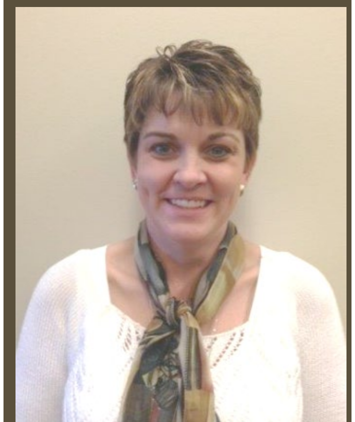

9.1 Planned grazing demonstration

2016 INT 1

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

Project Lead: **Pam Iwanchysko**, Farm Production Extension – Forage, 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

9.1.1 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% of respondents on tame pasture and 2.7% 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.

9.1.2 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.

9.1.3 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 randominzed complete block design to accomomdate soil microbiolgical analysis research by Brandon University.

The tame pasture mix consisted of 45% meadow bromegrass, 30% orchardgrass, 10% timothy, 10% 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 9.1.1. 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 40 days the planned grazing paddocks were sub-divided in half and the cattle were moved daily to a new paddock. After that period they were moved less frequently, every third or fourth day to accomodate slower growth in the forages. 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.

Soil testing was completed on the site in the spring. Individual animals were weighed monthly on the trial 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.

Forage quality was assessed three times during the grazing season. 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 124 days. The continuous herd remained for only 107 days as their grazing period had to be shortened by 17 days (due to lack of forage); they came off pasture on September 13. Preliminary results show that cows on the planned grazing system averaged 58 lb more than the continuous cows. The planned calves were also 78 lb heavier than those on the continuous system (Table 2).

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

	30-May	13-Sep	30-Sep	ADG
Continuous Cows	1399	1353		-0.4
Continuous Calves	80	319		2.2
Planned Cows	1405		1411	0.1
Planned Calves	82		396	2.5

Yield measurements, including the residual forage DM, show that there was more forage yield and residual on the planned grazing system (Fig. 1) than what was produced and consumed on the continuous pastures throughout the grazing period.

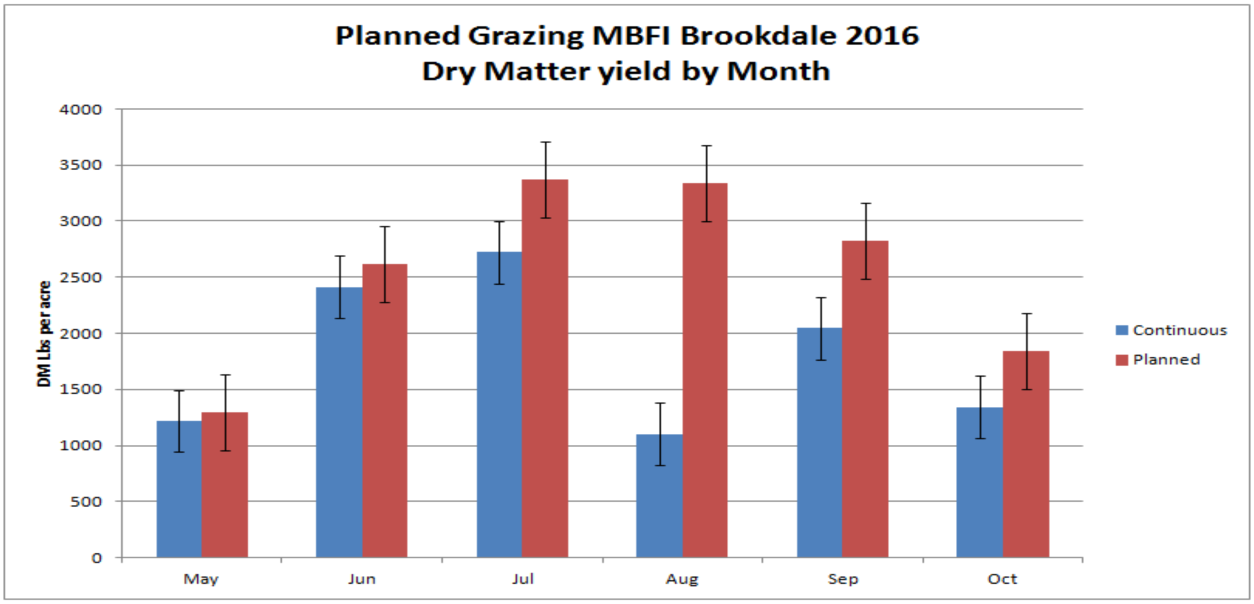

Fig. 9.1.1. Total yield of all paddocks (lb per acre) in DM including residual measurements taken at the end of the grazing trial.

MBFI's mission statement of '*being a centre of agricultural innovation engaging in science-based research to benefit valuable ecosystems and improving producer profitability'* is showcased in this work. This project's preliminary results indicate better forage growth and residual on the planned grazing system and is making the environment more resilient, and potentially more profitable by producing more kilograms of beef per hectare. The preliminary species composition assessment showed more invasive species on the continuous pastures, while the planned grazing system showed healthy, viable, high producing, good quality forages.

The soil health and fertility are being evaluated in a separate project - *INT 11 Experimental evaluation of microbial biomass as an indicator of soil health under forage management*.

9.1.5 Economics

For this project assuming that the average summer grazing period is 145 days, and based on Manitoba Agriculture's improved pasture rates of $0.78/d (4.5 miles of fence vs. marginal pasture at seven miles of fence), it was found that with 17 more days grazing x $0.78 = $13.26 per cow was saved which was equivalent to 11% more grazing. Please note that the planned cow-calf pairs were only on pasture for 124 days since the infrastructure was not in place for an earlier start to the trial.

Alternatively, another assumption that could be made is that 17 days less feed was required. At $1.63/hd/d plus yardage at $1.37/d; this is equivalent to $3/hd/d x 17 d = $50.92 x 25 cows = $1273 was saved by the additional grazing days on pasture.

From the calf perspective, the planned herd calves were 398 lb at the end of the trial whereas the continuous calves only weighed an average of 319 lb or 77 lb less than then planned calves, in addition to having been pulled off pasture 17 days earlier. From an economic standpoint, if we were to look at backgrounding these calves right off the cow, at a cost of $1.05/d feed and $1/d yardage x 17 d on feed, which would equal a cost of $34.85 per calf for the 17 days. There were 25 calves, so the total cost saved for the planned grazing herd compared to the continuous herd would have been $871.25. In this scenario, we would assume all other costs were applied to cows.

If we decided to sell these calves right off the cows at the end of trial at $2/lb, our profit difference would have been $154/calf or a loss of $3850 on the continuous calves versus the planned calves (77 lb different between the calf groups).

9.1.6 Summary

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

9.1.7 Acknowledgements

Thank you to our collaborating partners: Blain Hjertaas, Holistic Management Canada - Certified Educator; all the Manitoba Agriculture staff who helped with this project and Terrence McGonigle, Professor, Brandon University.

9.1.8 References

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Fig. 9.1.2. Cows getting moved on planned grazing paddock 27G, Sept. 26, 2016, Brookdale farm; photo by Manitoba Agriculture.

Fig. 9.1.3. Continuous herd, paddock 6B, September 2016, Brookdale Farm; photo by Manitoba Agriculture.

Fig. 9.1.4. Example of clipping area for paddock yield estimates, Brookdale Farm, September 2016; photo by Manitoba Agriculture.

Fig. 9.1.5. Fenceline contrast between continuous - paddock 6B and planned - paddock 9B, September 2016, Brookdale Farm; photo by Manitoba Agriculture.

Fig. 9.1.6 Planned grazing condition of manure and insect activity - paddock 3A, July 2016; photo by Manitoba Agriculture.