SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION PROGRAM

2005 FINAL REPORT

March 10, 2005

1. Optimizing Forage Quality and Production on Depleted Farmland to Extend the Grazing Season FNE02-432.

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2. Project Goals

Test three pasture improvement methods to determine which method(s) generate superior forage quality, composition and production.

Reclaim run out potato acreage and return soil fertility.

Test use of brassicas for extending the grazing season/reducing stored forage demand.

3. Farm Profile

In 2004 the commercial cowherd was comprised of 33 cow/calf pairs, four replacement heifers and two Red Angus bulls. Our study of the economics of a brood cow herd in extreme northern Maine is on going. Five years of operation costs and production figures through 2004 are expected to provide us with enough successive years of information to make a decision on the viability of the operation. We continue to explore the possibility of transitioning to a straight grazing operation of stocker cattle, a grass finished beef operation and other possibilities. The farm operation comprises 270 acres of pasture and hay land most of which is leased. Not all acreage is used every year. In 2004 we grazed about 135 acres. We are exploring the use of commercial wood ash as a liming agent for the pastures and hayland and have begun to discuss, with neighboring potato farmers, the use of forages as a rotational crop.

4. Participants

The projects technical advisor was Steve Cashman, Soil Conservationist, with the USDA-NRCS. His role in the project was to review practices and results and make suggestions. We discussed revisions after the Brassicas seeding failed. Steve also provided valuable input on the presentation of data used in the poster presentation. Heidi Royal, Saint John Valley Soil and Water Conservation District: Heidi helped with the design and layout for the poster presentation. She also supported the educational out reach by sponsoring the October 2004 pasture walk

including the publicity, handout materials and refreshments. Heidi also prepared a press release after the event and supplied photography. Our final cooperators were Jim & Gerry Robinson who own a neighboring farm in Fort Kent, Maine on which the research project was conducted.

5a. Project Activities by Year

Year 2002

The project was designed to compare three practices to improve pasture composition, quality and production over 2-3 growing seasons. The study site is divided into three, 12-acre sections each receiving a separate practice. (See Aerial Photo) The practices very in terms of the timing and types of inputs as summarized below:

Practice # 1: Animal deposition of nutrients, broadcast seeding, extended grazing using brassicas

Practice #2: Spring no-till seeding, July seedling release & manure application, Fall grazing

Practice #3: Early winter broadcast seeding, spring manure application, grazing using brassicas

Liming

All three practices required lime application according to soil test recommendations. Lime was applied topdress on June 7 and August 30, 2002. The first application was limited to 4000 lb per acre. A total of 76.3 U.S. tons were applied to about 33 acres at a cost of $3,273.04 Access to 3 acres was a problem in the Spring and we ran short of lime during the Fall application. This section requires 1500 lb/acre. It takes 2-3 growing seasons for lime to react with soil when applied by topdress method. Hence the soil pH management level of 6 will not be achieved until 2004-05.

Clipping

Practices 1 and 3 required that the existing stand be clipped close to the ground to knock back competition for the brassica seeding. About 25 acres was mowed on July 10 with a rotary deck mower, which took 8 hours to complete. Most of the acres had sparse vegetative cover and light brush but approximately 5-6 acres had a thick grass sward. Clipping in late June would have allowed greater breakdown of the mulch generated by mowing. These acres were no-till seeded with forage rape in July/August.

No-till Seeding of Brassicas

A total of 24 acres were no-till seeded with two varieties of forage rape (brassica) on July 29 and August 2, respectively. The varieties included Rangiora and Barnapoli with a seed test date of April 2002, origin New Zealand. A Tye Pasture Pleaser, no-till seeder was used and seed depth varied from ¼ to 1 inch. The seed cost totaled $435 (non-grant funds) and the seeder rental totaled $288. The seeding took 6 hours to complete. While it had been dry in the weeks prior to

seeding, a few days of rain in late July was the impetus to go forward with the seeding. The site was monitored in August and September for seed germination/seedling establishment.

Grazing and Manure Application and Hauling

Practice 1 requires cow manure application by the animals during grazing. A total of 32 dry beef cows equaling 48 animal units were grazed on the site from October 10 through November 2, 2002. Practices 2 and 3 require the use of chicken manure applied at different times, May and July, respectively. About 150 tons of chicken manure was trucked to the site in August 2002 and stockpiled for application in 2003. The trucking cost on the manure totaled $825 or $5.50/ton.

Plant Species Inventory

The study site was randomly traversed during late summer 2002 and the presence of herbaceous plant species was noted. Fifteen (mostly undesirable) species were identified. The list identifies the most dominant plants but is incomplete. (See attached list)

Year 2003

As a result of the first year's experience and results from the Brassicas seeding, the practices originally proposed were modified as summarized below:

Practice # 1: Brassicas seeding was repeated on 2½ acres, chicken manure was applied on all of the acres but applications were divided between May & July. Ten and one half acres were no-till seeded with rye and clover in May and broadcast seeded on 2½ acres in early November during grazing. Forage was mechanically harvested on 12 acres in early July and 1 acre was clipped.

Practice #2: Some mechanical harvest of grass (13 acres) and clipping sparse, brushy areas (1 acre) in early July for seedling release.

Practice #3: The area was no-till seeded in May followed by a combination of mechanical harvest of grass and clipping sparse, brushy areas in July for seedling release. About 3 inaccessible (wet) acres were not seeded. Forage was mechanically harvested on 4.5 acres in mid July and 8.5 acres were clipped. Cattle were grazed on the regrowth.
(Note: Failure of the brassicas seeding in 2002 modified this practice to the same as practice area 2.)

Seeding

A combination of BG-34 Italian perennial rye grass and Alice white clover was no-till seeded on a total of 34 acres in mid-May. (See photo) The seeding rate was 21 lbs/acre. The seed cost per acre totaled $51.87. The no-till seeder was rented at a rate of $7.65/acre. The seeder was calibrated at the start and it took about 16 hours to seed the three areas. A 2½ acre area in practice area #1 was reserved for a retry of the Brassicas seeding and a late fall broadcast seeding

of BG-34 and Alice white. (See photo) The Brassicas (Rangioria Rape) was no-till seeded at a rate of 10lbs/acre around the 20th of July. The seed cost per acre totaled $27. The broadcast seeding occurred in early November at a rate of about 24lbs/ac.

Manure Applications

About 60 tons of chicken manure was spread on 10 acres of practice area #1 in mid-May immediately following the no-till seeding. Spring manure application should have occurred in practice area #3 but was delayed until July. The reasons for the changes are as follows: The ground was ready to accept the weight of a seeder but not a loaded spreader; prior experience with no-till seeding perennial grasses suggests that "the earlier the better"; technical advice from FiL Agritech, (seed supplier), said to stay off newly germinated seed/seedlings, weather was optimum for seed germination so there wasn't enough time to get all spring manure spread before germination. Hence, the remaining 150 tons of chicken manure was spread in late July on the remainder of area #1, 11 acres of area #2 and all of area #3 following mechanical harvest of forage or clipping.

Clipping and Mechanical Harvest of Forages

The main purpose of clipping and mechanical harvest was to " release" the newly established rye and clover seedlings. The clipping helps to knock back brushy species. The mechanical harvest of hay and haylage helps recoup some of the initial cost of inputs. Both methods also set back the maturity of the forages for better grazing later in the fall. In each of the three practice areas, clipping was selectively done on the sparse, brushy sections as follows: P1 – 1 acre, P2 – 1 acre and P3 – 8.5 acres. Clipping was done in July using a 6 foot rotary deck mower. In all of the practice areas there were acres that responded well enough to the lime applications in 2002 to justify a mechanical harvest. The acres mechanically harvested are as follows: P1 – 12 acres, P2 – 13 acres and P3 – 4.5 acres. Forage was harvested as dry hay and silage, in round bales, between July 7th to the 17th, 2003. (See photo)

Grazing

Grazing occurred in each of the three practice areas from October 18th through November 23rd, 2003. Each area was grazed separately using a portable (temporary) fencing system. The herd was comprised of 26 dry cows and 10 yearling heifers totaling about 46 animal units. The duration of grazing in each practice area was as follows: P1 – 15 days, P2 – 9 days, and P3 – 12 days. The grazing intensity was light to moderate and left 4 – 8 inches residual stubble, sufficient to protect the new seedlings but allow utilization of the production. Grazing occurred through some snow cover. (See photo)

Forage Production Measurements

Three methods were employed to measure forage dry matter (DM) production in each practice area. The methods include mechanical harvest, grazing and manual harvest of plots along a sampling transect. (See photos) Mechanical harvest was accomplished using a mower/conditioner and round baler. A few bales were selected, moisture tested and weighed.

Dry hay bales were 85% dry matter and silage bales were 53% dry matter. Dry bales averaged 666 lbs DM and silage bales averaged 557 lbs DM. Since mechanical harvest was only done on the most productive sections of each practice area this method only estimates DM production on the sections harvested. Acres harvested were estimated using and aerial photo and dot grid. The total number of bales X tons DM/bale ÷ acres harvested = tons DM /acre. Grazing was accomplished using 26 dry cows and 10 yearling heifers with a total herd weight of 43,913 lb. Daily dry matter intake was based on 2.5% of the herd body weight or .55 tons DM /day. Estimates of dry matter harvested per acre was based on the formula: tons DM/day X # days grazed ÷ # acres grazed = tons DM /acre. In each practice area all acres were grazed except for 2 acres in P2. Manual harvest of sample plots was accomplished by laying out a sampling transect through each practice area. (See aerial photo) Transects were located through the middle of each area parallel with the long axis. The transect ends were marked with wood stakes and flags that were labeled to identify the practice area. Sampling was done on October 18th, 2003 to include the entire season's production. A random numbers table was used to locate the sample plots. The distance was measured using a 100-foot tape and a 1-foot by 1-foot pvc square was dropped on the ground. Scissors were used to cut the forage within the square leaving a 2 inch stubble. The samples were placed in bags and given a sample number and practice area number. The samples were dried in a 180 degree oven for six hours and weighed periodically until no change in weight occurred. Samples were weighed on an Ohause, model D5, platform scale with an accuracy of ± .05 lb.

Year 2004

Grazing

Grazing occurred in each of the three practice areas from October 21st through November 14th, 2004. Each area was grazed separately using a portable (temporary) fencing system. The herd was comprised of 24 dry cows and 9 yearling heifers totaling about 44 animal units. The duration of grazing in each practice area was as follows: P1 – 10 days, P2 – 8 days, and P3 – 6 days. The grazing intensity was moderate and left 2-4 inches residual stubble. Grazing occurred through 8-10 inches of snow cover. A scheduling problem required that the cattle be moved before the all of the available grass was consumed. There was at least 4 days of grazing left behind in area P-3.

Forage Production Measurements

The same three methods were used to measure forage dry matter (DM) production, as previously. A few bales were selected, moisture tested and weighed. Dry hay bales were 89% dry matter and silage bales were 53% dry matter. Dry bales and silage bales averaged 517 lbs DM. In each of the three practice areas the following acreage was harvested: P-1, 12 acres; P-2, 13.5 acres; P-3, 9.1 acres. The total number of bales X tons DM/bale ÷ acres harvested = tons DM /acre. Grazing was accomplished using 24 dry cows and 9 yearling heifers with a total herd weight of 48,833 lb. Daily dry matter intake was based on 2.5% of the herd body weight or .61 tons DM /day. Estimates of dry matter harvested per acre was based on the formula: tons DM/day X # days grazed ÷ # acres grazed = tons DM /acre. Not all acres were grazed in each of the practice

areas. Manual harvest of sample plots was accomplished using the same transects as in 2003. The P-3 transect was not measured as, for logistical reasons, it had been mechanically harvested earlier in the season. Sampling was done on October 2nd, 2004. Sample plots were harvested at every 30 paces using a 1 square foot pvc square layed on the ground. Scissors were used to cut the forage within the square leaving a 2 inch stubble. The number of samples collected was substantially increased over 2003 as follows: P-1, 8 samples; P-2, 9 samples. The samples were oven dried and weighed periodically until no change in weight occurred. Samples were weighed on an Ohause, model D5, platform scale with an accuracy of ± .05 lb.

Follow-up soil sampling/analyses

Soil sampling was conducted in late September 2004. Each practice area was traversed in a zig-zag manner and ten sub-samples from the top 4 inches were taken using a small spade and pail. Ten sub-samples were combined into one soil sample for analysis. One sample was analyzed for each 7 acres. A total of five samples were gathered; two each from practice areas 1 and 2 and one sample from practice area 3. Samples were sent to Maine Soil Testing Service, University of Maine for a standard pH and nutrient analysis and recommendations for a mixed grass hay crop. The same sampling method was used in 2001. The results from 2001 and 2004 were compared to assess the response to inputs. The comparisons focus on pH, organic matter, phosphorus, potassium and magnesium and changes that approach the optimum recommended levels.

Evaluate changes in forage composition

A subjective, visual evaluation of the forage stand composition was done during the mechanical harvest of the practice areas and the transect sampling. Photographs were taken to document the presence and dominance of various forage species. These observations were compared to observations made in 2002.

Nutrient analysis of harvested forage

During the 2004 growing season, forage was harvested as both round bale silage and dry hay. Samples were taken using a boring device attached to a drill. Three sub-samples were taken from each of five bales and combined to create a single sample. The sample were send to Dairy One Forage Laboratory for standard nutrient analysis. Harvest dates and hence crop maturity at harvest varied each year during the study. Given that forage maturity is a major factor in forage nutritional quality, nutrient analyses would show this variability. To carry out a meaningful evaluation of how forage stand composition effects nutritional value of pasture, hay and/or silage, forage maturity would need to be at the same stage each year it was harvested.

6. & 7. Results and Conditions

Brassicas Seeding to Extend Grazing in 2002

Unfortunately, the seeding failed to establish a sufficient stand for late fall grazing. Observations in September and October may best be summarized as germination, stagnation and death.

Seedlings were present but failed to grow. (See Photo Sheet) Why did the seeding fail? Probably because of poor fertility and lack of moisture. Soil test results from 2001 show the site variably low in ph, organic matter and all major nutrients. Some sections had optimum phosphorus and potassium and organic matter. All sections lacked calcium and magnesium and were below optimum for pH. It was believed that the spring lime application would "boost" fertility enough to allow the forage rape to establish and grow. It did not. Moisture may well have been the major factor limiting growth. The site is fairly well drained. Growing seasons in 2001 and 02 were dryer than normal. While there was good moisture at the time of seeding, August became hot, dry and breezy. The seedlings just did not respond to the cooler, wetter conditions when they arrived in mid-September. By mid-October the region was experiencing "hard" freeze conditions.

Extended Grazing 2002

Some October/November grazing was done on the regrowth that occurred after the July mowing. (See Photo Sheet) The best grazing was obviously on those acres that were more productive and had heavier cover. The sparsely vegetated acres without the forage rape having been established were simply not worth grazing. Approximately 11 acres received deposition of cow manure during the 23 day grazing period. Cow manure was deposited at an average rate of 1.75 tons/acre. The total grazing season was 160 days in 2002. Grazing ceased on November 2nd. A small amount of dry hay was fed during the last 4-5 days of grazing.

Seeding 2003

The results of seeding BG-34 and Alice white clover appeared to be very good. Germination and seedlings were noted within two weeks of seeding. The presence of seedlings became even more apparent in July after the fields were hayed or clipped and especially a few weeks after the July manure applications. (See photos) The very wet summer of 2003 certainly was an important factor in the success of the seeding. The harvest of a newly seeded field mechanically and by grazing is viewed as "risky". However, this was a no-till method into and existing, sparse, stand of native forages. The stand protected the young seedlings. The removal of the canopy in July helped to provide more sunlight and release of growth. The manure application gave the seedlings a major boost. The grazing was light and left about 4 inches of stubble to protect the seedlings for over-wintering.

In Practice Area #1, a 2½ acre area was reserved for a retry of the Brassicas seeding. This time fertility and moisture were not an issue. Seedlings did develop, but did not dominate the stand. There was a lot of competition from established forages. It is worth noting that strong, healthy Brassicas from the 2002 seeding were interspersed throughout the areas seeded. Apparently, some seedlings did survive, over-winter and thrive during the 2003-growing season. The presence of Brassicas during the 2004 growing season was also noted.

Extended Grazing 2003

In 2003, the total grazing season was extended by 21 days over 2002, November 23rd compared to November 2nd. Grazing in 2003 occurred without any supplementation with stored feed. In

2003, the total number of days grazed in the study area was 36 days compared to 22 days in 2002. Grazing removed an estimated total of 19.7 tons of dry matter in 2003. Grazing could have been longer and more intense if not for the need to protect the new seedlings.

Forage Production Measurements 2003

The harvest of forage by mechanical means and grazing are complimentary methods for managing production. Mechanical harvest is done early in the season and sets the forage growth back to a young vegetative state for later grazing. The production removed by each method is a sound measurement of total production in tons – dry matter/acre. In 2003, however, only the "lush" acres were both mechanically harvested and grazed hence the results are skewed toward the higher production on these acres. The remaining acres in the practice areas were clipped and grazed. The areas were not grazed hard because they had new seedlings interspersed with established forage. Residual stubble represents unmeasured production that could range from ¼ to 1 ton per acre. The results using these methods are simply the sum of the two measurements (mechanical + grazing) as stated below:

Mechanical	**Grazing**	**Total**
P1 .77 tons DM/ac	+ .53 tons DM/ ac	= 1.30 tons DM/ac
P2 .26 tons DM/ac	+ .35 tons DM/ ac	= .61 tons DM/ac
P3 .74 tons DM/ac	+ .51 tons DM/ ac	= 1.25 tons DM/ac

The harvest of sample plots along a study transect through each area is also a sound approach to estimating total forage production. The study transects remained through the growing season as a swath of forage that was not harvested but that did receive inputs. Random sampling along each transect should represent the variability in production across the field. However, only two plots in each transect were sampled. This small sample size may not give an accurate estimate. Taking the average of the two dry matter weights per square foot and multiplying times the square feet per acre of 43,681 derived the estimate. The estimate is stated as a range because of the accuracy limits of the scale.(± .05 lb) Unfortunately, the range is great but the lower figure seems more realistic based on estimates from mechanical harvest and grazing. The results of this method are stated below:

Study Area	**Sample weight (+/- .05 lb)**	**Range**
P1 –	.075 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 1.64 tons/DM/acre
	.175 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 3.82 tons/DM/acre
P2 –	.05 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 1.09 tons/DM/acre
	.15 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 3.28 tons/DM/acre
P3 –	.05 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 1.09 tons/DM/acre
	.15 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 3.28 tons/DM/acre

Note: In 2004 nearly all acres in each practice area were mechanical harvested and grazed and the transect sample size was increased. A larger sample of the bales (6) was done in 2004 to get a more accurate bale weight average and production estimate. A more accurate estimate of forage

harvested mechanically and through grazing will allow for a more meaningful comparison of the estimates derived from the transect sample plots.

Seeding 2004

The presence of Brassicas (forage rape)from both the 2002 and 2003 seedings was noted during 2004 even though their persistence is rated low. Despite two attempts, forage rape never established a meaningful presence in the fields. Observations during the 2004 growing season verified that rye and clover seedlings had become establish in the forage stand as a result of the no-till seeding. However, the presence of rye and clover could not be discerned from the broadcast seeding of 2003. It may be more apparent after another growing season or two.

Extended Grazing 2004

In 2004, the total grazing season was 162 days, 16 days less then 2003 but six days longer then in 2002 counting the five days of grazing that remained when the cattle were moved. Grazing ceased on November 16th and occurred without supplementation with stored feed. In 2004, the number of days available for grazing was 31 compared to 36 days 2003 and 22 days in 2002. Grazing removed an estimated 18.9 tons in 2004 compared to 19.7 tons of dry matter in 2003. The timing of inputs and harvest accounts for the difference. In 2004 no inputs were applied and the harvest date was two weeks later. This indicates that the second growth available for grazing in 2004 was very strong.

Forage Production Measurements 2004

As in 2003, the harvest of forage by mechanical means and grazing were used to measure the total forage dry matter production. The results using these methods are stated below:

Mechanical	**Grazing**	**Total**
P1 2.06 tons DM/ac	+ .56 tons DM/ ac	= 2.62 tons DM/ac
P2 1.13 tons DM/ac	+ .41 tons DM/ ac	= 1.54 tons DM/ac
P3 1.48 tons DM/ac	+ .61 tons DM/ ac	= 2.09 tons DM/ac

As expected, total production increased significantly over 2003 in each part of the study area. This is likely because of the lag time for inputs (lime and manure) to improve the soil. The growing season was ideal and the grazing was carefully managed to use most of the available production.

The harvest of sample plots along the same study transects was also used to measure total forage production. The results of this method are stated below:

Study Area	**Average Sample Weight**	**Total**
P1 –	.1375 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 3.0 tons/DM/acre
P2 –	.1111 lb DM/sq. ft X 43,681 sq. ft./ac ÷ 2000 lb/ton	= 2.43 tons/DM/acre

(Graph of dry matter production, 2002-04 at end of report)

A comparison of the estimates derived from the mechanical harvest/grazing and transect sample plots shows the estimates to be close in P1 (.38) ton but not so close in P2 (.89). This variation may be because the sample transect location in P2 did not represent the true variation in production across the field. The most accurate method(s) for measuring total production is to completely harvest a field and weigh a large sample of bales and to graze the regrowth. The use of a sample transect is best used to measure production before inputs are applied to create a baseline measurement of production. This method may be useful in advance of negotiating a new lease agreement on land not previously worked by the farmer.

Soil Fertility

Soil fertility improved from 2001 to 2004 as a result of the inputs and grazing management. The graph at the back of the report represents the averages for all samples for each respective soil parameter compared to optimum levels. Some highlights of the soil fertility changes are noted below for each practice area. The 2004 soils reports are attached at the end of this report.

In P1, the soil pH improved to 6.1 from a pH of 5.0 in 2001. Calcium, magnesium and organic matter all improved closer to optimum by 2004. Calcium and boron were still well below the optimum range. Sources of calcium and boron need to be identified and applied.

In P2, the soil pH improved to 6.1 from a pH of 5.6 in 2001. Again, optimum calcium and boron levels were not attained using lime and manures.

In P3, the soil pH improved to 6.1 from a pH of 5.1 in 2001. Here, potassium, calcium and boron levels were below the optimum levels.

Evaluate changes in forage composition

There were obvious and striking changes in the composition of the forage stand between 2002 and 2004. While the seeding of perennial rye and white clover were designed to improve stand composition, they certainly did not dominate the stand the year following seeding. What did dominate the stand were the native grasses and clovers that were present at the start of the study, primarily timothy and red clover. (See photo) The established native forages came on very strong and the "weed" species like hawkweed, golden rod, everlasting and asters dropped out significantly. Over the next two growing seasons it is expected that the rye and clover that was established will get stronger and show a greater presence. The composition of the stand was noticeably improved.

Nutrient analysis of harvested forage

The study design did not allow for an meaningful assessment of the relationship between stand composition and nutritional quality. To determine improvements in forage quality as a function of stand composition the study should have measured nutrients in harvested forage for 3 successive years with harvest done at the same stage of maturity. This was not done.

The stage of maturity is often considered the single greatest factor in determining quality of harvested forage. In this study, timothy (or in other cases any dominant grass) should have been used as the indicator of stage of maturity for the stand. As forage stand composition changed over time, harvesting at the same stage of maturity and then measuring nutrients in the harvested forage would reveal the influence of stand composition on forage quality.

The hay sample that was taken and analyzed for nutritional value was harvested in late July at or past the pollination stage of maturity. A crude protein of 10% is the lowest that should be fed to dry beef cows. The analysis is attached.

8. Economic Findings

Economic data to compare the practices as originally planned was not generated because of the failure to establish a stand of forage rape suitable for grazing. However, other important economic findings were generated and are presented below:

Restoring Soil Fertility and Improving Forage Quality and Production

$ Cost of Inputs Per Acre $	
Lime	$95
No-Till	$ 7.65
Rape Seed	$19
Manure	$36
Clipping	$ 4.35
Perennial Rye & Clover Seed	$52
Total	$214/acre versus $135/acre without seed cost

The Value of Extended Grazing

Days extended:	42
Daily feed cost:	$9.76
Savings of:	$410
Pounds of calf weaned:	18,657
Value added to calves:	$0.02 per pound

Note: Daily feed cost is based on a hay/silage production cost of $15.96 per ton and a brood cow herd feed requirement of 2% of the herd weight in dry matter per day.

9. Assessment

This projected generated some very important thoughts on a management approach and some cost effective practices to use to improve pastures/hay fields and extend the grazing season in northern regions.

LESSONS IN SUSTAINABILITY

The use of low persistence annuals, like forage rape, may not help you extend the grazing season, when no-till seeded into light sod without the correct soil fertility.

Extending the grazing season requires ample acreage for the size of herd, 2-4 tons/acre of forage dry matter production and good forage management including early harvest to ensure adequate regrowth.

Restoring soil fertility to depleted farmland costs $135 -$214 per acre and requires at least 3 years. After this time the benefits of improved production, stand quality and extended grazing should span several years.

Applying manure in July, after mechanical harvest of hay or silage, will boost production for fall grazing.

In the first year or two of reclaiming depleted fields, repeated close clippings, twice per season, will control brush and allow favorable forage species to better respond to inputs.

Delay expensive seeding until after you have assessed the response of native grasses and clovers to inputs and improved soil fertility. Seed only when the stand remains thin and with few desirable species and spot seed sparse areas.

Every penny counts in an operation with a narrow margin. Extending the grazing season is one small way to lower production costs and add hundreds of dollars in value to a calf crop.

10. Adoption

The traditional approach to reclaiming depleted fields involves tillage, lime, fertilizer and seeding. Tillage and seed are very, very expensive. Tillage destroys soil organic matter, is hard on equipment and creates the risk of soil loss. If the field is very rough and a significant increase in production is needed the first year, the tillage approach will address these issues.

This study identified a "reclamation protocol" that is effective and sustainable in this geographic region. I plan to use the approach identified in the assessment section and to be more careful about spending money on expensive seed. As for extending the grazing season, July manure application is suitable in this geographic area because of the cool, dry climate and low population. There is typically a cool, rainy period of 3-7 days in July.

Lime and manure alone did not elevate soil nutrient levels to optimum and hence, production remains below its potential. I plan to identify other sources of calcium to amend the soils or to increase the pH management level to 7 to raise calcium levels. I will also explore the application of commercial wood ash as a source of micronutrients like sulfur and boron.

11. Outreach

Educational out-reach activities included a pasture walk, poster presentation and a press release.

Pasture Walk: A pasture walk was held on Saturday, October 16, 2004. The event was announced via a flyer that was direct mailed to about 50 beef producers in the county. Approximately 20 persons attended the event that began with a presentation of the project and included the poster presentation materials and handout materials that were prepared. (See attached). The presentation included the "keys" to extended grazing, goals of sustainable agriculture and the "lessons in sustainability. The presentation was followed by a question and answer period and a trip to the study site. The trip to the pasture illustrated the forage available for late grazing and the results of the seeding. The St. John Valley Soil and Water Conservation District sponsored the event.

Posture Presentation: A poster on the project was prepared and displayed at the National SARE Conference in Burlington, VT on October 19th and 20th, 2004. The poster illustrated the practices that were used to increase pasture quality and production and extend the grazing season. The economic findings were also included. Preparation of the poster was a collaborative effort between the farmer and the St. John Valley Soil & Water Conservation District.

Press Release: A press release was prepared on the pasture walk and highlighted the results of the research. The press release appeared on November 3rd in the regional weekly paper. The article helped increase awareness in the local population on alternatives for agricultural production in the region. This is something that is desperately needed.

Aroostook Beef Producers Meeting: A presentation on the research, similar to that of the pasture walk, will be presented at the April 2005 meeting of the Aroostook Beef Producer's, Inc. ABP is a group on 40 producers from the county that cooperate on marketing and educational programs specific to beef production in the region.

12. Report Summary

The original study planned to test and compare three practices designed to extend the grazing season and improve quality and productivity on 36 acres of grassland (old, run out potato fields). The practices involved no-till seeding of forage rape, variously timed applications of lime and cow and chicken manures, the harvest or clipping of forages, rotational grazing and broadcast and no-till seeding of rye and clover. The successful establishment of forage rape was critical to test and compare two out of three practices, but the crop could not be established after two attempts to no-till seed into light sod. The study generated some valuable information. The use of forage annuals won't necessarily help extend the grazing season. The delivery of inputs and the

timing of inputs are important factors. Spending money on expensive seed should be delayed until after the response of native grasses and clovers has been assessed. Overall, our study goals were achieved.

David M. Potter March 10, 2005

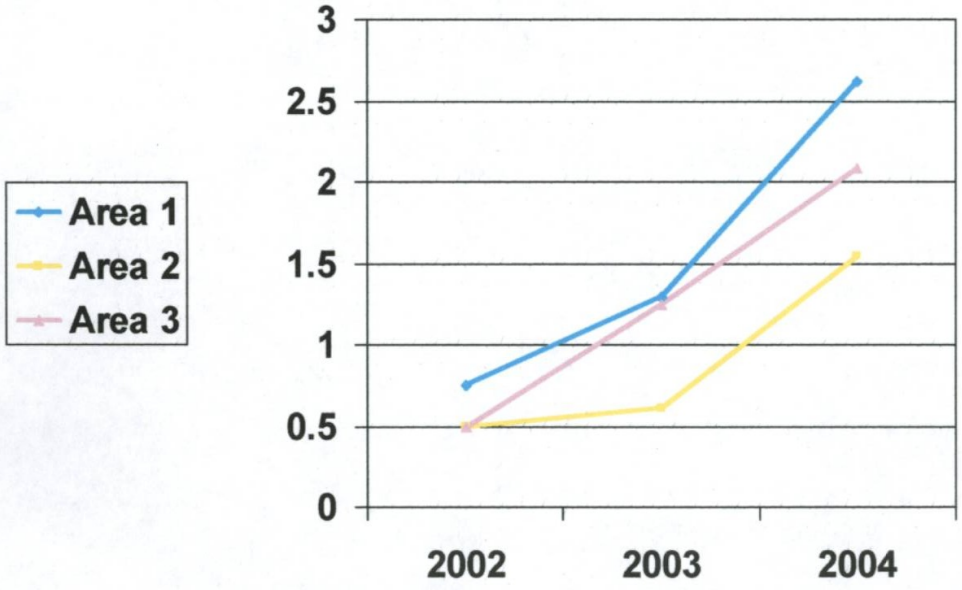
LIST OF PLANT SPECIES

	Common Name	Scientific Name
1.	Timothy	*Phleum pratense*
2.	Birdsfoot Trefoil	*Lotus corniculatus*
3.	Red Clover	*Trifolium pratense*
4.	Hop Clover	*T. agrarium*
5.	Cow Vetch	*Vicia cracca*
6.	Common Dandelion	*Taraxacum officinale*
7.	Wild Strawberry	*Fragaria virginiana*
8.	Wild Red Raspberry	*Rubus idaeus*
9.	Orange Hawkweed	*Hieracium aurantiacum*
10.	Mouse Ear	*H. pilosella*
11.	New England Aster	*Aster novae-angliae*
12.	Pearly Everlasting	*Anaphalis margaritacea*
13.	Goldenrod	*Solidago sp.*
14.	Fireweed	*Epilobium augustifolium*
15.	Dogbane	*Apocynum sp.*

Report Addendums

1. Graph of dry matter production
2. Graph of soil fertility changes
3. Soils reports
4. Forage nutrient analysis
5. Outreach support materials

Dry Matter Production 2002-2004



The figures for 2002 are based on both a visual estimate and the experience of the observer. The figures for 2003 and 2004 are based on measurements taken from harvesting and weighing forage samples.

Soil Fertility 2001-2004