

Canola Meal vs Soybean Meal and Two Levels of Protein for Backgrounding Steer Calves

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Introduction

Canola (the reformed, genetically improved replacement for rapeseed) is currently being processed in North Dakota at the Archer-Daniels Midland Co. crushing plant in Velva, ND. To qualify as Canola (the name stands for Canada oil-low acid) the crop must contain less than 2% erucic acid and have low levels of glucosinolates which directly effect palatability for livestock and poultry. Canola meal (CM), a by product of the oil making process, is a high protein feed that has 75-85% of the protein value of soybean meal (SBM) on a pound for pound basis.

When compared nutritionally to SBM, (see table 1) CM is lower in crude protein (38 vs 44%), lower in metabolizable energy (2700 vs 3100 kcal/kg), higher in fat (3.8 vs 0.8%) and higher in both calcium and phosphorous. However, CM contains a lower concentration of by-pass protein than does SBM which could reduce cattle performance. In Western Canada, CM is widely used in cattle diets because of its competitive price relative to SBM.

This trial was designed to measure and compare the feeding value of CM or SBM when used to supplement typical backgrounding rations fed to fast gaining crossbred steer calves.

Another aspect was to determine if feeding a higher level of protein than recommended by the National Research Council (NRC) would be beneficial in terms of increased gain, feed efficiency and overall economics. Some cattlemen believe that using high protein levels (above 13%) in backgrounding rations will result in greater dry matter intake, faster gains and improved feed efficiency. However, since protein is generally expensive, feeding more than required to balance a ration will increase feeding costs.

This trial compares the performance of backgrounding steers fed normal NRC balanced rations or rations that contained 20% additional crude protein.

Table 1. Comparison of nutrient values (as fed) in canola meal and soybean meal.

Nutrient^a	Canola meal	Soybean meal
Dry matter, %	92.5	90
Protein, %	38	44
Fat, %	3.8	0.8
Fiber, %	11	6.5
ME, kcal/kg	2700	3100
Calcium, %	0.7	0.25
Phosphorous, %	1.17	0.60
Bulk density, lb./ft ³	35.2	37.0
Ash, %	6.8	5.8

^aNutrient values taken from 1985 Feed Ingredient analysis table, International Minerals and Chemical Corporation; and Feeding with Canola Meal, 1984, Canola Council of Canada. Publication No. 63.

Methods

On January 5, 1990, forty-five Charolais crossbred steers were weighed, implanted with Ralgro, vaccinated with a seven-way booster vaccination and treated for lice with Lysoff. Following processing, the steers were randomly allotted into three uniform treatment groups. Each group was composed of three replicated pens with 5 steers per pen.

The pens were 32'X112' in size and provided 16' of feed bunk, an automatic waterer, and 9' X 48' of slotted board fence for wind protection on the north and west sides.

Complete mixed rations of chopped mixed hay, chopped wheat straw, dry rolled corn and barley, minerals, salt and vitamin were fed. The rations were supplemented with either canola meal (CM) or soybean meal (SBM) to meet NRC recommendations for crude protein. The rations were prepared in an Arts Way "Silamix" mixing wagon equipped with electronic scales. The rations were fed in the bunks with feed available at all times. Stale or rejected feed was removed periodically and subtracted from the lot totals.

Initially, the rations were formulated according to NRC recommendations for 700 pound steers projected to gain three pounds per day or better. Formulations were changed with every 100 pounds of weight increase, according to the following schedule:

Steer Weight	Crude Protein	Crude Protein
	NRC	NRC + 20%
700 lbs	10.8%	12.96%
800 lbs	10.8%	12.96%
900 lbs	10.3%	12.36%

Treatment 1 rations were supplemented with canola meal at current NRC recommendations. Treatment 2 rations were supplemented with canola meal but at a level 20% higher than current NRC values. Treatment 3 rations were supplemented with soybean meal at current NRC recommendations and served as the control ration in this trial.

The steers were fed from January 5, to March 29, 1990, a period of 83 days. All steers were individually weighed every 28 days with a two day average weight used as the final weight. One steer was removed from Treatment 2 due to sickness. The steers were sold at auction on March 29th in Dickinson, N.D. with weights averaging 1000+ pounds.

The rations as fed are shown in Table 2. All weights are averages for the trial and are on a dry matter basis.

Table 2. Average feed consumption in pounds of dry matter

per head per day.

	Treatment 1 Canola Meal	Treatment 2 Canola Meal + 20% NRC	Treatment 3 SBM
Ingredients			
Corn	11.63	11.46	11.12
Barley	5.33	5.50	5.02
Mixed Hay	3.23	1.53	3.03
Wheat Straw	1.92	2.25	2.13
Canola Meal	0.98	2.44	---
Soybean Meal	---	---	0.82
Limestone	0.60	0.16	0.15
T.M. Salt	0.11	0.11	0.11
Vitamins ADE	0.0046	0.0045	0.0043
Total/day	23.80	23.46	22.36

Table 3. Average weights, gains, feeding economics and marketing analysis backgrounded medium to large framed crossbred steer calves fed either Canola meal or Soybean meal at two levels of protein.

	Canola Meal NRC	Canola Meal NRC + 20%	Soybean Meal

Number of head	15	15	14
Days fed	83	83	83
Initial weight, lbs.	711.8	712.3	712.9
Final weight, lbs.	1016.3	1018.4	1000.9
Gain, lbs.	304.5	306.1	287.9
Ave. Daily Gain, lbs.	3.67 ^a	3.69 ^a	3.47 ^a
Feed Summary:			
Total feed per head, lbs.	1975	1948	1857
Ave. Feed/head/day, lbs.	23.80	23.47	22.37
Pounds of feed/pound of gain	6.49	6.36	6.45
Economics:			
Feed cost / head	\$107.30	\$112.94	\$99.96
Feed cost per day	\$1.29	\$1.36	\$1.20
Feed cost/lb. gain	\$0.3524	\$0.3690	\$0.3472
Marketing analysis:			
Market value @ .7095/lb.	\$721.06	\$722.59	\$710.14
Expenses:			
Calf value @ .83/lb.	\$590.79	\$591.21	\$591.71
Feed cost per head	\$107.30	\$112.94	\$99.96
Implant cost	\$0.99	\$0.99	\$0.99
Interest Cost @ 11.5%	\$18.24	\$18.43	\$18.11

Total expenses	\$717.32	\$723.57	\$710.77
Net gain or (-loss)	\$3.74	(-) \$0.98	(-) \$0.63
a no significant difference in ADG at .05 significance level. LSD (cal by T) = .5250			

Discussion

The steers made very good and economical gains, an indication that the rations were well balanced and palatable. The dry and mild winter weather also helped to promote excellent gain. One steer from treatment 2 was removed on January 26 due to sickness caused by a thiamin deficiency.

Results

The data collected in this trial indicate no significant differences between CM or SBM when they are fed on a pound of protein basis. Steers starting on feed at 712 pounds made gains of 3.47 lbs/hd/day when supplemented with SBM and 3.67 lbs/hd/day when supplemented with CM (differences were not significant). Feed efficiency was not different between the two supplements (6.45 vs 6.49 lbs of feed / lb gain. Feed costs per cwt. gain were \$0.52 higher for the CM supplement (\$34.72 vs \$35.24) than for the SBM supplement. The higher feed cost resulted in higher total expenses for the CM fed steers (\$717.32 vs \$710.77). However, because the CM fed steers were heavier at market, they had the best net return at \$3.74.

In the comparison of NRC vs NRC+20% crude protein, there was no advantage in ADG for the higher protein levels (3.67 vs 3.69 lbs/day), and only a slight advantage in feed efficiency (6.49 vs 6.36 lbs feed/lb gain). The extra protein caused an increase in feed cost by \$1.66 / cwt gain. Thus, the net return of the NRC ration was \$4.50 higher than the NRC+20% ration. Based on this study, if SBM was valued at \$190.00 /ton, Canola meal would have a value of \$159.00 /ton or roughly 84% the value of SBM.

Summary

Steers weighing 700 pounds were fed complete mixed rations supplemented with Canola meal (38% CP) or Soybean meal (44% CP) at National Research Council recommendations for gains of 3.0+ lbs /day during an 83 day feeding period. There was no difference in ADG or feed efficiency. Rations supplemented with CM to meet NRC recommendations returned \$4.37 more net profit than rations supplemented with SBM. Feeding 20% more protein than recommended by the NRC increased the cost /cwt. gain by \$1.66, without improving ADG or feed efficiency.

Both Soybean meal and Canola meal are excellent sources of supplemental protein for growing steers. When SBM is valued at \$190.00 per ton, Canola meal would be worth \$159.00 per ton based on the results of this trial.