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Economic Incentives, Transaction Costs and Carbon Trading:  
The Economics of Alberta's Reduced Age to Harvest Protocol

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# Economic Incentives, Transaction Costs and Carbon Trading: The Economics of Alberta's Reduced Age to Harvest Protocol

By Paul J. Thomassin

## Background

- Provincial government of Alberta established a carbon market and regulates Greenhouse Gas (GHG) emissions of Large emitters >100,000 tCO<sub>2e</sub>.
- Alberta assisted in the development of the carbon offset market by identifying science based protocols.

## Objectives

- Estimate the benefits and costs of the aggregator who manages a Reduced Age to Harvest Protocol.
- Estimate the carbon revenue to feedlot operators of GHG emission reductions.

## Reduced Age to Harvest

- Carbon Offset Protocol for Agriculture
- Management change reduces the age of beef cattle at harvest.
- Reduces the age to harvest from 19 months to 15 months

## Method

- To estimate the cost of the aggregation function a series of semi-structured interviews were undertaken with aggregators and potential aggregators.
- Once detailed costs were identified and estimated a survey was undertaken with aggregators to determine a consensus on costs.
- A GHG calculator was used to estimate the carbon reductions from the reduction in age to harvest (i.e. bringing steer calves and heifers as oppose to yearling steers and heifers).

## Conclusions

- Transaction costs must remain relatively low for the carbon offset market to be profitable.
- To keep cost down, aggregators provide this service with on-going services
- Carbon price and quantity of carbon offsets sold in the market determines profitability.

## Assumptions – Expected and Optimistic Scenarios

### Expected Scenario

	Price of Carbon Offset (\$)	Carbon Offsets Generated (Tonnes)	Discount Rate (as a %)
Year 1	\$13.00	40,000	3
Year 2	\$13.00	40,000	3
Year 3	\$23.00	42,000	3
Year 4	\$23.00	44,000	3
Year 5	\$27.00	46,000	3
Year 6	\$27.00	48,000	3
Year 7	\$27.00	50,000	3

### Optimistic Scenario

	Price of Carbon Offset (\$)	Carbon Offsets Credits Generated (Tonnes)	Discount Rate (as a %)
Year 1	\$13.00	60,000	2
Year 2	\$13.00	65,000	2
Year 3	\$27.00	70,000	2
Year 4	\$30.00	72,000	2
Year 5	\$30.00	74,000	2
Year 6	\$40.00	75,000	2
Year 7	\$40.00	75,000	2

## Results

### Expected Scenario

Indicator	Present Value
Present Value of the Costs	\$2,370,034.85
Present Value of the Revenue	\$3,619,555.93
Present Value of the Cost Per Offset Credit Generated	\$7.65
Present Value of the Revenue Per Offset Credit Generated	\$11.68
<b>Net Present Value</b>	<b>\$1,249,521.09</b>

Sensitivity Analysis on Carbon Price							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Assum. P	\$13.00	\$13.00	\$23.00	\$23.00	\$27.00	\$27.00	\$27.00
B-E P's	<b>\$13.00</b>	<b>\$13.00</b>	<b>\$13.48</b>	<b>\$13.48</b>	<b>\$15.82</b>	<b>\$15.82</b>	<b>\$15.82</b>
NPV	-\$1,816.01						

### Optimistic Scenario

Indicator	Present Value
Present Value of the Costs	\$2,923,593.41
Present Value of the Revenue	\$7,583,823.55
Present Value of the Cost Per Offset Credit Generated	\$5.95
Present Value of the Revenue Per Offset Credit Generated	\$15.45
<b>Net Present Value</b>	<b>\$4,660,230.13</b>

Sensitivity Analysis on the Price of Carbon							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Ass. Prices	\$13.00	\$13.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00
B-E Prices	<b>\$13.00</b>	<b>\$13.00</b>	<b>\$8.02</b>	<b>\$8.91</b>	<b>\$8.91</b>	<b>\$11.88</b>	<b>\$11.88</b>
NPV	-\$6,064.14						