Prairie Steward

Farming For Your Future Environment

The Newsletter of the Saskatchewan Soil Conservation Association Inc. Spring Issue No. 41, 2004

Forages, Cattle and Greenhouse Gases

By Tim Nerbas, PAg
Conservation Agrologist

"Beef cattle produce more than 90% of the greenhouse gases contributed by the livestock sector." Ouch. But other than the environment why should we care about statistics like these? Because, these emissions represent a loss of costly feed energy and nutrient inputs.

So, where does one start?

"Improving pasture quality will improve profitability, productivity and reduce Green House Gases (GHGs)," says Dr. John Basarab, a research scientist with the Western Forage Beef Group in Lacombe, Alberta. The relationship between forage quality and methane emissions is startling. Research shows methane emissions increase by nearly 50% as cattle move from high quality, vegetative, grass forage found in spring pastures to poor quality, more mature pastures in the fall.

So how can you improve your pastures' quality? One of the easiest ways is by improving soil fertility. By encouraging more vegetative growth, pasture quality is significantly improved. Tillage is another significant problem. Whenever you cultivate soil you lose a portion of soil carbon. Tillage has been used to control weeds and prepare seedbeds, but its main use has been to release nutrients stored in the soil organic matter. Over time, the mining of soil nutrients is exhausted. Production declines and a greater reliance on inorganic fertilizers for plant growth occurs. Thus perennials are better for pasture maintenance largely because perennials have more root material that rebuild soil organic matter than do annuals.

Many producers feel it is necessary to break up pastures because they have lost productivity. Generally regarded as having become root bound. But perennial forages can be long-lived pastures under good pasture management. Just like grain crops, soil fertility is crucial to ensure vigorous competitive forages. Through grazing, cattle efficiently spread manure back on the land but additional plant nutrition is necessary to maintain peak production. Additional plant fertility could come from inorganic fertilizers or spreading of composted manure.

Breaking up and reseeding forages should be looked at as a last resort. Using tillage is expensive, leaves the soil prone to erosion, and generally means losing one year of production.

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In This Issue

President's Message: SSCA Continues its Work on the Carbon Issue

By John Clair
SSCA President

This is my final report to the membership as President. I would like to take a few minutes to reflect on my 6 years as director.

First and foremost, I want to thank the staff for their outstanding contribution to soil conservation and the SSCA. By making research information available in producer meetings, annual conference, field days (and the many days of plot work) and the Prairie Steward, farmers have had the opportunity to make decisions that have improved the management of their soils and hopefully their bottom line. My term started in Feb of 1998. At that time, Saskatchewan had about 30% of its crop land in Minimum or Zero-till: today, that number approaches 50%. In my view, as I look at our sister prairie provinces and see their considerably lower numbers, I think a lot of credit should go to the staff of SSCA for their leadership in extension. If farmers in this province had not moved forward when they did and made a major change in their tillage practices, I can not imagine how much dirt would have been in the air the past few summers. The other major impact would have been a much larger deficit in our crop insurance program with the drought of the last number of years.

I want to thank the membership for their support and commend them for moving forward in tough times. Representing the membership, there is another group that I want to thank for having the opportunity to work with. I've worked with a very dedicated group of Directors - thank you for having the patience to work with me. I have to single out one director in particular, John Bennett. If it hadn't been for John's insight into the Carbon Issue, farmers would not be playing a leading role in the development of Federal Policy on Carbon today.

Looking at farming for a moment, we have seen advances in farm machinery and plant breeding. There have also been additional chemicals made available and improvements in fertilizer. We have made advances in agronomic research but, in my view, if any area is falling behind, this is it. Starting with soil testing and continuing right through until the grain is shipped, we need more refined information. For instance, we need better information on fertilizer requirements and placement as we fine tune Zero-till. Other questions as basic as "How much value do we receive from seed treatment?" Simply put, we need to be able to ask agronomic questions and quickly get a response so that we can take appropriate action to save money or, at the very least, make better use of it. One of my favorite lines has been, " I know how to farm better, I just can't afford to". I think a more appropriate line for today is " I need to farm smarter to survive".

Comparing farming to SSCA, our organization has also had to do more with less.

In my mind, the biggest struggle this organization has had over the past 6 years, and continues to have, is funding. I want to thank the members, organizations and government that have had the vision to support SSCA financially, so that we can do the work we do. It is much appreciated. With additional support, we could do so much more. The challenge to the future Board of Directors is to think 'outside the box' and develop ways and means of moving forward in very uncertain times.

May agriculture grow and prosper and farmers receive just returns for their endeavors. ●

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Monsanto

2004: A Year in Transition

By Blair McClinton, PAg
SSCA Executive Manager

2004 will continue to be a transitional year for the SSCA. While SSCA continues to receive a major portion of its funding through the Greenhouse Gas Mitigation Program and Ducks Unlimited Canada, funding from other sources is falling off. If no new funding is found, SSCA will be forced to reduce staff levels over the next few months.

Last fall, Monsanto went through its second restructuring in less than a year and a half. They are continuing to shift their focus away from the Roundup business and into seed traits. As a result, Monsanto will not enter into any new arrangement with SSCA. However, for 2004, Monsanto will provide SSCA with $75,000 (50% of its previous level) to help with the transition.

In 2000, the Government of Saskatchewan agreed to provide SSCA with $200,000 per year for three years. At the time, this funding helped SSCA maintain a portion of its field programs. We had hoped that this funding support would continue after the three-year period. The government's support will continue for an additional three years but the level of funding is greatly reduced ($150,000 over 3 years).

It is not all doom and gloom. There are still some funding opportunities on the horizon through both Greencover Canada and the environmental component of the "Agriculture Policy Framework." However, while there may be good opportunities for funding through these programs, they are not expected to be rolled out until sometime this spring or summer.

Unfortunately, funding problems are nothing new to SSCA. They are very frustrating for both the board and staff who are forced to spend considerable time and effort securing funding. We recognize that new solutions need to be found. To this end, the board is currently exploring the potential of different, and hopefully more stable, funding alternatives. ●

Low-Cost GPS Receivers for the Farm

By Garry Noble, PAg
Extension Agrologist
SAFRR

Last summer, Kent Shannon, associate director of the Missouri Precision Agriculture Center compared 12 recreational GPS receivers to a $40,000 surveyor's GPS. The accuracy of GPS receivers has improved with the availability of the Wide Area Augmentation System (WAAS).

In the United States the Federal Aviation Administration commissioned the WAAS network in July 2003 to improve the accuracy, availability and integrity of GPS navigation. Signals from GPS satellites are received by reference stations on the ground, relayed to master stations where corrections are made. The corrected signal is sent via an uplink to geostationary satellites orbiting over the equator for broadcast across the US and Alaska. The WAAS broadcast improves GPS signal accuracy from 20 meters to 1.5 - 2 meters. Thanks to the FAA stations in Alaska, most of western Canada has WAAS coverage. The WAAS signal is free to the public.

Kent Shannon measured the accuracy of low-cost GPS receivers and found all the WAAS-enabled handhelds performed well, within a 5 ft accuracy of the $40,000 unit. Those with a quad-helix antenna performed better than hand-helds with a patch antenna. Hooking an external antenna to a handheld improves signal reception for use in a combine or tractor cab.

Hand-held GPS receivers costing less than $400 Cdn can be used to measure the acreage of fields, locate weed patches for spot spraying and mark soil sampling sites. Nine of the GPS receivers from Garmin, Lowrance and Magellan that Kent Shannon tested are available in Canada from Radio Shack, Canadian Tire, Wal-Mart and independent retailers. Specifications for the GPS receivers are available online at: **www.garmin.com** , **www.magellangps.com** , and **www.lowrance.com** . Please call the Rural Service Centre 642-7227 for a list of the GPS receivers tested by the Missouri Precision Agriculture Centre.

....and yield mapping too

In May 2000, President Clinton announced the removal of Selective Availability (SA), an error intentionally induced in the GPS signal for national security reasons. With the accuracy of hand-held GPS receivers improving from 100 to 20 feet, Kent Shannon conducted an experiment to answer the question "Can a $300 GPS Receiver Be Used for Yield Mapping?". In 2001 Shannon mounted a low-cost GPS receiver and a differentially corrected GPS receiver on the same combine. The yield maps from a wheat field prepared with data from both systems were similar. The full report is available online at **http://www.fse.missouri.edu/mpac/pubs/EngineeringTech.htm**

WAAS enabled hand-held GPS receivers should increase the accuracy of yield mapping even more.

The University of Tennessee Agricultural Extension Service published a 3-page publication **"GPS Options for Precision Agriculture" in December 2002,** which provides information on purchasing a handheld GPS receiver for use on the farm **http://bioengr.ag.utk.edu/Extension/ExtProg/Precision/pubs/GPSOptionsforPrecisionAgriculture.pdf**

Virginia Cooperative Extension released an 8-page publication in July 2003 which provides an explanation of the GPS System including a section on using handheld GPS receivers for precision farming and a glossary of GPS / DGPS terms. "Precision Farming Tools: Global Positioning System (GPS)" is available online at **http://www.ext.vt.edu.pubs/bse/442-503/442/503.html** . ●

Grazing Club Members Learn by Trial & Error

By Juanita Polegi, PAg
Assistant Manager

The members of the Meachem Hills Forage Club like to try new crops and practises on their individual farms and assess the performance of these under their conditions. Only one rule applies: in order for a project to get the nod from the Club, the members must be able to use the equipment available either on their own farm or from within the community. So while some crops and ideas might look appealing, if they can't be seeded or harvested or applied using the available resources, then the project doesn't get off the shelf.

Ron Nowoselski, from Colonsay, is the current president of the club. He reported that the club formed in 2000. "Our club was formed when some neighbours and the local RM ADD Committee got together to look for different ways to diversify and add income to the farm", he said. The club has about 30 members and meets a couple of times per month.

In July of 2003, I had the opportunity to attend the Club's annual summer field day. We drove to a number of fields and pastures, listening to each producer explain what he did, how he did it and what might be the expected results. The diverse projects generated a lot of questions and good discussion. Projects included new forage crops, new varieties and different fertilizing techniques.

Our first stop was at a field of Roundup Ready corn owned by Ron Nowoselski. This is Ron's 4th year of growing corn. He seeds with an air seeder using splitter boots on 12 inch spacings. In order to have a firm enough seed bed, Ron coil packs about 3 times.

The corn was seeded on the 14th of May at a rate of 32,000 seeds / acre (or about 14 lbs / ac) and it took 2 weeks to emerge. Ron has found that the corn is not a good competitor against weeds so he applied 0.5 l / ac of Roundup just as the corn emerged and then another 1.0 l / ac 2 weeks later.

Ron's plan for the corn was to use it for winter grazing. During the winters of 01 & 02, he found he was able to graze about 105 cows / acre / day. He moved the electric fence every 2 or 3 days and found the cows would graze the corn stalks down to about 3 – 4 inches from the soil surface. With the amount of moisture and heat in 2003, he was hoping to get more grazing days this winter. Grazing commenced on

Ron Nowoselski indcates how much the Roundup Ready corn grew in just a couple of days. During its peak growth, the corn grew 11 inches July 9-14; 13.5 inches July 14-18 and 15.75 inches July 18-25. Ron was able to get 240 grazing days off this corn.

December 13. Ron estimates that he will be able to get about 200 cow days / acre from the corn. The average weight of the cows is 1350 lbs.

Mark Steckler's field of cicer milk vetch, alfalfa and a hybrid Meadow Brome Grass was the next stop on the tour. Mark seeded the perennials in 2 ways. Most of the field was seeded to Baylor oats at a rate of 1 bu / ac and underseeded to the forages. He cut out a plot on the corner of the field where no cover crop was seeded. He seeded both the field and the plot on May 31with an air drill and paired row openers, applying 45 lbs / ac N and 23lbs / ac $P_2 0_5$. In 2004, Mark will evaluate how well the forages established with and without a cover crop. As the field will be turned into pasture, Mark and his brother wanted a mixture that could withstand grazing. They chose cicer milk vetch because it stays green longer in the year and the alfalfa variety because its crown is below the soil surface enabling the plant to withstand hoof damage.

A Forage Fertility trial, which began in 2000, was the next stop on the tour. A soil test in 2000 revealed to Ron Nowoselski that his hay field of Meadow Brome Grass and Crested Wheat Grass required 80 lbs of $P_2 0_5$. No amount of N would have helped the yields of those grasses with such phosphate deficient soils. To apply the phosphate, Ron decided to try 2 different methods. He rented a coulter bar for $4 / acre. Using liquid, he coultered in and dribble banded (by lifting the coulters out of the ground) 50 lbs / acre actual N and 25 lbs / acre of $P_2 0_5$. Ron indicated that since the grasses have responded well to the phosphate regardless of the application method, in future, he will apply the phosphate using the dribble band method. Ron had a couple of interesting observations about the grass that had received fertilizer and the check strip which had not. "I found that there was more grass growth and fewer weeds where the grass had been fertilized", he said. "And in early spring, even at 60 mph, you could see the difference from the road!"

Another interesting observation was that the cows prefer to graze the fertilized grass first. And the fertilized grass is ready for grazing in the spring 10 – 14

days earlier than the unfertilized area. As the phosphate levels are beginning to rebound, Ron may apply only N fertilizer in 2004, but he will do a soil test before he makes a final decision.

From there we moved over to a 30 acre pasture with an 8 year old Crested Wheat stand owned by Don Pidlinsy. In 1999, Don had broadcast 50 lbs of 46-0-0 to the stand. Even though the pasture received a good amount of rainfall, the yield was disappointing. The plants were thin and spindly. In 2000, the soil test indicated that only 8 & 9 lbs / acre of Nitrogen and Phosphorous respectively were plant available. Don applied both Nitrogen and Phosphate to the pasture beginning in 2000. Clippings were collected and submitted to the Western Beef Development Centre. After just one year of a balanced fertility program, the Dry Matter production had increased by 270%!

The protein content of the fertilized grass was 14% while that of the check strip was only 8%. In 2003, Don was able to graze 13 head of cattle from May 11 to July 11. Not bad for a stand that just a couple of years ago could have been worked under because of its low productivity.

Tm Koral's native pasture was our next stop. Étienne Soulodre, better known as Steve, a Rangeland Agrologist with the Sask. Watershed Authority, led the tour in a discussion about managing native range land. Étienne indicated that good grass management is important for water fowl, water quality and Carbon sequestration. When conducting a range assessment in the Dark Brown Soil Zone, he said a number of grasses including Spear grass, needle & thread grass, Western porcupine grass, Hooker's oat grass and Western & Northern wheat grasses are all good producers. These species, however, can be replaced over time with sedges. The sedges are not desirable in a pasture as they are very low lying. And the presence of pasture sage is an indicator that the range needs to be rested. While precipitation plays an important role in grass production, another important determinant of next year's yield potential is the amount of litter (plant material) left behind at the end of the growing season. Depending on soil and range type, Étienne said that at least 400 lbs / ac litter must be kept from one year to the next. "It takes about a year for native range to recover from a once-over grazing so it must be managed differently than a seeded pasture," he advised.

From native range we moved on to a field of turnips owned by Jerry Hrechuk . The appeal of the turnips as an alternative feed source is that they can be treated much like canola and grazed 2 –3 times. Jerry seeded Marco turnips (the bulb type) May 29 at 5 lbs / ac into oat stubble cut for green feed. He seeded with a Mid Row Bander at a depth of about 1.5 inches. 51 lbs / ac actual N, 20 of P and 10 of S were applied at seeding. The soil was very dry at seeding. He sprayed twice for flea beetles and grass hoppers. In theory, 60 – 90 days after emergence, the cows can be allowed to graze the tops. By late September, early October, the bulbs can be grazed although, due to the high moisture and protein content, at least 25% of the diet should include some grass or straw. (See the May 2003 edition of Grainews Section 2 for more info on grazing turnips). Jerry's turnips had very patchy emergence and were quite weedy, even though he had applied Muster Gold. Before seeding another crop of turnips, Jerry will likely apply some Edge.

Mark Steckler and Dave Hryhor, Extension Agrologist with SAFRR talk about underseeding Baylor oats to cicer milkvetch and alfalfa.

Despite the patchy emergence and lack of rainfall, Jerry was surprised at how well the turnips yielded. "Even though we had flea beetle problems early in their growth and the grasshoppers played havoc with their tops, we were able to put 60 cows and calves out there for the better part of 2 weeks this fall," reported Jerry. Jerry turned the cows out on the turnips and another pasture the first week of October. "The cows completely cleaned up the turnips. And then, for the last 3 or 4 days, they went to the other pasture, but they kept going back to the turnip field". While Jerry got 2 weeks of grazing from the turnips, he hasn't yet figured out the cost / day / cow.

Another member of the club, who farms near Bruno, also grew turnips in 2003. Shaun Stadnyk chose the Tyfon variety (leafy type) and seeded the turnips on May 28. He applied 0.5 l / ac Roundup 4 days after seeding. His turnips emerged fairly evenly and established well. Like Jerry, he had to spray for flea beetles after emergence. He, too, got only one grazing off his turnips. "We put the cattle on the turnips at the end of July as the heat was taking its toll and the plants were beginning to wilt," he explained. "It was a situation of we had to use them or lose them". Shaun was able to put 80 Animal Units on the 40 acres of turnips for 34 days. He figures that if the field had received an inch or two more rain he may have been able to get a second grazing off them but the heat and the return of the flea beetles didn't allow the plants to recover. As for the cost of grazing turnips, Shaun indicated that he would need to get more than one grazing in a season for turnips to be an economic addition to a forage rotation.

The members of the Meachem Hills Grazing Club have many interests as evidenced by the diverse projects they have going. Their willingness to share their successes and mistakes with one another is a great way for each member to evaluate the potential for each project on his own farm. The members of the club seem to have an open mind about the various projects. Their enthusiasm for trying new things is a sure indicator that this is one producer club that will be operating for a long time. ●

More Seeding Tool Retrofits

By Garry Mayerle, PAg
Conservation Agrologist

Saskatchewan farmers continue to look for ways to make direct seeding work on their farms and within their budgets. Two NE producers explain how lower budget seeding tools have worked in the seeding operation on their farms.

Bob Clarke started out direct seeding about 10 years ago. He farms and has been in a liquid fertilizer dealership for 18 years located on the northern fringe of Sask. crop land, just a few miles west of Choiceland. His farm and the dealership site are on highway #55 in the gray soil zone. The soils there vary a lot in texture over short distances but he farms mostly sandy loams and loamy sands. He crops 700 acres annually growing wheat and barley, canola, flax and peas.

As with many producers, he made some parts of the leap to direct seeding as small as possible. He had been seeding with a hoe drill and he was able to find another hoe drill that had residue clearance and had already been retrofitted to do one pass seeding with liquid fertilizer. It was a 20 feet 9450 John Deere hoe drill with mid row band coulters added. This drill has cultivator shanks in 3 rows with regular light cultivator trips rather than the steel down spouts the older hoe drills had. Residue clearance is great on these drills.

The front frame on this drill had been extended 2 feet to mount K-Hart parallel lift coulters 14 inches apart between every other seed shank. These coulters lift independently from the seed shanks on their own rock shaft. Liquid fertilizer is distributed with a pressurized system to squirt out just behind the coulters in the furrow they make. These coulters are able to swivel a little so Bob says they follow around curves very nicely. They pull easily and do very little soil disturbance.

In the last few years, Bob decided he would like to get his fertilizer closer to the seed. He had been placing all the N, P, and S as a liquid blend with the coulters. Their soils are deficient in K so he spreads 200 to 300 lb / ac of dry potash fertilizer on about 1 / 3 of his acres annually to build up K levels. When Bob tried just lifting the coulters out of the ground and dribbling the fertilizer on the surface he found that there was enough soil movement from the seed shanks which are on 7 inch spacings to cover up the fertilizer. He saw no difference in crop response.

Clarke's JD 9450 hoedrill modified with K-Hart liquid MRB coulters and Gen eagle beak openers.

His next step was to change seed openers and run the fertilizer down beside the seed row. Bob had been using John Deere 2.5 inch wrap-around hoe openers. He switched to Gen H4 eagle beak openers last spring. These openers weren't as straight up and down or as wide as the hoe openers so they pulled easier and moved less soil even at 0.5 mph faster. He now seeds at 5 mph and is pleased to find that he has better closure on the back seed rows than he did at slower speeds with the John Deere hoe openers. Henry Bergen with Gen Manufacturing says the key feature of these openers is the funnel shaped feature which directs the seeds into a nice tight band at the bottom of the trench created by the tip.

To place the fertilizer, he welded a piece of Gen's ½ inch chrome wear bar on the side of the opener. He runs a ¼ inch stainless steel tube down behind the bar to squirt the liquid at about the depth the seed is being placed at and ¾ to 1 inch to the side of the seed. Bob is very happy with the results and says they went up to 80 and 90 lb of N / ac with canola with no problem. He expects to get 3000 ac on these openers before he changes the $9 replaceable tip. The openers retail at $26 and for another $15 will buy a carbide tip. Bob says he saw very little wear on the side bar last year and feels once the tip opens up the soil, there is enough fracturing that the side bar is not breaking much new ground.

Next year Bob may try placing some fertilizer with the coulter and some down the seed row. He has been pleased with his seeding unit. His fields are pretty much together so he doesn't have to worry about moving the steel press wheels too far on gravel roads. He can seed about 10 ac / hr when he is rolling. Bob says his seeding unit is a "poor man's air drill."

Darrell Fedak farms in a partnership with his wife Colleen east of Watson. Darrel purchased a Bourgault 8810 in 97 and seeded with shovels and spread boots for several years. In 2001 he switched to 1.75 inch wide Hoe Openers from Bourgault Tillage Tools and 3 inch wide Valley Systems shank mounted packers.

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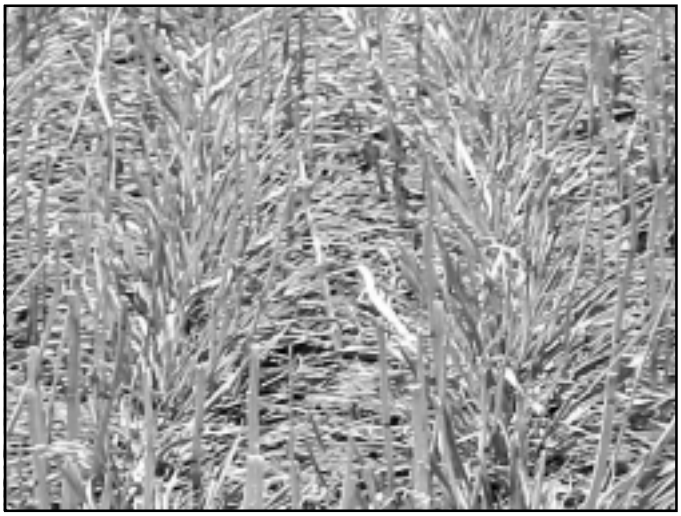
Nitrogen Application Options for Winter Wheat

By Richard Szwydky, PAg
Conservation Agrologist

One of the greatest challenges for even the most experienced winter wheat grower is making nitrogen fertilizer decisions. Which product to use, when to apply it, and how to place it are the main factors winter wheat producers have to consider when making their fertilizer decisions states Larry Durand, winter wheat agrologist for Ducks Unlimited.

The traditional method of fertilizing winter wheat is to broadcast ammonium nitrate (34-0-0) in the early spring when the field is able to support the weight of the equipment. 34-0-0 was traditionally used because it showed the most consistent yield and quality responses when compared to broadcast urea and urea ammonia nitrate. However, with the reduced availability and higher price, 34-0-0 may no longer be an option for winter wheat growers. On the positive side, advancements in direct seeding equipment, openers and dribble band technology have given producers other efficient alternatives to fertilizing winter wheat.



Picture of winter wheat taken shortly before freeze up.

The following article investigates the pros and cons of the nitrogen application timing options currently being utilized by Saskatchewan producers. The fertilizer application options include:

- At seeding application
- Late fall application
- Early spring application
- Late spring application
- Latter stages for protein production
- Any combination of the above in a split application system

Nitrogen fertilizer application at seeding:

With one pass seeding, many producers would prefer to apply all their crops' fertilizer requirements during the seeding operation, in a seed placed, side band or a mid row band scenario. All the nitrogen applied at this stage will eliminate a second pass at a later date, saving time, labor and fuel costs. Traditionally nitrogen costs have been significantly cheaper (by up to 20%) in the fall than the following spring.

There are, however, issues to consider when placing all the crops' fertilizer needs in the early fall. One issue is the risk of nitrogen loss to either leaching or denitrification. Once nitrogen is applied into the warmer soils in late August or early September (the traditional date to seed winter wheat) the nitrogen will rapidly convert to the nitrate form. This leaves the nutrient prone to deep leaching out of the rooting zone under very wet soils or loss as a gas into the atmosphere through the denitrification process.

The second issue with nitrogen applications at seeding relates to concerns about reduced winter survival. Producers in Manitoba and Saskatchewan have noticed plant reductions in the spring especially with seed placed nitrogen fertilizer. This leads researchers to believe that losses in winter hardiness may occur, resulting in a negative effect on crop yield, quality, and weed competition. Research in southern Alberta, however, has shown that yield, plant populations and winter hardiness were not affected with fall applied nitrogen fertilizer.

Nitrogen fertilizer applications in late fall:

Many producers are beginning to apply nitrogen fertilizer in the late fall when the winter wheat is dormant and the ground is frozen. 34-0-0 and 46-0-0 can be broadcast while 28-0-0 can be dribble banded on the soil surface. With surface banding, the nitrogen will eventually move into the rooting zone with the snow melt water. The advantages of late fall application would once again be the significant time, labor and fuel savings coupled with the usually cheaper fall nitrogen prices. Since the wheat is dormant in the late fall, nitrogen application at this stage will not stimulate fall growth, which has a tendency to reduce winter hardiness.

Producers should also consider the disadvantages of late fall nitrogen applications. The nitrogen will be exposed to denitrification and leaching losses, provided it has converted to the nitrate form. Due to surface applications at this time of the year, the nitrogen will be exposed to two more soil processes that may affect plant nitrogen uptake - immobilization and volatilization. Immobilization is the tie up of nutrients in the surface straw and trash layer, while volatilization is the gaseous loss of nitrogen to the atmosphere. Coulter banding in the late fall into the frozen soil is an option that will help improve the nitrogen use efficiency, provided the coulters are able to slice into the partially frozen soil to do an adequate job of fertilizer placement.

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Fertilizer Options - Swift Current Site

By Eric Oliver, PAg
Conservation Agrologist

Efficient use of fertilizer is a major concern for farmers, especially when the cost of nitrogen, in particular, has been reaching unprecedented levels. They want the biggest bang for their buck on inputs and can't afford to be otherwise. Efficient use of nitrogen is also important in reducing greenhouse gas emissions. Research has shown that double shooting fertilizer is a more efficient method of application than single shooting by keeping the fertilizer in a narrow, concentrated row. However, producers using single shoot systems also have limitations in how much fertilizer, especially nitrogen, that can be applied safely with the seed. So what options are there for producers who single shoot fertilizer to increase the amount of nitrogen applied?

There are several options available, such as broadcasting, fall and spring deep banding, or using liquid fertilizer, either as a split application or at the time of seeding. There is also the option of using slow release fertilizers. In 2003, SSCA contracted a few of the Agri-Arm sites to conduct an applied research project looking at comparing two slow release fertilizer products at different application rates applied with the seed, to two sidebanded treatments and two split application treatments. The Wheatland Conservation Area conducted the study at Swift Current. It is the findings at that site that I will describe.

Two slow release fertilizers were used in this study. Agrotain is commercially available and distributed by Philom Bios. The other is a polymer coated nitrogen fertilizer that is produced by Agrium, but is not yet registered for use or commercially available. Both slow release fertilizer products will allow higher rates of nitrogen to be safely seed placed, although they each use a different method to accomplish the same result. Agrotain is a urease inhibitor, which is a liquid product that when applied to urea, slows the conversion of the urea to a plant available form. At the full rate, Agrotain will slow the release of urea for up to two weeks. The other slow release product uses a polymer coating on the urea granules that acts as a mechanical barrier to release. The coating slowly breaks down in the presence of soil moisture, releasing the nitrogen. Both products require adequate soil moisture for the chemical reaction to occur. The presence of adequate soil moisture is especially important to Agrotain. If the soil is dry during that 2 week protection period and the seed germinates after that time, then essentially the seed will not be protected from the effects of the nitrogen.

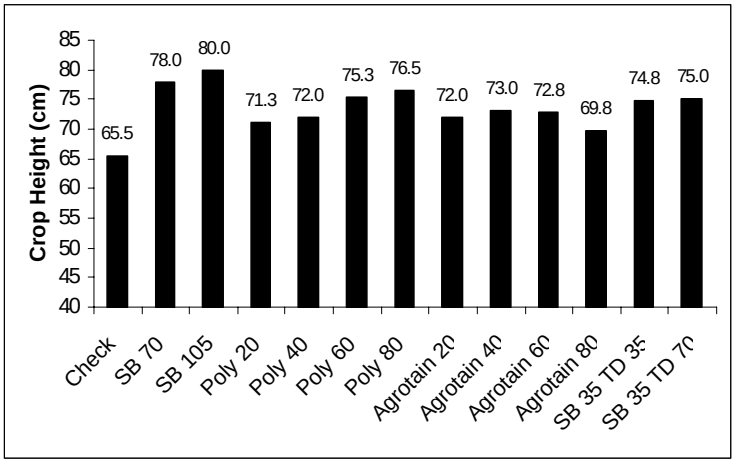


Figure 1: Average crop heights of wheat in Slow Release Fertilizer Study, Swift Current, Sk, 2003.

The polymer-coated product also needs moisture present to break down the coating. However, if it is dry at seeding, the coating won't break down and release the nitrogen until adequate moisture is present. As a result, the seed is less likely to suffer damage when it is dry.

Wheat and Clearfield canola were used in this study at Swift Current. Although soil moisture reserves were excellent at time of seeding, the combination of drought and high temperatures at the time the canola was flowering caused severe yield reductions in the canola treatments. While there were some differences between some of the treatments, yields only ranged between 3.9 to 5.98 bu / ac. Therefore, I will focus only on the treatments with wheat.

The double shooted treatments were seeded using the Stealth sideband boot and the single shoot treatments were seeded with 3 inch spreader tips. All treatments were seeded on 9 inch row spacing. Treatments were replicated four times and included a check strip with no fertilizer, sidebanded treatments using 70 and 105 lbs / ac of actual N, and single shoot treatments using 20, 40, 60 and 80 lbs / ac of actual

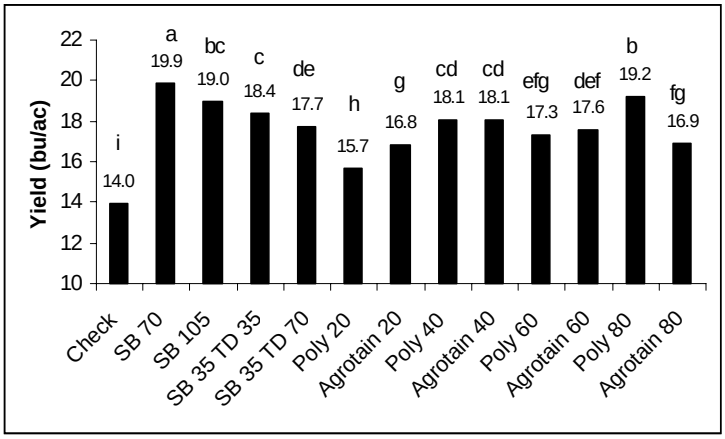


Figure 2: Wheat yield means (bu/ac) in Slow Release Fertilizer Study, Swift Current, 2003. LSD = 0.64 Letters the same indicate no significant difference.

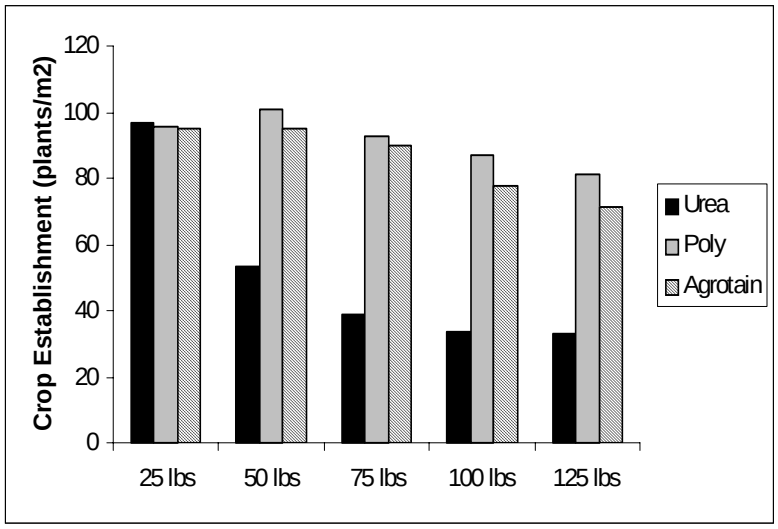


Figure 3: Average crop establishment of wheat in Slow Release Fertilizer Study. Aneroid, SK, 2000.

N using the two slow release fertilizer products.

The recommendation for using Agrotain in a single shoot system is for no more than 1.5 times the rate of urea recommended in the SAFRR Fact Sheet "Guidelines for safe rates of fertilizer applied with the seed". Using this guide, the maximum amount of nitrogen that could be safely applied with the seed using a 3 inch spreader tip opener on 9 inch row spacings and with a medium textured soil, was 40 lbs / ac. However, up to two times the recommended rate was used to see what the effect might be. Finally, there was a split application treatment using 35 lbs / ac of actual N sidebanded at the time of seeding and then had an application of liquid fertilizer dribbled on at two rates; 35 and 70 lbs / ac of actual N on the wheat. The split application of liquid fertilizer was applied prior to the 5 leaf stage in wheat.

The crop establishment for wheat really didn't differ all that much between treatments in the wheat. With excellent soil moisture, the slow release fertilizer products performed very well. Early crop development was also very good, however, it was evident the wheat treatments with the 20 lb / ac N rate was not supplying enough nitrogen to the crop judging by the lighter colour of the crop, shorter height and narrower leaves. There were no visible differences between the slow release treatments from 40 to 80 lbs / ac N rates early on. The two sidebanded treatments tended to have a taller, more lush crop than the other treatments (Figure 1). However, the drought and heat stress changed the yield potential of the crop.

Of note were the sidebanded and the sideband / top dressed treatments. In both cases, the lower nitrogen rate treatments produced a higher yield than the higher rate treatments (Figure 2). With good early season soil moisture, the higher nitrogen treatment produced a taller, more lush crop. But when the drought stress hit, the plant had to maintain the top growth that was already there. As a result, yield was sacrificed. With the seed-placed slow release fertilizer treatments, it was evident early on that the 20 lb / ac N rate was not enough fertilizer. The crop in both 20 lb / ac treatments was not as green and had narrower leaves than the higher nitrogen rate treatments. They were also some of the lowest yielding treatments. There was no significant difference in yield between slow release fertilizer products at the 40 and 60 lb / ac nitrogen rates. However, there was a significant difference in yield between both slow release products at the 20 and 80 lb / ac nitrogen rates. The polymer coated nitrogen had a higher yield at the 80 nitrogen rate but yielded less than the Agrotain treatment at the 20 lb / ac rate. The large spread in yield between the two slow release fertilizer products at the 80 lb / ac N rate may well be a result of the different mechanism each product uses to slow the release of the nitrogen. Not all the urea is released at the same time with the polymer coated product, whereas most of the urea is released after the two week period with Agrotain. This tends to reinforce the maximum recommended rate of 1.5x the rate of untreated urea when using Agrotain. Interestingly, the 40 lb / ac nitrogen rate yielded higher than the 60 lb / ac rate.

A similar study conducted by SSCA at Aneroid, SK in 2000 produced results in a year with very good growing season conditions. This study also used both Agrotain and the polymer coated nitrogen with the same row spacing and using a 3 inch spreader tip opener on a sandy loam soil. Under this soil, row spacing and seedbed utilization, the recommended maximum safe rate of seed-placed nitrogen with wheat is 30 lbs / ac. This study also compared the two slow release fertilizers to untreated urea. Much higher rates of nitrogen were used in this study, largely to see how far one could push the rates and still get some protection. Although there was some reduction in plant establishment after the 75 lbs / ac N rate in both slow release fertilizer products, the crop establishment with untreated urea dropped dramatically after the 25 lbs / ac N rate (Figure3). Normally there would be even more of a reduction in crop establishment in the untreated urea treatments except that two inches

Table 1: Wheat yield means of wheat in Slow Release Fertilizer Study, Aneroid, SK, 2000.

	Rate of Nitrogen					
	0 lb / ac	25 lb / ac	50 l / ac	75 lb / ac	100 lb / ac	125 lb / ac
Urea		22.70 g	17.55 h	16.60 hi	15.62 i	13.59 j
Polymer		28.96 f	36.10 d	38.24 c	40.49 a	38.50 bc
Agrotain		27.88 f	34.82 e	39.72 a	36.43 d	38.57 b
Check	11.74 k					
LSD = 1.9 letters the same indicate no significant difference.						

CONTINUED PAGE 19

Blizzard Didn't Stop Conference

By Juanita Polegi, PAg
Assistant Manager

The blizzard that hit southern Saskatchewan on February 10 couldn't stop the 16th Annual SSCA Conference from beginning February 11. Heavy snow, white-out conditions and icy roads created a real challenge for many delegates and speakers as they made their way to Regina. But once the farm lanes and highways were open, about 700 people from all over the province registered for the Conference.

The Conference began with a bit of a scramble as we learned that our Key Note speaker, Michele Payn-Knoper, was grounded in Minneapolis. Two other morning session speakers were unable to drive from Saskatoon. It was decided to delay the opening of the Conference for an hour. This allowed the farmers to spend some extra time in the full sized trade show and the Board and Staff to make alternate arrangements for speakers.

Fortunately, Dr. Guy Lafond and John Bennett volunteered to fill in with presentations of their own. Dr. Lafond's presentation focused on New Research and its Implications for Direct Seeding. John Bennett discussed the policies and the politics behind Carbon trading. Dr. Reynald Lemke ended the morning session with his presentation on how direct seeding has impacted air quality with regards to CO_2 and N_20.

At the Annual Meeting of the SSCA, Laura Reiter from Radisson and Daniel O'Reilly from Scout Lake joined the Board of Directors. They replace John Clair and Perry Leach whose terms have now expired. Following the meeting, Darryl Reynolds from Nokomis was elected the new President.

From L to R: Barry Book, RBC Royal Bank co-sponsor of the Award; Ernie Luchsinger; Tim Nerbas, SSCA. Ernie and Ramone Luchsinger of Rosthern received the Conservation Farm Family Award at the Conference banquet. Congratulations Ernie and Ramone!

By the afternoon of February 11, all the speakers had arrived and the delegates continued to make their way to the Queen City. The Advanced Direct Seeding and Beginning Direct Seeding sessions were held concurrently.

From L to R: Barry Book, RBC Royal Bank co-sponsor of the Award; Gord Hultgreen, humbolt; Tim Nerbas, SSCA. The Award of Merit is presented to an individual who has shown outstanding leadership in the area of soil conservation. Gordon Hultgreen, through his research and extension efforts, has played a major role in the adoption of soil conservation practices across the province. Congratulation Gord!

The afternoon ended with high school students from Lumsden and Waldheim participating in the Environmental Ag Challenge arranged through Agriculture in the Classroom. The students were to take into account the changing economic, political, climatic and environmental conditions and then develop a plan for the next 5, 10 and 15 years for a fictitious 2,100 acre farm near Maidstone, Saskatchewan. Their plans looked at Soil Conservation Practices, Diversification, Greenhouse Gas Emissions, Carbon Sinks, Profitability, the Kyoto Protocol and Climatic Predictions.

Each team was allowed 15 minutes for their presentation. Questions from the audience followed. The students put a great deal of time and effort into the project. Both teams posed some interesting solutions and suggestions for the farm.

At the banquet that evening, the SSCA was pleased that the Honourable Clay Serby, Deputy Premier and Minister of Saskatchewan Agriculture, Food & Rural Revitalization was present. In his remarks, Mr. Serby expressed his government's gratitude for the work the SSCA does, and the tremendous impact direct seeding has had on the Saskatchewan landscape. He added that the SSCA and its members have made a difference in the way agriculture and farming are being practised today.

Following Mr. Serby's comments, Barry Book from RBC Royal Bank presented Gord Hultgreen with the

Following the SSCA's Annual Meeting, John Clair's term as President ended and Daryl Reynolds was elected a the new President. At the banquet, John (at right) passed the gavel to Daryl. Thanks John for a successful year under your leadership. And to Daryl, we wish you well!

Award of Merit. Mr. Book then presented Ernie & Ramone Luchsinger of Rosthern with the Conservation Farm Family Award.

The ever popular informal Bear Pits concluded the evening. These informal sessions are popular with both the producers and researchers for the exchange of information that occurs between the two groups.

Day 2 of the Conference dawned sunny and warm. Many of the delegates who weren't able to arrive for Day 1, were able to attend Day 2. The sessions on Day 2 included Nutrient Dynamics, Forages & Livestock, Rotation Issues and Hot Issues. Dr. David Biesenthal of Walkerton, Ontario certainly captured everyone's attention as he related his family's experience with the Walkerton Water crisis. He emphasized over and over the need for accurate, daily record keeping and the benefits of an Environmental Farm Plan.

Kevin Hursh's closing address, *The Good Ol' Days are Gone – Thank Goodness!* was a provocative look at how farming on the prairies has changed over the years, most often for the better. He asked if any one of us could go back to the open air tractors and combines? Could any one of us once again get up at 5 to milk the cows before we put in a full day's seeding? Kevin went on to discuss the challenges we face in agriculture today and pointed out the many opportunities we have yet to explore.

Overall, the 16th Annual Conference has been deemed a success. The SSCA appreciates the efforts of all the farmers and speakers who did their best to attend the Conference. The SSCA also appreciates the perseverance of the many trade show exhibitors who pushed through less than ideal conditions on the morning of the 11th to ensure that their booths were up and running for the farmers to visit. Truly, everyone made the best of a bad situation. Does a blizzard the day before a Conference keep the farmers away? Not in Saskatchewan. Besides, we needed the moisture!

Copies of the Proceedings from the SSCA's 16th Annual Conference "Direct Seeding: The Key to Sustainable Management" are available from each of the Conservation Agrologists and the SSCA Head Office. The price? Only $10! ●

Dr. David Biesenthal of Walkerton, Ontario, held the crowd's attention as he described how his family farm were put under intense scrutiny following the Walkerton Water Crisis. Dr. Biesenthal encoraged every farming operation to undertake an Environmental Farm Plan and to keep detailed daily records. Dr. Biesenthal pointed out that he, his family and the farm were eventually cleared of any wrong-doing, but if it had not been for his records, the outcome could have been very different.

Seager Wheeler Field Day June 2

The 10th Annual Seager Wheeler Field Day will be held June 2 at the Seager Wheeler Farm 7 km east of Rosthern on Highway #312.

Gates open at 8:00 am and the registration fee is $10 / person. The program begins at 9:15.

Highlights of the day include:

Direct Seeding demonstration, Sprayer demonstration, Forage Seeding & Production, Forage Seeding equipment demonstration, Gardening & Horticulture Seminar, Winter Wheat Production demonstration and a Producer Panel. The Producer Panel will focus on the challenges and opportunities direct seeding has presented for each member of the panel..

In the event of inclement weather, the alternate date will be June 4.

New to the Direct Seeding Community

By Travis Goebel, PAg
Conservation Agrologist

Brian Petracek owns and operates his farm, Dandilee Agro Inc., north of Gerald Saskatchewan in the black soil zone. He started farming in 1969 with two quarters of land. Brian raised and showed polled Herford cattle in the early years of the farm. He became interested in special crops in 1972 and began producing lentils and field peas. In 1987 Brian began experimenting with the spice crop coriander. His interest continued and he expanded into cropping dill seed, caraway seed, borage seed and annual ryegrass.

The farm dispersed the cattle herd in 1989 and continued diversification into oil seed and spice crops. Brian maintains diversification in his business by operating a special crop trading company, Dandilee Spice Corp. They purchase crops from producers in Western Canada and Northern USA and market the crop through out the world. Brian's crop rotation now includes the spice crops, marrowfat peas and canola. Borage, dill, and wheat are grown when the market warrants production.

Brian has been interested in zero tillage for years. He has not had summerfallow since 1980. The first drill purchased was a Morris Seed Rite. This seemed to work well and was effective in reducing pre-seeding passes. He then made the switch to a Bourgault FH528-32 field cultivator with a 138-air tank and 8-inch spacing. For many years Brian would apply NH_3 in the fall and direct seed with high disturbance 11inch sweeps applying phosphate with the seed then follow up with the harrow packer.

Brian has been contemplating zero tillage for a few years. He did not get all the NH_3 down in the fall of 2002 and the moisture conditions were a concern. This was a perfect opportunity for Brian to retrofit his existing system and try minimum disturbance direct seeding on the acres he had not fertilized in the fall. Brian converted his Bourgault air seeder into a low disturbance direct seeding system with the addition of Bourgault knoc-on ¾ inch tipped openers with a side band liquid wing. Rubber K-Hart packers were mounted on the back of the toolbar. The nitrogen fertilizer is applied as a liquid in the side band and all other nutrients are placed with the seed. Brian manufactured a piece of curved metal tubing on the opener in his shop to decrease the costs of the switch. He also made his own manifolds for the liquid system to keep the costs to a minimum. Brian found himself able to save quite a bit of money by doing a little bit of innovative thinking and acting on his ideas. The original plan was to have the system quickly interchangeable to allow for high disturbance seeding again. Brian has one year experience now and is very doubtful the change back will ever happen.

Bourgault airseeder retrofitted into a LDS system

I was able to be at the farm with Brian when the new system entered the soil for the first time. The changeover did not take much time to accomplish once the parts were made and organized. We spent plenty of time leveling the system front to back and side to side making sure the depth was uniform across the toolbar. The amount of packing pressure the packers would exert and alignment of packer to opener was also adjusted. It took some time, but eventually we had the system ready to go. Brian was very excited and relieved once the system was running properly in the ground. He had a good feeling about direct seeding right from the beginning. Our main concern was seeding depth and proper packing. Brian cautions farmers regarding getting the seed into the hard, low organic matter soil for the first years of zero till. Time needs to be taken adjusting the seeding depth as soil conditions change.

Brian was pleased with the zero till crops compared to the conventional crops. There were no wrecks with the zero till system but the conventional had a quarter section of canola that needed to be re-seeded due to poor establishment. Moisture conditions were poor during the 2003 growing season, only 2 inches of rain, but still he had canola yields exceeding 30 bushels per acre. Brian noticed reduced weed growth between the rows but in the rows, the populations were still sufficient enough to warrant a herbicide spray.

The fall is also an important time for direct seeders. Brian uses a CaseIH Axial Flow combine with a 25-foot straight cut header. It has a home built Kirby type chaff spreader with a modified straw spreader. This system does an acceptable job of spreading and Brian does not anticipate any plugging problems in the spring. Brian did no fall tillage or harrowing but does see the importance of fall weed control. A large percentage of his acres were treated with post harvest glyphosate to control nasty perennial weeds. Brian is a veteran when it comes to Round-up application because weed control is very important when dealing with different types of perennial special crops.

Time will tell as to how direct seeding will fit into Dandilee Agro Inc. but for now the outlook is good and the results, so far, are exceptional. It takes years to nourish soil back to a healthy state and Brian is on his way. He admits there are many benefits with zero tillage but also new hurdles ahead. Brian sums up with this "Our farm has never been so big that the work load was extremely hard to handle, but with the switch I can see that I will have more time to devote to the trading part of our operation or my golf game."

FORAGES, CATTLE AND GREENHOUSE GASES ... CONTINUED FROM PAGE 1

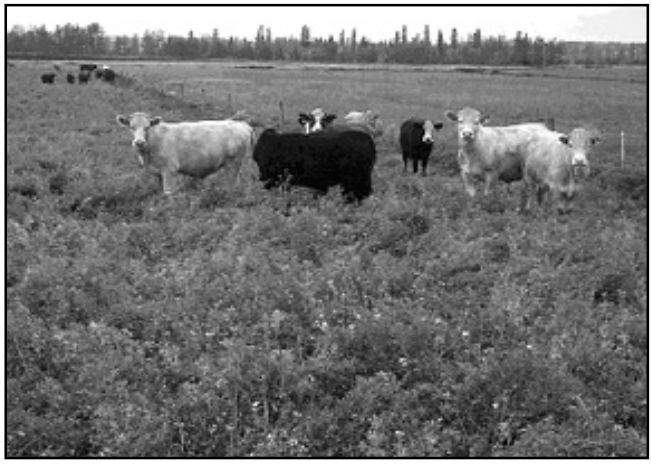
If stand termination is considered necessary, it can be done effectively using herbicides instead of tillage. Re-establishment is an excellent opportunity to change the make-up of forages in the stand. The mix of forages is an important consideration. Grass / legume combinations are good. Legumes can fix their own nitrogen, creating a more balanced system. As well, adding as little as 25% legume in your forage will result in significant drops in methane production because it greatly improves the efficiency of fermentation in the rumen.

To get the best use of better pastures, producers must use better grazing management techniques. But developing a high quality pasture is all for not if cattle are allowed to overgraze it. Rotational grazing helps maintain even pasture growth, which reduces weed encroachment and promotes a healthy forage stand.

Intensive grazing management techniques, while far more time intensive, are perhaps the most economically productive methods. By dividing pasture into carefully selected paddock areas, the producer determines grazing periods for each paddock depending on the number of animals, the growth rate of key forage species, the time needed for these forages to recover from grazing periods, moisture conditions, and the time of year. Though intensive grazing management requires daily monitoring of grass growth, animals' conditions, and deciding when to move livestock, the payoff is optimal use of pastures, both economically and environmentally.

Adair Ramsell is one producer who is making rotational grazing work. Ramsell, who raises cattle near Paradise Hill, Sask. has been pasturing approximately 100 cow / calf pairs on 200 acres of tame pasture. Virtually all the pasture was seeded to meadow brome grass and alfalfa between 1980 to 1984. His success has been achieved by utilizing good pasture management. He has a half section of land but he does not allow cattle to graze in the areas of bush or along the creek. His land is rolling, and ranges from sandy to loam in texture. Ramsell has seven paddocks that the cattle are rotated through. If pasture growth is excellent he will divide a paddock in half to manage the forage better. In general the cattle spend about 5 to 6 days in a paddock before being moved. His grazing season starts between June 1st to the 15th. His main determining factor is that there is six inches of new plant growth before the cattle are put on pasture.

With healthier, better-managed pastures, the producer can get a fairer evaluation of the herd itself. This evaluation should begin with the feed. Feeding higher quality feeds and balancing rations for energy, protein, minerals and vitamins results in greater feed efficiency and fewer methane emissions.



However not all cattle perform equally on even the most optimal of diets. Some animals are more efficient than others in using the nutrients in their feed. For example, animals in the same pen on the same diet may have the same weight gain, but some will do it by eating three kilograms less feed per day. But how can these genetic lines be easily and efficiently selected? Research headed by John Basarab of the Western Forage / Beef Group indicates that residual feed intake (RFI) can be used as a beef efficiency trait independent of body size and growth.

"Like a golf score, cattle with negative RFI have reduced feed intake but similar average daily gain as cattle with high or positive RFI," says Basarab. "We suggest that using the new residual feed intake trait as a selection tool for cattle would lead to savings in feed costs and a reduction in methane emissions by cattle."

Less feed through the animal means less manure from the animal. That's critical. Research shows that more than 80% of the nitrogen animals digest is excreted in their manure and urine. Therefore, waste management is crucial in light of its economic and environmental impact. Allowing cattle to spread their own manure through well-managed pasturing saves money and cuts emissions. Only small amounts of GHGs are released from manure deposited directly on the soils by livestock. Feeding winter rations over a large area, frequently moving the bedding pile, and feeding on level ground or gentle slopes are all ways to ensure a more uniform distribution of manure.

Manure can also be used as inorganic fertilizer. Adair Ramsell completes regular soil nutrient and manure nutrient tests to determine available nutrients in each. These tests help avoid over-application. The timing of manure spreading affects GHG emissions. Fall and winter manure spreading should be minimized if not eliminated. By spreading the manure on actively growing forages, the amount of GHG emissions can be significantly reduced. If excess nitrogen is available in the spring, large N_2O losses can occur.

The jury is still out on which method of managing manure stocks is most economical and emission-free. Composting is currently being reviewed for its ability to meet these requirements. By composting, Ramsell produces a stabilized product that is greatly reduced in volume and mass. This means fewer trips to the field for disposal, hence lower fuel costs and less exhaust emissions. Currently passive and active composting methods are being compared to determine which method produces the fewest emissions.

Although cattle have been a significant contributor of GHG's by the livestock sector in the past, research shows us that if we concentrate on improving our pasture quality, not only do we become more profitable, we also benefit the environment.

Prairie Agriculture In a Changing Climate

By David Larsen, PAg
Conservation Agrologist

As I write this article (middle of January), it is raining. In other parts of the country there is record cold. Within Saskatchewan there is large amounts of snow in traditionally dry areas while there is a lack of snow in areas where there is normally snow in abundance. Are these just strange occurrences, or is this part of something larger?

Current and past weather makes an easy argument for the presence of global warming. Weather is naturally variable and strange things do occur. However, there is little doubt among world scientist that global warming is occurring and will continue to increase in severity. The Intergovernmental Panel on Climate Change (IPCC) is a collaboration of scientists that reviewed climate data and the trends that impact climate. They described the current state of understanding of the climate system and provided estimations of its projected future trends. The observations of this group indicate a warming world and other changes to the climate system (see Table 1).

Evidence of climate change is abundant. Glaciers are melting at unprecedented rates. Snow cover has decreased by 10% since 1960. Arctic sea ice is also thinning by up to 40% since the 1950's. Global surface air temperature has increased since 1861. In the 20th century, surface air temperature has increased 0.6±0.2°C. The temperature increase in the 20th century has been larger than any other century in the past 1000 years. In the Northern Hemisphere, the 1990's were the decade with the largest temperature increase while 1998 was the warmest year on record. The frequency and intensity of droughts has increased as has the warm episodes of El-Niño.

There are many variables that affect the climate. External factors such as changes to the earth's orbit around the sun and solar activity will impact climate. Volcanic activity, aerosols, land use and other factors that affect the solar reflectance will also impact the climate. But the single greatest factor affecting the climate has been burning of fossil fuels. Carbon dioxide released from burning of fossil fuels, along with nitrous oxide and methane are the greenhouse gases that reduce the amount of radiation able to leave the earth's atmosphere. Increased amounts of greenhouse gases mean an increased rate of global warming.

The global effects are expected to be monumental. A recent *Nature* journal article has linked global warming to the mass extinction of 17 to 35% of plant and animal species by 2050. The projected impact of global warming on the well being of the world population led the British government's chief scientific advisor to declare global warming a bigger threat than terrorism.

What does this mean for agriculture? While it's true warmer winters wouldn't be a bad thing for most people; most of the effects of global warming on the prairies won't be beneficial.

"Implementation of the Kyoto Accord will almost certainly lead to an increase in fuel and fertilizer costs. However, implementation of the Kyoto Accord will also likely create benefits for farmers."

Global warming has featured prominently in the agricultural news with the possible implementation of the Kyoto Accord. Implementation of the Kyoto Accord will almost certainly lead to an increase in fuel and fertilizer costs. However, implementation of the Kyoto Accord will also likely create benefits for farmers. The SSCA has also been working diligently to lobby for recognition and compensation for producers that adopt practices that sequester carbon. This compensation will help offset some of the direct costs of efforts to reduce the greenhouse gases.

Rising costs of production and possible compensation for sequestered carbon are only the immediately visible aspects of climate

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Table 1. Projections for the Future Climate of the Prairies

Temperature	Increasing, greater in winter than summer, greater at night than during the day
Precipitation	Great uncertainty, annually small decrease to significant increase
Evaporation	Significant increase
Soil Moisture	Decrease
Growing Season	Increased length
Water Resources	Increased variability, earlier peak flows
Extreme Events	Increased frequency and magnitude

Carbon Sink Offset Trades, Hits and Misses

By John Bennett
Advisor to the SSCA Board

To help you blitz through this there are three sections. First a brief background of some of the politics and the history behind Carbon Offsets. The second section explains some of the past deals that have been proposed, deals that failed, a near miss, and one small success. The last section speculates on what the future might look like.

There is little doubt that Organic Matter will have value. It is less certain that that value will be returned to the farm gate by the market place. Under the worst case scenario, the market will transfer the value from the farm to the emitter and the emission liability will transfer from the emitter to the farmer. The offset is created when CO_2 is removed from the atmosphere. The liability is the emission created if the sink is lost and the CO_2 is returned to the atmosphere. The removal potential is huge but the liability of maintaining the sink in perpetuity to maintain atmospheric integrity could be enormous.

***Part One*: The Background**

The global science community has had serious concerns about "Anthropogenic (Human) influence" on climate. Simply put burning fossil fuels, deforesting the planet and creating other GHG (Green House Gases) are affecting the climate. A series of international meetings starting in Montreal in 1988 resulted in the Kyoto Protocol.

At the talks in Marrakech, Canada succeeded in having Agricultural soils included as sinks. The Marrakech round recognized both ERUs (Emission Reduction Units) and RMUs (Removal Units or sinks) as offsets that would be tradable internationally. Canada later ratified the Kyoto accord, which will come into force when or if Russia ratifies.

Where does this leave farmers in the market place? U.S. firms are suggesting that as a result of trade agreements such as NAFTA and GATT, the U.S. can't be excluded from potentially profitable emission offset markets. Some U.S. firms are pursuing ag offsets in South America and have ag representatives in Canada as well.

North of the 49th, the Federal government is working on the rules for a domestic carbon offset market. Emitters on both sides of the border are speculative buyers and are willing to buy offsets if they are cheap enough before formal market mechanisms are in place. Carbon offsets are listed on both the Winnipeg Commodity Exchange and Chicago Climate Exchange (CCEX -likely not associated with the Chicago Commodity Exchange). I don't think that Winnipeg has seen any activity and the CCEX had a low volume of approximately 30,000 tonnes @ $1.00 a tonne as of December 2003. Neither the volume nor price is anything to get excited about.

"There is little doubt that Organic Matter will have value. It is less certain that that value will be returned to the farm gate by the market place. Under the worst case scenario, the market will transfer the value from the farm to the emitter and the emission liability will transfer from the emitter to the farmer."

The CCEX has set guidelines for soil carbon participation, namely an entering group has to represent a minimum of 10,000 tonnes of carbon and has to commit to 4 years of continuous conservation tillage, and must not plant soybeans for more than two years.. Farmers will be paid at the rate of 0.15 tonnes of carbon per acre. Carbon offsets generated from grassland planted after Jan 1 1999 may also get credit at the rate of 0.21 tonnes per acre. Maintenance Liability is not assigned as part of the contract.

***Part Two*: Deals, Failures, Near Misses and One Small Success**

In Canada, a carbon lease contract was discussed between a group of representatives from MANDAK (Manitoba-North Dakota Zero Till Assoc.), ACTS (Alberta Conservation Tillage), SSCA (Saskatchewan Soil Conservation Association) and the IFAO (Innovative Farmers of Ontario) and two different emitters.

The first discussion was brief when the buyer was only interested in purchasing offsets and in leaving the maintenance liability with the producer.

The second discussion was on a lease concept. This looked promising until the Canadian government grudgingly revealed the plan to divide Canadian Ag sinks offset credits into two pools. One pool called BAUs (business as usual), would be appropriated by the federal government, returning no value to farmers. The Farmer would own the other "tradable" pool returning value to the farm gate. Since there was no definition about which offsets would be the property of the farmer (tradable) and whichat offsets would be property of the government (not tradable), the discussions ground to a halt. The U.S. government in the latest farm bill (1605?) has confirmed that Carbon Credits belong to the landowner.

The Alberta government attempted to facilitate a sink trade between farmers and emitters. Discussions were domi-

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Plans for Spring Underway at CLC

By Laurie Hayes, MSc PAg
Manager, Conservation Learning Centre

We are gearing up for another year – many new projects on the go and the continuation of others. We will be showcasing a some new varieties on a field-scale in 2004: 5020 InVigor canola, 5601HR hard red spring wheat, CDC Copeland malt barley and CDC Imagine (Clearfield) hard red spring wheat, as well as Snowbird hard white wheat, MilleniUM 03 and Bethune flax again. We will also have some plots of new canola varieties (Brett-Young Seeds, Dekalb, BASF) and perennial and annual forage varieties. Demonstrations of new products include canola (Prosper, Helix XTra) and flax (VitaFlax) seed treatments, cereal (Stratego, Headline) and canola (Lance) fungicides and Roundup WeatherMax.

We will be using Milligan Bio-Tech's canola biodiesel fuel additive in our equipment. The precision agriculture project continues with funding assistance from federal sources. The rotational grazing project initiated by Ducks Unlimited was seeded last summer. This spring a field day will be held with PFRA demonstrating the trenching of the water pipelines. We will continue to compile a wild plant collection (we have over 90 plant species collected and pressed to date). We will be working on developing some farm safety demonstrations for both our young and experienced visitors.

The major project that we are working on now is implementing a system for alternative energy generation. Coupled with that project is one on the effect of early harvest and grain drying on grain quality. We hope to get all the funding and partners lined up and be operational by this fall.

We had a number of interesting projects in 2003:

· A trial (four replicated plots of 54' x 250' each) was established to determine the effect of **canola seed size** on maturity, yield, oil and contribution margin. Regular and large size seed of the variety MilleniUM 03 were used. Germination, seed weight and plants counts were 92% vs 96%, 4.3 vs 5.1 g / 1000 seeds and 129 vs 89 plants per m for the regular and large seed respectively. Original seed size had very little effect on oil (43.0% vs. 43.3%) and erucic acid (48.9 vs 47.8%) content. Marginal differences are seen in yield (21.3 vs 20.2 bu / ac), dockage (3.95% vs 3.72%), green (0.4% and 0.65%) and damaged seed (0.85% and 0.65%) but these have not been tested statistically. *Cooperators: CanAmera Foods, Canola Council of Canada*

· Best management practices for the injection of swine manure in the production of annual crops (wheat) were demonstrated as a Greenhouse Gas Mitigation Project for Canadian Agriculture. The demonstration also showed the negative agronomic effects of over application of swine manure. Amount (3000, 6000 or 9000 gal / ac — 90, 180, 270 lb N / ac), timing of application (pre-seed, post-emergent) and type of fertilizer (manure, commercial granular 46-0-0, no fertilizer) had no impact on crude protein content of the wheat. Increased amounts of swine manure injected pre-seed did not have any effect on yield and increased amounts injected post-emergent had a negative effect. Yield in plots with pre-seed injections was similar to plots seeded with commercial granular fertilizer. Yields in the check and post-emergent injection plots were similar. This demonstration will be continued in 2004. In preparation, swine manure was injected into some plots in the fall of 2003. *Cooperators: Prairie Agricultural Machinery Institute, Canadian Pork Council, Roger Begrand*

· A long-term on-farm **water quality monitoring** program has been initiated. Water samples (collected 3X a year) from 8 water bodies will be analyzed for nutrients and pesticides. Various levels of riparian protection exist: surrounded by dense nesting cover (not abutting cultivated land); within a cultivated area and surrounded by an established riparian area; within a cultivated area and surrounded by a developing riparian barrier; in fields where cultivation nears the water's edge. Due to low water levels, only 9 of a possible 24 samples were collected. Results are pending. *Cooperator: CARDS (Agriculture and Agri-Food Canada), National Hydrology Research Institute*

· Vegetation control in white spruce has been studied since 1994. Weed control methods employed are: herbicides only (directed spraying with Roundup); rotatilling to within 3 inches of tree stems; perforated plastic blankets; jack pine wood shavings mulch (4 inchesdeep) and no weed control. Trees with no weed control are less than 2 feet in height or have died. Rotatilling had a negative effect on root development. Wood shavings served the initial purpose with some "weeds" (most crested wheat grass) starting to invade. The established grass stand subsequently controls weeds. The perforated blankets are beginning to tear but have served the initial purpose. The two best methods of weed control are the herbicide and wood chips treatments. In 2002, tree height and trunk diameter at four feet above the ground were measured. *Cooperators: PFRA (Agriculture and Agri-Food Canada), Canadian Forest Service*

Just a short overview of some 2003 projects and upcoming 2004 activities!!

Again, we would like to thank our partners, sponsors and cooperators for their continued commitment to the CLC. Our success is due to your input and contributions.

Don't forget our annual field day – Tuesday, July 20, 2004.

MORE SEEDING TOOL RETROFITS ... CONTINUED FROM PAGE 6

Darrell puts the bulk of his N down ahead of seeding. For most of his acres, he applies NH_3 with knives on 12 inch spacing. He tries to get this operation done in the fall if possible. Although this does some disturbance, there is quite a bit of stubble still standing. Last year he tried Atom Jet insulated knives and found there was a lot less freezing which reduced disturbance significantly. On his pea stubble, he broadcasts about 200 lb / ac of ammonium sulfate fines. From the N the pea residue supplies, he has enough N to grow a crop and the sulfur is there for the canola in rotation. Of course, on the ground where peas will be planted, he doesn't need any N so there are a significant number of acres where Darrell is just 1 pass seeding even with his single shoot seeder.

Darrell decided to try a narrow knife last spring. He chose the Bourgault 1 inch vertical knife. He found that he got better closure behind this opener. He also found that his fields were smoother, there was less disturbance, and more stubble standing with the narrower knife. He could also gear up 0.5 mph. to 4.5 – 5 mph. On 10 inch spacing, Darrell wants to swath any cereals that are going to lay in the swath to dry, at 90° to the direction he has seeded. He particularly noticed that the narrower knife left the field significantly smoother when swathing.

With a shank mounted packer running close to the shank, there isn't as much time for dirt to fall back over the seed. If it is dry, seed can be placed deeper to moisture and there won't be as much dirt back over the seed. Darrell says typically for canola the knives are cutting 2 – 2.5 inches below the surface and getting about 1 inch of dirt on top of the seed. With cereals, he will cut 3 – 3.5 inches below the surface and get just over 1 inch of dirt over the seed. With peas he is cutting 4 inches down and getting about 2 inches of dirt on top of the seed. He also comments that there is no seed depth difference between front and back shanks.

Fedak's Bourgault 8810 with Bourgault 1 inch vertical knife and Valley System's shank mounted packers.

These shank mounted packers have given Darrell very good emergence in the drier springs we have had the last few years, even with canola. When Darrell switched to the narrow knife he also changed half of his packers to 2 inches to see how they would perform. He found that the wider 3 inch packers tended to ride up on the shoulders of the furrow in places where the soil was firmer so he will have 2 inch packers on the whole seeder next spring.

Jim Sowa with Valley Systems says these packers with one tension spring give you 60 lb of packing per wheel. With use, some of that tension is lost but Jim is confident that they maintain 50 lb of pressure per wheel for a long time. He has had very few users replacing more than a few broken springs. He points out that one of the key features of this shank mounted packer is that it comes right back against the shank. When the shank trips over a rock, the packer is following right behind the shank and just rides over the rock without being slammed against it.

Darrell is pleased with the durability of the packers. He has not changed a bearing yet. He does store the packers in the shed after seeding. There is only one bolt to remove the packers so it is not a big job and will save the rubber. These packers retail for $140.

Residue management is an important consideration with any direct seeding tool. Darrell says adding these packers probably reduced residue clearance on his drill with 10 inch row spacing to the residue flow that is expected from a shank spacing of 8.5 – 9 inches. When weighing out the pros and cons of 8 inch row spacing, he says if he went to an 8 inch spaced unit, he would probably use Bourgault's rear mounted packers to avoid skewing on his side hills.

Darrell used to think about coming up with the money to switch to an air drill. But he says he has had 3 of the toughest years he has ever had to get a crop going and has seen no difference between his crops and those seeded with air drills. ●

Correction

In the last edition of the Prairie Steward (Issue #40), an error was made on Page 11 in the discussion about Green House Gases. It should be noted that N_2 gas is not a GHG. In fact, 80% of the air we breathe is N_2. It is not toxic. N_2O (nitrous oxide) is a GHG and while it is not "toxic" to plants, animals or humans, it traps 310 times more heat per molecule than $C0_2$. Put another way, its GWP (Greenhouse Warming Potential) is 310 times more than $C0_2$. Or simply put, N_2O is more potent as a GHG than $C0_2$. The SSCA apologizes for any confusion this may have caused.

NITROGEN APPLICATION OPTIONS FOR WINTER WHEAT ... CONTINUED FROM PAGE 7

Nitrogen fertilizer application in early spring

Producers have a variety of fertilizer options and placement methods when applying nitrogen fertilizer in the spring. Anhydrous ammonia, granular and liquid fertilizer can all be banded into the soil. Banding has been done with coulters or even a very narrow knife although precautions should be taken to ensure the furrow is closing behind the opener to limit volatilization losses. 28-0-0 can be dribble banded and granular fertilizer can be broadcast onto the soil surface. Keep in mind that surface nitrogen applications are prone to increased losses, if conditions are favourable.

The key to spring fertilization of winter wheat is early application of nitrogen. Winter wheat growth is very aggressive in the spring, and any delay in nitrogen application may affect yield. Generally, most producers will fertilize winter wheat when the field is dry enough and able to support the equipment.

Nitrogen fertilizer application in late spring::

Nitrogen application in the late spring is not common among Saskatchewan winter wheat growers. Nitrogen application at this stage would only be used in a risk management scenario. In drought years and drier soils, producers will tend to fertilize less. However, if moisture situations improve, producers may top up their winter wheat fertility package. The key to the success of this system is to apply enough nitrogen at the time of seeding, late fall or early spring to carry the crop without hampering yield, until the second nitrogen application can be made. By providing nitrogen to the growing crop when it can utilize it, producers facilitate increased efficiency of nitrogen use. Split application will therefore reduce the exposure of nitrogen in the soil to elements that can create losses such as leaching and denitrification. It also reduces the amount of product a producer must handle during the busy seeding period.

28-0-0 is probably the most common fertilizer form that is used for this method. Growers should be aware that winter wheat crops could be well advanced at the time of second application and crop drive down and wheel tracking could be a factor. The possibility therefore exists that later maturing plants could be an issue in the wheel tracks.

Nitrogen application for protein production

Traditionally, growers did not have to worry about getting paid for protein premiums in winter wheat. In 2002, the Canadian Wheat Board offered winter wheat growers a special contracting program that pays for protein production in winter wheat greater than 11.5%. Due to this program, winter wheat producers are now investigating late season soil or foliar additions of nitrogen to help boost protein content. As with spring cereals, many other factors help determine protein production within the plant such as environment and to a certain extent genetics of the variety. Current research shows winter wheat yield response to applied nitrogen is optimized at approximately 11.5% grain protein. Once yield has been optimized, the remaining energy in the plant will go into protein production.

Conclusion

Due to the higher yield potential of winter wheat, many experienced growers will usually apply nitrogen at rates of 20 – 25% higher than those used on spring cereals. A soil test would more accurately determine nitrogen requirements. The key is to apply nitrogen early enough into the spring so that yield is not affected.

The application option for nitrogen is ultimately the grower's decision. It will be determined to a certain extent by convenience, nitrogen costs, equipment availability, time, moisture conditions, etc. Growers must consider the pros and cons of each system and make a choice based on all factors. ●

PRAIRIE AGRICULTURE IN A CHANGING CLIMATE ... CONTINUED FROM PAGE 14

change. Saskatchewan agriculture will be dramatically affected by global warming. Currently, moisture is the single greatest factor limiting agricultural production in Saskatchewan. As global warming increases in severity, the increased temperatures will increase the evaporation and transpiration that occurs. This means an increase in aridity (less moisture available for plant growth).

Higher temperatures also mean longer growing seasons. Longer growing seasons increase the demand for water. The increased demand for water as a result of increasing temperatures will likely be slightly offset by a small increase in precipitation. The effect of global warming on precipitation, however, isn't conclusive. The projected effect on precipitation is anywhere from a slight increase to a small decrease in precipitation.

Saskatchewan will experience a greater increase in temperature than other areas of North America. Temperature change will be the greatest in polar and inland regions (i.e.– prairies). Throughout the prairies, southeast Saskatchewan and southwest Manitoba will have the greatest increase in temperature.

The increased aridity will have a negative impact on crop production. Moisture limitations will increase in severity across the province. Large parts of southern and southwest Saskatchewan will become rated in a category currently not suited for agricultural production. Parts of the northern grain belt that have traditionally lacked heat and were limited from a short growing season will benefit from the increased heat. However, most areas that will receive the ideal agricultural production climate are areas that are bedrock or otherwise unsuitable for agriculture.

CONTINUED PAGE 19

FERTILIZER OPTIONS - SWIFT CURRENT SITE ... CONTINUED FROM PAGE 9

of rain fell two or three days after seeding.

Yields in 2000 were more reflective of excellent growing season precipitation. As expected, yields of the untreated urea treatments were reduced as the rate of nitrogen with the seed increased (Table 1). Also evident was that the 25 lb / ac N rate was not enough nitrogen for the above average precipitation that occurred in 2000. Overall, the two slow release products performed very well, even at high nitrogen rates. However, yields did seem to plateau at about the 75 lbs / ac N rate (Table 1).

Grain protein levels steadily increased with increasing rates of nitrogen. Unfortunately, protein data for the 2003 study was not available at the time of writing this article.

A similar study in 2000 was carried out in Swift Current with canola on a clay loam soil. As with the wheat at Aneroid, the higher the rate of untreated urea used, the more damaging it was to crop establishment. The two slow release fertilizer products performed very well, but crop establishment did decline after the 60 lbs / ac N rate. The combination of ideal growing season conditions and canola's ability to compensate for lower crop establishment by branching out more, resulted in yields that continued to increase with increasing rates of nitrogen (Table 2). There was little difference in yields between the two slow release products except at the 120 lb / ac N rate.

Table 2: Average canola yields in Slow Release Fertilizer Study, Swift Current, SK, 2000.

	0 lb / ac	30 lb / ac	60 lb / ac	90 lb / ac	120 lb / ac
Check	7.71 i				
Urea		18.78 f	18.78 f	16.16 g	14.27 h
Polymer		19.37 ef	31.17 d	34.68 c	39.06 a
Agrotain		20.04 e	31.57 d	34.37 c	36.67 b

LSD = 0.78 letters the same indicate no significant difference.

The two studies conducted in 2000 at Aneroid and Swift Current do show that under above average precipitation throughout the growing season, slow release nitrogen products can significantly exceed the recommendations for seed-placed N. However, the study in 2003 shows the risks of exceeding the recommendations for the slow release nitrogen products and even very high sidebanded rates.

Although a sidebanding treatment was not included in the studies conducted in 2000 at Swift Current and Aneroid, research shows that double shooting fertilizer is more efficient than single shooting and much higher rates of nitrogen can be applied compared to single shoot systems. However, as observed in 2003, which had good growing conditions early on followed by drought and high temperatures, little yield advantage occurred with sidebanding in the wheat, especially at the high rate (Figure 2). Under these conditions, the taller, more lush crop in the sidebanded treatments had to be maintained by the plant, sacrificing yield.

Split application remains a good risk management technique for producers using single shoot systems. It is low tech and easy to apply. Unfortunately, liquid fertilizer is not readily available in many of areas in Saskatchewan. Slow release fertilizers are also good options for risk management for producers using single shoot systems, providing the cost of such products is not too high to become an economic barrier. ●

PRAIRIE AGRICULTURE IN A CHANGING CLIMATE ... CONTINUED FROM PAGE 18

Where does that leave agriculture in Saskatchewan? Simply with an increasing need to adapt. Saskatchewan farmers have adapted to many crises in the past. This won't be any different. Crop and variety selection, production practices and production intensity will all be important to developing sustainable production systems to cope with the increased aridity.

Adaptation techniques will vary with location, however, the trend will be towards increased moisture conservation. Water use efficient crops will replace moisture intensive crops. Longer season crops will be utilized. However, in order to maximize the amount of moisture available for the next growing season, a diverse rotation including shorter season crops will be required. Winter seeded crops will become more critical as they are better suited to using available spring moisture. Utilizing plant breeding technology can increase the water use efficiency and drought tolerance of the crops.

Production practices like direct seeding and utilizing tall stubble will be increasingly important to preserve the moisture that is present. Soil testing to ensure proper fertility will also be important to ensure maximum water use efficiency of your crop. In some cases, moisture will not be sufficient for commercial crop production. Livestock or forage production may be a better alternative.

Climate change is here. It cannot be totally avoided. While politicians debate the course of action to take to curb the effect of climate change, you can prepare your own operation. An understanding of how climate change will impact your operation will help you make decisions to prepare you for the consequences of global warming. As the Y2K scare proved, a disaster can be prevented if you are prepared. ●

CARBON SINK OFFSET TRADES, HITS AND MISSES ... CONTINUED FROM PAGE 15

nated by buyers and traders and again failed to address the permanency and liability issues. It was suggested by the buyers and brokers in these discussions that farmers had nothing to worry about since Federal regulators would not likely pursue or penalize a farmer if the sink was lost. It is unlikely any further trading indicatives in Canada will take place before the federal government establishes the rules for offset trading and abandons or clarifies the two-pool system.

As a side bar, an emitter that once funded SSCA is claiming 19.8 million tonnes of offset credits on an annual basis since their support provided the "incentive" that changed farming practices on the Canadian Prairies. There are rumors that the Alberta government may support this claim. On a similar note, the Canadian Government intends to claim the offsets resulting from a green cover program they are supporting. This is all a bit disconcerting and will likely result in some sort of litigation to determine ownership.

In the U.S. there were a flurry of press releases several years ago announcing a trade between GEMCO (a Canadian consortium of large emitters) and IGF (a crop insurance company) in Iowa. This deal fell apart when growers in Iowa got to take a look at the contract offered by IGF.

The sole small success was when an Ag sink carbon lease was successfully concluded between the PNWDSA (Pacific Northwest Direct Seed Assoc.) and ENTERGY (a U.S. based energy consortium). The EDF (Environment Defense Fund) a U.S. based environmental group helped broker the deal. SSCA and other Canadian conservation groups worked closely with PNWDSA. This was a cooperative effort in that all soil conservation groups agreed on the principles before the deal was consummated. There was not a large tonnage involved or a lot of money trading hands but the risks to the farmers was minimized. Hopefully the precedents of this carbon lease will transfer to future agreements. To my knowledge this is the only deal to date that has returned money to the farm gate.

The latest development in the U.S. is currently taking place in Iowa. There was a press release in late October regarding an initiative with the Chicago Climate Exchange and the Iowa Farm Bureau. At the time of this submission, I am not aware of the details.

***Part Three*: The Future**

There is little doubt in my mind that offsets created by storing CO_2 in organic matter (soil carbon sinks) will have value in the market place. It may be Kyoto, Son of Kyoto or some parallel process but some type of offset market will be in place.

Responsible governments all acknowledge that greenhouse gas levels must be addressed. Sinks will be a significant part of the solution and have value. The challenge for farmers is to see that the value is returned to the farm gate. Agricultural producers on both sides of the border must be vigilant or the value will transfer from the farm and only maintenance liability will remain.

It is in the interests of both Canada and the U.S. for as large as possible ag sink be created and maintained. Markets can provide incentives (sometimes perverse) that affect the contribution that sinks can make. A properly designed market should incent both creation and maintance that add value far into the future both to farmers and the nation.

Perhaps SSCA should take the initiative and pursue a trade on behalf of its members. Call your nearest director and give him or her your views. ●

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