



## COMPARISON OF GRAZING CORN VARIETIES

### Introduction

Continued interest in silage corn varieties for late fall and winter grazing led the Western Beef Development Centre to evaluate different varieties in 2001. Nine varieties of grazing corn (Table 1) were established at Termuende Research Farm, near Lanigan, Saskatchewan to evaluate plant establishment, input costs, production and forage quality for mature, bred cows grazing during the fall or winter months.

### Seeding

Eight corn varieties (Hyland, Pioneer, Super Leafy Silage and Canamaize) were seeded on 24 acres where grazing corn was grown the previous year (Section 22, Field 7). Monsanto's Roundup Ready corn was also direct-seeded on 30 acres south of this corn project area (oat swath grazing area in 2000). All varieties were seeded May 15, 2001 once soil temperatures reached 10° Celsius. Seeding rates were based upon recommendations for each variety (see specific variety management factors in Table 1) and seeded at 1" depth. Corn was sod-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.

### Fertility

Soil samples were taken April 26, 2001 to evaluate residual fertility levels and to determine appropriate levels of fertilizer application (based upon recommendations). Soil tests indicated nutrient levels were 134 lbs N/acre, 80 lbs P/acre, 1200 lbs K/acre and 96 lbs S/acre for the eight varieties. Soil tests for the 30 acres of Roundup Ready corn indicated 70 lbs N/acre, 90 lbs P/acre, 1080 lbs K/acre and 86 lbs S/acre. Tests indicated elevated levels of soil nutrients due to heavy fertilization in 2000. Additional fertilizer was coulter applied prior to seeding May 15<sup>th</sup> for only two varieties. The Super Leafy Silage variety from Gold Country Seeds received 50 lb N/acre and the Roundup Ready corn from Monsanto Canada Inc. received an additional 30 lb N/acre.

### Weed Control

Weed species present included wild oats, round-leaved mallow, redroot pigweed, wild buckwheat, foxtail barley, green foxtail, Russian thistle and kochia. The field (24 acres) where Super Leafy Silage, Pioneer, Hyland and Canamaize varieties were seeded received Atrazine 480 (1.0 L/ac) on May 9, 2001, which was then incorporated with a cultivator. Buctril-M at 0.36 L/ac was applied June 12<sup>th</sup> for additional control of broad leaf weeds. Weed control on the

Round Up Ready corn was achieved with Roundup Transorb (glyphosate) . Roundup was applied June 9 (0.33 L/ac) and August

7 (0.5 L/ac), 2001. Specific variety recommendations are for 1.0 L/acre.

**Table 1. Silage Corn Varieties**

VARIETY	HEAT UNITS	SEEDING RATE (seeds/acre)	AREA (acres)
<b>Super Leafy Silage</b>	2200	30,000	6
<b>Hyland 2007</b>	2100	30,000	2
<b>Hyland 2428</b>	2100 - 2250	30,000	2
<b>Hyland 2093</b>	2200 - 2350	30,000	2
<b>Pioneer 39M27</b>	2200 - 2350	30,000	2
<b>Pioneer PB85</b>	2175	30,000	2
<b>Pioneer 39W54</b>	2150	30,000	2
<b>Canamaize</b>	2100	60,000	7.5
<b>RR DKC27-11</b>	2250	30,000	30

**Costs**

Input costs (Table 2) are calculated according to custom application and equipment rental rates. 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 (\$/acre)**

	Canamaize	Super Leafy Silage	Hyland	Pioneer	Roundup Ready
Field Prep	5.00	5.00	5.00	5.00	5.00
Fertilizer	0	15.00*	0	0	9.00*
Herbicide	15.93	15.93	15.93	15.93	12.95
Fencing	3.73	3.73	3.73	3.73	3.73
Seeding	15.00	15.00	15.00	15.00	15.00
Seed	27.50	46.87	40.00	42.00	65.62
<b>TOTAL</b>	<b>67.16</b>	<b>101.53</b>	<b>79.66</b>	<b>81.66</b>	<b>111.30</b>

\*Fertilizer costs based upon spring application with value of fertilizer calculated at \$0.30/lb actual nitrogen. No fertilizer applied on Canamaize, Hyland or Pioneer varieties due to residual nitrogen level (134 lb N/ac) according to soil test in 2001 (assuming two years of nutrient value).

**Results**

Yield estimates were completed on all nine varieties on September 27, 2001. These results have been summarized in Table 3. Yields ranged from 4.5 to 9.7 wet tons per acre for 2001, greater than in 1999 or 2000. Moisture content averaged 40% for Canamaize and 70% for Super Leafy Silage, Hyland, Pioneer and Roundup Ready. This improved performance may be due to early seeding of the crop, good weed control in

the first four to six weeks, and sufficient heat units (CHU) during the growing season. Long-term average is 1900 heat units for the Lanigan area. Calculated heat units from May 1 to September 30, 2001 at the research farm were 2700 CHU's. All varieties had very good cob development with differing stages of maturity (Table 4). Hyland and Canamaize corn plants had the most mature cobs with 58% at kernel dent and 73% hard kernel, respectively.

**Table 3. Production and quality of corn varieties (September, 2001)**

VARIETY	LB/AC	T/AC Wet	T/AC Dry	Protein (%)	TDN* (%)	DE** (Mcal/kg)	ADF*** (%)
<b>Super Leafy Silage</b>	19456	9.73	2.92	8.85	71.39	3.13	25.51
<b>Hyland 2007</b>	18885	9.44	2.85	8.74	63.87	2.78	32.55
<b>Hyland 2428</b>	16518	8.26	2.48	10.43	68.48	3.00	28.23
<b>Hyland 2093</b>	15908	7.95	2.39	6.64	53.15	2.34	42.57
<b>Pioneer 39M27</b>	15380	7.69	2.31	11.70	67.55	2.95	29.10
<b>Pioneer PB85</b>	17819	8.91	2.67	10.08	57.37	2.51	38.62
<b>Pioneer 39W54</b>	16273	8.14	2.44	10.88	75.27	3.31	21.87
<b>Canamaize</b>	12907	6.45	3.77	8.77	65.62	2.87	30.91
<b>RR DKC27-11</b>	9022	4.51	1.35	10.24	65.78	2.87	30.76

\*TDN = Total digestible nutrients \*\*DE = Digestible Energy \*\*\*ADF = Acid detergent fibre

**Table 4. Plant establishment and cob development of nine corn varieties (Sept2001)**

VARIETY	Plants/Acre	Cob Stage (%)			
<b>Super Leafy Silage</b>	28,586	57	39	4	0
<b>Hyland 2007</b>	32,126	37	27	32	4
<b>Hyland 2428</b>	37,843	73	26	0	1
<b>Hyland 2093</b>	31,037	33	9	58	0
<b>Pioneer 39M27</b>	33,215	22	30	1	29
<b>Pioneer PB85</b>	25592	27	50	13	10
<b>Pioneer 39W54</b>	36482	60	25	13	2
<b>Canamaize</b>	53906	12	8	7	73
<b>RR DKC27-11</b>	27497	47	52	1	0

Stage of maturity; 1=immature, 2=milk, 3=kernel dent, 4=hard kernel

### Grazing Results

Electric fencing was used to control access to corn varieties and monitor utilization of the available crop. Grazing of corn varieties began on October 11 and was completed by November 17, 2001, a total of thirty-six days. One hundred fifty one Black Angus cows, with an average weight of 1150 lbs, had controlled access to corn varieties.

Cow numbers have been presented as Animal Units (1 AU= a 1000 lb cow) to account for differences in cow weight between grazing trials. Due to the small acreage of some varieties, the three Hyland varieties were grazed at one time, as were the Pioneer varieties. Grazing dates, grazing days per acre and costs are presented in Table 5.

**Table 5. Corn grazing results (2001)**

	Total acres	Grazing days	Animal Units	Grazing days/acre	\$/AU/day
<b>Super Leafy Silage</b>	6	6 days	174	174	\$0.58
<b>Hyland Varieties</b>	6	6 days	174	174	\$0.46
<b>Pioneer Varieties</b>	6	6 days	174	174	\$0.47
<b>Canamaize</b>	7.5	6 days	174	139	\$0.48
<b>RR DKC27-11</b>	30	12 days	174	83	\$1.34

The greatest numbers of grazing days per acre were obtained with Hyland and Pioneer varieties at 174 AGD/acre. These varieties yielded from 7.7 to 9.7 tons per acre but more importantly had advanced plant maturity with cobs at the dent or hard kernel stage. It is important that corn reach full cob development prior to grazing thus providing sufficient crop density which will translate into maximum grazing days per acre.

Cob production and maturity on Canamaize was good and contributed to the number of grazing days obtained, however trampling and feed wastage were noted on this variety. Reduced rates of glyphosate for weed control on the Roundup Ready variety resulted in reduced yield and animal grazing days of the crop.

### **Animal Performance**

On average cows entering the corn plots and at the end of the study maintained a body condition score of 3.0. Average cow weight was 1150 lbs prior to grazing the corn and 1215 lbs coming off the study with an average gain of 65 lbs per animal.

### **Economics**

How does this production translate into returns for producers? The costs per animal unit (1000 lb cow) per day for the nine corn varieties are shown in Table 5. Costs per AU/day ranged from \$0.46 to \$1.34 for the Hyland and Roundup Ready varieties, respectively. Due to high soil nutrient levels in this study based on soil tests, additional fertilizer was not applied. Even with an expense of \$30/acre for

fertilizer, cost/cow/day would only increase \$0.70 to \$0.76 across all corn varieties. Calculated costs involving swath grazed barley and oat varieties at Termuende Research Farm in 2000 worked out to \$1.00/AU/day.

### **Conclusion**

Early maturing silage type corn varieties can provide excellent late season grazing, in the year of establishment and into the following year as well. The role for grazing corn can be a flexible late fall or winter crop to balance off with existing winter graze options. It is important to control animal access to the crop with electric fencing. This will improve utilization of the crop while reducing trampling and wastage. In years of heavy snowfall, cattle may have better access to standing corn in comparison to swathed crops under the snow.

With multiple inputs of seed, herbicide, fertilizer and fencing it is important to maximize the full potential of silage corn varieties to extend the winter grazing period.

Intensive grazing of grazing corn can also provide adequate returns for producers. The key to successfully maximize profits is to manage costs effectively.

### **Thank you to project contributors:**

- **Pioneer Hi-Bred**
- **Prairie Seeds (Hyland Seeds)**
- **Canamaize Seed Inc.**
- **Monsanto Canada Inc.**
- **Gold Country Seed**