

ADOPT DEMONSTRATION REPORT

**(Agriculture Demonstration of
Practices and Technology)**

RESEARCH

20120431

**IMPACT OF GRAZING MANAGEMENT ON FORAGE
PRODUCTIVITY.**

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Prepared by: South East Research Farm (SERF)



**Saskatchewan
Ministry of
Agriculture**

Project Title: Impact of Grazing Management on Forage Productivity

Project Number: 20120431

Producer Group Sponsoring the Project: South East Research Farm

Project Location(s):

Fairlight

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Project contact person & contact details:

Lana Shaw, MSc
Research Manager
South East Research Farm
Redvers, SK
457-2829
Lshaw.serf@gmail.com

Fairlight Grazing Demonstration – 2013 Report

The Fairlight land parcel (NE 28, 10-31 W1) was seeded in 2005 to perennial forage. Three perennial forage seed mixtures were seeded on separate parcels to demonstrate the use of non-bloating legumes and native grass species for pasture. A cover crop of barley was seeded at 10 lbs/acre. The three combinations were:

1. sainfoin, alfalfa, meadow bromegrass
2. cicer milkvetch, alfalfa, meadow bromegrass
3. alfalfa, green needlegrass, northern wheatgrass, western wheatgrass, needle and thread, rough fescue, blue grama

In 2005 the site was left uncut. During 2006-2009 the site was hayed and/or grazed. The initial plans to demonstrate forage and grazing management did not proceed as planned. In 2010, grazing treatments were started and continued on separate paddocks to demonstrate the long term effects of moderate and heavy grazing.

The management for **moderate grazing** paddocks was a twice-over grazing system. Generally the first pass started when growth was 12-18 inches tall, and removed about 50-60% of the vegetation. The second pass started when regrowth was 12-18 inches tall, and removed 50-60% of the vegetation. The duration of each pass was 5-10 days. There was no grazing after Sept 1 to allow for plant growth and root replenishment prior to winter.

The management for **heavy grazing** paddocks simulated continuous season-long grazing where the vegetation was kept to a height of 6 inches or less. These paddocks had rest periods, but the rest periods were relatively short and insufficient for plant recovery and root replenishment. At the end of the growing season, the majority of the vegetation was removed with grazing.

Schedule A shows an aerial photo of the project, mapping the three separate forage seed mixes, paddock layout and grazing treatments. The moderate and heavy grazing treatments were focused on Paddocks 1-4. Paddocks 5 and 6 were reserved for “buffer” pasture to keep the livestock on site so the grazing treatments in Paddocks 1-4 could be applied as planned.

Methodology:

In spring 2013, a representative area in each of Paddocks 1-4 was fenced to exclude livestock grazing. Within these electric fenced areas, five grazing cages were placed parallel to the fence separating them. Samples of initial season growth were clipped on July 5th, and regrowth clipped on Sept 20th to compare dry matter yield and forage quality. The heavily and moderately grazed area for each forage type were located adjacent to each other to minimize variability between them.

Figure 1. Sainfoin mix plots in early July prior to forage cutting. On the right is the heavily grazed paddock and on the left is the moderately grazed paddock. Electric wire was put around the grazing cages to protect them, as cattle are known to damage them.



Results:

Forage Species Composition

- A. Sainfoin Mixture: In 2010, a visual estimation of species composition was 25% sainfoin, 50% alfalfa, 25% meadow bromegrass. After 3 years in the moderate grazed paddock, the species composition appears about the same. After 3 years in the heavy grazed paddock, there is a noticeable shift with lesser legumes replaced by weedy species including dandelions and thistles. Weedy species are estimated at 15-20% of biomass production.
- B. Cicer Mixture: In 2010, a visual estimation of species composition was 20% cicer, 50% alfalfa, 30% meadow bromegrass. After 3 years in the moderate grazed paddock, the cicer milkvetch appears to have increased to about 30% of the stand. After 3 years in the heavy grazed paddock, again there is a noticeable shift with lesser legumes replaced by weedy species making up about 15-20% of biomass production.

Forage Yield

After three years of grazing treatments (2010-2012) the yield reductions from moderate to heavy grazing were significant and relatively consistent, ranging from 36-51% yield reduction with heavy grazing.

Table 1. Forage yield of sainfoin and cicer milkvetch mixtures, comparing moderate and heavy grazing.

	Forage Yield (lbs/acre Dry Matter)					
	Sainfoin Mixture			Cicer Milkvetch Mixture		
Sample Date	Moderate	Heavy	Difference	Moderate	Heavy	Difference
July 5	4185	2662	1523	3980	2199	1781
Sept 20	1220	677	543	1362	668	694
Season Total	5405	3339	2066	5342	2867	2475



Figure 2: Harvesting quarter meters in the heavily grazed Sainfoin plot.

Forage Quality – Protein

On the sainfoin mixture, the percent protein was lower on the heavy grazed paddock. This may be partially explained by the reduction of legumes and increase in weed population on this paddock. On the cicer mixture, the percent protein was higher on the heavy grazed paddock. This may be partially explained as yields are reduced, forage quality tends to increase.

Table 2. Protein percentages comparing moderate and heavy grazing.

	Protein (% basis Dry Matter)					
	Sainfoin Mixture			Cicer Milkvetch Mixture		
Sample Date	Moderate	Heavy	Difference	Moderate	Heavy	Difference
July 5	10.9	8.8	-1.9	10.4	12.1	+1.7
Sept 20	11.0	9.9	-1.1	9.9	12.0	+2.1

Forage Quality – Total Digestible Nutrients (Energy)

On both mixtures and harvest dates, the percent energy increased on the heavy grazed paddocks. This may be partially explained as yields are reduced, nutrients become more concentrated in the plants. Also, the plants were less developed and more vegetative at harvest.

Table 3. Total Digestible Nutrient percentages comparing moderate and heavy grazing

Sample Date	Total Digestible Nutrients (% basis Dry Matter)					
	Sainfoin Mixture			Cicer Milkvetch Mixture		
	Moderate	Heavy	Difference	Moderate	Heavy	Difference
July 5	52.9	55.9	+3.0	51.4	56.9	+5.5
Sept 20	49.4	52.9	+3.5	48.8	56.9	+8.1

Discussion

The project was generally carried out as planned with quite dramatic differences in forage productivity. It was a year with above average precipitation for the area, and good regrowth in the late summer. I would expect results to be no less dramatic in a dryer year.

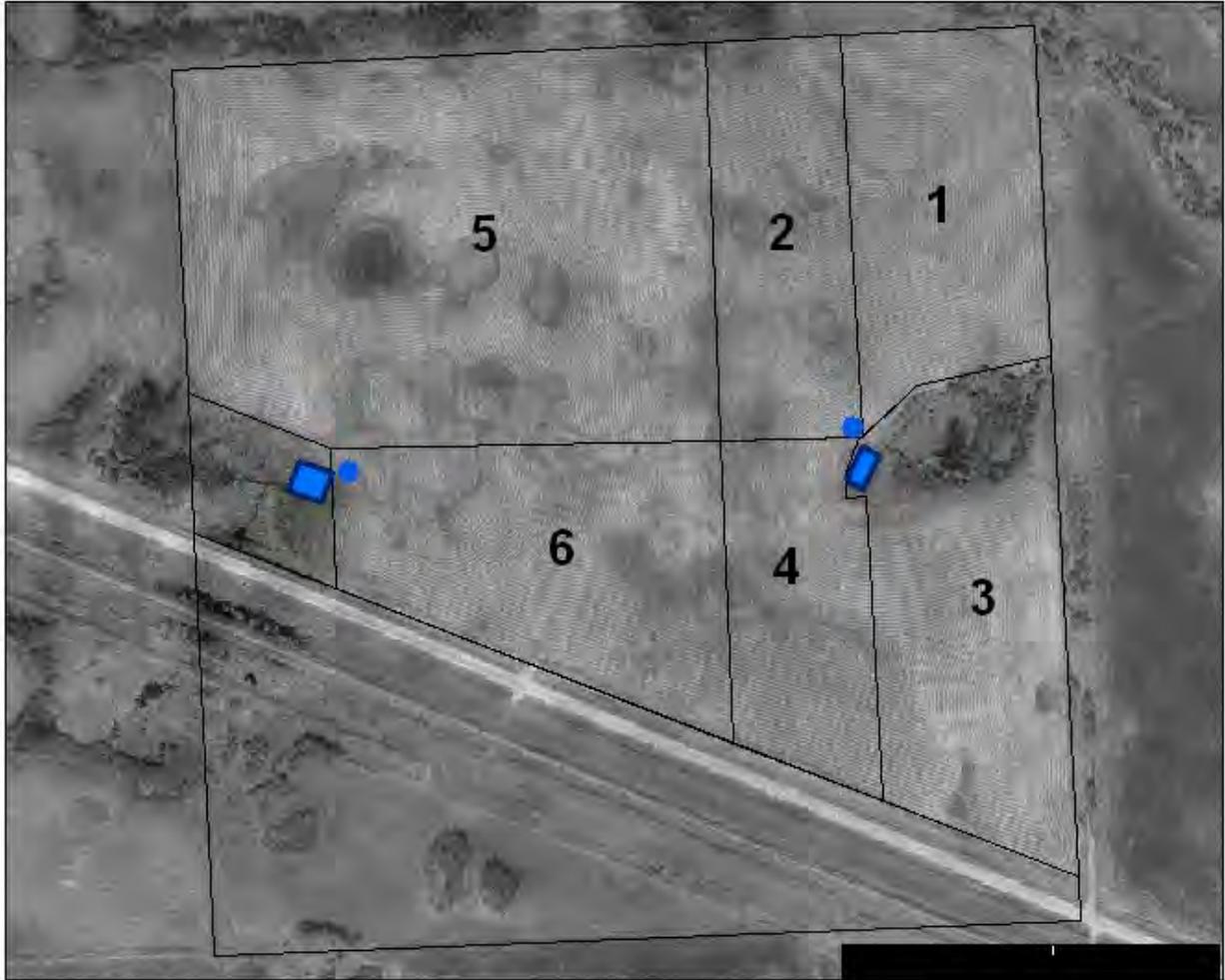
Due to an oversight at harvesting, the soil temperatures and residue amounts were not determined in 2013. The original application did not include a second cutting or forage analysis, but this was determined to be desirable in discussion with Lorne Klein, Regional Sk Ag Forage Specialist. As such, this final report includes two cuttings and forage analysis.

Conclusion

After three years of grazing treatments, the reduction in forage yield from moderate to heavy grazing is quite significant. Although the quality of forage tends to increase with heavy grazing, this gain is relatively small compared to the yield loss and invasion of weed species. These results are consistent with earlier work at Southeast Research Farm showing reduced root growth when comparing clipping frequencies (Schedule B). This replicated demonstration is an excellent way to confirm and demonstrate that heavy, continuous grazing reduces productivity of forage stands over time.

There were no cases of bloat during grazing of the paddocks. With this project design, there is no certainty that the inclusion of sainfoin or cicer milkvetch did indeed prevent bloat cases. However, the grazing of non-bloating legumes along with alfalfa can only help to reduce the risk. This project demonstrated that sainfoin and cicer milkvetch are viable forage options to include in a pasture mixture and are relatively grazing tolerant with good management.

Fairlight Grazing Project



Habitat Lands

NE28-10-31-W1

- 1 = Heavily grazed Sainfoin, Alfalfa & MB
- 2 = Moderately grazed Sainfoin, Alfalfa, MB
- 3 = Heavily grazed Cicer Milkvetch, Alfalfa, MB
- 4 = Moderately grazed Cicer Milkvetch, Alfalfa, MB
- 5 = Heavily grazed native
- 6 = Moderately grazed native

● = water system

■ = dugout



Description	Landscape Lightning Creek	THIS SKETCH PLAN HAS BEEN PREPARED FROM AIR PHOTO INTERPRETATION	
Land Parcel: NE28-10-31-W1		Date Drawn: 20090514 By: VE	
NTS Map Sheet:	Scale: 1:10,000	File:	
Photo No.:	Photo Date:	Page:	Checked By:

Schedule B. Root growth after three years comparing once, twice and five times/year clipping treatments.

