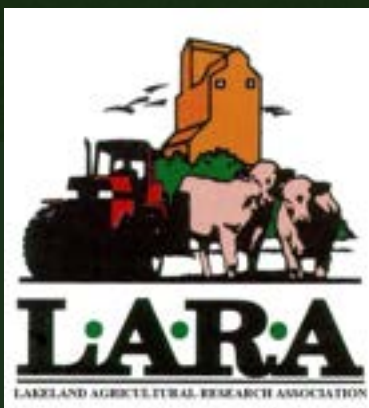


Grow With Us

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Prescribed fires: A tool to preserve grassland conservation.

by Angelica Ouellette, LARA

Last year there were a total of 1088 wildfires in Alberta. According to the Alberta Forestry and parks, the main causes are power lines, house fires, recreation, intentional incendiaries, and agriculture. Fire on its own has been part of ecosystem offset for thousands of years. Fire is crucial in nature as it allows land renewal and thereby, plant regeneration.

Today, uncontrolled fires are being controlled through public announcements and social awareness. Little attention is given to controlled fires, also known as prescribed fires. A prescribed fire, as its name indicates is a fire that is set up on purpose, in a specific given area and with a specific objective in mind. Many prescribed fires are conducted to reduce weeds, to disrupt plant diseases and to prevent the transformation of the land into a forest, in some cases, this is performed in order to reduce the amount of brush fuel for the next fire occurrence.

For many cattle growers, the conversion from grassland to forest is counterproductive because first, cattle feed mostly out of plant species found in pastures. Second, cattle have difficulty walking through forested soil and third and most importantly, studies have

shown that plant species regenerating from burnt land have greater protein content, which is essential for the livestock wellbeing. In fact, there is photo evidence of herds going near recently burned grassland for grazing. In other words, animals know some good grass is about to sprout.

As explained by Dinyar Minocher and Jennifer McGuinness at the Canadian Prairies Prescribed Fire Exchange, a grassland is a stable plant community, but it is not static. Consider Figure 1.

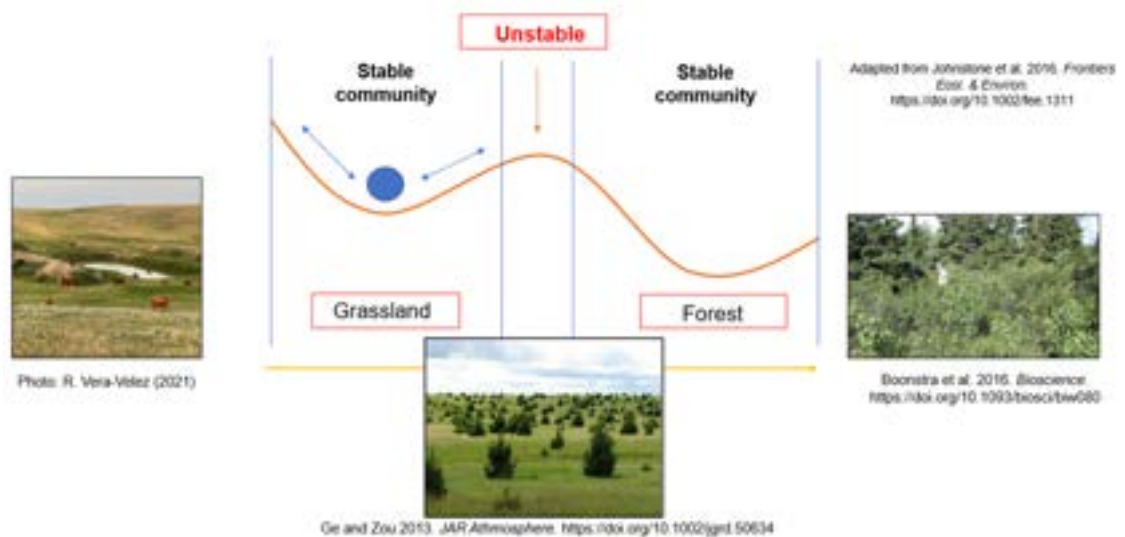


Figure 1. Illustration by Dr. Roy Vera-Velez

The “blue ball” depicted represents the stability of a grassland plant community. Thus, a prescribed fire is one of the necessary disturbances that perpetuates the establishment of pasture plant communities and prevents the introduction of species that eventually open the transition into a forest, such as shrubs as well as spruce or aspen.

Speaking to Minocher, prescribed fire practices in Canada is something that is several decades behind with respect to other countries such as the United States. Minocher mentioned that in the US it's common for any given State to have multiple landowner-led Prescribed Burn Associations (PBAs) as well as 15 Prescribed Burn Exchanges involved in spreading and informing communities about the benefits and proper conduction of prescribed fires. “The relationship to fire in the United States is different. Communities are more frequently at risk to wildfires due to population and city distribution across their landscape. In Canada, where most of the populations live within 100 kilometres of the US-Canada border, we were able to pretend it wasn't a problem for longer” he said “wildfire mitigation is only one of the benefits of prescribed fire, but with increased heat anomalies across North America they have a fair bit more experience than us at a community level. We're catching up and we're seeing the conversation expand to include more non-fire management agencies here in Canada. It's helpful to have an example from which to learn”. Indeed, the United States Department of Agriculture has a website destined to report all prescribed fires as well as wildfires occurring in the country. Both the Canadian and the Alberta websites have interactive maps where wildfires can be found within a specific time, but neither provide details of prescribed fires occurring as of today. Dinyar argues the reason behind this relies on the

stark difference between a wildfire and a prescribed fire “I don't think any wildfire agency would ever report on prescribed fires being planned or conducted. Also, prescribed fires are typically finished in a day or two. It's uncommon that they would be active long enough to be worth reporting.”

When Dinyar was asked about the perspective of producers on this topic, he mentioned that it was best to let the results speak for themselves. “We had a partner southwest of Calgary who was interested in adopting the practice. We invited them to a few of our training events and they successfully completed several units on their pasture. That summer we were able to plan a field event which involved a community visit to the property. There's nothing I could say about prescribed fire that has a bigger impact than getting to watch cattle eat green grass in a recently burned pasture.” The purpose of the Canadian Prairies Prescribed Fire Exchange is to facilitate meaningful conversations around prescribed fire and to open a pathway into using the land management tool.

So, if you are a grower and would like to conduct a prescribed fire, what do you do? Minocher advises to first attend a training event or take a course that is hosted by them in conjunction with the University of Saskatchewan, second to have a clear objective of what you want to achieve with this prescribed fire “having a clear objective will help inform what conditions are necessary and how you can prepare the burn site.” he stated. Also to stay posted with government and authorities about nearby wildfires happening close to your area and make sure that you have taken all the measures to prevent your prescribed fire from becoming a wildfire.

In summary, fires are necessary in nature as a reset for land to start over and regenerate. Prescribed fires are simply a management tool where pasture plant communities are maintained and rejuvenated. Grassland species renewal is important because grazing livestock feeding from it gathers more nutrients from it in comparison to grasslands unexposed to controlled burning. If you would like to have more information about prescribed fires, please visit the [Canadian Prairies Prescribed Exchange](#) for more information.

Figure 2. Cow grazing from recently burned pasture. Photo by Dinyar Minocher



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Seeding Wheat and Barley into Dry Soils

Alberta Grains

In the Prairies, seeding into dry soils is inevitable in some years. These dry seeding conditions require careful seeding best management practices to help reduce risk. However, many of these considerations rely on eventual rainfall, so not all risks can be mitigated. Additionally, not all considerations fit on each farm. Assessing the practicality of each potential management practice, on your farm, will help you make the best decision.

In general, the main concern with seeding into dry soils is emergence. Lack of, or variable moisture, can lead to uneven emergence. Uneven emergence leads to variable crop development throughout the field, lower yield potential, more weed issues, less than ideal timed in-crop management, and harvest challenges leading to lower quality grain. This article will address minimizing the potential of variable crop germination and emergence.

It should be noted that bumper crops are no less likely when seeding into dry soils as compared to seeding into moist soils (assuming even emergence). After consistent germination and emergence, it is the rainfall and available soil moisture during the rest of the plant's growth that will impact the final yield. Therefore, the main goal of seeding into dry soils is to provide the best opportunity for even germination.

There are three scenarios to approach seeding wheat and barley into dry soils.

- Scenario 1: Seed at normal depth (1-2") into dry soils and wait for rain
- Scenario 2: Seed deep (>2") to reach soil moisture
- Scenario 3: Wait for the rain, then seed at normal depth

Scenario 3 is typically the least desirable. Although waiting for rain can help ensure that you have a greater chance of seeding into moisture, there are risks involved with waiting. First, when rain does arrive, it may continue to rain and delay seeding or limit field access and passability. The next risk is yield reduction due to delayed seeding. Research by McKenzie et al. (2011) compared seeding dates of various crops including CWRS wheat, durum, SWS wheat, CPS wheat, feed barley, triticale, malt barley, barley silage, canola, and flax. Research indicated a downward trend of 0.6 to 1.7 percent yield loss per day after April 30th. This yield loss is due to less solar radiation being received by the crop, less tillering, increased disease pressure, and increased maximum temperatures at flowering. Additionally, O'Donovan et al. (2012) indicated that delayed seeding of malt barley can reduce kernel plump while increasing protein. Finally, Collier et al. (2021) indicated that seeding CWRS wheat at 2-6°C provided the greatest yield and yield stability when combined with high seeding rates and dual seed treatments. Therefore,

having the seed already in the soil when rain does occur allows the crop to emerge earlier than if seeding is delayed until after rain has already occurred.

Scenario 1 and 2 are the more common approaches to seeding in dry conditions. Deciding between the two requires careful consideration of current soil moisture depth. Although recent research on seeding depth is few and far between, there are some assumptions we can make. These assumptions are that deeper seeded cereals require more energy and time to emerge. This presents a few problems. First, increased risk of the seed running out of energy or reaching the soil surface with low energy reserves. This increases the risk of seed and seedling death. Additionally, there is an increased chance of disease or pests killing or otherwise negatively affecting the seeds before emergence. Duzek and Piening (1982) investigated the effects of deep seeding vs intermediate vs shallow seeding in spring barley. In most years, deeper sown seed lots proved to yield less. However, in drier years, deeper sown seed yielded higher. Earlier emergence of the deeper sown seed lots due to moisture access was the likely cause of higher yields. However, the higher amounts of tillage used in this study likely increased the depth that soil moisture could be found. This demonstrates the relationship between seeding depth and emergence timing. Gan and Stobbe (1995) also looked at varying seed depths on the emergence and yield of spring wheat. Their results indicated that the highest yields were found at shallow seeding depths. One can anticipate a reduced level of crop competition with weeds if emergence is delayed (Lafond and Harker, 2011). Knowing that delayed emergence can arise from seeding shallow in dry soil or from seeding too deep, addressing current soil moisture is a vital step before seeding. If targeting deeper seeding, using increased seeding rates and seed treatment is recommended. This will be especially important in fields that do not have extended rotations. Fields with short rotation are more likely to harbour seeding diseases that will impact emergence.

As mentioned above, uniform and even germination is important when we discuss crop establishment. When we are seeding into soil that is dry on the top couple of inches and moisture can be found below, there is a high likelihood of variable moisture through the top of the soil profile. For example, depth to moist soil may be 2-3" in low areas and 3-4" on knolls. There is no optimum seeding depth and emergence will be uneven. The remaining seeds will be stranded in dry soil. If this occurs, crop maturity will vary across the field. Attempting to place all of the seed into moisture may result in very deep seeding and some seedlings never emerging.

Conversely, if the seed is sown shallow (1.5-2") but above the level of soil moisture, when rains do occur, it is more likely the rainfall will evenly wet the soil to depth. Although germination may be delayed while waiting for rainfall, the seed is more likely to germinate and emerge evenly across the field.

It would be valuable for producers to walk some of their fields to determine soil moisture depth and variability of depth. Those fields that have moisture only below 2" may be better off seeding shallow and waiting for rain rather than seeding deep and risking variable germination. For fields that have a consistent moisture line between 1.5-2" may benefit from seeding closer to 2" if each seed is expected to be placed into moisture.

One question that needs to be considered when seeding into dry soils is "How much moisture is required to achieve germination?" Although germination of wheat and barley can occur at 35-40 per cent of field capacity (FC), 50 per cent FC is more likely to achieve even germination. A soil's FC is the maximum amount of water a soil can hold. Different textured soils hold different quantities of water before reaching FC. Taking time to walk fields to assess soil moisture can provide an indication of soil moisture at different depths across the field. Using a soil probe, collect soil at different depths and locations. The number of sample locations will vary based on field variability. Eight to 12 sample locations provide a good idea of field variability. Fields with higher variability may require more sample locations. After collecting a sample, use the visual hand-feel method to determine per cent FC. The information collected can then be used to help determine the appropriate seeding depth.



Additional considerations to mitigate risk when seeding into dry soils:

- Seeding rates
- Split nitrogen applications
- Fertilizer seed safety
- Seed treatments
- Herbicide carryover
- Pre-emergence herbicides

Seeding and mortality rates

Seeding into dry conditions adds stress to the germinating seed. Therefore, higher mortality rates may be expected. We can combat this by increasing seeding rates and expected mortality in our seeding rate calculation. Targeting higher seeding rates provides yield benefits for both wheat (Beres et al., 2011, Beres et al., 2020, Collier et al., 2021, and Isidro-Sanchez et al., 2017) and barley (O'Donovan et al., 2012 and Perrott et al., 2018). To help maintain target plant stands, increase your seeding rates to minimize the risk of a low population plant stand.

Split nitrogen applications

One option producer's can implement when seeding into dry conditions is reduced nitrogen (N) rates at the time of seeding. Applying 60-70% of normal N and planning to follow up with an in-crop application can reduce the risk of nitrogen going unused in a dry year. However, considerations around equipment, available labour, and timing of an in-crop N application around rainfall all need to be considered. If an in-crop nitrogen application cannot be completed, and rainfall returns to more normal levels, yields will be lower due to limited nitrogen availability.

Fertilizer Seed Safety

Recommended maximum nitrogen rates in the seed row are based on good soil moisture (75% of FC). However, if seedbed moisture is poor (less than 50% of FC), seed placed nitrogen should be reduced by 50% from the recommended rate. Applying rates above this will increase the risk of seed death due to fertilizer injury. For information on your N seed safety rates, locate your provincial recommendations.

Seed Treatment

As mentioned previously, seeding into dry conditions or seeding deeper will increase the risk of seed and seedling mortality. To reduce mortality risk, dual (fungicide + insecticide) seed treatments can be used. Dual seed treatments that include both an insecticide and a fungicide have been shown to increase the abiotic resistance of seedlings (Beres et al., 2016 and Larsen and Falk., 2013). This means that a seed

treated with a dual fungicide will have a greater chance of surviving dry or deep seeding conditions.

Herbicide Carryover and Pre-emergence Herbicides

Although not directly related to seeding, herbicide carryover and the use of pre-emergence herbicides must be considered. For herbicide carryover, many crops are vulnerable to Group 2, 4, and 27 herbicides. When considering whether herbicide carryover is a risk on your farm, look at the in-season rainfall after herbicide application time into September. Once soil temperatures drop in the fall, little herbicide breakdown occurs. Herbicide breakdown requires adequate soil moisture, temperature, and time. Breakdown occurs via soil microbes which require ample time under adequate soil moisture and temperature conditions. Herbicide carryover injuries may not show up until after a soaking rainfall event, which releases the herbicide from soil particles and washes it into the rooting zone. If rainfall after the use of herbicides in these groups is less than 150 mm, one can expect some risk of herbicide damage. More information on herbicide carryover risk by area, in Saskatchewan, can be found here.

Pre-emergence herbicide use has been on the rise for the past decade. This is due to several factors including implementing multiple modes of action on-farm to combat herbicide resistance. However, some pre-emergence herbicides require 'working' the product into the soil through some form of tillage such as heavy harrows. When soil conditions are already dry, incorporation of pre-emergence herbicides through tillage (even light tillage) will further reduce the soil moisture. Additionally, breaking up already dry soil may lead to increased wind erosion of the soil as well as increased risk of seedling damage from blowing soil particles.

Summary

Seeding into dry soil conditions creates added challenges and risks to the already complex process of seeding. However, taking the time to assess soil moisture can help to make the best decisions to increase the chances of an evenly germinated crop. Additionally, assessing the benefits of adjusted seeding rates, fertility rates, fertilizer seed safety, and seed treatments can provide some added measures to reduce risks for the seed and seedlings.

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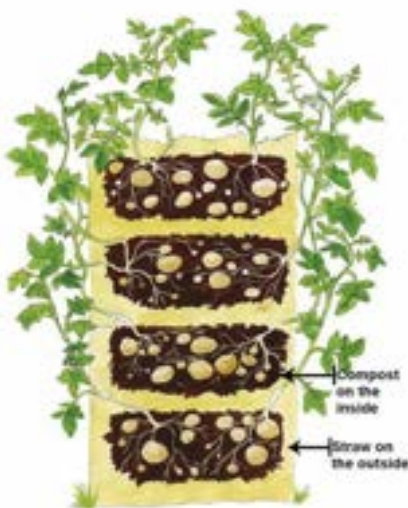
Original article published on April 12, 2021 is available at:
<https://www.albertagrains.com/the-growing-point/articles-library/seeding-wheat-and-barley-into-dry-soils>

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From the LARA Garden

by LARA Staff

New for the garden this year – we are going to plant potatoes in a tower garden. Tower gardens range from 2-4 feet tall and are comprised of wire fencing lined with straw and filled with straw and compost. While saving space and negating the need for deep tilling it also provides some disease control by keeping the potatoes contained and in fresh soil.



Another benefit is the lack of hilling the potatoes throughout the summer as they are basically hilled as they grow.

Once the plants have died back in the fall, the tower is tipped, and the potatoes collected.

The straw and compost can then be tilled into the rest of the garden to amend the soil.

We will also be trying out the trellis method for cucumber and squash. This is a simple technique of providing an upright support for the vines to climb.

Growing cucumbers on a trellis saves space as they are growing vertically. It also makes watering and harvesting easier as the cucumbers will be hanging rather than being hidden amongst the leaves. This also keeps the cucumbers cleaner as again; they are hanging and not growing on the soil itself.

Interested in seeing what we are doing?

Call us at 780-826-7260 or drop in at our Fort Kent office Monday to Friday.



Summary of Resilient Rotations, a project from Integrated Agronomy Cluster - Findings for Albertan Northern Prairies (2018-2021)

by Lance Ouellette, LARA

The objective of this project was to evaluate various crop rotations productivity, profitability, resiliency, and sustainability on the Canadian Prairies. Four sites were evaluated in the Northern Prairies, including two in Alberta (Beaverlodge and Lacombe).

1) Precipitation Use Efficiency

- There is not a consistently 'better' precipitation use efficiency rotation in the northern Canadian Prairies.
- Researchers did find a consistent trend for the soil health rotation to have lower precipitation use efficiency due to the lack of grain production in the green-manure phase of the rotation.

2) Yield and Yield Stability

- There was rarely one rotation that was the highest yielding at individual sites.
- When choosing a multiple high yielding rotation, select one with more than two crop species, and select for more pulse crops in rotation.
- The high-risk rotation had lower CEY in part because crops were not well suited to the environment where they were planted.
- The yield stability of the intensified rotation makes it well suited for managing yield and yield risks.

3) Net Revenue

- The most profitable rotations varied depending on the geographic region. The market driven and diversified rotations can have higher net returns while the soil health rotation consistently has some of the lowest net returns.
- The net returns associated with the market driven rotation are attributed to the high frequency of canola in the rotation and the high canola crop prices. However, the market driven rotation also has the highest input costs. It is important to note that the market driven rotation often has canola being grown in three of four years, which is an agronomically risky practice which is not recommended due to the long-term impacts of canola disease.
- The higher returns in the diversified rotation at Beaverlodge are driven by the good pea and faba bean yields.

PRECIPITATION USE EFFICIENCY BY CROP ROTATION IN ALBERTA, 2018-2021

Rotation Treatment	Crop Species Used Based on Local Growing Conditions				Precipitation Use Efficiency Ranking*	
	Year 1	Year 2	Year 3	Year 4	Beaverlodge	Lacombe
Control	Wheat	Pea	Wheat	Canola	●	●
Intensified	Wheat	Canola	Wheat	Canola	●	●
Diversified	Pea	Winter Wheat	Faba Bean	Canola	●	●
Market Driven	Canola	Malt Barley	Canola	Canola	●	●
High Risk	Flax	Soybean	Durum	Canola	●	●
Soil Health	Forage Pea Green Manure	Winter Wheat	Faba Bean	Canola	●	●

Precipitation Use Efficiency Ranking*

● = good precipitation use efficiency

● = statistically lower use efficiency

● = statistically lowest use efficiency

*Precipitation Use Efficiency Ranking is calculated by location

YIELD AND YIELD STABILITY BY CROP ROTATION IN ALBERTA, 2018-2021

Rotation Treatment	Crop Species Used Based on Local Growing Conditions				Canola Equivalent Yield Ranking of Various Crop Rotations*	
	Year 1	Year 2	Year 3	Year 4	Beaverlodge	Lacombe
The CEY at Beaverlodge was 1,516 kg ha ⁻¹ (27 bu ac ⁻¹). The CEY at Lacombe was 2,850 kg ha ⁻¹ (51 bu ac ⁻¹).						
Control	Wheat	Pea	Wheat	Canola	●	●
Intensified	Wheat	Canola	Wheat	Canola	●	●
Diversified	Pea	Winter Wheat	Faba Bean	Canola	●	●
Market Driven	Canola	Malt Barley	Canola	Canola	●	●
High Risk	Flax	Soybean	Durum	Canola	●	●
Soil Health	Forage Pea Green Manure	Winter Wheat	Faba Bean	Canola	●	●

Canola Equivalent Yield Ranking*

● = good CEY ● = statistically lower CEY ● = statistically lowest CEY

*CEY ranking is calculated by location

TEN-YEAR (2012-2021) AVERAGE INPUT PRICES FOR CROP ROTATION TREATMENTS USED TO CALCULATE NET REVENUE

Rotation Treatment	Seed Costs \$/acre	Fertilizer Costs \$/acre	Pesticide Costs \$/acre	Other Variable Costs \$/acre	Fixed Costs \$/acre	Total Cost \$/acre
Control	\$ 41	\$ 58	\$ 70	\$ 49	\$ 86	\$ 304
Intensified	\$ 53	\$ 50	\$ 73	\$ 53	\$ 91	\$ 320
Diversified	\$ 56	\$ 41	\$ 64	\$ 51	\$ 89	\$ 301
Market Driven	\$ 55	\$ 77	\$ 57	\$ 56	\$ 93	\$ 338
High Risk	\$ 63	\$ 48	\$ 59	\$ 49	\$ 88	\$ 307
Soil Health	\$ 54	\$ 39	\$ 51	\$ 42	\$ 78	\$ 264

Input costs were highest for the market driven rotation and significantly lowest for the soil health rotation.

NET RETURNS BY CROP ROTATION IN ALBERTA, 2018-2021

Rotation Treatment	Crop Species Used Based on Local Growing Conditions				Net Return Ranking of Various Crop Rotations*	
	Year 1	Year 2	Year 3	Year 4	Beaverlodge	Lacombe
The average net return of all rotations at Beaverlodge was \$6 ac ⁻¹ (the highest net returns were for the diversified rotation at \$57 ac ⁻¹). The average net return of all rotations at Lacombe was \$122 ac ⁻¹ (the highest net returns were for the market driven rotation at \$234 ac ⁻¹).						
Control	Wheat	Pea	Wheat	Canola		
Intensified	Wheat	Canola	Wheat	Canola		
Diversified	Pea	Winter Wheat	Faba Bean	Canola		
Market Driven	Canola	Malt Barley	Canola	Canola		
High Risk	Flax	Soybean	Durum	Canola		
Soil Health	Forage Pea Green Manure	Winter Wheat	Faba Bean	Canola		

Net Return Ranking*

= good net returns = statistically lower net returns = statistically lowest net returns

*Net Return ranking is calculated by location

NITROGEN USE EFFICIENCY (NUE) BY CROP ROTATION IN ALBERTA, 2018-2021

Rotation Treatment	Crop Species Used Based on Local Growing Conditions				Nitrogen Use Efficiency Ranking of Various Crop Rotations*	
	Year 1	Year 2	Year 3	Year 4	Beaverlodge	Lacombe
The average NUE of all rotations at Beaverlodge was 13.9 kg CEY/kg available N (0.28 bu CEY/lb available N). The highest NUE at Beaverlodge was for the diversified rotation at 19.4 kg CEY/kg available N (0.39 bu CEY/lb available N). The average NUE of all rotations at Lacombe was 17.3 kg CEY/kg available N (0.34 bu CEY/lb available N). The highest NUE at Lacombe was for the diversified rotation at 23.9 kg CEY/kg available N (0.48 bu CEY/lb available N).						
Control	Wheat	Pea	Wheat	Canola		
Intensified	Wheat	Canola	Wheat	Canola		
Diversified	Pea	Winter Wheat	Faba Bean	Canola		
Market Driven	Canola	Malt Barley	Canola	Canola		
High Risk	Flax	Soybean	Durum	Canola		
Soil Health	Forage Pea Green Manure	Winter Wheat	Faba Bean	Canola		

4) Nitrogen Use Efficiency

- The diversified rotation consistently had some of the highest nitrogen use efficiencies in the northern Prairies. This is likely attributed to having pulse crops in the rotation for two of four years and winter wheat which is able to make use of available nitrogen late in the fall and early in the spring.
- The soil health rotation significantly reduced the amount of nitrogen fertilizer (by approximately 1/3 to 2/3, depending on the location) applied compared with the control rotation; however, the soil health rotation did not have a high nitrogen use efficiency because of its low yield.

For More Information

More information on how these crop rotations stack up in terms of risk, economics and nutrient use will be covered in separate factsheets as part of this series. These results are based on the first four years of the study. More robust results are expected if a second four-year cycle of the study is completed.

This factsheet is part of a series by Resilient Rotations – a project of the Integrated Crop Agronomy Cluster – led by Kui Liu, AAFC Swift Current – the project examines the benefits and drawbacks of different crop rotation options for farmers across Western Canada. To find out more visit wgrf.ca/resilient-rotationsfactsheet

Reference

Resilient Rotations: Northern Prairies Rotation Factsheets, Western Grain Research Foundations. Available at: wgrf.ca/resilient-rotations-factsheet/



Nitrogen Use Efficiency Ranking*

= good nitrogen use efficiency = statistically lower nitrogen use efficiency = statistically lowest nitrogen use efficiency

*Nitrogen use efficiency ranking is calculated by location

Managing Through A Drought: Existing Forage Resources

by Beef Cattle Research Council

Taking stock of forages is an important first step in making a plan for drought. Knowing what you have for pasture, harvestable forages (or salvaged crops), and grains is the first step to determining if it is necessary to make the decision of buying feed or culling cattle.

When a drought happens, the benefits of a rotational grazing system will be particularly evident as plants need more time to recover when its dry. As grazed plants slow their growth, their ability to restore their root systems slows as well. During a drought, grazing plans should be flexible enough to extend periods of rest when possible.

One grazing strategy to consider during a drought is combining groups of animals. This will concentrate more animals in a single herd which decreases the number of paddocks/pastures being used at any one time. The result will be extended rest periods for the paddocks that the animals have been removed from. By combining herds, stock density will also be increased, which results in less selectivity by individual animals and more uniform grazing. As selectivity is reduced, animals will consume less-preferred plants. This leads to a greater variety of plant types being consumed as compared to more typical grazing behaviour. As animals consume the less-preferred plants, grazing pressure on the more desirable plants is reduced. Less severe grazing and increased recovery time protects more desirable plants from overuse during the dry period. It is always important to remember that grazing management decisions must continue to balance overall animal demand with total forage supply, including appropriate levels of utilization, and that timing of grazing and frequency must provide adequate rest and recovery.



As much as possible, management should be focused on leaving litter (plant residue) behind to provide shade and insulation to the soil surface, reducing soil temperatures and minimizing moisture loss through evaporation. When moisture is scarce, forage stands with adequate litter reserves will produce more forage than those with less litter¹. Litter is also critical when rain does occur in order to catch rain drops and prevent moisture loss through runoff, evaporation, and erosion.

Forage quality is affected by changes in temperature, light and water availability that occur during a drought. The effect of drought on quality parameters including crude protein, fibre and digestibility is variable, and any improvements may be offset by decreased yields. Nutrients such as vitamin A which is found in green leafy plants can also be limited in drought times. Unpredictable conditions and the varying effect on different plant species highlights the need for constant monitoring of forage quality and the importance of feed testing.

Intentionally grazing pastures with specific plant species that are more tolerant of increased grazing pressure is a wise management choice during drought. For example, crested wheatgrass pastures, if available, may be selected to be grazed earlier in the season and for longer periods than normal as this species is more tolerant of grazing pressure than many other forage sources. This will allow for reduced or deferred pressure on more grazing-sensitive plants.

In response to drought conditions, producers may need to consider ways to increase total forage supply in order to balance with animal demand. This may include seeding annual forages, making use of crops originally intended for grain production, renting additional pasture land, purchasing feed to supplement on pasture or feeding animals in pens. All options must be weighed against economic considerations.

Visit [beefresearch.ca](https://www.beefresearch.ca) for more resources and tools for managing forage resources through drought conditions.

Article source: <https://www.beefresearch.ca/topics/drought-management-strategies/>

Testing Dugout Water Quality for Livestock Consumption

by Alyssa Krawchuk, LARA

Dugout water quality can vary significantly, particularly during summer months when intense heat and low precipitation can cause reduced water availability and quality. Other factors such as runoff conditions, adjacent land use and livestock access can also cause changes to water quality in surface water sources.

With the unprecedented low precipitation levels seen in the Lakeland since 2021, many dugouts and other surface water sources are deteriorating alarmingly. A large number of dugouts ran dry last fall and this has led to significant changes in water quality. With dry conditions being predicted again for this summer, dugout testing should be considered a priority moving forward. Even small changes in water quality can lead to significant impacts on livestock health and performance.

A recent webinar series that LARA hosted which was funded by the Beef Cattle Research Council (BCRC) featured Dr. Cheryl Waldner and Dwayne Summach discussing short-term and long-term effects of poor water quality on livestock health and practical approaches to maintaining or improving water quality.

Cattle can consume as much as 80 L of water per day depending on environmental conditions and type of animal. Reduced water intake can lead to reduced feed intake and subsequent reduction in milk production. Reduced feed intake can also lead to issues with reproductive performance and nutritional imbalances.

When considering water quality and drought, Dr. Waldner highlights the constituents outlined in the Beef Cattle Research Council table to the right, all of which can be exacerbated by dry conditions. Dr. Waldner says that in some cases “a couple of weeks could see [surface water sources rapidly] slipping into danger zones [for total dissolved solids (TDS)].”

One of the easiest ways of managing water quality is through testing. Similar to feed sampling, obtaining a representative sample of the water livestock are drinking is essential for accurate results. In the case of dugout or surface water body sampling, this should mean reaching out four to five feet using a long pole with a bucket attached to the end. Items such as an extendable painters stick can be used. The sample should then be packaged in a clean bottle prior to sending to the lab. If fecal coliforms are a concern, samples must be rushed.

Water Constituents Affecting Beef Cattle Performance

Constituent	Reduced Performance	Unsuitable for Beef Cattle
Nitrate (ppm)	450 - 1,300	>1,300
Salinity/TDS (ppm)	3,000 - 7,000	>7,000
Sulphate (ppm)	500 - 3,300	>3,300
Fecal coliform (No./100ml)	1,000 - 2,500	>5,000
pH	>8.5	>10

Adapted from: Agriculture and Agri-Food Canada

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Prior to lab analysis, samples can be tested for electrical conductivity (EC) at home, which helps to measure total dissolved solids (TDS) and provides a quick indication of the sodium and sulphate levels in the water. Higher dissolved mineral content in water means a higher EC level. When EC levels test over 4000 mg/L, it is considered problematic. This can be done at home with an EC meter or refractometer.

Many producers are limited to the water sources that they have available and may not have other options should water quality become unusable to livestock. When water quality becomes a concern, some producers test water sources once per month, particularly if precipitation is low and water levels are decreasing. In a case study presented by Dwayne Summach from 2023 where a dugout was tested weekly showed that sulfate levels changed rapidly from June 9, 2023 to July 14, 2023. Electrical conductivity levels increased to the point it became unusable by the end of July.

According to Dr. Waldner, testing well water once or twice per year is adequate. However, it is recommended to test surface water monthly during use in both winter and summer conditions. However, if dugouts are dropping a foot a week, as seen in some cases last summer, Dwayne Summach recommends producers consider testing once per week for EC levels. Once EC levels exceed 6000 mg/L, cattle should be moved immediately.

Other options when EC levels rise include 1) hauling fresh water to a holding tank and trough, 2) dilution through mixing fresh clean water with the contaminated water source and 3) putting in a new well.

Job Opportunity!

Summer Agricultural Research Technician

LARA is looking for 2 ambitious and hard-working Summer Agricultural Research Technicians to be a part of our team.

In this position, you will work closely with our program coordinators and gain hands-on experience in all aspects of the applied research process. This includes field design and planning, implementation of projects, collecting and analyzing data and preparing extension activities.

If you enjoy time outdoors, you will appreciate the field work associated with agricultural research. Duties will include seeding, mowing, spraying, harvesting, plot maintenance and data collection. There will also be occasional handling of livestock.

Agricultural and machinery experience is considered an asset, but is not imperative as training will be provided. Applicants must hold a valid class 5 drivers license and have a safe driving record.

We are looking for someone with a genuine interest in the agriculture industry!

Please submit your resume and cover letter to:

Alyssa Krawchuk, Executive Director
Lakeland Agricultural Research Association
director@laraonline.ca



Funding Assistance

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CALL THE LARA OFFICE FOR MORE INFORMATION (780) 826-7260



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- Silage, haylage, greenfeed, hay, grain, pellets, protein supplements.
- Complete forage package including all macro and micro minerals
- Additional feed tests are \$40.00/test
- Nitrates is an additional \$10.00/test
- Toxins or other tests are an additional \$10.00/test

Hay probes are available at the Smoky Lake County Office and the LARA office in Fort Kent.

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JOHNSON-SU COMPOST BIOREACTOR WORKSHOP
- JULY 25, 2024**
FORT KENT SUMMER FIELD DAY
- JULY 30, 2024**
SMOKY LAKE SUMMER FIELD DAY
- AUGUST 1, 2024**
LAC LA BICHE SUMMER FIELD DAY
- AUGUST 6, 2024**
ST. PAUL SUMMER FIELD DAY

WATCH FOR MORE DETAILS AS IT BECOMES AVAILABLE AT WWW.LARAONLINE.CA



Lakeland Agricultural Research Association

Mission Statement:

*Lakeland Agricultural Research Association (LARA)
conducts innovative unbiased applied research and extension
supporting sustainable agriculture.*

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