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Forage Nutrient Management for Longevity

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Why was this project a priority?

Longevity and winter hardiness are two factors of great importance to northern forage producers; and several soil nutrients play a role in preventing winterkill. The Peace River Forage Association (PRFA of BC) was approached to evaluate the role of nutrients such as sulphur, potassium, phosphorus and boron in extending the longevity of forage stands. In the spring of 2001, there were many calls from ranchers concerned about alfalfa winterkill.

In response to these two requests, PRFA of BC partnered with several agribusinesses and agencies to undertake a 3 year project. First of all, they joined forces with BCMAFF staff to conduct a winterkill survey.

To evaluate the role of soil nutrients and forage quality, they partnered with Norwest Labs in Edmonton. In the initial years of nutrient applications, there were generous donations of product by Sulfer Works, and application discounts by Agrosource in Dawson Creek and Agricore United in Fort St. John. BCMAFF Crop Insurance provided a valued contribution in kind to weigh the bales at all the sites with their spike truck.

The first 2 years were partially funded by PRAD, but in 2003 the important partner was Soil Conservation Council of Canada through the Greenhouse Mitigation Program. The Beef Cattle Industry Development Fund provided the continuity as a funding partner over the full 3 years to ensure meaningful results.



Sandra and Paul Cowger
discussing the demo plot.

Objectives

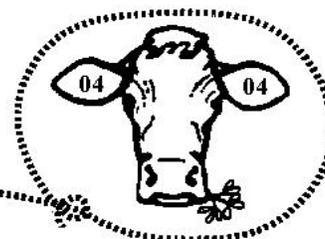
- ⇒ To identify nutrients important for winter hardiness and longevity (including nitrogen, phosphorus, potassium, sulphur and boron).
- ⇒ To conduct a survey of frost injury (bud ratings, root bark condition, root interior) and assess % winter survival.
- ⇒ To soil test selected areas of winterkill in the Peace region.
- ⇒ To document factors of winterkill (soil, climate, moisture, ice/ snow cover and grazing injury, management factors).
- ⇒ To evaluate specific nutrient amendments/ combinations to forage stands.
- ⇒ To evaluate economic returns for applying nutrients.

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Julie Robinson taking soil samples (each is a composite of 15 to 20 samples).

How were the plots done?

At each cooperator's site, comparisons were done between a control and a treatment where nutrients were applied as a NPKS blend or as manure. Other treatments were added at each site according to what the cooperator was especially interested in. (Table at right.)

Fields were monitored for 1 or 2 seasons following the treatments. Yields were taken both as clipped weights (12 per treatment) and at field scales by weighing the bales. Composite samples for forage quality were taken from each treatment. Composite soil samples were taken before and after the project.

How the winterkill survey was done is described separately in Forage Fact # 28: "What did we learn from the alfalfa winterkill survey?"

Name	List of Treatments
Cowger	Control, 2 rates of manure
Clarke	Control, NPKS blend, S95 only, KCl only, manure
Double M	Control, NPKS blend, S95 only, KCl only
Lazinchuk	Control, NPKS blend
Sutherland	Control, NPKS blend, S95 only, NPKS + S95

"Summarizing this Nutrient Management Project as Forage Facts is a producer-friendly way of sharing the information."
Glenn Hogberg,
Progress

Sharing Info About the Nutrient Management Project

There have been 3 project updates as powerpoint presentations at the AGMs of the Peace River Forage Association in 2001, 2002 and 2003. There have also been several Friendly Forage Field Days at the cooperators fields.

During the life of this project, a number of forage facts were produced to share information about nutrient management:

Forage Fact # 8: Sulphur - Important Animal & Plant Health

Forage Fact # 9: Pot of Gold at the End of the Barn

Forage Fact # 14: Potassium - A Role in Root Carbohydrates & Winter Hardiness

Forage Fact # 17: Phosphorus - Important to Healthy Animals & Plants

Forage Fact # 18: Feed Samples - Only as Good as the Sample You Take!

Forage Fact # 19: To Hay or Not To Hay - That is the Question

Forage Fact # 20: What's What in Feed Tests - A Vocabulary Enhancer

Forage Fact # 31: Maintaining Legumes in Your Pastures

The directors of the Peace River Forage Association of BC felt that a series of forage facts was a better format to share information at the end of this project than a lengthy thick report, that sits on a book shelf. The following combination represent the final report for this 3 year project:

Forage Fact # 28: What Did We Learn From the Alfalfa Winterkill Survey?

Forage Fact # 32: Forage Nutrient Management for Longevity Project

Forage Fact # 33: Cowgers Beef Up Carrying Capacity

Forage Fact # 34: Clarke's Boost Forage Quality

Forage Fact # 35: Double Treatments at Double M Ranch

Forage Fact # 36: Did Lazinchuks Get More Rain?

Forage Fact # 37: Sutherlands' Soil Says Peas Please



Lee Bowd, BCMAFF Crop Insurance, weighing the bales in each treatment and taking feed samples for quality.

This format also enables sharing the information with a larger group, since they can be printed from the website at www.peaceforage.bc.ca

Setting up these comparisons, collecting and compiling this information was part of the 3 year project called: Forage Nutrient Management for Longevity. See the website at www.peaceforage.bc.ca

This Project Reinforces Important Nutrient Management Factors

There are many reasons to supplement nutrients to a forage crop. Each of the cooperators had different objectives for their nutrient management plans including:

- ⇒ increasing stand longevity
- ⇒ improving forage quality
- ⇒ increasing carrying capacity
- ⇒ reducing alfalfa winterkill
- ⇒ improving soil quality, and
- ⇒ increasing yield, (the underlying theme in all).

The success of fertilization to address each of these reasons is driven by other factors as well. Moisture, soil chemistry, fertilization methods, type of fertilizers, cropping practices, stand condition or health and forage stand composition, amongst other things, can all affect the response to one degree or another. The only way to ensure that your objectives can be met is to soil test first!



Get to know your soil.

Water is an important nutrient

Water is a very important nutrient and if it is deficient, it will suppress the economic response of fertilization. Dry conditions in 2002 made water the limiting factor for forage growth. At the multi year sites at Clarkes' and Sutherlands', the residual effect of fertilization in 2001 may have been masked. Moisture undoubtedly had an affect at the other sites too. Proof of the importance of water as a nutrient is apparent in the moisture under the chopped straw cover at Lazinchuks' and the moisture additions with the liquid manure at Clarkes'. In both cases there is a marked improvement in yield, related at least in part, to available moisture.

There is also a relationship between organic matter in the soil and its water holding capacity. The smaller difference in yields between 2001 and 2002 at Sutherlands' when compared to the difference in yields at Clarkes' is related as much to the lower water holding capacity from lower organic matter in the soil as it is to the difference in rainfall.



Sutherlands' soil has very low OM% so it has less ability to carry over & hold water or nutrients into the next season.

Should we irrigate?

Or should we conserve moisture?

Looking at precipitation records, irrigation would pay in an average of 3 to 4 years out of 10 for most areas in the BC Peace, and perhaps somewhat more in the last decade. However, it is hard to pay for the equipment and infrastructure needed in such a short time frame.

A more economic alternative in this area is to conserve as much moisture as possible prior to and during those dry years. Method of moisture conservation include:

- ⇒ longer stubble and cutting heights,
- ⇒ cutting at difference heights,
- ⇒ wind breaks (planted vegetation, snow fence),
- ⇒ snow ridging,
- ⇒ building up organic matter (manuring, crop choices),
- ⇒ minimizing and/or timing of tillage operations.

However, to maximize the benefits of having the extra moisture you must also ensure there are adequate nutrients or the moisture will go unutilized. Also, proper fertilization can increase the water use efficiency of forage plants and allow them to draw water from deeper from the soil profile. This may be seen as a healthier regrowth in the late summer and fall that wouldn't necessarily be measured as hay yield on a one-cut system.

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Dale Fredrickson checks seed to soil contact.



Manure after swath grazing conditions soil.

“Soil testing is the only reliable method of determining what your soil needs to be at its best productivity.

Do you really want to be guessing on an expense as large as a fertilizer bill?

Jim Forbes

Key to longevity: be proactive when establishing stands

Management for stand longevity involves doing a lot of little things right and then getting favorable climatic conditions. Getting a stand to last as long as possible starts by getting it off on the right foot when you establish it,

and then looking after it along the way. The health and productivity of a forage stand depends on a healthy and productive soil with adequate nutrients. (see *Farm Forage Fact # 28 on nutrients & winterkill.*)

Manure more than fertilizer !

Manure is more than just a fertilizer, it is also a soil conditioner. Manure adds organic matter (OM), bacteria and provides a “timed” release of nutrients which works well with the ongoing requirements of growing plants. It can assist in buffering the pH (acidity) of the soil.

Additionally, manure may provide some of the trace elements depending on your mineral supplementation program for the livestock.

The organic matter in manure can also provide extra water holding capacity and soil moisture conservation benefits in dry conditions as discussed in the previous comments about water.

Probe into the economics

The economics of fertilizing is dependant on your operation, as well as what, how and how carefully you measure. A dairy producer is more likely to know how much the extra feed quality is worth to his operation and how much he can spend to get it. This is because a dairy producer can see the results of his fertilization program improving the quality of feed for the cows almost immediately in the milk tank.

While yield of a hay crop can be relatively easy to measure, sometimes important information is lost in the details. Many producers think of their yields in terms of bales per acre, assuming that the bales are going to be the same weight because they were made by the same operator & baler. This assumption can be misleading (eg. fertilized bales were 13% heavier at Lazinechuks). Also, most Peace producers are using a one-cut system, thus the amount of regrowth is not taken into account even though it is an important part of the economics.

On the other hand, a beef producer may believe that the genetics of the bulls was responsible for that extra 35 to 50 lbs on the weaned calves rather than attributing it to the improved feed quality of the pasture. Feed quality may also have an affect on other factors that are hard to measure or pinpoint such as herd health and pregnancy rates.

Another commonly overlooked detail can be the change in feed prices. In a dry year when feed prices increase it takes a smaller improvement in yield to cover the cost of the fertilizer. While it is more difficult to put numbers to factors like reducing winterkill and improving soil quality, they are important considerations.

Compiled by: Sandra Burton, Jim Forbes & Julie Robinson in April, 2004.

Forage Nutrient Management for Longevity Project Funded in 2003 by:

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