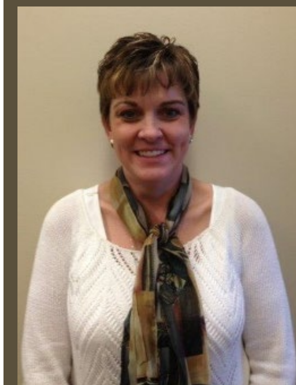

8.1 Planned grazing demonstration

2017 INT1

Measuring the impact of planned grazing on forage, soil and cattle health and productivity

Project Lead: **Pam Iwanchysko,** Livestock Farm Production Extension, Manitoba Agriculture

MBFI Location(s): Brookdale Farm

Collaborating Partners: Blain Hjertaas, Holistic Management Canada, Certified Educator and beef producer from Redvers, Saskatchewan

Start Date: June 2015 Status: In Progress

8.1.1 Introduction

Beef producers are interested in understanding the beneficial and detrimental effects cattle may have on existing pastures and annually cropped fields. The key factor that turns a detrimental effect into a beneficial effect is the management of the cattle. Ranchers have a vested interest in the managing for the best results in terms of production, profitibality and sustaining natural resources[1]. Cattle managed in a continuous grazing situation may damage the land, whereas cattle managed in a planned grazing situation can be beneficial. Impacts of livestock on soil fall into two broad categories: first, the physical impact of the animal on soil as it moves around, and, second - the chemical and biological impact of the feces and urine that the animal deposits to soil[2].

This project will demonstrate how producers can make positive changes with minimal expenses by focusing on the management of the cattle. It has been noted, that the absence of distubances in grassland ecosystems results in a decline in species diversity and deterioration of physical structure[3]. The end result is one of the biggest opportunities to increase profit on the farm, while adding environmental resiliency to the farm through improved soil, animal and forage species, productivity and health.

The core of planned grazing is simply grazing livestock in super dense herds that mimic the grazing patterns of big game, which have since disappeared. Those livestock tilled the soil with their hooves and fertilized it with their dung – thus preparing the land for new vegetation in a cycle that evolved over millions of years[4].

This project will target short graze periods, high stock density and full recovery of the plants before being grazed a second, and even a third time. The project will also monitor growing conditions with adjustments being made in recovery periods based on the monitoring of forage growth, environmental conditions and animal performance.

The graze period is defined as the amount of time cattle are allowed to stay in a pasture at one time. Overgrazing is a function of time. To exemplify the positive impacts that cattle can have on the land, overgrazing must not occur. This in turn requires a short graze period and, as a general rule, the shorter the better. For practical purposes, a graze period of two to three days will be used in this project, the same amount of days as used in the previous year.

The stock density is the number of head per hectare at a given time and the higher the stock density the better the results. The stock density is affected by the graze period. As the graze period is shortened, the stock density will be increased. This will be pre-determined along with the graze period according to the planned grazing technique, whereby animal requirements on a dry matter basis are calculated first and then estimated yields will be taken prior to grazing to determine the length of stay on a particular measured paddock.

The recovery period is the number of days that the plants have to re-grow before they are grazed a second time. Full recovery of the plants is essential. In most areas a recovery period of 60 to 90 days is likely required. Experience has been that the results tend to improve as you move closer to the 90-day range. In dry, slow-growing areas grazing only once in the growing season may be the best choice. The project will also aim for a 90-day recovery period at the start of the project on which to base the rest of the grazing days. First and foremost, the project will essentially work backwords in terms of grazing days to account for a 90-day rest period on the grazing paddocks.

Monitoring plant re-growth is essential to planned grazing. In fact this is one of the major differences between planned grazing versus many other types of grazing. A plan as described above will be made and adjusted to current growing conditions by increasing the recovery period if required. The result will be a full recovery of the pastures under all growing conditions. Planned grazing is a powerful tool to improve the land's resilience to environmental extremes, its carrying capacity and ultimately the bottom line.

It is hypothesized that planned grazing (commonly referred to as intensive grazing or mob grazing) will increase soil, forage and ultimately animal health and production. However, this management style can require some time and resources to set up and manage, which is likely why it is not widely adopted yet. According to the Western Canadian Cow-Calf Survey[5] collected in 2014, "Intensive grazing was practiced by 11 per cent of respondents on tame pasture and 2.7 per cent of respondents on native pasture." Planned grazing is designed to have short grazing periods, high stocking density and a full rest and recovery of the plants before being grazed a second time. Recovery periods are adjusted (60 to 90 d is targeted) based on monitoring forage growth, environmental conditions and animal performance.

8.1.2 Objectives

This project will compare two types of grazing: planned grazing and conventional continuous grazing. It is hypothesized that in the initial years, the performance of the cattle will stay relatively similar between the two grazing types but a significant improvement in soil health and forage production will result.

The overall project objective is to determine if planned grazing is a more beneficial grazing method than the conventional continuous grazing. Another project objective is to determine the soil nutrient status and its change over time after the different grazing methods have been utilized. Baseline soil tests were taken in 2015 to compare to consecutive years. Grazing cages will stay in place for many years to be used as a baseline with no grazing in the grazed paddocks and fields (results to be reported in projects *INT 10* and *EXT 11*). Additionally, the project will measure the change in forage production and quality and its potential impact on livestock production (weight gain and BCS). The final objective is to identify fixed point plant succession and to determine if there will be any long-term changes in plant communities and biodiversity.

8.1.3 Project Design and Methods

A grazing plan was developed to implement grazing of two herds of 25 cow-calf pairs each, to compare planned grazing to a conventional continuous grazing plan. Each herd is assigned a paddock letter (A-G) which corresponds to the same forage quality, and within those lettered paddocks, smaller paddocks of the same size for the planned herd. The continuous herd has the same amount of acres but there is no paddock division within that paddock letter.

Pastures consist of native forage (paddocks 12, 13, 14, 15, 16, 21, 22, 23) and a tame pasture mix (paddocks 1 to 11, 17 to 19 and 24 to 30) for the herds. Each herd had access to a combination of both tame and native species. The herds were assigned grazing according to a randomized complete block design to accomomdate soil microbiolgical analysis research by Brandon University.

The tame pasture mix consisted of 45 per cent meadow bromegrass, 30 per cent orchardgrass, 10 per cent timothy, 10 per cent creeping red fescue and some additional cicer milkvetch was also added. The native pastures included western wheatgrass, northern wheatgrass, slender wheatgrass, green needlegrass, big bluestem, little bluestem, side-oat grama grass, switch grass and indian grass. Twenty-three paddocks, approximately four acres each, were set-up with temporary electric fencing on the perennial summer pastures, with a permanent two-strand electric wire around the perimeter for the planned herd and continuous grazing occured on the rest of pastures (Table 1). There was the same amount of pasture area for each of the herds.

Table 8.1.1. Paddock treatment assignment and number of acres in each

Paddocks for McGonigle project INT 11	Planned herd paddock number(s)	Number of ac	Continuous herd paddock number(s)	Number of ac
A	1 – 4	16.8	5	16.8
B	7 – 11	18	14	18
C	12 – 13	8.1	7 – 8	9.9
D	15	5.7	16	5.1
E	17 – 19	10.8	20	10.4
F	21 – 23	10.4	24	9.7
G	25 – 28	21.1	30	20
Sum of acres		90.9		89.9

For the first 21 days, starting 15-May-17, 25 cow/calf pairs were allowed to graze the paddocks for one day in each paddock. The cattle were moved daily to a new paddock. This grazing strategy wsa used to help keep the forage groth in a vegetative state early in the growing season, whereas in previous years the forage had to be mechanically harvested to do so. This method allowed the cattle a quick graze and helped to maintain the vegetative state for the rest of the grwoing season instead of mechanical means. After the cows were through all of the planned grazing paddocks for one day, they were then started on the second rotation whereby the paddocks were split in half and then cattle were moved daily again in each half paddock. After that period they were moved less frequently, every second or third day to accomodate slower growth in the forages, where they were assigned to a whole paddock for two to three days pending the amount of regrowth with a target of leaving 50 per cent of the forage behind in each paddock. The continuous herd had access to an equal amount of acres of the type of pasture (native or tame) in all assigned paddocks at once, but did not begin grazing until 01-June-17.

Individual animals were weighed at the beginning of the trial and then monthly to get a measurement of the rate of gain and they were body condition scored (BCS). Animals and pastures were monitored for health and growth and were managed according to the forage growth in the paddocks. A grazing plan was compiled and used for the detailed management of the grazing treatments. Cows were watered daily through a solar-powered watering system that was developed on the entire section.

The number of animal days per acre (ADA) plus residual forage was assesed on all the paddocks at the end of the growing season. Yield clippings were taken each day the cattle were moved to a new paddock. Species composition was completed at the beginning of August. These assessments are to record any plant succession that may take place due to the impact of grazing in the future.

9.1.4 Results and Discussion

The planned herd remained on trial for 135 days from 15-May-17 through to 27-September-17, while the continuous herd was placed on pasture on 01-June-17 and taken off on 05-September-17 for a total of 97 days. There were 38 more days grazing for the planned herd in the 2017 grazing season. There appeared to be no difference between weight gains on any of the animals while they were on the pasture trial (Table 2). The continuous cows however did lose some body condition, which was pretty well identical to the results of the previous grazing year.

Table 9.1.2. Average weights (lb) and average daily gains (ADG, lb/d) of cows and calves on planned and continuous grazing systems at Brookdale pasture during the 2016 grazing trial

	15-May	1-June	5-Sep	27-Sep	ADG
Continuous Cows		1264	1390		0.98
Continuous Calves		88	389		2.6
Planned Cows	1272			1408	0.93
Planned Calves	106			476	2.7

Yield measurements including residual forage DM, show that overall there was more forage yield on the planned grazing system for the second consecutive year (Table 3), with the exception of the C paddocks, which yielded approximately the same on both grazing systems. The C paddocks on the planned grazing system were only grazed once in this grazing season and then again at the end of the season for one day once frost had occurred. In the previous grazing season, it was overgrazed and needed more rest, which was given in this current grazing season.

Table 9.1.3. Average yield (lbs/acre) of forage production on the planned versus continuous grazing paddocks in the planned grazing demonstration project.

Paddocks	Planned Herd	Continuous Herd	Description
A	3818.67	2052.87	Tame Pasture
B	2627.87	1410.85	Tame Pasture
C	2621.63	2739.23	Native Pasture
D	2826.76	1398.96	Native Pasture
E	3497.58	1203.79	Tame Pasture
F	3185.89	2765.75	Tame/Native Mix
G	3178.04	1439.91	Cicer Milkvetch Pasture

Figure 9.1.2 also showcases the impact of the grazing strategies on the forage yield between the two grazing pastures and the indivudal two consequetive years of the project. In 2016 yields were higher on the planned grazing system and in 2017 as well. Forage growth slowed dramatically in August and September for the continuous pasture. Dry conditions in 2017 showed a decrease in overall yield on both grazing systems as compared to the previous year, with a dramatic drop in September before rainfall had any effect in October to replenish soil mositure and resume forage growth after grazing prior to freezing.

Visual observations (Figure 9.1.1) were also noted with regards to the viusal appearance of the continuous pastures. There appeared to be some population growth of rodents into the pastures, particularly gophers and more invasive plant species. However this was not measured statisctically but rather just an observation.

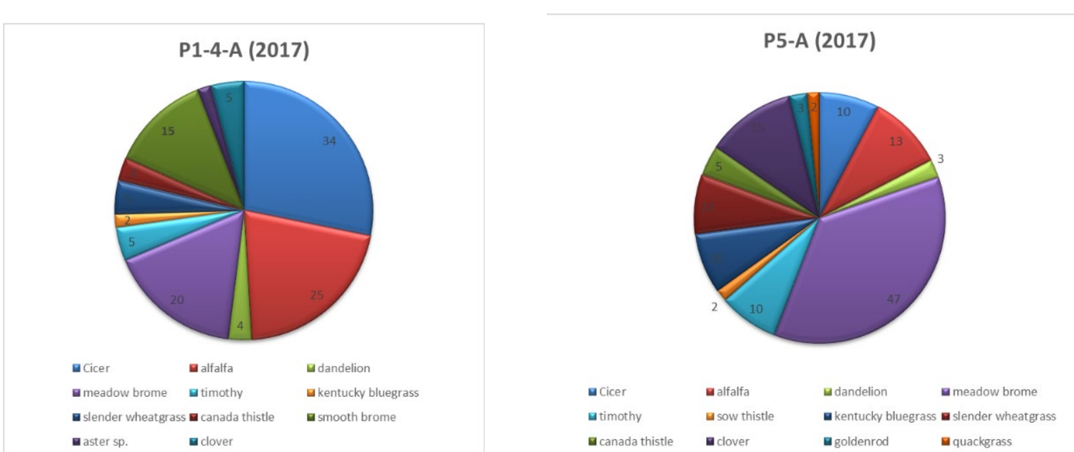

Figure 9.1.1 – Example of visual observation measurements of compared planned (paddocks 1-4) and continuous (paddock 5) paddocks for species composition in 2017.

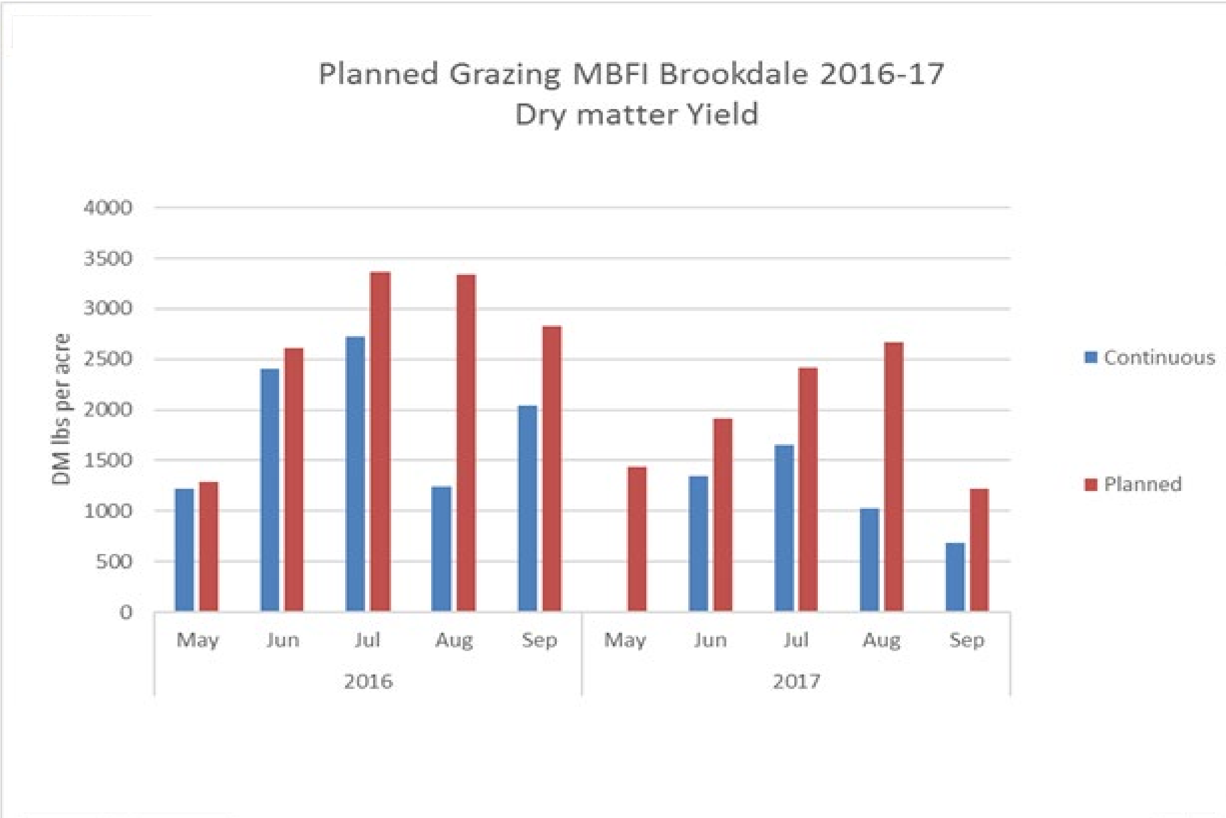

Fig. 9.1.2. Total yield of all paddocks (lb/acre) in DM for both the 2016 and 2017 grazing seasons.

Additionally to the yield measurement in the paddocks, a species composition was conducted across all of the paddocks. One significant difference that was found was with regards to a higher population of Meadow Bromegrass on the continuous grazed pastures. It is suggested that this may be due to the earlier grazing that happens on the planned grazing system. With Meadow Bromegrass being more palatable in the early spring, the cattle tend to eat it more readily and since the continuous herd was postponed in terms of grazing, the meadow bromegrass had more time to re-grow and regenerate itself. The planned herd grazing strategy may have actually decreased the population of Meadow Bromegrass in the paddocks due to the early grazing. However, there may be more of a need to reassess the population of the many different grass species in future grazing years to see if this effect continues.

9.1.5 Economics

For this project assuming that the average summer grazing period is 135 days based on the Manitoba Agriculture cost of production costs, and that 38 days less feed for winter was required, at $1.734/hd/d plus yardage at $1.345/d; this is equivalent to $3.08/hd/d x 38 d = $117.04 x 25 cows = $2926.00 was saved by the additional grazing days on pasture. In comparison to 2016 in which there were an additional 17 days grazing at a total reduced cost of $1273.00 for the additional winter feed that would have been required in that year as well.

To date additional project costs have been labor and fencing and the solar powered watering system. The watering system was amortized over a minimum of 10 years and the fencing will be split between the two grazing systems and amortized as well over 10 years. Therefore total project costs for the two years to date are approximately $33,000.00.

9.1.6 Summary

To date the results of this project look very promising in terms of yield response, grazing days (animal days per acre) and the effect that they grazing rest and recovery planned system is having on the planned grazing paddocks. Even with the dry year in 2017, yields were higher than the continuous system and more grazing days occurred.

The hypothesis of the continuous system experiencing detrimental effects seems to be holding true in terms of more invasive plant species entering the pastures and overall yield to be lower and declining. Economic returns also appear to be promising in terms of return on investment for the input costs as well as there is good financial returns to date in the two years that the project has occurred.

Planned grazing can be a powerful tool to improve the land's resilience to environmental extremes and its carrying capacity and ultimately the producer's bottom line.

9.1.7 Acknowledgements

Acknowledgement to Blain Hjertaas for his ongoing support and input towards the project planning. The author is extremely grateful to Leah Rodvang, Kristelle Harper and Warren Bowles and MBFI summer students for assistance in the field and data management during this study.

9.1.8 References

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9.1.9 Pictures


Legumes in Paddock 12C (Planned Grazing Regime) – June 20, 2017


Riparian Area Crossing in the Continuous Pasture between Paddocks

24F and 20E.

Contrast pictures of Paddock 5A - Continuous (right) and 2A - Planned (left) on June 20th prior to second grazing on Paddock 2A.