



# Western Beef Development Centre

## 2002 GRAZING CORN REPORT

### Introduction

Saskatchewan producers continue to look for ways to extend the grazing season for their cow herd. The Western Beef Development Centre continues to collect information on crops such as grazing corn for dormant season grazing. For the past four years, corn has been included in winter grazing studies at the Termuende Research Farm, near Lanigan, SK. In 2002, four varieties of grazing corn were seeded to evaluate establishment, yield, nutritional value and input costs for mature, bred cows grazing during the fall or winter months.

### Seeding

Four corn varieties (Table 1) were seeded on 65 acres where grazing corn was grown the previous year. All varieties were seeded May 25, 2002 once soil temperatures reached 10° Celsius. Seeding rates were based upon recommendations for each variety (Table 1) and direct seeded at a depth of 1" with conventional seeding equipment. The Roundup Ready (DCK27-11) and Hyland varieties were seeded using a 40-foot Seed Hawk air seeder. The Pioneer and Canamaize varieties were seeded using a 15 ft. John Deere no-till press drill (runs blocked to achieve wider row spacing than 7 ½"). All varieties were seeded at 30-inch row spacing except Canamaize, which was seeded at 8-inch row spacing.

**Table 1. Corn varieties**

Variety	Heat Units	Seeding Rate (seeds/acre)	Area (acres)
Roundup Ready	2250	30,000	15
Hyland Seeds	2100-2250	30,000	20
Pioneer Hi-Bred	2150	30,000	20
Canamaize	2100	60,000	10

### Fertility

Soil samples were taken from the field in early May 2002 to evaluate residual fertility levels and to determine appropriate levels of fertilizer application (based upon seed company recommendations). Soil tests indicated nutrient levels were 108 lbs N/acre, 50 lbs P/acre, >1080 lbs K/acre and 65 lbs S/acre. Tests indicated elevated levels of soil nutrients due to heavy fertilization in 2001. An additional 50 lbs/acre of N was coultter applied prior to seeding on May 16<sup>th</sup> for all corn varieties.

## Weed Control

Roundup Transorb was applied to the Roundup Ready corn June 6<sup>th</sup>, June 21<sup>st</sup> and July 3<sup>rd</sup> at a rate of 1 L/acre. A herbicide tank mix consisting of Accent, Banvel II, Merge (surfactant) and Atrazine was applied at a rate of 1 L/acre on June 2<sup>nd</sup> and July 3<sup>rd</sup> for broadleaf control on the other three varieties of corn.

## Grazing Management

Electric fencing was used to control animal access to each corn variety and control utilization of both crops. One hundred fifty-seven (157) bred cows grazed the 65 acres of corn for a total of 31 days from December 16, 2002 to January 16, 2003.

## Input Costs

Input costs are calculated according to custom application and equipment rental rates (Table 2). It is important to note that costs will vary for each operation and need to be calculated according to each producer's individual situation.

**Table 2. Input costs for crops (\$/acre)**

	<b>Roundup Ready</b>	<b>Hyland</b>	<b>Pioneer</b>	<b>Canamaize</b>
<b>Field Prep</b>	<b>5.00</b>	<b>5.00</b>	<b>5.00</b>	<b>5.00</b>
<b>Fertilizer*</b>	<b>25.00*</b>	<b>25.00</b>	<b>25.00</b>	<b>25.00</b>
<b>Herbicide</b>	<b>21.00</b>	<b>30.00</b>	<b>30.00</b>	<b>30.00</b>
<b>Fencing</b>	<b>5.00</b>	<b>5.00</b>	<b>5.00</b>	<b>5.00</b>
<b>Seeding</b>	<b>15.00</b>	<b>15.00</b>	<b>15.00</b>	<b>15.00</b>
<b>Seed</b>	<b>58.00</b>	<b>43.00</b>	<b>42.00</b>	<b>36.00</b>
<b>Swathing</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL</b>	<b>129.00</b>	<b>123.00</b>	<b>122.00</b>	<b>116.00</b>

\*Fertilizer costs for corn varieties include commercial fertilizer @ 50 lb N/acre.

## Frost Damage

On August 2 and 4, 2002, the temperature at the Termuende Research Farm dropped to an overnight low of -0.5° and -1.8° Celsius, respectively. Due to frost damage, all corn varieties turned yellow within 48 hours with the uppermost leaves on all plants receiving the most damage. For the remainder of the growing season, plant maturity was severely restricted.

## Project Results

Estimates of corn plant establishment were completed on all four varieties in mid-September 2002. Pioneer and Roundup Ready had a 99% establishment rate; 29,576 and 29,942 plants per acre respectively, as both were seeded at a rate of 30,000 seeds/acre. Hyland had the lowest establishment rate at 93%; 27,497 plants/acre with a seeding rate of 30,000 seeds per acre. Finally, Canamaize had a 91% establishment rate at 54,622 plants per acre. Corn establishment is dependent upon good seed to soil contact therefore rolling or packing after seeding may be used to improve establishment.

## Yield & Quality

Weed competition was adequately controlled with herbicides; however, grasshoppers, frost and limited rainfall did have a negative impact upon plant growth and subsequent forage yield. Forage samples were collected for nutritive analysis at the end of the growing season and prior to grazing by animals. Estimates of forage yield and feed quality results are presented in Table 3.

**Table 3. Yield (wet basis) and quality (dry matter basis) (September 2002)**

Crop	Ton/Acre	<sup>z</sup> CP (%)	<sup>y</sup> TDN (%)	<sup>x</sup> ADF (%)	Nitrate (%)
RR DCK27-11	1.78	12.4	58.2	37.9	0.66
Pioneer	3.55	12.2	54.3	41.5	0.23
Hyland	1.30	12.7	55.5	40.4	0.31
Canamaize	2.98	11.9	54.2	41.6	0.60

<sup>z</sup>CP=crude protein; <sup>y</sup>TDN=total digestible nutrients; <sup>x</sup>ADF=acid detergent fibre

Corn yield estimates include the entire plant on a wet matter basis. Quality constituents are presented on a dry matter basis. There was limited cob development due to early frosts which halted plant maturity. Due to drought and frost damage, yields were very low, ranging from 1.3 to 3.5 tons per acre in 2002, which were significantly less than the 2001 crop. Even with the reduced productivity all varieties were swath grazed with animals in late 2002.

Forage quality of the four corn varieties was estimated in September 2002. Protein quality of all corn varieties (Table 3) was more than adequate for beef cows in the second trimester of pregnancy (NRC 1996). Corn CP averaged 12% and corn TDN ranged from 54.2 to 58.6% across all varieties.

## Corn Grazing

Corn grazing began on December 6, 2002 and was completed by January 16, 2003. One hundred fifty-seven (157) bred cows, averaging 1451 lbs, grazed 65 acres of corn for 31 days from December 6, 2002 to January 16, 2003. Average cow weight coming off the corn was 1531 lbs. Due to the small acreage of some varieties, animal access to the crop was controlled with electric fencing. Animals were monitored daily to evaluate remaining crop material and managed for 90-95 percent utilization of the corn varieties.

### Animal Grazing Days – Corn Varieties

• Roundup Ready	220 x 7 days/15 acres = 103 AGD
• Hyland	220 x 11 days/20 acres = 121 AGD
• Pioneer	220 x 7 days/20 acres = 77 AGD
• Canamaize	220 x 6 days/10 acres = 132 AGD
AVERAGE	220 AU x 31 grazing days / 65 acres = 105 AGD

Based on forage yield and grazing days, feed per AU (dry matter basis) = 65 lb/AU/day

## Animal Performance

Dormant season grazing began at the beginning of December 2002 and continued through to January 2003. Cow numbers have been presented as Animal Units (1 AU= a 1000 lb cow) to account for differences in cow weight between grazing trials.

Average daily gain was determined before and after cows had access to the corn varieties. One hundred fifty-seven (157) cows gained an average of 2.4 pounds/day over the thirty-one days grazing the four corn varieties. This would suggest the nutrient value of the corn not only met cow maintenance needs but also allowed the animals to put on body condition. Beef cows in mid pregnancy require 54% TDN and 9% CP on a daily basis (NRC 1996). Nitrate levels in all varieties were elevated (Table 3) therefore animals were introduced slowly to the crop and monitored daily throughout the trial.

Swath grazing results are presented in Table 4 and indicate the production and economics of all varieties. The greatest number of grazing days per acre was obtained with Canamaize and Hyland varieties at 132 and 121 AGD/acre respectively. The lowest cost per AUM/day was for swath grazing the Canamaize corn crop. These results indicate that high input crops like grazing corn need to return maximum AGD during the winter to be cost effective when compared to other annual crops such as oats or barley of similar quality.

**Table 4. Swath grazing results (2002-2003)**

	<b>Total Acres</b>	<b>Grazing Days</b>	<b>Animal Units</b>	<b>Grazing Days/Acre</b>	<b>\$/AU/Day</b>
<b>Roundup Ready</b>	<b>15</b>	<b>7 days</b>	<b>220</b>	<b>103</b>	<b>\$1.25</b>
<b>Hyland</b>	<b>20</b>	<b>11 days</b>	<b>220</b>	<b>121</b>	<b>\$1.02</b>
<b>Pioneer</b>	<b>20</b>	<b>7 days</b>	<b>220</b>	<b>77</b>	<b>\$1.58</b>
<b>Canamaize</b>	<b>10</b>	<b>6 days</b>	<b>220</b>	<b>132</b>	<b>\$0.88</b>

It is important to note that weather conditions were contributing factors in the final results and this study shows the extreme variability between years in crop production due to environmental factors. However, the Western Beef Development Centre will continue to utilize and analyze annual crops for dormant season grazing.

## References

The National Research Council. 1996. Nutrient requirements of beef cattle. 7<sup>th</sup> Ed. National Academy of Sciences, Washington, D.C.