Evaluation of nutrient-dense annual crops (forage brassica) in west central Alberta as complement of stockpile forage production.

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Partners:

- Union Forage
- Yellowhead County
- West Central Forage Association
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Introduction

Nutrient dense annual forage crops such as brassicas are reported to produce high yields of highly digestible forage during periods when perennial forages have limited production and quality. Although nutrient dense crops are being marketed as good late summer and winter grazing fodder in Alberta, nothing beyond anecdotal information is available to producers with regards to whether these crops are viable feed options for cattle in Alberta growing conditions. It is unknown whether these crops will grow successfully, will provide sufficient nutrients, or if the nutrition will degrade in fall and winter.

This one year trial was desinged to demostarte the ability of three varieties of annual crops Hunter, Windfred and Goliath to hold feed value as a winter option in the west central region of Alberta.

The demonstration plots were located at the West Central Forage Association Forage Research Site (SE 27-53-9- W5th) near Wildwood Alberta, which is located 120km west of Edmonton, in the gray wooded soil zone. In this soil zone the surface layer is leached of clay and plant nutrients. Soil and organic matter is low and crusting often reduces seedling emergence. Moisture is not as limiting as elsewhere in Alberta, but the growing season is shorter. Data were collected and results will be available to producers to help them make management decisions.

Objectives

- Evaluate 3 varieties of brassicas for quality and yield in fall and winter under two different management practices: swathed and standing crop.
- Determine if these annual crops hold feed value as a winter-feeding option
- To determine if these crops are viable for production in the west central area

Methodology

The soil was tested for nutrients in the fall and this information was used to prescribe fertilizer applications. Plots were seeded to a prepared seedbed on May 21st , 2015 using a small plot Fabro disc seeder (18 m long 5 rows at 22.5 cm) at a rate of 4 pounds per acre. A glyphosate treatment was administered prior to seeding at 450 mL/ac rate.

In the fall treatments were divided in two; swathed and standing crop (stockpile), biomass yield and quality samples were collected on (September 24th) and (January 14th). Material from 1 square meter were taken of the swathed side including the regrowth and from the standing side.

Treatments

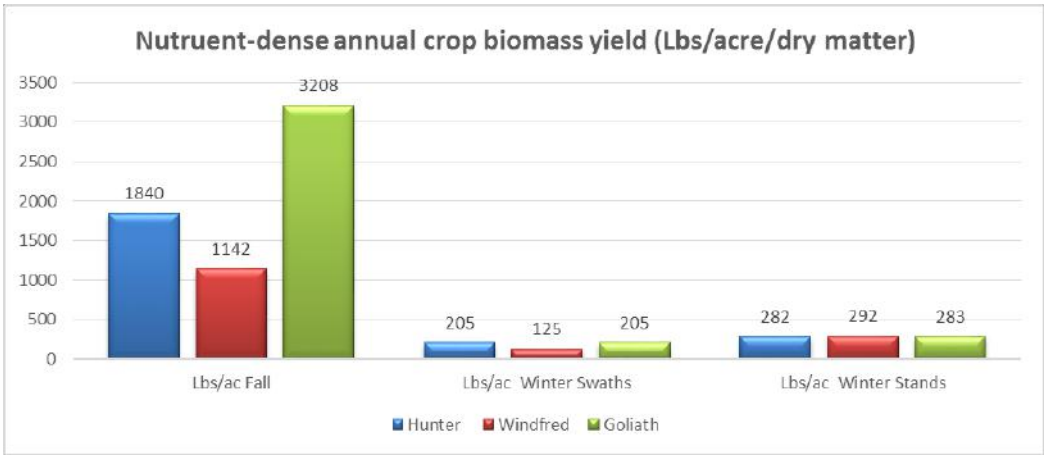
•Hunter; Forage Brassica
•Windfred; Forage Brassica
•Goliath; Forage Brassica

Observations

Stand establishment was good for all nutrient-dense annual crops (forage brassica) despite pest and weed pressure and lack of moisture Picture #1 shows weed pressure on June 30th. On August 25th, Windfred and Goliath showed even stand and lower weed pressure, Hunter had uneven stand and more weed pressure see Picture #2.

- **Biomass Yield**

Fall samples: In September, samples were collected, Goliath has highest yield with 3208 lbs/acre/dry matter, followed by Hunter with 1840 lbs and Windfred had the lowest yield at 1142 lbs. winter samples: On January, two sets of samples were taken from each treatment (swathed side and the standing side). On the swathed side the highest were Goliath and Hunter with 205 lbs/acre/dry matter each and the lowest was Windfred at 125 lbs. On the standing side the highest yield was Windfred with 292 lbs and the lowest were Hunter and Goliath each yield 282 lbs.



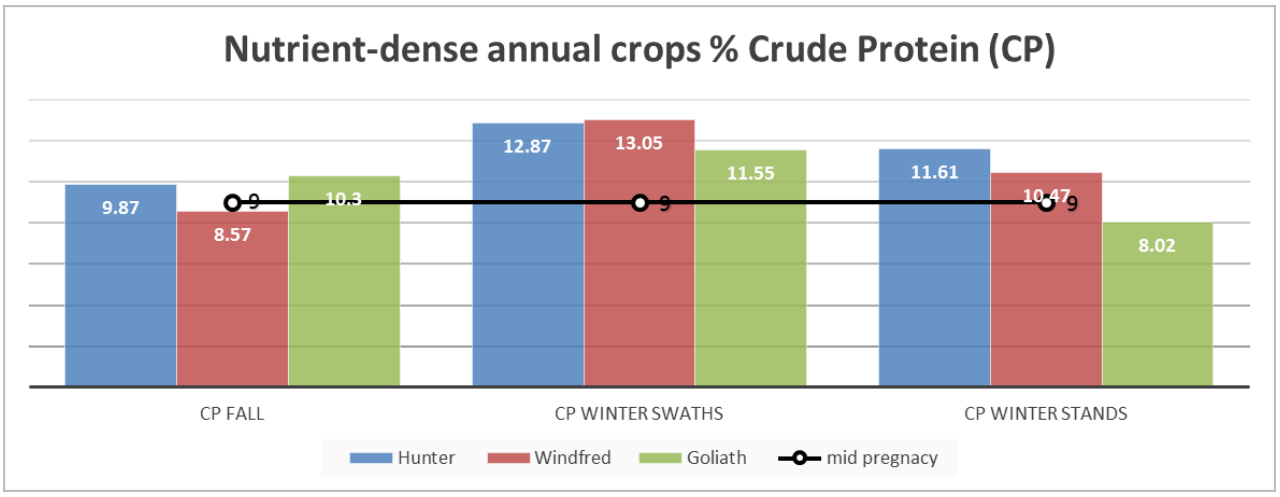
Graphic #1. - Biomass yield lbs/acre in dry matter basis in three annual crops at three different management practices.

- **Crude Protein**

The beef cow rule of thumb with protein is 7-9-11, which means an average mature beef cow requires a ration with crude protein of 7 per cent in mid pregnancy, 9 per cent in late pregnancy and 11 per cent after calving, (Yurchak, 2004).

Fall samples: On September, samples were collected the treatment with highest % of crude protein (%CP) on the dry matter basis was Goliath with 10.3 %CP, followed by Hunter with 9.87 % CP and Windfred had the lowest with 8.57 %CP

Winter samples: On January, two sets of samples were taken from each treatment (swathed side and the standing side). On the swathed side the highest %CP was Windfred with 13.05 %CP, followed by Hunter with 12.87 %CP and the lowest was Goliath with 11.55 %CP

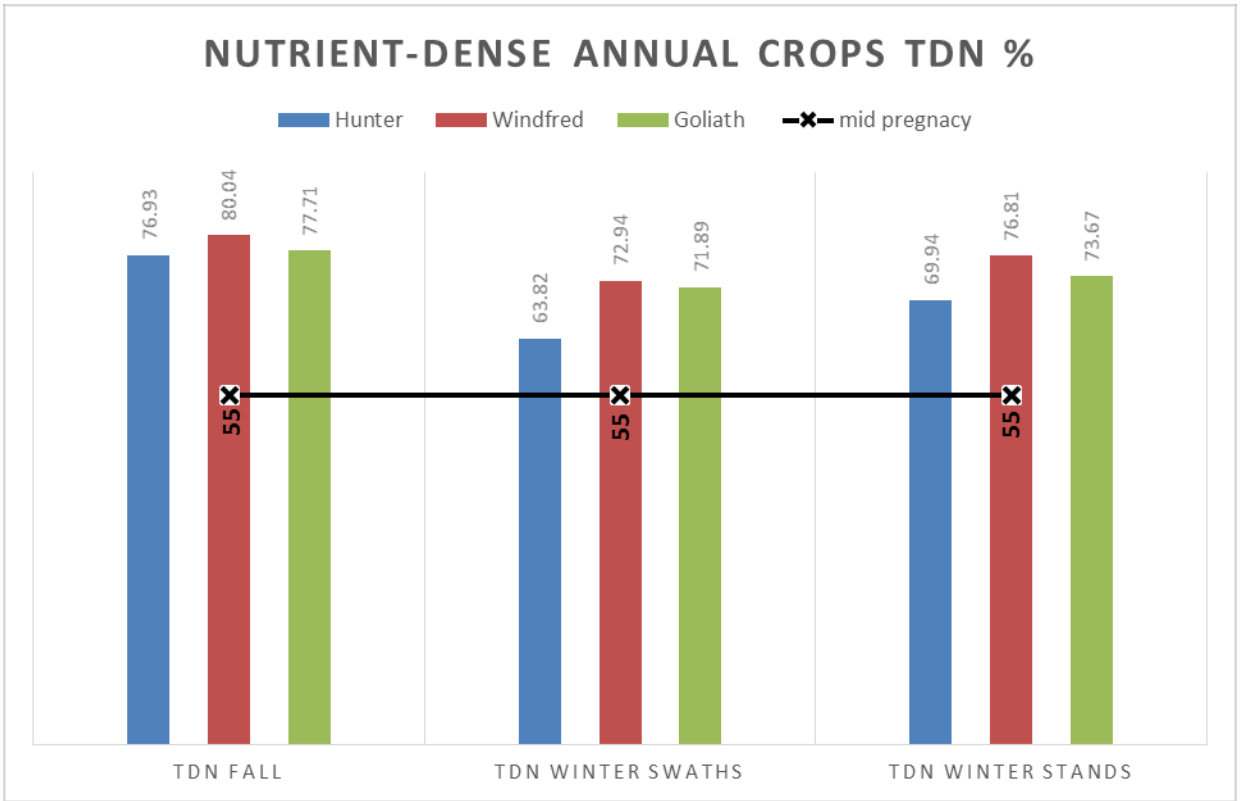


Graphic #2. – Crude Protein in dry matter basis in three annual crops on different management practices/stages (fall, winter swaths and winter standing forage).

- **Total Digestible Nutrients (TDN)**

Total Digestible Nutrients (TDN) measures available energy of feeds and energy requirements. As a rule of thumb for a mature beef cow to maintain her body condition score (BCS) through the winter, the ration must have a TDN energy reading of 55 per cent in the mid pregnancy. (Yurchak, 2004). The highest TDN % on the dry matter basis consistently on the three management practices was Windfred, followed by Goliath and Hunter the lowest.

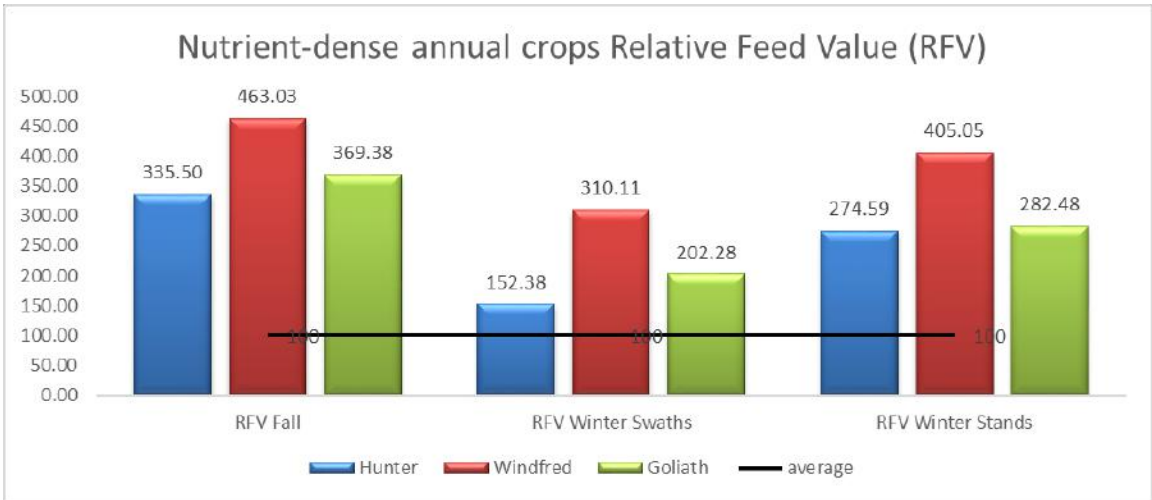
The highest RFV in the fall was Windfred with 80.04 %, followed by Goliath with 77.71 TDN % and Hunter had the lowest with 76.93 TDN %. All treatments showed similarities with the fall values in the winter swaths and the winter standing.



Graphic #3. –TDN % in dry matter basis in three annual crops Windfred, Hunter and Goliath on different management practices/stages (fall, winter swaths and winter standing forage).

- **Relative Feed Value (RFV)**

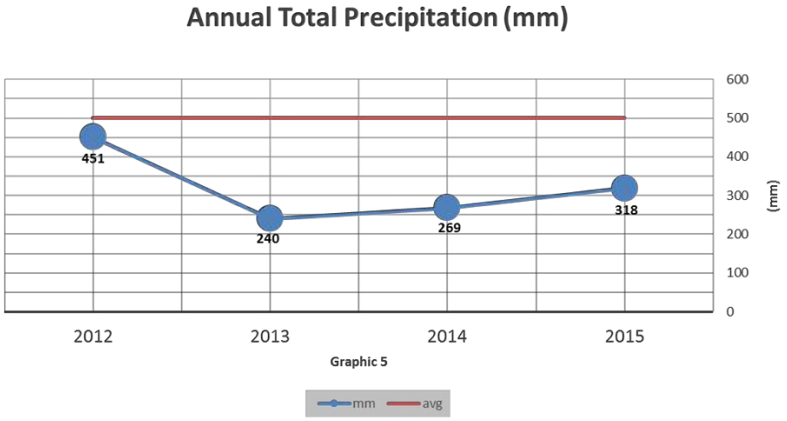
Relative feed value is an index that combines the important nutritional factors of intake and digestibility. Higher RFV values indicate higher forage quality. RFV of 100 being considered an average value. (Alberta Ag-Info Centre, 2006)



Graphic #4. –RFV for three annual crops Windfred, Hunter and Goliath on different management practices/stages (fall, winter swaths and winter standing forage).

Comments

Results should be treated with caution as they are from only one year of field testing, in addition to low precipitation. The annual total precipitation of the gray wooded soil zone from 1971 to 2000 was 500mm (Agroclimatic Atlas of Alberta, 2003). Graphic #5 shows the accumulative precipitation from the Evansburg weather station has been collected from 2012 to 2015 from May until October of each year.



Graphic #5. – Annual total precipitation in the Evansburg weather station from 2012 to 2015

Discussion

- All treatments showed good emergence and successful growth during the season,
- All treatments showed sufficient nutrients to maintain a mature cow in the mid pregnancy stage through the winter, with the exception of Windfred in the fall %CP value and Goliath in the winter swaths %CP value,
- No treatments decreased nutritional value but Goliath; stared with 10.3 %CP in the fall and decreasing to 8.02 %CP in the winter.
- Noteworthy to mention that all the treatments increased the % CP and decreased the TDN % in the winter test.
- The drastic drop in biomass yield over the winter months is based on the hypothesis that damage was made by grasshoppers late in the fall and wildlife early winter. In addition winter deterioration of leaves (Picture below) had a negative effect on the biomass yield.

Picture 1. – Plot showing the weed pressure on June 30th, 2016 in nutrient-dense annual crops demonstration plots at Wildwood Alberta.

Picture 2. – Nutrient-dense annual crops demonstration trial at Wildwood Alberta on August 20th, 2015 Windfred (W) and Goliath (G) show better establishment and Hunter (H) is uneven and more weed presence.

Picture 3. – Nutrient-dense annual crops Hunter treatment demonstration trial at Wildwood Alberta

Picture 4. – Nutrient-dense annual crops Windfred treatment demonstration trial at Wildwood Alberta

Picture 5. – Nutrient-dense annual crops Goliath treatment demonstration trial at Wildwood Alberta

Picture 5. – Fall harvest of nutrient-dense annual crops (forage brassica) demonstration trail at Wildwood Alberta

Picture 6. – Picture taken on September 24th, showing two treatments in nutrient-dense annual crops demonstration trail at Wildwood Alberta. Goliath at the top and Hunter at the bottom.

Picture 7. – Picture show 1 square meter sample taken from Hunter treatment nutrient-dense annual crop demonstration trail at Wildwood Alberta on January 2015.

Picture 8. – Picture show the Goliath treatment plot differences in height and biomass of the nutrient-dense annual crop demonstration trail at Wildwood Alberta. The top show the swathed side and the bottom the standing side.

Picture 9. – Picture showing the two samples spots from Windfred treatment nutrient-dense annual crop demonstration trail at Wildwood Alberta on January 2015. The top show the standing side and the bottom the swathed side.

Appendix

The following graphics show the quality in dry matter basis for individual treatments; Hunter (Figure 1), Windfred (Figure 2) and Goliath (Figure 3) of nutrient dense annual crops (forage brassicas) trial, conducted in the winter of 2015 at Wildwood Alberta for West Central Forage Association.

Figure 1

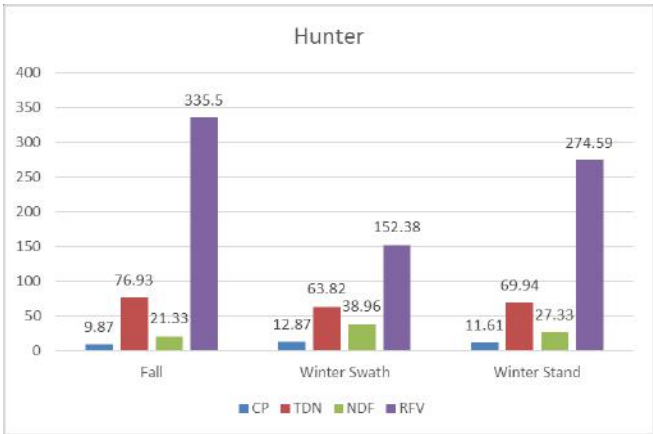


Figure 2

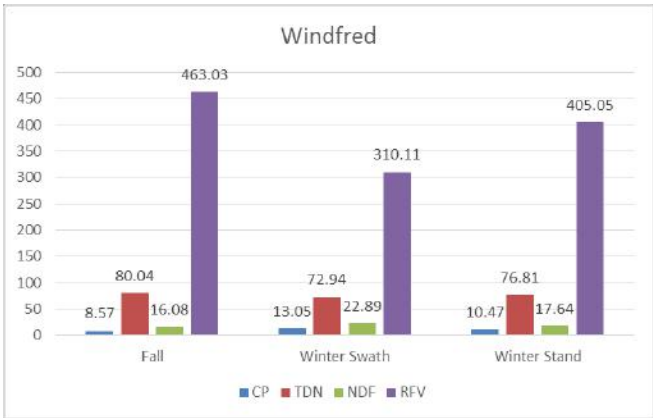


Figure 3