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Sask Leafcutters Association

Cost of Production Calculator

Alfalfa – “Queen” of forages vs Corn – “King” of silage crops

It might be titled a royal rumble of the forage crops when the debate flares up about the best forage crop for winter feeding the beef cow herd. Alfalfa, the queen of the forages, has been a long-time standard feed in Saskatchewan. And yet there is growing interest in Saskatchewan about corn for standing whole corn plant grazing by beef cattle, stemming from the successful public and company plant breeding programs that have generated short-season or low corn heat unit (CHU) hybrids and the continuing need for low-cost winter grazing of beef cows. Is alfalfa left behind in this contest of alternative forage production systems? Don’t give that championship belt to corn just yet….

Research results from the Western Beef Development Centre (WBDC) at Lanigan Saskatchewan can put some facts into the ring. Corn was grown in 2011 and grazed during the winter of 2011-12 at WBDC (Lardner et al. 2012). Corn yield, quality and costs were reported in WBDC Factsheet 2012.03 “Winter Grazing Beef Cows with Standing Corn”. Five corn hybrids with CHU requirements ranging from 2050 to 2250 were grown at a 1950 CHU site, sampled and then grazed with dry pregnant beef cows from November 19 to February 27, 2012. The actual CHU in Lanigan in 2011 growing season was 2417 so it was above average and favourable for corn (to calculate corn heat units for your farm see: Saskatchewan Crop Insurance 2016).

At the same time, alfalfa was grown in another experiment at WBDC about 2 miles away from the corn (Jefferson et al, 2014). The variety was Pickseed 2065MF, a multi-foliate leaf, hay-type alfalfa variety with fast regrowth for intensive production. It was seeded and established in 2010 with one seedling harvest taken. Excellent weather coupled with harvesting the alfalfa at 10% bloom allowed for three harvests in 2011, admittedly an aggressive harvest management that could reduce the stand longevity. Forage yield and quality data were determined for all three harvests.

We combined the results for these two crops to compare yield and quality on the same soil type and same year. Which forage royal would come out the winner?

Surprisingly, the dry matter (DM) yield of alfalfa and corn were equal (Table 1). Forage yield was compared on a DM basis because grazing cornand alfalfa hay have very different moisture contents (typically 65% vs 12%, respectively) which would confound yields on an as-fed basis. Three harvests of alfalfa in one year is exceptional, two harvests is more typical on the Termuende Research Ranch but these results show the potential yield for alfalfa under intensive harvest management.

Alfalfa is much higher in CP (22.1% vs 4.4%) and lower in TDN (63.4% vs 69.4%) than corn (Table 1). The CP of corn is close to the marginal level required for beef cows in their last trimester. In contrast, the high CP of alfalfa exceeds pregnant beef cow requirements and could result in high N losses to the environment. The TDN concentration of both crops is adequate for cows just prior to calving but in excess for cows in the second and third trimester of gestation. Limit feeding of alfalfa would help avoid excessive weight gain or over-feeding. Another solution that is common in other regions of the world is to combine alfalfa hay and corn silage into a total mixed ration (TMR) that takes advantage of both. Some straw or other low-cost and low-nutrient dense feed can be blended into the TMR to reduce overall ration costs while still meeting the nutritional requirements of the cattle on feed. For example, beef cows in the first or second trimester of pregnancy typically require 8% CP and 55% TDN.

Mineral concentration of alfalfa was higher than that of corn (Table 1). Mineral supplementation would likely be needed for cattle grazing only standing corn. Corn and alfalfa had similar ADF concentration, but corn had higher NDF concentration than alfalfa.

WBDC calculated the cost of hay vs silage based on custom rates and producer survey data. The alfalfa hay cost 4¢ per lb while corn silage cost 5¢ per lb. Alfalfa hay is still cost competitive with corn for winter feeding of beef cows.

Table 1. Yield and forage quality of alfalfa and corn grown at WBDC, Lanigan Saskatchewan in 2011.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Alfalfa | Corn | Differencez |
| Total yield t DM/ac | 4.7 | 4.8 |  |
|  |  |  |  |
| Crude Protein % | 22.1 | 7.4 | \*\* |
| TDN % | 63.4 | 69.4 | \*\* |
| Calcium % | 1.45 | 0.20 | \*\* |
| Phosphorus % | 0.36 | 0.22 | \*\* |
| Magnesium % | 0.33 | 0.16 | \*\* |
| Potassium % | 2.67 | 0.93 | \*\* |
| Acid Detergent Fiber % | 31.8 | 33.4 |  |
| Neutral Detergent Fiber % | 37.3 | 56.7 | \*\* |
| Lignin % | 5.9 | 2.8 | \*\* |
| Fat % | 2.1 | 1.2 | \*\* |
| Ash % | 9.7 | 3.6 | \*\* |
|  |  |  |  |
| Cost $/lb of hay or silage | 0.042 | 0.052 |  |

 z Statistically different by paired t test at 95% confidence.

\*\* Asterisks in the difference column indicate statistically significant results in t-test comparison.

**Cost of Production comparison**

Comparing the cost of hay and standing corn for grazing can be challenging from several perspectives. Hay is frequently traded between farm units so a market price can be established but the value of corn grazing is less well known. WBDC valued hay at $85/ton because of prices paid for hay in 2014. Standing corn can be valued compared to the grazing days it provides to wintering beef cows (moderate frame size 1400 lb) based on the value of hay that it replaces. WBDC used that approach in this cost of production (COP) calculator (Table 2).

WBDC costs were used in the “Our costs” section of the calculator. Entering your operation’s costs will allow you to compare your net returns for alfalfa hay vs corn grazing.

Alfalfa seed is purchased by the pound while corn seed is purchased in units, with one unit equivalent for an acre. Alfalfa seed should be inoculated for good N fixation.

Fertilizer applied to new alfalfa stands is usually in small amounts; WBDC applied 50 lb/ac of 11-52-0. Alfalfa in a crop rotation can leave 30 to 330 lb N/ac for the next two crops seeded with the highest amounts of N fixed at the wettest locations according to research conducted by WBDC (Jefferson et al. 2014). In contrast, corn is a high N user so WBDC applied 120 lb/ac of 46-0-0 pre-planting which then was incorporated. Soil tests at WBDC had high P, K and S levels especially on the corn field where barley swath grazing in previous winters had contributed manure to soil nutrients. Sample your fields so you know if any soil nutrients are limiting. Corn has a high demand for soil nutrients.

Herbicide costs per application of glyphosate were relatively low for corn, but WBDC sprayed three times (pre-plant, early and late) due to weed pressure and a wet June.

Seeding alfalfa and establishment costs should be amortized over each year that it produces a hay crop. In this COP calculator, WBDC used 2 years amortization. Corn seeding costs are incurred each year that it is seeded so it is an annual cost. You can amortize alfalfa seeding to the number of hay crop years that you wish.

High-tensile electric fencing to limit access to feed is a common practice for winter field feeding and was used to graze the corn. Labour to move electric fencing in the corn grazing field every 3 to 4 days was included in the corn grazing costs.

 To calculate your return to corn, this calculator compares it to the price and amount of alfalfa hay that the corn grazing replaces. This is done to account for the difference between pricing of hay and pricing of winter grazing. WBDC esimtated 32 lb hay/day/cow for the alfalfa hay.

Note: You may need to activate the Excel tool on your Word toolbar to use the COP calculator. Click on Table 2 to open the Excel tool to input your operation’s numbers.

**Conclusion**

In this one year comparison, alfalfa hay returned significantly more value per acre to WBDC than corn grazing. How do the numbers turn out for your farm operation?

**References**

Jefferson P.G., Larson, K., Schoenau J., Coulman B.E., Nybo B., Foster A., and Vera C. 2014. Short Rotation Forage Legumes for Reducing Nitrogen Fertilizer Costs in Saskatchewan; ADF Project #20090283 Final Report.

Lardner H.A., Larson, K. and Pearce L. 2012. Winter Grazing Beef Cows with Standing Corn. WBDC Factsheet 2012.03.

Saskatchewan Crop Insurance 2016. Online: [www.saskcropinsurance.com/ci/weather-based/corn-heat-unit-insurance-program/](http://www.saskcropinsurance.com/ci/weather-based/corn-heat-unit-insurance-program/)

Note: Cost of bedding, salt and mineral is not included.