasylciw on BioFiber hemp building materials.

Livestock Vaccinating, Prescriptions and Improving Your Livestock Operation Seminar
In Plamondon on March 28th, over 50 producers attended the seminar to learn about VBP, livestock vaccinating and prescriptions, Environmental Farm Plans and agricultural grants available for producers, and livestock watering system options.

safeTALK
safeTALK is a half-day workshop for attendees to learn the signs and how to get help for someone at risk of suicide. The workshop was held in Mallaig in partnership with the Demeria Memorial Fund on April 5th with 8 in attendance.

Jim Gerrish
The one day introductory grazing management school with Jim Gerrish took place at Barb and Doug Shapka's ranch in Smoky Lake County on July 5th. Forty-seven producers attended to learn about stocking rates and densities, energy and nutrient cycles, rest and recovery, ranching profitability, fencing and water development, high animal performance and creating pasture from the soil up.

St. Paul Summer Field Day
On July 24th at the Mallaig Unity Hall, LARA hosted its summer field day. Twenty six producers attended to tour our canola, wheat, barley, oats and triticale trials, as well as learn about using ESN in spring cereals, disease scouting with Michael Harding, and a canola update with Keith Gabert.

Alberta Charolais Breeders Tour
On June 29th LARA attended the Charolais Breeders Tour stop at K-Cow Ranch and had a booth.

Fort Kent Summer Field Day

On July 30th LARA hosted its Fork Kent summer field day at the LARA office. It featured our Quinoa demonstration, regional cereal variety trials, flax, cover crops, ESN and top dressing trail, liming and crop rotation trial, and ultra-early wheat trial. Forty four producers attended the day. Presenters from SeCan, Graymont, and NorQuin discussed the trials with producers.

Beavers in Our Landscape

A workshop on understanding and living with beavers was held in Lac La Biche on July 10th, with 20 people in attendance. The day covered beaver basics, management challenges, case studies regarding co-existence tools, and a round table discussion. The workshop was in partnership with Cows and Fish.

Dugout Workshop

On August 13th in Fort Kent, eleven people attended the workshop on Dugout management. The day included a presentation from Melissa Orr-Langner from Alberta Agriculture and Forestry on common dugout issues, management, considerations when building a new dugout, and tips on extending dugout life and improving water quality. CAP Solar was also there to talk about offsite watering systems and show pumps and considerations when installing a new system.

New Crops and New Markets Workshop

In Partnership with St. Paul County, a workshop was held in Mallaig featuring Brad Goudy with Proactive Producers to provide an update on the pulse fractionation plant in Tisdale, SK and in Alberta, as well as new marketing opportunities for Faba beans, dun peas, hulless oats, as well as new malt and feed barley programs and markets. Eighteen producers attended the workshop.

Gabe Brown Regenerative Ranching and Farming Workshop

On August 22nd in Ashmont, 42 attended the Gabe Brown Regenerative Ranching and Farming Workshop. The author of "Dirt to Soil: one Family's Journey into Regenerative Agriculture" joined us for a day to share his journey into regenerative agriculture, improving soil health through cover crops, grazing, no-till and multiple farm operations such as livestock, bees and intercropping to increase production and profits.

Working Well Workshop

On November 5th a working well workshop was held in Bonnyville. Forty two people came to learn 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.

Feed What You Need

Seventeen Producers attended the Feed What You Need workshop in Smoky Lake on December 16th. The workshop covered dealing with variable forage quality and alternative feed sources, and an overview of tools to valuate and interpret feed test results.

What the Flux?

Forty-two people attended What the Flux? The evening was held at the Bonnyville Centennial Centre and featured Dr. Holz from HAB Aquatic Solutions to present the results and interpretation of what was found in the sediment cores that were taken from across the bottom of Moose Lake during July of 2019. He discussed the implications of the sample results on lake health and water quality and the next steps that are needed to create a nutrient budget.

Classroom Agriculture Program (CAPs)

Kellie Nichiporik presented the Classroom Agriculture Program in schools in April and May. Information on crops, livestock and sustainability was covered with 30 classes of grade four students at schools across the area to over 600 students. This year Kellie as the zone 8 CAP Coordinator, coordinated volunteers to present to 71 classes to over 1,465 students.

Alberta Beef Producer Zone 8 Meetings

Kellie Nichiporik chaired the zone 8 Alberta Beef Producer meeting on October 30th at Sandy Rapids.

Grade Seven Wetland Education

Seventy grade seven students from Cold Lake Middle School had a hands-on nature experience at Cold Lake Provincial Park and Pelican Point in May where they learned about the value of wetlands, riparian areas, ecosystems, abiotic and biotic factors, symbiotic relationships, and food webs.

Walking With Moose

The Moose Lake Watershed Society held several day sessions of Walking with Moose. Walking with Moose allows grade five students to be further educated about the ecosystem of Moose Lake, supplementing their curriculum, learning about biodiversity, healthy shorelines and forest ecology. The students spend half a day at Pelican Point

where they collect animals and organisms and place them in containers where they are identified and then returned to their habitat. The students also learn about water quality, wetlands and larger animals that live along the shore such as birds and fish. The students get lunch and then are taken to the Moose Lake Provincial Park. There they are guided by LARA staff, BRWA staff, Municipal District of Bonnyville staff and volunteers and hike though the dry pine forest, learning about wildlife signs and tracks, vegetation such as lichens and dwarf mistletoe, and the forest ecosystem including potential threats such as the pine beetle and fire. This was the eleventh year of Walking with Moose with over 300 children going through the program.

X-Stream Science

On May 21st, Kellie Nichiporik assisted the Beaver River Watershed Alliance (LICA) with the X-Stream Science Program. The program is delivered to junior high and high school students throughout the region. The students used scientific protocols to collect aquatic benthic macroinvertebrates (water bugs) and conduct water quality tests to answer the question "What is the health of my local river?" Specific parameters that were tested include surrounding land use, riparian area vegetation, aquatic benthic macroinvertebrates and water quality data, such as temperature, dissolved oxygen, pH, conductivity and turbidity.

Lac La Biche Environmental Week

On June 2nd LARA ran a booth at the Lac La Biche County Environmental Week kick-off at Mac Arthur Place and ran activities for families in attendance teaching about riparian areas and biodiversity. Over 200 people were in attendance.

Moose Lake Pentecostal Camp Eco Day

On July 31st LARA led an Eco session with camp families to create a better understanding of lake ecosystems, water quality, forest ecosystem and riparian areas.

Camp Sunshine

On July 12th LARA staff assisted at Camp Sunshine, a grief camp for children aged 6-12. LARA staff led the children with building their lunch followed by planting tree seedlings in remembrance of the person(s) that they had lost.

MD of Bonnyville ASB Summer Tour

On August 15th the Municipal District of Bonnyville hosted its ASB summer tour. The day featured stops at the winners of the ASB rural beautification awards, Ye Old MacLean Hobby Farm, E-tree, Kinosoo Ridge and LARA's plots and greenhouse.

Grade Seven Wetland and Ecosystem Energy Education

Seventy-five grade seven students from Nelson Heights Middle School in September had a hands-on nature experience at Kinooso Beach where they learned about the water quality, riparian areas, benthic macro invertebrates, conservation and energy flows in ecosystems.

Shoreline Cleanup

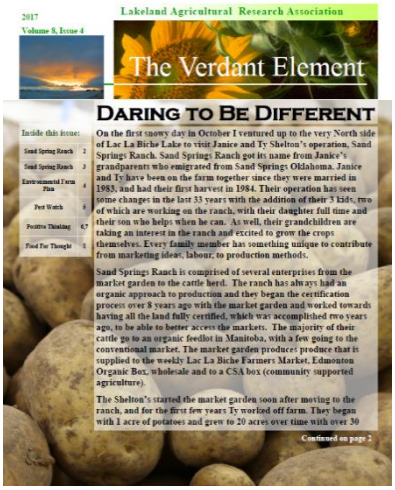
On September 26th at Sandy Beach on Cold Lake, over 100 grade sevens from Cold Lake Middle School spent their afternoon removing litter and debris from the shoreline, truly making an improvement in the health of our aquatic ecosystems. Over 200 kilograms of garbage was removed from the area. The shoreline cleanup is an annual event and volunteers are always appreciated.

Shoreline Cleanup

On September 28, 2019 Moose Lake Watershed Society volunteers cleaned up over 2 dumpster's worth of trash from the watershed. The shoreline cleanup is an annual event and volunteers are always appreciated.

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.


Lakeland Agricultural Research Association

2017
Volume 8, Issue 4

The Verdant Element

DARING TO BE DIFFERENT

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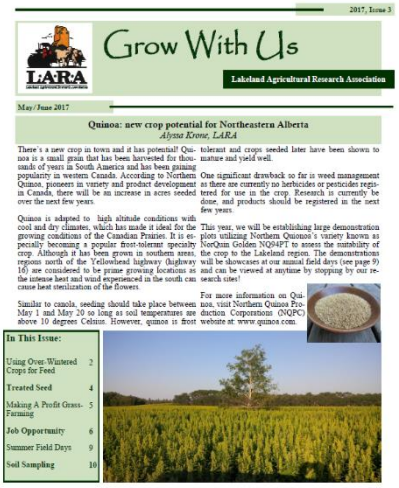
Sand Spring Ranch 3
Environmental Farm Plan 4
Pest Watch 6
Positive Thinking 6,7
Food For Thought 8

On the first snowy day in October I ventured up to the very North side of Lac La Biche Lake to visit Janice and Ty Shelton's operation, Sand Spring's Ranch. Sand Spring's Ranch got its name from Janice's grandparents who emigrated from Sand Springs Oklahoma. Janice and Ty have been on the farm together since they were married in 1983, and had their first harvest in 1984. Their operation has seen some changes in the last 33 years with the addition of their 3 kids, two of which are working on the ranch, with their daughter full time and their son who helps when he can. As well, their grandchildren are taking an interest in the ranch and excited to grow the crops themselves. Every family member has something unique to contribute from marketing ideas, labour, to production methods.

Sand Springs Ranch is comprised of several enterprises from the market garden to the cattle herd. The ranch has always had an organic approach to production and they began the certification process over 8 years ago with the market garden and worked towards having all the land fully certified, which was accomplished two years ago, to be able to better access the markets. The majority of their cattle go to an organic feedlot in Manitoba, with a few going to the conventional market. The market garden produces produce that is supplied to the weekly Lac La Biche Farmers Market, Edmonton Organic Box, wholesale and to a CSA box (community supported agriculture).

The Shelton's started the market garden soon after moving to the ranch, and for the first few years Ty worked off farm. They began with 1 acre of potatoes and grew to 20 acres over time with over 30

Continued on page 2


2017, Issue 3

LARA

Grow With Us

Lakeland Agricultural Research Association

May/June 2017

Quinoa: new crop potential for Northeastern Alberta

Alyssa Krone, LARA

There's a new crop in town and it has potential! Quinoa is a small grain that has been harvested for thousands of years in South America and has been gaining popularity in western Canada. According to Northern Quinoa, pioneers in variety and product development in Canada, there will be an increase in acres seeded over the next few years.

Quinoa is adapted to high altitude conditions with cool and dry climates, which has made it ideal for the growing conditions of the Canadian Prairies. It is especially becoming a popular frost-tolerant specialty crop. Although it has been grown in southern areas, regions north of the Yellowhead highway (highway 16) are considered to be prime growing locations as the intense heat and wind experienced in the south can cause heat sterilization of the flowers.

Similar to canola, seeding should take place between May 1 and May 20 so long as soil temperatures are above 10 degrees Celsius. However, quinoa is frost tolerant and crops seeded later have been shown to mature and yield well.

One significant drawback so far is weed management as there are currently no herbicides or pesticides registered for use in the crop. Research is currently be done, and products should be registered in the next few years.

This year, we will be establishing large demonstration plots utilizing Northern Quinoa's variety known as NorQuin Golden NQ94FT to assess the suitability of the crop to the Lakeland region. The demonstrations will be showcases at our annual field days (see page 9) and can be viewed at anytime by stopping by our research sites!

For more information on Quinoa, visit Northern Quinoa Production Corporations (NQPC) website at www.quinoa.com.

In This Issue:

Using Over-Wintered Crops for Feed 2
Treated Seed 4
Making A Profit Grass-Farming 5
Job Opportunity 6
Summer Field Days 9
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Horticulture Program

The 2019 garden faced some significant challenges (as most areas of agriculture did) – severe, excess rain and hail certainly played havoc with garden plants.

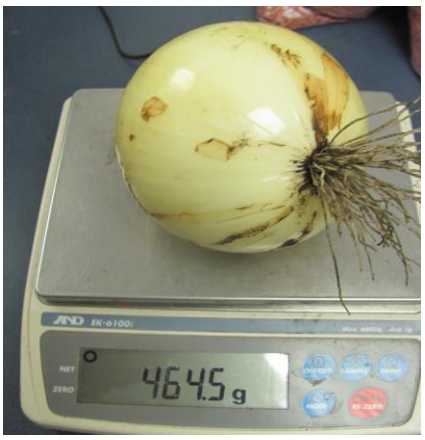
Potatoes

We did plant 4 varieties of potatoes – all did very well. There was no evidence of disease or insect damage. The following table summarizes yield data:

Variety	1 plant – July 30 (grams)	10 plants – Sept 18 (kgs)
Jazzy	3536 g	23.62 kg
Merida	1203 g	20.20 kg
RoseMarie	1954 g	18.58 kg
Cerisa	1442 g	19.42 kg

Onions

We planted two varieties of onions (Ailsa Craig & Walla Walla) from seed – both did quite well. In the past, root maggots have been a problem with onions. We tried using coffee grounds (used) and wood ashes in the row at transplanting time. Root maggots were not a problem with either variety. Several of the Ailsa Craig onions exceeded 1 lb in size.



Artichoke

We tried some "unusual" plants – artichoke (from seed) did very well and produced several edible artichoke hearts. Our fennel plants also produced well. Mangels (grown for animal feed) grew very well and a neighbor's hogs enjoyed them a great deal.

Fennel – Selma Fino

Red Mangels

Tomatoes We planted several varieties of tomatoes – plants outdoors suffered from the adverse weather conditions experienced. Those "lucky plants" in the greenhouse did much better! Honey Drop – a cherry tomato – produced huge quantities of bite-sized fruits. (They were also a taste favorite.) Kelloggs produced a good number of very large fruits – some in excess of 1 lb. Beaverlodge, Old German and Taxi also produced large quantities of mid-sized fruits

Kellogg's

Appendices

Definition of Common Feed Nutrient Terms

ADF Acid Detergent Fibre – the least digestible portion of roughage. ADF content is used to determine digestibility and energies.

AIP 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.

AP Available Protein – the portion of the total protein which is available to the animal if the animal could completely digest the feed.

BP Bypass Protein – ingested protein that is not degraded in the rumen.

CP Crude Protein – the total protein contained in feeds as determined by measuring nitrogen content.

DE Digestible Energy – the amount of energy consumed minus the amount of energy lost in feces.

GE Gross Energy – measure of total caloric energy of a feedstuff.

IP Insoluble Protein – the portion of protein which digestive juices or similar solutions cannot dissolve.

ME Metabolizable Energy – equal to DE minus energy lost in urine, feces and in methane for ruminants.

NDF Neutral Detergent Fibre – measures cellulose, hemi-cellulose, lignin, silica, tannin and cutin; used as an indicator of feed intake.

NEG Net Energy for Gain – amount of energy for gain above that which is required for maintenance; used for balancing rations for ruminants.

NEM Net Energy for Maintenance – amount of energy required to maintain an animal with no change in body weight or composition.

RFV 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.

SP Soluble Protein – the portion of protein which digestive juices of ruminant can dissolve.

TDN 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.

	Percent of DM Basis								
Feedstuff	**DM**	**CP**	**ADF**	**NDF**	**TDN**	**Ca**	**P**	**K**	**Mg**
Alfalfa Hay Early	90.5	19.9	31.9	39.3	60	1.63	0.21	2.56	0.34
Alfalfa Hay Late	90.9	17	38.7	48.8	55	1.19	0.24	1.56	0.27
Alfalfa Silage	44.1	19.5	37.5	47.5	63	1.32	0.31	2.85	0.26
Barley Grain	88.1	13.2	5.77	18.1	88	0.05	0.35	0.57	0.12
Barley Straw	91.2	4.4	48.8	72.5	40	0.3	0.07	2.36	0.23
Barley Silage	37.2	11.9	33.9	56.8	60	0.52	0.29	2.57	0.19
Corn Silage Mature	34.6	8.65	26.6	46	72	0.25	0.22	1.14	0.18
Oat Grain	89.2	13.6	14	29.3	77	0.01	0.41	0.51	0.16
Oat Straw	92.2	4.4	47.9	74.4	50	0.23	0.06	2.53	0.17
Oat Silage	36.4	12.7	38.6	58.1	59	0.58	0.31	2.88	0.21
Oat Hay	90.7	9.5	38.4	63	53	0.32	0.25	1.49	0.29
Smooth Brome Early Pasture	26.1	21.3	31	47.9	74	0.55	0.45	3.16	0.32
Smooth Brome Hay Mid-bloom	87.6	14.4	36.8	57.7	56	0.29	0.28	1.99	0.1
Rye Grass Pasture	22.6	17.9	38	61	84	0.65	0.41	2	0.35
Orchard Grass Hay Early Bloom	89.1	12.8	33.8	59.6	65	0.27	0.34	2.91	0.11
Orchard Grass Early Pasture	27.4	10.1	35.6	57.6	57	0.23	0.17	2.09	0.33
Timothy Hay	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 (7th 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.

	Acidity	Alkalinity	Salt	Drought	Winter
Legumes	**Tolerance**	**Tolerance**	**Tolerance**	**Tolerance**	**Hardiness**
Alfalfa	Moderate	High	Moderate	Very High	Moderate-High
Cicer Milkvetch	Low	Moderate	Low-Moderate	Moderate-High	Very High
Alsike Clover	Moderate	Moderate	Low-Moderate	Low-Moderate	High
Red Clover	Low	Moderate	Low	Low-Moderate	Moderate-High
Sainfoin	Low	Low	Low-Moderate	Moderate	Moderate
Birdsfeet Trefoil	High	Moderate	High	Moderate	Low-Moderate
Sweetclover	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**
Meadow Bromegrass	Moderate	Moderate	Low-Moderate	Moderate-High	Moderate
Smooth Bromegrass	Moderate	Moderate	Low-Moderate	Moderate-High	Moderate-High
Reed Canarygrass	High	Moderate	Moderate-High	Moderate-High	Low-Moderate
Creeping Red Fescue	High	Moderate	Moderate-High	Moderate-High	High-Very High
Meadow Fescue			Moderate	Low	Moderate
Tall Fesue	High	Moderate	Moderate-High	Moderate	Moderate
Creeping Foxtail	High	Low	Low	Low-Moderate	High-Very High
Meadow Foxtail	Moderate		Low	Low	High
Orchardgrass	Moderate	Low	Low-Moderate	Moderate	Moderate
Italian Ryegrass	High	Low	Moderate	Low	Low
Perennial Ryegrass	High	Low	Moderate	Low	Low
Timothy	Very High	Low	Low	Low	Moderate
Crested Wheatgrass		Moderate	Moderate	Very High	Very High
Intermediate Wheatgrass	Low	Moderate	Moderate	Moderate	Moderate
Northern Wheatgrass	Moderate	High	Moderate	Very High	Moderate
Slender Wheatgrass		High	Moderate-High	Moderate	High
Tall Wheatgrass		Very High	Very High	High	Moderate
Western Wheatgrass	Moderate	Moderate	Very High	Moderate - High	Moderate
Russian Wildrye	Low	Moderate	High	Very High	High
Altia Wildrye			High	Very High	High
Dahurian Wildrye			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**	**(%)**	**(%)**
600 lb Calves	1.5	1308	1.32	9.5	9.4	68.5	0.32	0.21
950 lb Bred Heifers	0.9	19	1.5	8	10.3	54.1	0.27	0.02
1200 lb Cows Mid Pregnancy	-	20.8	1.4	6.9	10.1	48.8	0.19	0.19
1200 lb Cows Late Pregnancy	0.9	22.3	1.7	7.8	11.8	52.9	0.26	0.21
1000 lb 2 yr Heifer With Calf	0.5	20.8	2.1	10.2	12.9	61.9	0.31	0.23
1200 lb 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 (6th Ed.) National Academy Press, Washington, D.C.

Lakeland Agricultural Research Association

Sprouting Seeds of Knowledge

Factsheet #2018-01

Barley Varieties for Forage Production in the Lakeland

A summary of 10 years of research trials

Forages, both annual and perennial, make up the largest portion of livestock feed on the Canadian prairies. While annual forages are not typically utilized in conventional systems as a grazing resource, they are often heavily used as a preserved forage for winter feeding including greenfeed and silage.

Background

Lakeland Agricultural Research Association (L.A.R.A.) has been growing barley varieties for forage production for the past 10 years to help assess the regional adaptability of each variety.

The trials are seeded prior to May 25 of each year using a zero-till drill with a 9 inch row spacing to a depth of 0.5 to 1 inch. Spring soil tests are used to develop a unique blend fertilizer each year that is side-banded during seeding. Seeding rate is for a targeted 300 plants/m^2.

Prior to seeding, the trial site is sprayed with a glyphosate based herbicide and one to two in crop herbicide applications are done depending on weed pressure. No fungicides are used.

The barley trials are aimed to be harvested at the soft dough stage with an average moisture content of 65%. The trials are seeded in the MD of Bonnyville, County of St. Paul and Lac La Biche County.

Yield Results

Table 1 summarizes the average yield results from the 2008 growing season to the 2017 growing season. The yields displayed in table 1 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.**

Table 1. Average yield by location.

	Average Dry Matter Yield		
	St. Paul	Fort Kent	Lac La Biche
Variety	(ton/ac)	(ton/ac)	(ton/ac)
CDC Austenson	4.98[7]	4.88[7]	4.57[4]
CDC Cowboy	4.89[9]	5.02[9]	4.31[6]
Busby	4.30[5]	4.76[5]	4.42[4]
Seebe	4.26[7]	4.89[7]	4.20[6]
Ponoka	4.43[7]	4.94[7]	4.19[6]
Vivar	4.10[7]	4.84[7]	3.92[6]
Xena	4.04[7]	4.94[7]	4.01[6]
Trochu	3.74[7]	4.65[7]	3.62[6]
Lacombe	4.14[3]	4.51[3]	4.01[3]
Stockford	3.76[5]	4.65[5]	3.79[4]
Chigwell	4.12[5]	4.68[5]	4.03[4]
Ranger	4.05[8]	4.44[8]	3.71[6]
Sundre	4.23[9]	4.32[9]	3.80[6]
Yorkton	3.25[5]	4.33[5]	3.37[6]
CDC Maverick	5.07[5]	5.24[5]	4.41[2]
Muskwa	3.77[2]	5.09[2]	3.53[2]
Gadsby	5.58[5]	4.45[5]	4.27[2]
CDC Coalition	4.74[5]	4.20[5]	3.39[2]
Conlon	3.80[5]	4.11[5]	3.01[3]
Champion	5.43[3]	5.27[3]	*
CDC Meredith	5.20[3]	4.18[3]	*
Amisk	5.22[3]	4.10[3]	*
Canmore	5.29[3]	5.04[3]	*
Claymore	6.34[2]	3.75[2]	*
Altorado	6.44[1]	4.63[1]	*
Tradition	3.14[2]	4.93[2]	2.84[3]
Standard	2.58[2]	4.10[2]	2.66[3]
Westford	2.76[1]	4.20[1]	1.68[2]

* these varieties have never been tested in Lac La Biche County.
[#] indicates the number of years each variety has been tested at a given site.

1

Quality Results

During harvest, composite samples are taken from each variety, frozen and sent to an accredited laboratory for wet chemistry analysis. The average forage quality results are illustrated in table 2. No significant variations in quality between sites were noted over the past ten years. Therefore, all three site locations were compiled and averaged for variety comparison.

The data presented should not be used as a replacement for individual crop feed tests. A detailed forage analysis should always be done prior to feeding and a mineral program should be developed to ensure adequate nutrition for your livestock each year.

Table 2. Barley variety quality results.

Variety	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
CDC Austenson[2]	9.63	29.67	48.03	65.80	0.35	0.16	1.81	0.20
CDC Cowboy[9]	10.20	26.68	43.82	68.04	0.31	0.21	1.73	0.21
Busby[5]	10.01	27.04	45.91	67.79	0.42	0.17	0.89	0.16
Seebe[7]	9.21	31.74	49.15	64.20	0.42	0.18	1.03	0.18
Ponoka[7]	9.77	27.24	44.42	67.69	0.56	0.15	0.96	0.21
Vivar[7]	10.55	31.25	50.26	64.56	0.59	0.14	1.14	0.25
Xena[7]	9.38	29.35	49.75	66.04	0.35	0.16	0.96	0.16
Trochu[7]	9.52	24.44	39.99	69.87	0.43	0.19	1.20	0.23
Lacombe[3]	9.44	26.40	45.60	68.30	0.43	0.14	1.10	0.23
Stockford[5]	10.07	31.20	53.19	64.60	0.57	0.17	1.09	0.21
Chigwell[5]	9.68	27.84	45.16	67.22	0.52	0.16	1.18	0.21
Ranger[8]	9.37	28.71	49.33	66.47	0.51	0.21	1.97	0.25
Sundre[9]	10.76	30.37	50.75	65.25	0.53	0.17	1.82	0.20
Yorkton[5]	10.25	30.80	48.61	64.90	0.71	0.25	1.00	0.19
CDC Maverick[5]	8.77	28.17	46.16	66.96	0.35	0.17	1.57	0.63
Muskwa[2]	9.60	28.50	45.06	65.20	0.63	0.17	1.74	0.16
Gadsby[5]	9.10	30.31	51.34	64.95	0.40	0.15	1.13	0.15
CDC Coalition[5]	9.82	28.97	48.35	66.33	0.34	0.18	1.76	0.20
Conlon[5]	8.90	27.97	47.87	67.11	0.41	0.19	1.47	0.19
Champion[3]	11.46	30.06	52.82	65.87	0.33	0.39	1.75	0.17
CDC Meredith[3]	8.14	30.48	51.56	66.92	0.35	0.27	1.89	0.18
Amisk[3]	9.16	28.14	47.69	67.93	0.43	0.22	1.78	0.19
Canmore[3]	10.86	29.28	50.18	67.66	0.38	0.28	1.65	0.17
Claymore[2]	9.80	32.99	54.35	63.06	0.34	0.16	1.22	0.15
Altorado[1]	11.22	29.58	50.95	65.82	0.30	0.33	1.70	0.18
Tradition[2]	12.87	34.35	54.89	56.10	0.61	0.18	1.89	0.23
Stander[2]	11.18	37.45	53.70	60.15	0.51	0.17	1.87	0.23
Westford[1]	13.06	33.73	52.65	55.90	0.52	0.19	2.13	0.23

[#] indicates the number of years each variety has been tested.

* CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, TDN = Total Digestible Nutrients, Ca = Calcium, P = Phosphorous, K = Potassium, Mg = Magnesium

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Lakeland Agricultural Research Association

Sprouting Seeds of Knowledge

Factsheet #2018-02

Oat Varieties for Forage Production in the Lakeland

A summary of 10 years of research trials

Forages, both annual and perennial, make up the largest portion of livestock feed on the Canadian prairies. While annual forages are not typically utilized in conventional systems as a grazing resource, they are often heavily used as a preserved forage for winter feeding including greenfeed and silage.

Background

Lakeland Agricultural Research Association (L.A.R.A.) has been growing oat varieties for forage production for the past 10 years to help assess the regional adaptability of each variety.

The trials are seeded prior to May 25 of each year using a zero-till drill with a 9 inch row spacing to a depth of 0.5 to 1 inch. Spring soil tests are used to develop a unique blend fertilizer each year that is side-banded during seeding. Seeding rate is for a targeted 300 plants/m^2.

Prior to seeding, the trial site is sprayed with a glyphosate based herbicide and one to two in crop herbicide applications are done depending on weed pressure. No fungicides are used.

The oat trials are aimed to be harvested at the milk stage with an average moisture content of 65%. The trials are seeded in the MD of Bonnyville, County of St. Paul and Lac La Biche County.

Yield Results

Table 1 summarizes the average yield results from the 2008 growing season to the 2017 growing season. The yields displayed in table 1 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.**

Table 1. Average yield by location.

	Average Dry Matter Yield		
	Bonnyville	St. Paul	Lac La Biche
Variety	(ton/ac)	(ton/ac)	(ton/ac)
Murphy	4.60[9]	4.59[7]	3.86[6]
Waldern	4.38[9]	4.37[7]	3.85[6]
AC Mustang	4.06[10]	4.26[7]	3.58[6]
AC Morgan	4.12[10]	4.10[7]	3.14[6]
Jordan	4.03[7]	3.95[6]	3.44[6]
CDC SO-1	3.93[8]	4.52[5]	3.39[4]
AC Baler	4.33[10]	4.19[7]	3.61[6]
Grizzly	4.00[4]	3.28[3]	4.04[3]
Foothills	4.08[7]	3.87[6]	3.66[6]
Everleaf	3.34[5]	3.02[4]	2.66[4]
CDC Haymaker	3.92[5]	5.06[3]	3.65[2]
AC Juniper	3.52[5]	4.42[4]	2.88[3]
Derby	4.00[3]	3.13[2]	2.69[2]
CDC Seabiscuit	4.32[2]	6.22[1]	*
Cascade	3.96[3]	3.13[2]	3.15[3]
Lu	3.69[2]	3.18[2]	2.82[2]
Athabasca	3.49[2]	3.29[2]	2.48[2]
Pendek	4.52[1]	2.84[1]	1.63[1]

* these varieties have never been tested in Lac La Biche County.

[#] indicates the number of years each variety has been tested at a given site.

1

Quality Results

During harvest, composite samples are taken from each variety, frozen and sent to an accredited laboratory for wet chemistry analysis. The average forage quality results are illustrated in table 2. No significant variations in quality between sites were noted over the past ten years. Therefore, all three site locations were compiled and averaged for variety comparison.

The data presented should not be used as a replacement for individual crop feed tests. A detailed forage analysis should always be done prior to feeding and a mineral program should be developed to ensure adequate nutrition for your livestock each year.

Table 2. Oat variety quality results.

Variety	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Muphy[9]	10.17	36.98	57.22	61.17	0.32	0.19	1.63	0.19
Waldern[9]	10.92	39.47	60.50	59.32	0.28	0.18	1.99	0.21
AC Mustang[10]	9.38	35.87	56.39	60.95	0.19	0.21	1.86	0.22
AC Morgan[10]	9.97	33.73	54.38	62.62	0.29	0.22	2.36	0.21
Jordan[7]	9.20	34.36	55.91	62.13	0.56	0.16	2.22	0.29
CDC SO-1[8]	10.26	32.34	53.29	63.70	0.25	0.21	1.92	0.22
CDC Baler[10]	10.77	35.35	55.50	61.36	0.30	0.20	2.02	0.21
Grizzly[4]	10.81	33.07	53.18	63.10	0.33	0.20	1.49	0.31
Foothills[7]	11.19	34.08	56.19	62.35	0.31	0.18	2.16	0.27
Everleaf[5]	11.14	37.27	57.97	59.90	0.32	0.19	2.14	0.37
CDC Haymaker[5]	11.60	31.34	53.39	64.49	0.28	0.25	1.83	0.20
AC Juniper[5]	10.46	35.43	56.84	61.29	0.28	0.19	2.57	0.26
Derby[3]	10.48	37.52	58.40	56.40	0.37	0.16	1.73	0.25
CDC Seabiscuit[2]	10.97	32.76	53.11	63.38	0.24	0.23	1.79	0.20
Cascade[3]	11.31	36.70	58.42	60.30	0.34	0.18	1.91	0.25
Lu[2]	10.83	44.98	65.42	53.90	0.35	0.08	2.41	0.34
Athabasca[2]	9.66	40.91	60.53	51.40	0.33	0.10	2.28	0.28
Pendek[1]	9.69	37.88	59.94	59.40	0.37	0.16	2.20	0.25

[#] indicates the number of years each variety has been tested.

* CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, TDN = Total Digestible Nutrients, Ca = Calcium, P = Phosphorous, K = Potassium, Mg = Magnesium

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These trials and publication were made possible by:

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MUNICIPAL DISTRICT
BONNYVILLE NO. 87

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Lakeland Agricultural Research Association

Sprouting Seeds of Knowledge

Factsheet #2018-03

Triticale Varieties for Forage Production in the Lakeland

A summary of 10 years of research trials

Forages, both annual and perennial, make up the largest portion of livestock feed on the Canadian prairies. While annual forages are not typically utilized in conventional systems as a grazing resource, they are often heavily used as a preserved forage for winter feeding including greenfeed and silage.

Background

Lakeland Agricultural Research Association (L.A.R.A.) has been growing triticale varieties for forage production for the past 10 years to help assess the regional adaptability of each variety.

Table 1. Average yield by location.

	Average Dry Matter Yield		
Variety	Bonnyville (ton/ac)	St. Paul (ton/ac)	Lac La Biche (ton/ac)
Pronghorn	5.37[7]	4.66[7]	4.66[6]
AC Utlima	5.26[5]	4.32[5]	4.65[4]
Tyndal	4.68[9]	4.73[10]	4.30[6]
Bunker	4.86[9]	4.69[9]	4.28[6]
Taza	4.39[7]	5.31[7]	3.89[3]
Sunray	4.71[5]	5.56[5]	4.75[2]
Companion	4.97[3]	4.26[3]	5.16[3]

[#] indicates the number of years each variety has been tested at a given site.

The trials are seeded prior to May 25 of each year using a zero-till drill with a 9 inch row spacing to a depth of 0.5 to 1 inch. Spring soil tests are used to develop a unique blend fertilizer each year that is side-banded during seeding. Seeding rate is for a targeted 370 plants/m^2.

Prior to seeding, the trial site is sprayed with a glyphosate based herbicide and one to two in crop herbicide applications are done depending on weed pressure. No fungicides are used.

The triticale trials are aimed to be harvested at the late milk stage with an average moisture content of 65%. The trials are seeded in the MD of Bonnyville, County of St. Paul and Lac La Biche County.

Yield Results

Table 1 summarizes the average yield results from the 2008 growing season to the 2017 growing season. The yields displayed in table 1 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.**

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Quality Results

During harvest, composite samples are taken from each variety, frozen and sent to an accredited laboratory for wet chemistry analysis. The average forage quality results are illustrated in table 2. No significant variations in quality between sites were noted over the past ten years. Therefore, all three site locations were compiled and averaged for variety comparison.

The data presented should not be used as a replacement for individual crop feed tests. A detailed forage analysis should always be done prior to feeding and a mineral program should be developed to ensure adequate nutrition for your livestock each year.

Table 2. Triticale variety quality results.

Variety	CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Pronghorn[7]	9.14	34.51	54.38	61.27	0.20	0.18	1.46	0.15
AC Ultima[5]	10.64	30.93	49.02	64.81	0.23	0.23	1.98	0.15
Tyndal[10]	7.86	35.18	56.52	61.49	0.17	0.19	1.58	0.15
Bunker[9]	8.80	36.48	55.59	60.48	0.21	0.17	1.45	0.17
Taza[7]	8.58	35.65	56.48	61.50	0.18	0.19	1.73	0.14
Sunray[5]	9.74	29.53	46.89	65.89	0.20	0.20	1.73	0.14
Companion[3]	10.10	32.47	48.60	63.61	0.24	0.22	1.24	0.14

[#] indicates the number of years a variety has been tested.

* CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, TDN = Total Digestible Nutrients, Ca = Calcium, P = Phosphorous, K = Potassium,, Mg = Magnesium

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