

# 19. Determining yield potential of annual forages/cover crop mixtures in the Interlake region of Manitoba

## Project duration

- 2021

## Collaborators

- Imperial Seeds, Fosters Ag Services

## Objectives

- This project was planned to determine yield potential of four annual forages when grown in combination with cover crop mixture (TG Extend). Forage quality comparisons were also done in the test.

## Results

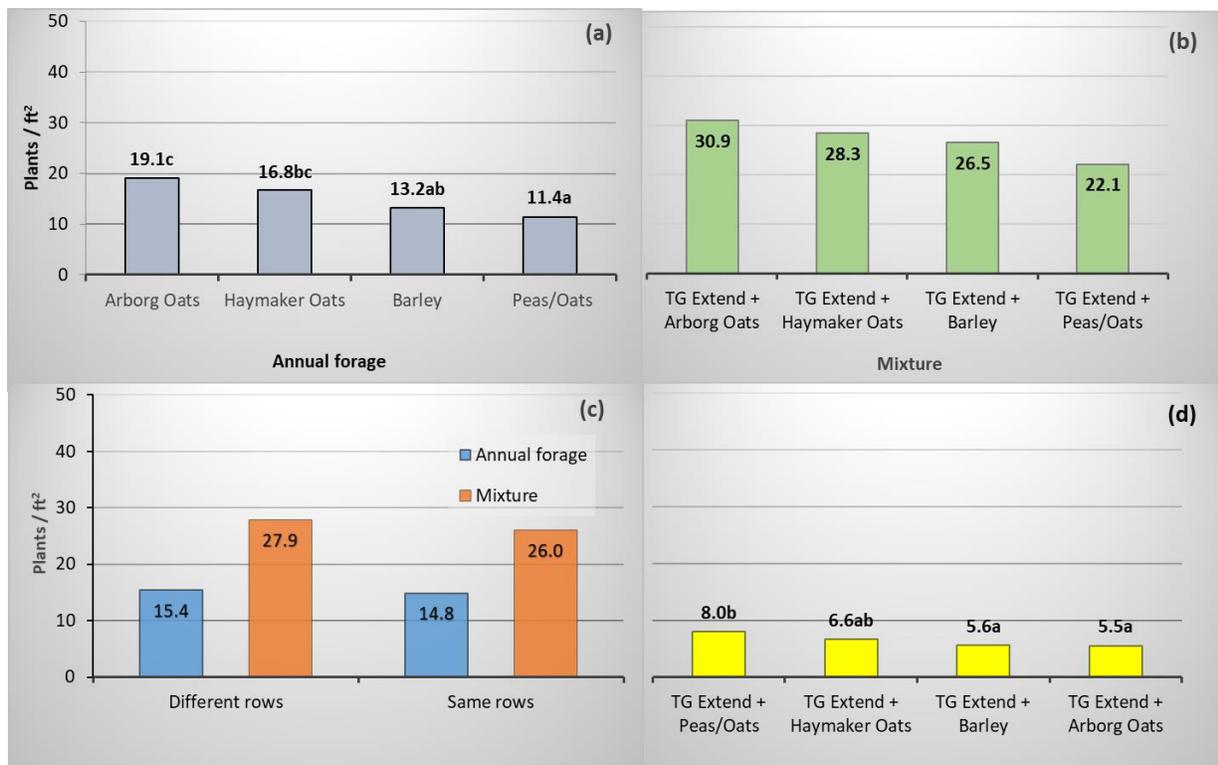


Fig.19.1. Plant establishment after seeding in (a) annual forages (b) annual forage + TG extend (c) different row treatments and (d) establishment of mixture after first cut at Arborg.

When plant establishment was compared after seeding, TG extend/Arborg oats plots had higher oats plant population (Fig 19.1a). Pea/Oats plots had lower number of annual forage plants/ft<sup>2</sup>, when grown with cover crop. Plant establishment of annual forages/cover crop mixtures, however, did not differ after seeding (Fig. 19.1b). Similarly, seeding annual forages

and cover crops in the same row or different row did not have any effect on plant population of either annual forages or mixture (Fig.19.1 c). When plots were checked for regrowth after first cut, pea/oats plots had higher regrowth than in barley and Arborg oats/cover crop mixtures (Fig.19.1 d).

Table 19.1. Forage dry matter yield of annual forage / cover crop mixtures at first cut, second cut and during the entire season at Arborg.

Annual forage /cover crop mixture	Growth stage at first cut	Forage dry matter yield		
		First cut	Second cut	Total
	<i>BBCH</i>	-----Tonnes /acre-----		
<b>TG Extend + Haymaker Oats</b>	75	1.98 b	0.69 ab	2.65
<b>TG Extend + Arborg Oats</b>	77	1.91 b	0.71 ab	2.47
<b>TG Extend + Barley</b>	83	1.85 b	0.38 a	2.22
<b>TG Extend + Peas/Oats</b>	R4 /75	1.61 a	1.01 b	2.65
<b><i>p-value</i></b>		<i>0.001</i>	<i>0.005</i>	<i>0.106</i>
<b><i>CV%</i></b>		<i>7.5</i>	<i>20.4</i>	<i>8.4</i>
<b><i>Sig. diff.</i></b>		Yes	Yes	<i>NO</i>

Pea/Oats when grown with TG extend produced less forage yield during first cut than all other three mixtures tested (Fig.19.1). On contrary, this mixture produced higher forage yield at second cut. All forage/cover crops combinations were similar in producing forage dry matter yield over the season.

Feed quality analysis showed slight difference in crude protein (%) among different forage/cover crop mixtures tested (Fig. 19.2). In general, second cut had almost two times higher protein than in first cut. Arborg oats and barley / TG extend mixtures had relatively higher total digestible nutrients (TDN, %) and relative feed values (RFV) at first cut than Haymaker Oats and Peas/ Oats and TG extend mixture. Neutral detergent fibre (NDF, %), TDN (%) and RFV did not vary much at second cut.

## Project findings

Plant establishment differences were not evident among different annual forages/cover crop mixtures used in this project. These differences, however, were recorded during regrowth in the second cut. Forage yield varied among mixtures at individual cuts, however, all mixtures produced similar yield over the season. The year 2021 was extremely dry year at the site and it might have resulted in relatively lower forage yield irrespective of any mixture tested. Arborg oats and Barley/ TG extend mixtures were better for feed quality at first cut. At the second cut, NDF (%), TDN (%) and RFV did not vary much among different mixtures.

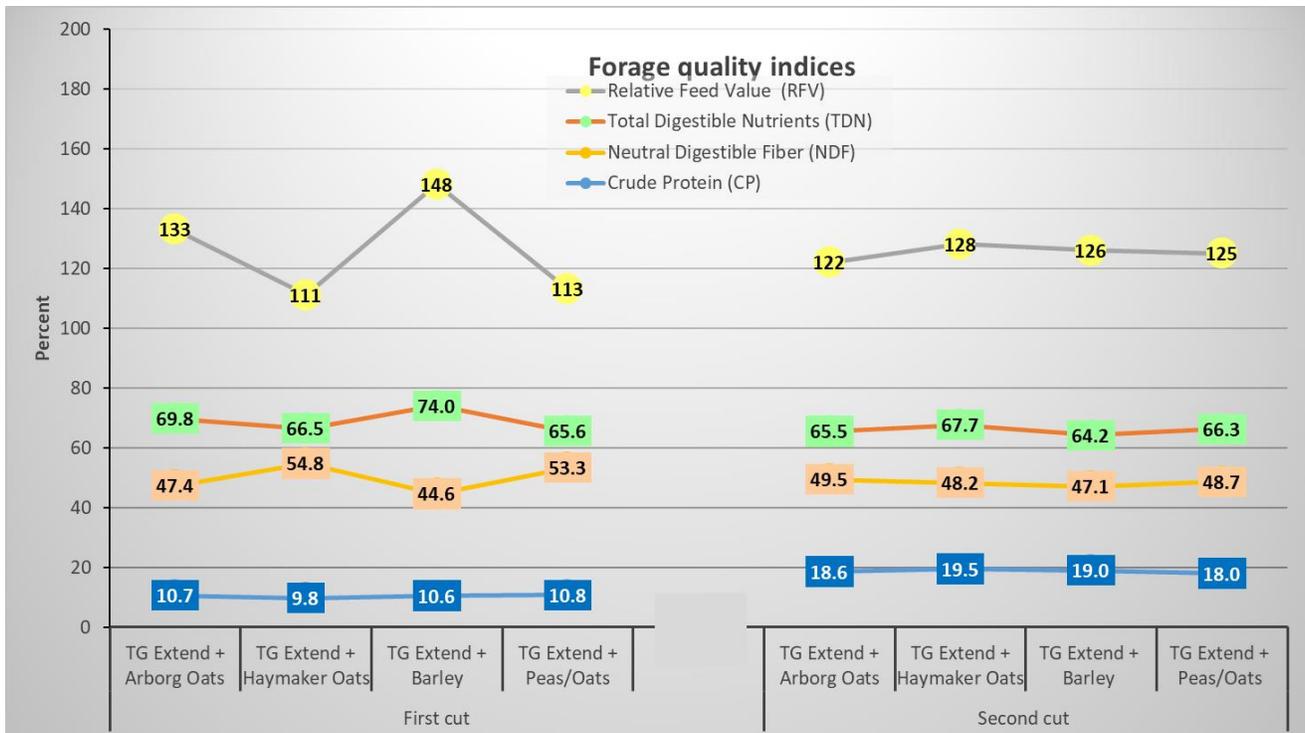


Fig. 19.2. Feed quality results from the first and second cut of different annual forage/cover crop mixtures tested at Arborg site.

### Background / Additional resources / References

Cattle producers utilized cereal-legume intercrops for forage production in western Canada (Aasen et al. 2004). In recent years, producers are growing a multispecies annual crop mixture for forage production. A multispecies annual crop mixture can be selected from a diversity of plant families (Polygonaceae, Brassicaceae, Poaceae, and Fabaceae), corresponding to different plant functional groups (Lavorel et al. 1997). Such mixtures are reported to increase forage productivity and nutrient cycling (BCRC 2016). In a recent study from Alberta, three forage/cover crop mixtures had forage yield advantage, better marginal returns and benefit/cost ratio when compared with cereal monocrops (Omokanye et al 2018). Most of the mixtures had >13.0% forage crude protein (CP) compared to less than 12.0% forage CP for monocrops. This study also demonstrated that growing a minimum of three annual crop (cereal, legumes and brassicas) rather than one or two crops, increased forage production and offered a forage-based diet that was able to adequately meet the nutritional requirements of beef cattle in most cases. The top yield mixture had Red proso millet (*P. miliaceum* L.), CDC Haymaker oat variety (*A. sativa* L.), CDC Maverick barley variety (*H. vulgare* L.), 40–10 forage pea variety (*P. sativum* L.), Tillage radish (*R. sativus* L.), Hairy vetch (*V. villosa* Roth L.), Kale (*B. oleracea* L.), Crimson clover (*T. incarnatum* L.) and Laser Persian clover (*T. resupinatum* L.).

In the current study, we tested different annual forages in combination with TG extend cover crop mixture from Imperial seeds. This mixture has the following plant species:

- **Melquatro Italian Ryegrass (25%)** - this tetraploid variety has high yield potential for hay, silage and grazing. The high sugar content makes it a good candidate for improved digestibility.

- **Ebena Brand Common Vetch (20%)** - produces a high protein feed. Also, is an excellent cover crop for nitrogen fixation, erosion control, biomass and weed suppression.
- **Akela Brand Forage Rape (5%)** - high leaf to plant ratio and is easily digested. It provides a protein rich, high-quality feed that can be used as late grazing or silage.
- **Malwira Brand Turnip Rape (5%)** - offers better flexibility in sowing and grazing times. Regrowth from hybrids is rapid with multiple grazings achievable.
- **Japanese Millet (20%)** – very good quality millet that will regrow.
- **H.O. Brand Crimson Clover (5%)** - has erect stems, grows quickly. Primary advantages are rapid growth during cool weather, shade tolerance, and nitrogen fixation.
- **Winner Brand Berseem Clover (5%)** - an annual legume that resembles alfalfa in appearance and can be used as a cover crop, pasture or hay. Berseem clover is not winter hardy but can create significant biomass and fix large amounts of nitrogen due to its rapid establishment and fast growth (1.5 times that of alfalfa).
- **Pearl Millet (15%)** – a high protein annual grass (Family Poaceae) crop of tropical origin. Its seed or entire plant can be used as animal feed. Pearl millet can be grown in less fertile soils and poorer growing conditions where wheat and corn cannot thrive.

## References

- Aasen A, Baron VS, Clayton GW, Dick AC, McCartney DH. 2004. Swath grazing potential of spring cereals, field pea and mixtures with other species. *Can J Plant Sci.* 84:1051–1058. doi:10.4141/P03-143.
- Lavorel S, McIntyre S, Landsberg J, Forbes TDA. 1997. Plant functional classifications: from general groups to specific groups based on response to disturbance. *Trends Ecol Evol.* 12:474–478.
- Beef Cattle Research Council [BCRC]. 2016. Cover crops as forage for beef cattle. [Accessed 2018 September 11]. [http://www.beefresearch.ca/files/pdf/BCRC\\_Cover\\_Crops\\_Fact\\_Sheet.pdf](http://www.beefresearch.ca/files/pdf/BCRC_Cover_Crops_Fact_Sheet.pdf).
- Akim Omokanye, Herbert Lardner, Lekshmi Sreekumar & Liisa Jeffrey (2019) Forage production, economic performance indicators and beef cattle nutritional suitability of multispecies annual crop mixtures in northwestern Alberta, Canada, *Journal of Applied Animal Research*, 47:1, 303-313, DOI: 10.1080/09712119.2019.1631830

## Materials and methods

*Experimental design* – Randomized complete block design

Replications – 3;

*Plot size* – 8.22m<sup>2</sup>;

Seeding depth – 0.75 inch

*Treatments* – Four annual forages;

- Arborg oats (50 lb /ac),
- Haymaker oats (50 lb /ac),
- Austenson Barley (48 lb /ac),
- Peas/Oats (64 lb /ac) grown with TG Extend cover crop mixture (10 lb /ac) either in the same row or different rows.

**Data collected**

Plant species established (plants /ft<sup>2</sup>), crop stage at harvest, forage dry matter yield (FDMY – tonnes /acre), Feed quality testing

For each treatment plot, above ground biomass was harvested from all the rows and weighed fresh. Approximately 1 kg of freshly harvested material (sub-sample) was dried to a constant weight for dry matter (% DM) calculations. The DM calculations were then used to find out forage dry matter yield (FDMY). Feed samples were sent to Central Testing lab to find out crude protein (%), Acid Detergent Fibre (%), Neutral Detergent Fibre (%), Total Digestible Nutrients (%) and relative feed value.

**Agronomic information**

*Stubble, soil type* – Fallow, Heavy clay

*Fertilizer applied* – no fertilizer was applied.

Inoculant applied to Pea plots @ 8 lb /acre

Pesticides applied: Silencer @ 34ml /acre applied on July 13 and July 29 for grasshoppers

*Seeding date* – May 31, 2021

*Harvesting date* – Aug 6, 2021