East Kootenay
Winter Corn Grazing Trial

Prepared by
Kootenay Livestock Association

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Introduction

For the beef industry in B.C., one of the greatest costs is providing winter feed. With escalating costs for machinery, fuel and transportation, the ability to cost effectively produce your own hay or get it trucked in is becoming unbearable. Extending your grazing season, or conversely, shortening your winter feeding requirements, is one way to lower costs.

This project was undertaken to assess the use of corn for late fall – early winter grazing in the East Kootenay. Determining production, nutrient content, ability to withstand snow loads and the economics of grazing corn were questions to be answered by this project.

Objectives

The objectives of the project are:

1. Monitor the nutrient and energy content of the corn between September and December.
2. Monitor how the corn stand withstands snow loads.
3. Assess corn production.
4. Determine the cost of using corn as a standing forage crop to minimize winter feeding.

Location

The study site was located in the East Kootenay region in B.C., near the community of Parson, which is approximately 50 km south of Golden (Figure 1).

Two fields were used to plant the corn, a lower field where three corn varieties were planted and an upper field where only one variety was planted (Figure 2). The lower field is at approximately 800 meters while the upper field is at 980 meters.

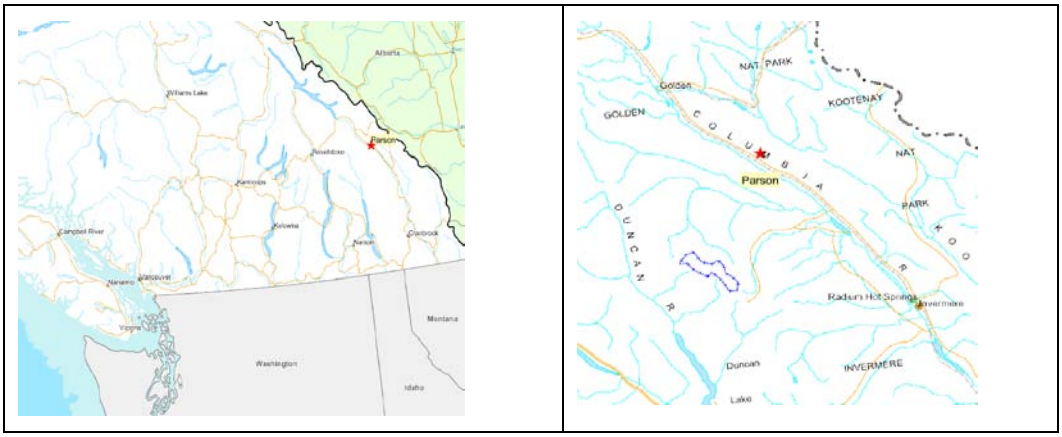

Figure 1 General Location Map

Methods

The project was carried out on the Kingscleare Ranch (Jeff Braisher) near Parson, B.C. (Figure 2). The ranch has been experimenting with corn silage the last 5 years but with increasing costs alternative options to winter feed beef cattle needed to be explored.

Four acres were set aside for the four varieties to be planted, fertilized and irrigated as per the usual management regime on the ranch. Three varieties were planted on the lower site and one planted on the upper site with various corn heat units (CHU) (Table 1).

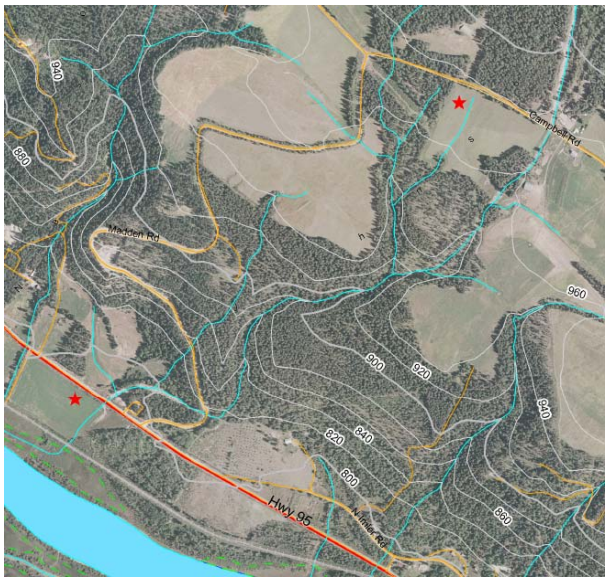

Figure 2 Site Location Map

Table 1 Corn Varieties and Heat Units

Corn Variety	Location	Elevation	CHU
DEKALB	Lower	800 m	2500
PIONEER 39T67	Lower	800 m	2200
PRIDE A4741	Lower	800 m	2400
PIONEER 39F60	Upper	980 m	2250

All the corn plots were planted on May 14, 2008 using a Case IH 4-row air seeder. Herbicide was applied on May 31, 2008. Fertilizer (18-18-18) was applied at time of planting at a rate of 250 lbs. per acre. All plots were irrigated 6 times during the growing season, with approximately 1.5 inches of water each time.

In mid September and continuing until mid December, samples were taken from all plots for nutrient testing. Mid-West Labs out of Calgary, Alberta provide the analysis on the samples, as well as a mold test on two of the samples in December.

Photos were taken to illustrate stand height and structure of the corn once it had stopped growing and to track any changes in structure until mid December. Cattle were turned onto on the corn pasture once the mold tests indicated all was ok with the corn.

Results and Discussion

Nutrient Analysis

Samples were taken four times between September and December to track the protein content, acid detergent fibre (ADF) and total digestible nutrients (TDN) (Table 2).

Table 2 Nutrient Analysis

		10-Sep-08	15-Oct-08	18-Nov-08	08-Dec-08
DEKALB	Protien %	15.1	9.93	8.97	11.9
	ADF %	29.1	32.4	33	35.5
	TDN %	69.4	65.6	64.9	62.1
PIONEER T67	Protien %	9.16	10.2	9.64	12.6
	ADF %	28.2	30.2	36.8	30.3
	TDN %	70.4	68.1	60.6	68
PIONEER F57	Protien %	9.99	9	9.2	
	ADF %	30	29.8	37.8	
	TDN %	68.3	68.6	59.5	
PRIDE	Protien %	12.4	10.1	11.4	9.28
	ADF %	27.4	27.2	30.6	34.1
	TDN %	71.3	71.5	67.7	63.7

Tracking crude protein, ADF and TDN and comparing it to the three stages of pregnancy for a beef cow, all four corn varieties are able to meet the mid and late stages of pregnancy (Figure 3). However, the corn on its own would not provide the necessary requirements for the beef cow after pregnancy. In the East Kootenay, calving ranges from late January to late March, so late pregnancy could range from December to February. Based on those assumptions, the standing corn would be adequate for feed until that time.

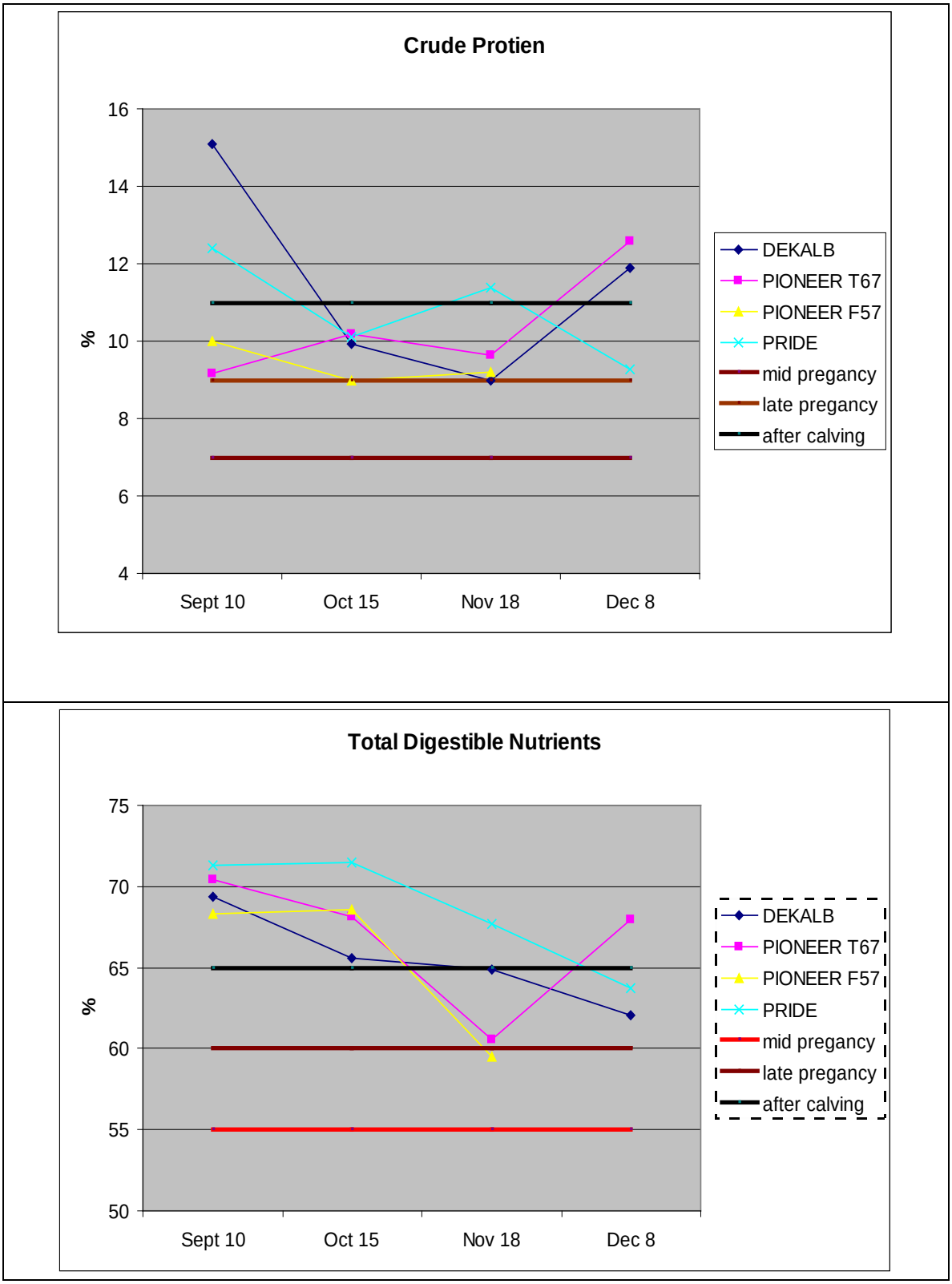

Figure 3 Crude Protein & TDN

Stand Structure

To use the corn into the winter, it is key that the plants remain standing and accessible to the livestock for forage. If the corn can not withstand the snow load and becomes buried, the corn is not a viable alternative to late season grazing.

At the time of nutrient sampling, photos were taken of each variety to visually track changes in structure. No imperial measurements were taken.

Dekalb, which had the highest heat unit requirements (2500 CHU), was of the lowest stature which is reflective of the shorter growing it was placed in and it could not reach full maturity. The other varieties, with less heat unit requirements, were able to reach maturity and withstood the snow load much better which is evident in the pictures.

DEKALB

September 10, 2008	December 10, 2008
	

Figure 4 Dekalb

PIONEER 39T67

September 10, 2008	November 5, 2008
	

Figure 5 Pioneer 39T67

PIONEER 39F60

September 10, 2008	December 10, 2008
	

Figure 6 Pioneer 39F60

PRIDE A4741

September 10, 2008	December 10, 2008
	

Figure 7 Pride A4741

Economics

To determine if there are costs savings in using corn to extend the grazing season, one must compare the cost of making the winter feed (100% hay) versus some sort of combination of hay and grazing corn production. The biggest costs are in the production of the feed, while the cost of feeding the hay to the cattle is considerably smaller in comparison. Consequently, the feeding out costs have not been calculated, just the cost of production in making the feed.

Hay Production

Based on Peterson and Malmberg (2007), the average cost of producing a ton of hay in the East Kootenay was approximately $115/ton with the assumption that this was based on 200 acres of production.

In using the spreadsheets from Peterson and Malmberg, an estimated cost of winter feeding could be calculated based on some general assumptions;

- Cost of the hay produced by the rancher is $115 per ton
- The herd size is 350 head.

Based on that information, a general analysis could be derived showing the cost to feed per cow over various winter feeding lengths (Figure 3). With a 181 day winter feeding duration (Nov 1 to May 1), the costs are approximately $370 per cow. As the duration is shortened by feeding later (Nov 30 / 152 days, Dec 31 / 121 days, Jan 31 / 90 days), the cost can be reduced up to 49%. These savings are solely based on the fact that less feed is needed so hay production costs drop.

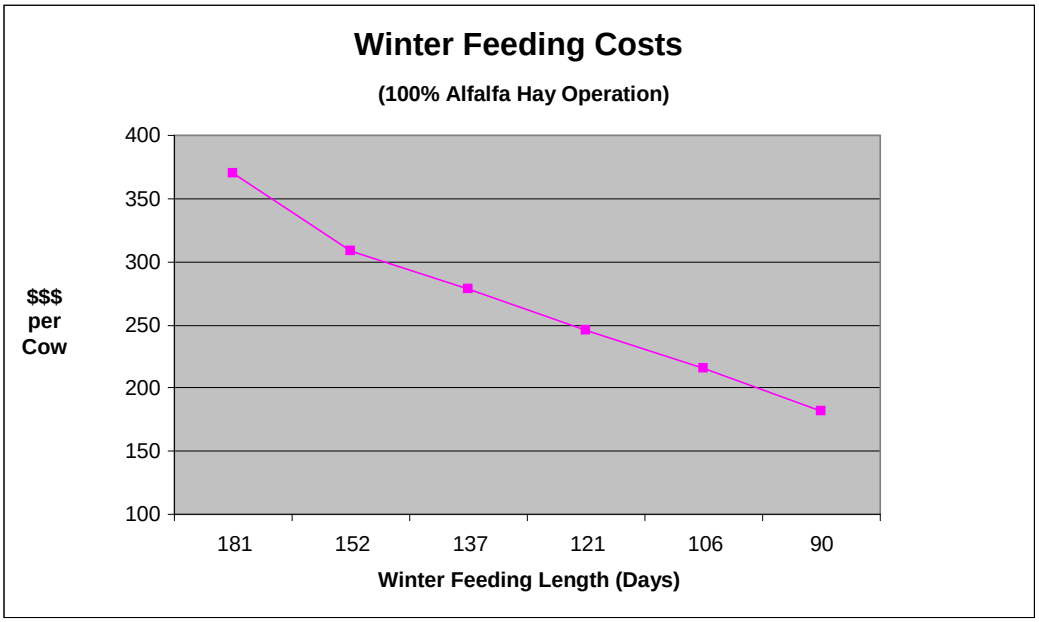

Figure 8 Winter Feeding Costs (Alfalfa Hay)

Corn Production

Corn production for the East Kootenay is relatively new and only small acreages being planted. The Kingsclere Ranch has been growing corn for fiver years for silage and the general cost of production for the corn was derived for this project.

Over the last 5 years, the cost per acre for corn production was $300 per acre. This included fertilizer, herbicide treatments, water and excluded silage costs.

To use corn to extend the grazing season, the nutritional value is of sufficient quality that corn could support the cow herd until late pregnancy or calving. Assumptions are:

- Winter feeding starts on Nov 1
- Average cow needs 30 lbs of forage per day
- Herd size is 350
- Average corn production is 5.5 tons per acre

Table 3 outlines the number of days of grazing for a herd of 350 animals and the required amount of tonnage and area of corn to meet that.

Table 3 Required Corn Production

	Days on Corn	Tons required	Area (ac)
Nov 30	30	158	29
Dec 15	45	236	43
Dec 31	61	320	58
Jan 15	76	399	73
Jan 31	92	483	88

As the length of the grazing on corn can be extended, the true test is knowing if greater profitability on the livestock operation will occur if a combination of corn and alfalfa hay was grown in tandem on the East Kootenay ranch. To answer this question, the cost of corn production must be added to the cost of hay production and hay winter feeding costs. The following assumptions are made in this scenario.

- Average cow needs 30 lbs of forage per day
- Herd size is 350
- May 1th is when the herd is back on grass
- Average hay production is 3.5 tons per acre (irrigated)
- Average hay production costs are $115/ton or $400/ac
- Average corn production is 5.5 tons per acre (irrigated)
- Average corn production costs are $55/ton or $300/ac
- Winter corn feeding costs are zero (labour to move electric fence not calculated)
- Winter hay feeding costs (tractor, time, fuel, etc) has not been factored into the calculations

Table 4 outlines the cost of winter feeding using a combination of corn and hay. It should be noted that the winter feeding costs for the hay DO NOT INCLUDE machinery, fuel or labour costs, just the cost of hay production. In essence this is a coarse filter analysis.

Even based on this broad brush approach, the addition of only 29 acres of corn for winter grazing, reduces feeding costs by $9,450 over 29 days (on a herd of 350 head). The equivalent of $326 per day. The breakdown of the potential cost savings by adding more corn acreage for winter grazing is found in Table 5.

Table 4 Cost of Winter Feeding a Combination of Hay and Corn										
WINTER FEEDING		**CORN**				**HAY**				**$$$$$**
Winter Feeding starts:	*Number of Days Winter Feeding*	*Days on corn*	*Tons Needed*	*Acres Needed*	*Cost of production $$$*	*Days on hay*	*Tons*	*Acres needed*	*Cost of production $$$*	*Costs of Winter Feed for Livestock*
01-Nov	181	0	0	0	$0	181	950	272	$109,279	$109,279
30-Nov	152	30	158	29	$8,663	151	793	227	$91,166	$99,829
15-Dec	137	45	236	43	$12,994	136	714	204	$82,110	$95,104
31-Dec	121	61	320	58	$17,614	120	630	180	$72,450	$90,064
15-Jan	106	77	404	74	$22,234	105	551	158	$63,394	$85,628
31-Jan	90	93	488	89	$26,854	89	467	134	$53,734	$80,588

	Table 5 Winter Feeding Cost Savings					
Winter Feeding starts:	Winter feeding period	Corn Acres	Hay Acres	Cost to Winter Feed	**Total Savings**	**Savings per day**
01-Nov	181	0	272	$109,279		
30-Nov	152	29	227	$99,829	**$ 9,450**	**$325.86**
15-Dec	137	43	204	$95,104	**$ 4,725**	**$315.00**
31-Dec	121	58	180	$90,064	**$ 5,040**	**$315.00**
15-Jan	106	74	158	$85,628	**$ 4,436**	**$295.75**
31-Jan	90	89	134	$80,588	**$ 5,040**	**$315.00**

Average Savings per day: $313.32

Conclusion

Winter feeding costs can be reduced by $313 per day by supplementing existing hay production with grazing corn. A wide variety of corn hybrids are on the market that have a good range of heat units that should allow them to be used in most areas in the East Kootenay. To completely move towards 100% corn grazing production would be very risky (spring frosts, wildlife damage if unfenced, etc.) but adding 30 to 50 acres would substantially reduce costs for the East Kootenay beef producer.