

ADOPT FINAL REPORT - Project #20090442

Project Identification

- 1. Project Title:** Re-establishing Alfalfa into Existing Grass Stands
 - 2. Project Number:** 20090442
 - 3. Producer Group Sponsoring the Project:** Saskatchewan Forage Council (SFC)
 - 4. Project Location(s):**
 - Lanigan, SK – Western Beef Development Centre (WBDC)
 - Forget, SK – Moose Creek Red Angus, Glen and Darren Ippolito
 - Central Butte, SK – Grainland Community Pasture
 - 5. Project start and end dates:**
 - October 2009 – September 2011
 - 6. Project contact person & contact details:**
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Objectives and Rationale

7. Project objectives:

This project demonstrated different methods to re-establish alfalfa into existing grass stands, providing producers with a practical look at potential methods to increase the productivity of older grass stands.

8. Project Rationale:

Many livestock producers attempt to re-establish legumes into grass pastures and hay fields, often with poor results. This project explored various methods to re-establish legumes into existing grass stands in an effort to demonstrate practical, low cost options with maximal success. This project provided a practical look for producers who are actively seeking options to improve pasture and hayland productivity by the addition of legumes.

Methodology and Results

9. Methodology:

Each of the three sites included five (5) treatments of approximately 5 acres each. The treatments were established during the fall of 2009 on pre-existing grass stands with little or no alfalfa present in the stand. Treatments included:

1. broadcast alfalfa with phosphate fertilizer;

2. broadcast alfalfa without phosphate fertilizer;
3. drilled alfalfa with phosphate fertilizer;
4. drilled alfalfa without phosphate fertilizer; and
5. a check.

For this demonstration, creeping rooted alfalfa was seeded (both drilled and broadcast) at 5 lbs/acre and fertilized treatments received 15 lbs/acre of actual phosphate. During the fall of 2009, all three sites were grazed to suppress grass growth and give alfalfa seedlings a better chance to compete the following spring.

Sites were assessed for establishment success including seedling counts (using 10, 20m transects across each plot), botanical species analysis (clipping of 5-10 quadrats and separation of plant material to determine alfalfa establishment) and forage production (quadrats clipped, weighed and dried to determine yield). Seedling counts were taken prior to any pasture defoliation in both years. Forage production and botanical species analysis was also conducted prior to pasture defoliation at the WBDC site in both 2010 and 2011. While this method was followed at the Moose Creek and Grainland sites in 2010, visual estimates of yield and % alfalfa were taken in 2011. The Grainland site was part of a holding pasture where animals were grazing for most of the 2011 season, thus clipping plots for forage yield estimates was not possible. At the Moose Creek site, a misunderstanding by the co-operator saw animals turned out for grazing in 2011 before clipping could be conducted. A visual estimate of yield and % alfalfa contribution to the stand was noted soon after animals were turned out. The table below shows data collection activity at the three sites during 2010 and 2011.

Site Location	Seedling Count		Forage Clipping	
	2010	2011	2010	2011
WBDC (Lanigan, SK)	June 1 and 2 and August 13	July 27	August 18	July 28
Grainland (Central Butte, SK)	June 4	June 20	September 13	June 20*
Moose Creek Red Angus (Forget, SK)	June 7	June 21	September 14	August 5*

*visual estimate

10. Final Results

Western Beef Development Centre – Lanigan, SK

The WBDC site saw alfalfa seed drilled/broadcast into a predominately crested wheatgrass pasture with or without phosphate (P2O5) fertilizer. A control plot in the centre of the field was not treated (no alfalfa, no fertilizer). This site was seeded on November 5, 2009 with a John Deere 750 No-till drill and a Valmar broadcast applicator. In June 2010 and August 2010, alfalfa seedlings growing in ten transects per plot were counted across each plot including the control. Clippings were also conducted on August 18, 2010 to measure the forage production and botanical composition of the various treatments. Plots were re-evaluated on July 27 and 28, 2011 by conducting seedling counts and forage clippings. The results for 2010 and 2011 are shown in the table below.

ADOPT Re-establishing Alfalfa Demo Forage Data - WBDC

	Drill + P	Drill – P	Broadcast +P	Broadcast - P	Control
Seedling Counts*					
June 2010	0.3	0.4	0.1	0.2	0
August 2010	6.1	3.1	9.9	7.7	0.2
July 2011	11	7.8	23.1	21.7	0.5
Forage Production (kg/ha)					
2010	2757	2737	2948	2369	2925
2011	2942	2976	3702	3251	3512
% Alfalfa by weight**					
2010	0.56	0.16	0.71	0.44	0
2011	22.65	28.07	50.70	30.41	0

* Mean number of alfalfa seedlings observed in 20 m transects across seeding treatments

**% Alfalfa by weight after hand separation of forage clippings

Grainland Community Pasture – Central Butte, SK

The Grainland site saw alfalfa seeded into a predominately crested wheatgrass pasture (some bluegrass in low-lying areas and pasture sage) with or without phosphate (P2O5) fertilizer. A control treatment was left on the east end of the plot (no alfalfa, no fertilizer). Both drilled and broadcast treatments were seeded on October 28, 2009 with a John Deere 750 No-till drill. Drilled treatments were seeded with the drill set to ½" depth. The drill was lifted above the soil surface for the broadcast treatments so that both seed and fertilizer were dropped onto the soil surface. In June 2010, alfalfa seedlings growing in ten transects per plot were counted across each plot including the control and again in June of 2011. Forage clippings were conducted on September 13, 2010 to measure the forage production and botanical composition of the various treatments. A visual estimate of forage yield and % alfalfa was noted in 2011 as animals were out grazing in this holding pasture for most of the growing season. The results for 2010 and 2011 are shown in the table below.

ADOPT Re-establishing Alfalfa Demo Forage Data - Grainland

	Drill + P	Drill – P	Broadcast +P	Broadcast - P	Control
Seedling Counts*					
June 2010	12.7	9.4	0.3	0.3	0
June 2011	17	19.6	4.6	1.5	1.1
Forage Production (kg/ha)					
2010	887	657	899	841	734
2011**	1000	1000	900	800	800
% Alfalfa by weight					
2010	3.16	3.29	0	1.17	0
2011***	10	10	1	1	0

* Mean number of alfalfa seedlings observed in 20 m transects across seeding treatments

**Total forage production by visual estimate

***% Alfalfa by visual estimation

Moose Creek Red Angus – Forget, SK

The Moose Creek site saw alfalfa seed drilled/broadcast into a predominately meadow bromegrass pasture (some tall fescue) with or without phosphate (P2O5) fertilizer. A control treatment was left on

the south end of the plot (no alfalfa, no fertilizer). Due to some difficulties with equipment calibration, treatments were not all seeded/fertilized at the intended rate. However, seeding and fertilizer rates were recorded based on seed and fertilizer used on each of the treatment plots. The table below shows the seeding and fertilizer rates actually achieved at this site.

Seeding/fertilizer rates recorded at Forget site

Treatment	Drilled + P	Drilled - P	Broadcast + P	Broadcast - P
Seeding rate	3 lbs/acre	5 lbs/acre	5 lbs/acre	5 lbs/acre
Actual P	15 lbs/acre	-	40 -45 lbs/acre	-

Both drilled and broadcast treatments were seeded on November 12, 2009 using a quad mount broadcast seeder and an 8 foot hoe drill with packer wheels. In June 2010 and June 2011, alfalfa seedlings growing along ten transects per plot were counted across each treatment including the control. Forage clippings were conducted on September 14, 2010 to measure the forage production and botanical composition of the various treatments. As mentioned previously, animals were put out to graze prior to clipping in 2011, so a visual estimation of yield was carried out shortly after animals had been grazing. The results for 2010 and 2011 are shown in the table below.

ADOPT Re-establishing Alfalfa Demo Forage Data – Moose Creek Red Angus

	Drill + P	Drill - P	Broadcast +P	Broadcast - P	Control
Seedling Counts*					
June 2010	52.5	53.2	14.9	15.9	0
June 2011	89.6	44.3	67.9	19.4	0
Forage Production (kg/ha)					
2010	2410	2770	2592	2920	1928
2011**	3500	3500	2500	2000	2000
% Alfalfa by weight					
2010	6	2	7	3	0
2011***	25	25	20	20	0

* Mean number of alfalfa seedlings observed in 20 m transects across seeding treatments

**Total forage production by visual estimate

***% Alfalfa by visual estimation

Multi-Site Discussion

Based on the results from 2010, alfalfa seedling establishment appeared to be delayed at the WBDC site compared to Moose Creek and Grainland. Initial seedling counts in early June of 2010 showed that alfalfa establishment at the WBDC site was less successful than at the other two sites. One consideration may be that grazing pressure at the other two sites was more effective in reducing the existing grass competition compared to the WBDC site. Very wet growing conditions in the spring of 2010 seemed to encourage existing grass re-growth. However, the later seedling count at the WBDC site in 2010 (August 13) showed an increase in the number of alfalfa seedlings on both drilled and broadcast treatments.

This demonstration also showed that at the Grainland and Moose Creek sites, drilled alfalfa seeding resulted in higher numbers of alfalfa seedlings compared to broadcast seeding while the opposite effect was seen at the WBDC site. Site supervisors noted that much of the alfalfa that germinated in 2010 at the Grainland site was winterkilled during the winter of 2010/2011. Seedling counts in 2011 were

attributed to new seedlings germinated in 2011. Winterkill was also noted to be more of a problem in broadcast treatments at the Moose Creek site when compared to drilled treatments. This may suggest that drilled seeding of alfalfa is preferred for this type of rejuvenation.

Continued evaluation of these three demonstration sites in 2011 showed that alfalfa was indeed establishing at all three sites with the WBDC and Moose Creek sites showing the most promise. Seedling counts at all three sites were greater in 2011 than in 2010 and % alfalfa in each of the three stands also increased in 2011 over 2010. The trend from 2010 where drilled treatments at both the Grainland and Moose Creek sites resulted in higher seedling counts than in broadcast treatments was also noted in 2011. The WBDC site remained the opposite in 2011 with broadcast treatments resulting in higher seedling counts than the drilled treatments. This result is unexpected as drilled seeding normally results in higher germination due to improved soil to seed contact and better moisture availability over broadcast seeding. However, given that moisture was not limiting in either 2010 or 2011, broadcast seeded alfalfa would not have been lacking moisture to germinate.

There did not appear to be a clear effect from fertilizer at these demonstration sites. Seedling counts and forage yield were similar between fertilized and unfertilized treatments at both the WBDC and Grainland sites. At the Moose Creek site, seeding counts and forage yield were similar between fertility treatments in 2010 however, seedling counts in 2011 were higher on fertilized treatments compared to unfertilized. This result suggests that phosphorous fertilizer may have an extended effect to aid in alfalfa germination.

As mentioned previously, both 2010 and 2011 were above average moisture years, therefore results from these three demonstration sites should be observed with caution. If moisture conditions were more typical during the establishment years for this demonstration, it could be expected that alfalfa germination would have been lower, particularly in the broadcast seeded treatments. Although the Grainland site appears to be the least successful, due to its location in the dry brown soil zone, this result was somewhat expected. However, alfalfa seedlings were establishing at the Grainland site and in the second year were beginning to produce a noticeable portion of the yield particularly for drilled treatments.

Total forage yield at all three sites was not significantly affected by the addition of alfalfa however, as the legume continues to establish, forage yield may also increase. While there was not an apparent effect on forage yield in this short-term project, forage quality was likely enhanced. As the proportion of alfalfa increases in a stand, forage quality is improved.

Low Cost Establishment Option

In all locations, alfalfa did establish into the existing grass stands. In all of the treatments in all locations, there appeared to be little correlation between phosphate fertilizer and alfalfa establishment. Even at the Moose Creek site where the broadcast + P treatment received between 40-45 lbs/acre of actual P, there was basically no difference in seedling counts in 2010. However, during the 2011 season, seedling counts at this site did show an increase in numbers for fertilized treatments compared to unfertilized treatments. As previously mentioned, this result suggests that phosphorous fertilizer may have an extended effect to aid in alfalfa germination. It appears that pre-seeding suppression of the existing stand (through grazing) is important in allowing alfalfa to establish. Due to the high rainfall recorded in both 2010 and 2011, these results may not be typical. The following tables show a simple economic analysis for each of these sites using estimated input costs (alfalfa seed and/or fertilizer) and output

revenue (forage value based on average hay prices).

Economic Analysis of alfalfa seeding at WBDC site

Treatment	Alfalfa Seed Price* (Per acre)	P cost** (Per acre)	Hay Yield 2011 (ton/acre)	Hay Price*** (\$/ton)	Net Gain/Loss (per acre)
Control	\$0	\$0	1.56	\$50	\$78
Drilled + P	\$18	\$6	1.31	\$50	\$41.50
Drilled – P	\$18	\$0	1.31	\$50	\$47.50
Broadcast + P	\$18	\$6	1.67	\$50	\$59.50
Broadcast – P	\$18	\$0	1.44	\$50	\$54

*Based on 5lbs/acre of creeping root alfalfa - price in 2009 as derived from the Forage Market Price Report, SFC, July 2009

**Based on 2009 price for P2O5 (\$0.20/lb)

***Average price for alfalfa/grass hay in 2011 based on SFC estimates

Economic Analysis of alfalfa seeding at Grainland site

Treatment	Alfalfa Seed Price* (Per acre)	P cost** (Per acre)	Hay Yield 2011 (ton/acre)	Hay Price*** (2011)	Net Gain/Loss (per acre)
Control	\$0	\$0	0.36	\$50	\$18
Drilled + P	\$18	\$6	0.45	\$50	-\$1.50
Drilled – P	\$18	\$0	0.45	\$50	\$4.50
Broadcast + P	\$18	\$6	0.41	\$50	-\$3.50
Broadcast – P	\$18	\$0	0.36	\$50	\$0

*Based on 5lbs/acre of creeping root alfalfa - price in 2009 as derived from the Forage Market Price Report, SFC, July 2009

**Based on 2009 price for P (\$0.20/lb)

*** Average price for alfalfa/grass hay in 2011 based on SFC estimates

Economic Analysis of alfalfa seeding at Moose Creek site

Treatment	Alfalfa Seed Price* (Per acre)	P cost** (Per acre)	Hay Yield 2011 (ton/acre)	Hay Price*** (2011)	Net Gain/Loss (per acre)
Control	\$0	\$0	0.90	\$50	\$45
Drilled + P	\$18	\$6	1.58	\$50	\$55
Drilled – P	\$18	\$0	1.58	\$50	\$61
Broadcast + P	\$18	\$6	1.13	\$50	\$32.50
Broadcast – P	\$18	\$0	0.90	\$50	\$27

*Based on 5lbs/acre of creeping root alfalfa - price in 2009 as derived from the Forage Market Price Report, SFC, July 2009

**Based on 2009 price for P (\$0.20/lb)

*** Average price for alfalfa/grass hay in 2011 based on SFC estimates

Although it appears that cost of adding alfalfa and/or fertilizer at these sites was not economically warranted (with the exception of the drilled treatments at the Moose Creek site), it often takes multiple years to realize the full effect of forage establishment. During this two year demonstration, forage yield had not yet significantly increased over the control plots. Given more time to observe these sites, yield

is likely to increase as alfalfa continues to establish. Also, this simple economic comparison does not take into account the change in forage quality. As the legume component of the stand increases, forage quality will also increase. Increased forage quality will improve animal gains and hay quality both of which will have a positive effect on economic returns. The producer cooperator at the Moose Creek site indicated that he would attempt to seed alfalfa into other existing grass stands on his operation as he was pleased with the results of his demonstration site.

Extension/Promotion Activities:

Extension activities completed included:

- Signs placed at each of the sites
- Western Beef Development Centre Summer Field Day, Lanigan, SK (June 22, 2010) – 180 attended (Appendix B)
- Field day at Forget site (July 27, 2011) – 20 producers in attendance (Appendix B)
- An informational video clip was produced based on this demonstration project and is available for viewing on the SFC website (www.saskforage.ca). This video will also be used at future producer events to highlight this project and the three sites included.
- Information regarding this project was included on the Saskatchewan Forage Council website (average hits of 1100+ per month) as well as in the October 25, 2010 edition of the *SFC Forage and Livestock eNews* which has an electronic distribution of 400+ with additional forwarded distributions.
http://www.saskforage.ca/Coy%20Folder/Publications/eNews/October_25,_2010.mht

It must be noted that the most valuable aspect of this demonstration project has been the peer-to-peer discussions that were facilitated at field days, and through extension materials/events that the SFC participated in. And it is anticipated that this information will continue to be of value to producers into the future. With this demonstration of how alfalfa can be added to existing grass stands, producers will be better equipped to evaluate the potential of this practice on their own operation.

11. Conclusions and Recommendations

The purpose of this project was to look at various methods to re-establish alfalfa into existing grass stands. A question to be evaluated at the three co-operator sites was whether broadcast or drilled seeding was more effective and if the addition of phosphate fertilizer would improve alfalfa establishment. If the addition of fertilizer improved alfalfa establishment, is the added cost of fertilizer justified?

The project was successful in comparing the effectiveness of two seeding methods and the effect of phosphate fertilizer on the establishment of alfalfa into existing grass stands. In particular, demonstration plots showed that alfalfa can be established into existing grass stands with drilled seeding showing an advantage over broadcast seeding at two of the three sites. The addition of phosphate fertilizer did not have a clear effect on the establishment of alfalfa seedlings at any of the three locations in either seeding method. Suppression of the existing grass in the stand appeared to have an important effect. All three sites utilized fall or early spring grazing on the area to be seeded as a method to suppress existing vegetation. It should be noted that during both years of this project above average moisture conditions were experienced at all three locations, thus results from these sites may not be typical.

Although total forage yield was not significantly improved by the establishment of alfalfa at these demonstration sites, forage quality was very likely improved. To gain a better understanding of how

alfalfa continues to establish into existing grass stands, plots will be continue to be monitored over the next couple of years.

Reduced productivity is a major concern with older grass stands and this project has demonstrated that alfalfa seeded into existing grass stands may be a practical, low cost option for rejuvenation. However, it must be noted that both years of this project saw above average moisture conditions at all three sites. In an average moisture year alfalfa establishment may not be as successful.

Supporting Information

12. Acknowledgements

The Ministry's support for the project was acknowledged on signage displayed at each site and in all communication/extension materials.

Industry/co-operator support has also been noted all project site signage and in all communication/extension materials.

Industry Support – Viterra and Pickseed both provided alfalfa seed to use at these demonstration sites. Precision Ag, Carlyle provided fertilizer for the Moose Creek site.

In-Kind support was provided by Saskatchewan Ministry of Agriculture Forage Specialists and Western Beef Development Centre Staff to oversee these demonstration sites.

13. Appendices

Appendix A – Site Photos

Appendix B – Project Field Days

Abstract

14. Abstract/Summary

With the assistance of ADOPT funding, the Saskatchewan Forage Council collaborated with three co-operators to demonstrate different methods to re-establish alfalfa into existing grass stands, providing producers with a practical look at potential methods to increase the productivity of older grass stands. At sites located near Lanigan, Forget, and Central Butte, Saskatchewan, alfalfa was seeded by drill or broadcast, with and without the addition of phosphate fertilizer. Demonstration plots showed that alfalfa can be established into existing grass stands with drilled seeding showing an advantage over broadcast seeding at two of the three sites. The addition of phosphate fertilizer did not have a clear effect on the establishment of alfalfa seedlings at any of the three locations for either seeding method. Suppression of the existing grass in the stand appeared to have an important effect. Although a simple economic analysis of the input costs and output revenue showed that seeding alfalfa and/or fertilizer application to existing grass stands may not be economically advantageous, this short-term demonstration likely has not captured the full effect of alfalfa establishment. As alfalfa continues to establish, forage yield is expected to improve over control plots and forage quality will also improve. Field days were held at two sites (Lanigan – June 22, 2010; Forget – July 27, 2011) with a total of approximately 200 in attendance. As well, a number of communication materials including an

informational video clip were compiled to facilitate widespread messaging about the project. Producers need to consider local environmental and vegetation conditions before attempting to seed alfalfa into an existing grass stand. These demonstration sites and the resulting extension activities and communication materials provided extremely valuable and practical information as well as a first-hand look at opportunities that should be explored. With a visual and practical example of how co-operators were able to establish alfalfa into existing grass stands within their own operations, other producers may begin to explore any opportunities that may exist for them to rejuvenate their own forage stands.

Finances

15. Expenditure Statement

Project expenditures are reported in the attached Excel spreadsheet.

Appendix A – Site Photos

Western Beef Development Centre – Lanigan, SK



Seedling Counts – July 27, 2011

Grainland – Central Butte, SK



Drilled treatment at Grainland site
September 2011

Moose Creek Red Angus – Forget, SK



Alfalfa seedlings
June 21, 2011

Appendix B – Project Field Days and Extension Material

**MANAGING HERD INFORMATION,
THE CATTLEMAN'S NEW REALITY**

**WBDC Summer Field Day
Tuesday, June 22, 2010**

9:30 a.m.

REGISTRATION

10:00 a.m.

WELCOME & OPENING REMARKS

- VP WBDC - Dr. Paul Jefferson
- SK Ministry of Agriculture – Mr. Greg Brkich
- Termuende Family – Dale Termuende
- WBDC Strategic Advisory Committee chair – Tim Oleksyn

10:30 a.m.

BEEF INFOXCHANGE SYSTEM UPDATE (BIXS)

Larry Thomas, BIXS National Manager

11:10 a.m.

**CANADIAN CATTLE IDENTIFICATION AGENCY UPDATE
AND PREMISE IDENTIFICATION**

Brian Anderson from the Saskatoon office

12:00 Noon

LUNCH & TRADESHOW

1:30 p.m.

BUS RESEARCH TOURS

- Grazing Crop Residues – Ashley Kraus (Dept. Of Animal & Poultry Science) & Dr. Bart Lardner (WBDC)
 - Eco-Buffer Management – Laura Poppy (AESB)
 - Pasture Rejuvenation, AgrowPlow Root Bed Renovation and AgrowDrill Sod Seeding – Doug Bidulock (AGROWPLOW)
 - Sod Seeding Alfalfa – Dr. Paul Jefferson (WBDC)
- Nutrient Export Runoff – Dr. Jeff Schoenau (Dept. Soil Science) & Barbara Cade-Menin (AAFC-SPARC)
 - Water Filtration – Serena McIvor (AESB)
 - Mycoplasma Pneumonia in Beef Cattle – Dr. Jose Perez Casal (VIDO)

5:00

CLOSING REMARKS

5:30

BBQ STEAK SUPPER (\$10)

WBDC Field Day – June 22, 2010
Note: ADOPT Project included
as part of field tour.

South East Research Farm
Summer Ag Seminar and Red Cross Benefit
Flood-Buster Challenge
Stoughton – July 27th Memorial Hall 304 Main St.

1:00 Registration – Memorial Hall, Stoughton

1:15 Leave Memorial Hall for Alfalfa Establishment Demonstration – Sask Forage Council

2:15 Tour returns to Memorial Hall for refreshments

2:30 Ag Seminar at the Memorial Hall

- Mark Akins, Winter Wheat – Ducks Unlimited
- Kylie McRae, Forages - Ducks Unlimited
- Lorne Klein, Regional Forage Specialist - Saskatchewan Agriculture
- Andre Bonneau, Forage Specialist - Saskatchewan Agriculture
- Edgar Hammermeister, Soil Fertility - Western Ag Labs

Crockpot Challenge for supper....

Vote for your favourite Stoughton and area crockpot cooks. Or bring a batch of your best summer crockpot recipe for a chance to win great prizes. The cook that raises the most money in tickets will win a framed Ducks Unlimited wildlife print.

- Cost is \$10 per couple for the tour, seminars, and supper with proceeds to the Red Cross. Please bring an item for the Food Bank.

Brought to you by:

- South East Research Farm
- Ducks Unlimited
- Saskatchewan Ministry of Agriculture

For more information on this and other Flood-Buster events, contact Lana Shaw at 457-2829 for more information, or email lshaw.serf@gmail.com.





Tour of Moose Creek demonstration site
July 27, 2011

Video available at: www.saskforage.ca

