

Demonstrations:
Corn Varieties for Cattle Grazing

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Objectives:

1. To assess the growth and establishment of various forage corn varieties for use as livestock feed in Northeastern Alberta.
2. To assess the yield and quality of various forage corn varieties for use as livestock feed in Northeastern Alberta.

Background:

The single most variable cost in beef production is feed, so it makes sense to experiment with different feeding strategies that could help reduce costs – one of these being extending the grazing season. Extensive systems include stockpiles forages, swath grazing, bale grazing and, more recently, standing corn.

Previous research done at the Western Beef Development Centre has shown that the nutritive value of corn is adequate to meet beef cow requirements and the reduced nutrient content of the leaves/stems later in the season is countered by the high value of the cobs produced. If access is limited through the use of grazing tools such as fencing, cows will consume both the cobs and the leaves/stems. In higher snowfall years, cattle can be turned back into the pasture in the spring to clean up any remaining material.

The agronomics of growing corn for winter grazing is a primary factor in determining yield and grazing days. Although soil temperature, seeding date, fertility and seeding depth will impact emergence and establishment, corn significantly lacks competitiveness with weeds as well as itself. Consequently, row spacing can play an important role in overall yield. Similarly, timing of spraying also has a significant impact on yield as high weed pressure leads to reduced plant vigor and poor or late cob development.

The interest in grazing corn has significantly increased over the last 10 years, with the acres seeded to corn in the Lakeland close to doubling. Lakeland Agricultural Research Association has been growing corn demonstrations over the past five years assessing production agronomics, growth, yield and quality.

Method:

The corn varieties were seeded in blocks side-by-side at the LARA Fort Kent Research Site (NE25-51-5-W4) on May 31, 2017 utilizing a corn planter with 30" row spacing. Prior to seeding, soil tests were taken and a blend fertilizer of 33-5-6-5 was broadcasted at 150 lbs/acre and incorporated via harrowing. All varieties were round-up ready so the trial was sprayed with glyphosate at the 3-5 leaf stage utilizing a three-point hitch sprayer and volunteer canola was hand weeded once during the growing season.

Prior to harvest, cob samples were taken and rated for maturity. The plots were harvested on October 4, 2017 by hand and, at the time of harvest, forage samples were taken, run through a wood chipper to reduce particle size, frozen and sent to A & L Laboratories for wet chemistry analysis.

The five varieties included in the demonstration and their varying corn heat units (CHU) are listed below:

- Fusion RR (2000-2300 CHU)
- P7005 AM (2000 CHU)
- 39F44 (2000 CHU)
- P7527 AM (2150 CHU)
- 39B90 (2200 CHU)

Quality samples will continue to be taken in January, February and March of 2018 to assess quality throughout the winter grazing season of the five varieties.

Results and Discussion:

The yield and quality results are illustrated in table 1. The highest yielding variety was Fusion RR from Brett Young Seeds at 7.65 ton/acre followed by P7527 AM at 6.35 ton/acre. The average yield of the corn varieties was 5.60 ton/acre and the lowest yielding variety was 39B90 at 3.50 ton/acre.

When considering quality, crude protein (CP) tends to be lower in corn while energy, illustrated as total digestible nutrients (TDN), tends to be higher depending on cob development. According to the general rule of thumb for CP of 7% in mid-gestation, 9% in late gestation and 11% after calving, the majority of the varieties are adequate to meet the CP requirements during gestation with the exception of 39F44 where a protein supplement will be needed after mid-gestation. The only variety that can adequately meet CP requirements after calving is P7527 AM at 10.40%.

Table 1. Yield and Quality of Corn Varieties, 2017.

Variety	Yield ton/acre)	2017 Corn Quality							
		CP (%)	ADF (%)	NDF (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Fusion	7.65	8.17	27.06	49.29	66.81	0.28	0.18	1.18	0.18
P7005 AM	5.55	9.78	23.29	42.74	72.40	0.36	0.21	1.12	0.2
39F44	4.95	7.08	29.88	54.94	63.16	0.29	0.16	1.28	0.16
P7527 AM	6.35	10.40	24.67	44.65	69.53	0.34	0.19	1.01	0.2
39B90	3.50	9.28	26.48	49.22	65.26	0.31	0.29	1.17	0.17
Average:	5.60	8.94	26.28	48.17	67.43	0.32	0.21	1.15	0.18

Total Digestible Nutrients is the easiest method of estimating energy in a feed and, as expected, the high energy content of the developed cobs significantly increases the energy content of corn over that of other forages utilized for grazing. Based on the energy rules of thumb of 55% in mid-gestation, 60% in late gestation and 65% after calving, the energy content of all of the varieties are adequate to meeting the requirements of gestating and lactating cattle.

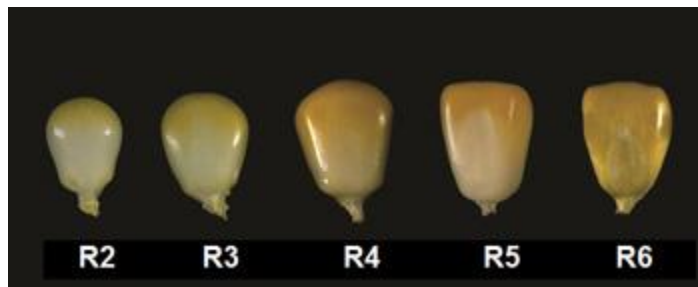
Corn is known to be low in Calcium (Ca) with an average content of 0.32%. The Ca:P ratio should be at least 2:1 as increased Phosphorous (P) can interfere with proper Ca absorption and utilization. Consequently, with an average P content of 0.21, a mineral supplement will be necessary to ensure adequate ratios are available.

Overall, the majority of the varieties are adequate to meet beef cow nutrient requirements during gestation. However, utilizing the variety 39F44 will require protein supplements after mid-gestation and energy supplements after calving to ensure beef cattle requirements are met.

Prior to harvest on October 4, 2017, cob samples were taken to estimate maturity and compare between the varieties. The maturity method used is illustrated below and in figure 1:

- R1 – silks visible outside the husks.
- R2 – kernels are white outside, clear liquid inside.
- R3 – kernel yellow outside, milky white fluid inside.
- R4 – kernel fluid thick/pasty, cob pink or red.
- R5 – most kernels at least partially dented.
- R6 – milk line no longer evident, black layer formed.

Figure 1. Photographic explanation of corn maturity rating scale.



(<https://www.pioneer.com/home/site/us/agronomy/library/staging-corn-growth/>)

The results of the rating are listed in table 2. Prior to maturity ratings, a cob count was done in each variety and showed an average of 2 cobs per plant in each variety, although the cobs were at varying levels of maturity.

Table 2. Cob and Maturity Rating of Corn Varieties, 2017.

Variety	Number Cobs/plant	Cob Maturity	Yield ton/acre
Fusion	2	R3	7.65
P7005AM	2	R5	5.55
39F44	2	R4	4.95
P7527AM	2	R3	6.35
39B90	2	R5	3.5



Figure 2. Variations in cob development on October 4, 2017.