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by

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## Marketing Strategies in the Canadian Beef Sector

*The Canadian beef sector has undergone a structural change since the outbreak of BSE in 2003 and a higher U.S./Canadian dollar exchange rate variability. Hedging beef prices and the U.S. dollar using the futures market may help producers and other beef market participants to alleviate some of their price risk. We assess the hedging usefulness of the CME Group futures contract in total price risk reduction for Canadian cattle market participants and we examine the implications of exchange rate variability on optimal commodity hedging. Futures hedging after BSE removes approximately 35% of the risk, and a combined commodity and currency hedge after BSE was discovered removes approximately 50% of the risk. Hedge ratios are in general low, approximately 0.29 when a combined cattle-currency hedge is performed.*

**Keywords:** currency hedge, exchange rate risk, hedge ratio, beef futures market, offshore hedging

### Introduction

Beef producers in Canada faced a sudden price drop when bovine spongiform encephalopathy (BSE) was discovered in 2003. With closed international borders and inventories that couldn't be sold, prices fell and left the industry in crisis. Following the BSE crisis foreign exchange differences led to further price fluctuation. The U.S. market price variation was compounded in Canada because of the variation in the foreign exchange. While low prices and U.S. border policies cannot be controlled, there may be strategies that can be implemented to reduce the risks associated with price fluctuations. For example, hedging beef prices and the U.S. dollar using the futures market may help producers and other beef market participants to alleviate some of their price risk. However, the evidence on the benefits of using U.S. futures markets to hedge Canadian cattle is not clear. Previous research has provided only mixed results.

Carter and Loyns (1985) simulated hedging strategies using Chicago Mercantile Exchange Group (CME) futures and forward exchange rates contracts for Western Canadian custom fed cattle during the period 1972-1981. The findings suggest that most of the strategies were not able to outperform the alternative of no hedging, which most of the time yielded larger average returns and lower price risk. These counterintuitive results were attributed to the high variability of the basis. As pointed out by Carter and Loyns (1985), a better understanding of the factors affecting the basis may lead to more advanced hedging strategies that may result in better alternatives. In contrast to these findings, Novak and Unterschultz (1996) showed that futures markets are effective in reducing price risk for a feeder located in Western Canada using CME cattle and futures exchange rates to hedge cattle during the period 1980-1992. They also show that the exchange rate contributes little to price risk (less than 1%) whereas futures prices and commodity basis remove about 60% and 40% respectively of total price risk. However, the exchange rate risk has increased recently, which may change these results.<sup>1</sup>

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<sup>1</sup> The coefficient of variation for the U.S./Canadian dollar exchange rate was 8% in Carter and Loyns' (1985) period, 6% in Novak and Unterschultz's (1996) period, and has increased to 15% more recently in 2000-2009.

Thompson and Bond (1987) point out that there is an interaction effect between the price of the commodity and the exchange rate. Changes in the U.S. dollar are normally transmitted into spot commodity prices, and price changes may affect a country's terms of trade which in turn may cause changes in the exchange rate. Monetary shocks affect interest rates and can also alter both commodity prices and exchange rates (Frank and Garcia 2010). Thompson and Bond (1987) incorporate these interaction effects in deriving optimal hedge ratios. Using these relationships in the Canadian cattle market may yield more realistic estimates and help improve hedging strategies.

The outbreak of BSE, a higher U.S./Canadian dollar exchange rate variability, commodity prices-exchange rate interaction effects, and U.S. monetary shocks, all contribute to a new market environment that requires more complex trading strategies. The objectives of the research are to i) investigate the short-run price risk faced by a Canadian livestock producer hedging using U.S. futures markets, ii) assess the hedging usefulness of the CME Group futures contract in total price risk reduction for Canadian cattle market participants, and iii) examine the implications of exchange rate variability on optimal commodity hedging. To achieve this objective we examine the basis between U.S. exchange values for beef and Canadian beef markets and decompose price risk and identify relative contributions of futures prices, exchange rate, and basis risk. We also develop basis forecasting models. We use three- and five-month forecast horizons.

Canada's cattle industry is concentrated in the three prairie provinces of Alberta, Saskatchewan and Manitoba. Just under 70% of the breeding herd and total cattle inventories are located in the prairies (Statistics Canada, 2011). Manitoba has the third largest beef cow herd in Canada and was the largest live cattle exporting province in Canada prior to 2003. Carlberg et al. (2009) discuss the geography of the Manitoba market in detail. Because of its dependence on U.S. markets, using U.S. futures justifies the hedge. It also makes marketing strategies aimed at minimizing price risk particularly important for Manitoban cattle producers.

Most of Canada's cattle slaughter takes place in Alberta, where both Cargill (in High River) and XL Beef (in Brooks) have large-scale plants. Approximately 66% of Canada's cattle slaughter happens in Alberta plants, with an additional 20% processed in Ontario (Carlberg et al. 2009). Much research has been done for Alberta, however cattle marketing strategies for Manitoban producers have been less explored.

## **Background**

Research performed on hedging strategies for different products, derivation of optimal hedge ratios, and basis studies is rich; however joint commodity and currency strategies applicable to offshore hedgers is less abundant and, for the particular case of Canadian livestock producers results are mixed. Carter and Loyns (1985) use financial records of custom fed feedlots in Western Canada to assess the effectiveness of U.S. futures markets. Data including cost, revenue, price, and profit information augmented with futures price data is used to construct various hedging strategies based on the following main four: a simple routine hedge, a naïve selective forward hedge based on expected profit, a selective forward hedge that allows the hedge to be placed after feeding started, and a threshold hedge that helps make the decision of whether cattle will be

placed on feed. The findings suggest that hedging reduces profit or increases risk in the majority of the lots of cattle, and that exchange rate risk represents a significant source of hedging loss, specially for heifers. Further investigation using a variance minimizing framework shows that the Chicago futures prices used do not explain the variance in Canadian cash prices as needed for an effective hedge.

Using another period's data and a different framework, Novak and Unterschultz (1996) find that a Canadian hedger placing feeder steers in a custom feedlot for a three-month period faces little exchange rate risk, futures hedging removes about 60% of the risk, and basis risk is about 39% of total risk. The method used by Novak and Unterschultz (1996) is described in more detailed below.

A Canadian firm using futures contracts trading in the U.S. is also explored by Nayak and Turvey (2000). The study examines various corn hedging strategies in terms of the revenue variance-minimizing hedge levels and the risk reduction with respect to the unhedged case for the period 1975-1996. As in Novak and Unterschultz (1996) futures prices are assumed to be unbiased, and the covariance between price and exchange rate is assumed to be non-zero. Out of seven different strategies, the major risk reduction of 95.81% is achieved when a combined price-yield-currency hedge is performed. The next major risk reduction of 82.98% is found for the price-currency hedge strategy. The results show that revenue risk for the Canadian corn producer can be reduced more effectively using foreign commodity, yield insurance, and currency futures contracts rather than commodity futures contracts only.

In another application, Braga and Martin (1990) analyze the case of hedging soybean meal price risk in Italy using the Chicago Board of Trade futures contract and the International Monetary Market Deutsche mark futures. The study uses a model for a firm that maximizes a linear function of mean and variance of expected return from a portfolio composed of a cash position and soybean meal and Deutsche mark futures positions. The findings suggest that the joint commodity and currency hedge is superior in terms of hedging effectiveness relative to a commodity hedge only.

Benninga, Eldor and Zilcha (1985) derive optimal hedging ratios for a firm that maximizes expected income in local currency when the product is sold in a foreign market. In the model, the firm faces simultaneous foreign price and exchange rate uncertainty. At time  $t$  the firm decides the amounts that will be allocated to purchase inputs for production at time  $t+j$  and to be invested in a riskless bond which bears interest rate. The firm also decides the amount of commodity and local currency sold forward. At time  $t+j$  the firm repatriates the foreign income at the prevailing spot exchange rate. The case where the foreign commodity price and the exchange rate are unbiased but correlated is analyzed using a quadratic objective function only, given the reported difficulties associated with the interpretation of a more general solution. Benninga, Eldor and Zilcha (1985) show that the optimal hedge ratio under the above assumptions is the regression coefficient of the foreign price of the commodity denominated in local currency on the exchange rate. Here we use the model for the particular case of a Canadian livestock firm where cash sales occur in the local market and hedging activities take place using foreign futures markets.

Using a mean-variance model, Thompson and Bond (1987) and Sarassoro and Leuthold (1988) also derive optimal hedge ratios for a hedger using foreign commodity futures markets and

forward currency transactions. For the case of an Australian standard white wheat producer hedging with U.S. hard red winter futures contracts, the results suggest a significant effect of the exchange rate risk on the hedging decision. When no currency hedge is implemented, the optimal hedging position for the Australian hedger is double to that for the U.S. hedger; however when the exchange rate hedge is added, the optimal hedging position for the Australian hedger is similar to that of the U.S. hedger. The methods used in Thompson and Bond (1987) and Sarassoro and Leuthold (1988) are discussed below.

## Methods

### *Price risk decomposition*

Novak & Unterschultz (1996) argue that producers make their decisions based on price forecasts, and therefore their price risk is represented by the degree in which the forecast differs from the actual sale price. A conventional measure to assess the accuracy of a forecast is the mean squared error (MSE) of the forecast. Novak & Unterschultz (1996) use the MSE measure of the forecasted net sale price,  $N\tilde{P}_{t+j}$ , and the realized net sale price,  $NP_{t+j}$ , to decompose the total price risk into futures price risk, exchange rate risk, and basis risk. Next we describe Novak & Unterschultz's (1996) price risk decomposition for three different marketing strategies.

The MSE measure is given by,

$$MSE = \frac{\sum_{t=-j+1}^{T-j} (NP_{t+j} - N\tilde{P}_{t+j})^2}{T-1} \quad (1)$$

where  $T$  is the total number of periods and  $j$  is the forecast horizon. The net sale price for a local producer not performing any hedge equals the realized cash price, that is,  $NP_{t+j} = p_{t+j}$ . When the local producer hedges the commodity using a foreign futures contract, the realized net price is given by,

$$NP_{t+j} = p_{t+j} + (f_t - f_{t+j}) e_{t+j} \quad (2)$$

where  $f_t$  is the futures price in the foreign currency when the hedge is placed,  $f_{t+j}$  is the futures price in the foreign currency when the hedge is lifted, and  $e_{t+j}$  is the spot exchange rate converting foreign currency into local currency. When the local producer hedges the commodity and the currency, the realized net price is given by,

$$NP_{t+j} = p_{t+j} + (f_t - f_{t+j}) e_{t+j} + f_t (x_t - x_{t+j}) \quad (3)$$

where  $x$  is the futures exchange rate. Analogously, the forecasted net sale price is computed with the forecasted cash price,  $\tilde{p}_{t+j}$ , the forecasted foreign futures price,  $\tilde{f}_{t+j}$ , the forecasted exchange rate,  $\tilde{e}_{t+j}$ , and the forecasted futures exchange rate,  $\tilde{x}_{t+j}$ . Following Novak & Unterschultz (1996) we assume unbiased futures prices, and therefore  $N\tilde{P}_{t+j}$  reduces to  $\tilde{p}_{t+j}$  for all three strategies

mentioned above. For the estimation of  $\tilde{p}_{t+j}$  we perform basis forecasts. Then, the  $\tilde{p}_{t+j}$  is defined as,

$$\tilde{p}_{t+j} = f_t X_t + \tilde{B}_{t+j} \quad (4)$$

where  $\tilde{B}_{t+j}$  is the forecasted basis when the cash sale is realized and the basis is the difference between the local cash price and the foreign futures price transformed to local currency.

Expanding (1) using (2), (3), and (4) yields the MSE measures for the three strategies,

$$\text{i) Cash sales only: } MSE = \frac{\sum_{t=-j+1}^{T-j} [(f_{t+j} e_{t+j} - f_t e_t) + (B_{t+j} - \tilde{B}_{t+j})]^2}{T-1} \quad (5)$$

$$\text{ii) Commodity hedging: } MSE = \frac{\sum_{t=-j+1}^{T-j} [f_t (e_{t+j} - e_t) + (B_{t+j} - \tilde{B}_{t+j})]^2}{T-1} \quad (6)$$

$$\text{iii) Combined commodity-currency hedge: } MSE = \frac{\sum_{t=-j+1}^{T-j} (B_{t+j} - \tilde{B}_{t+j})^2}{T-1} \quad (7)$$

### *Basis forecast*

Hedging decisions are usually driven by the predictability of the basis. A simple basis convergence model originally suggested by Working (1953) has been traditionally used in agricultural markets. Gómez et al. (2009) use this model to study the lean hog basis predictability in the U.S. In the model, the change of the basis between two time periods is a function of the initial basis (Tomek 1997). The basis is perfectly predictable when the slope is -1 and the constant is zero. We also control for other factors such as the discovery of BSE in Canada in 2003 and seasonal behavior. The basis forecasting model is given by,

$$\Delta B_t = \beta_0 + \beta_1 B_t + \beta_2 BSE + \beta_3 D_s + \varepsilon_t \quad \varepsilon_t \sim N(0, \sigma^2) \quad (8)$$

where  $\Delta B_t = B_{t+j} - B_t$ , BSE is a dummy variable taking the value of 1 after BSE in May 2003 and 0 otherwise, and  $D_s$  is a seasonal dummy variable.

The estimation is performed using OLS. Prior to the estimation of equation (8) we perform an F-test for differences in the variance of the regression before and after BSE. When the variance between periods is not significantly different we estimate equation (8) for the whole period, otherwise we estimate (8) separately for each period. Since the basis at time  $t$  is known, from (8) we compute a point forecast for  $B_{t+j}$ .

### Optimal Hedge Ratio

The optimal hedge ratio for a commodity hedge is usually computed as the coefficient of the regression between the change in spot prices and the change in the futures price of the commodity. When spot and futures prices are in different currencies, exchange rate uncertainty brings additional considerations in the computation of the optimal hedge ratio. In this section we focus on the estimation of the optimal hedge ratio for the third hedging strategy mentioned above in which a producer sells the commodity in the cash local market while hedging the commodity using a foreign futures contract and simultaneously hedging the currency.

Using the mean-variance framework the objective is to maximize the expected  $NP_{t+j}$  from cash sales and hedging activities subject to the risk associated with the  $NP_{t+j}$  (Thompson and Bond 1987). The objective can then be specified as the maximization of,

$$Q_t = E(NP_{t+j}) - \lambda Var(NP_{t+j}) \quad (9)$$

where  $\lambda$  is the decision maker's risk aversion coefficient and estimates of  $E(NP_{t+j})$  and  $Var(NP_{t+j})$  are conditional on the information available to the decision maker at time  $t$ . Relaxing the assumption of unity hedging ratios in (3), the  $NP_{t+j}$  can now be written as,

$$NP_{t+j} = Q_t p_{t+j} + H_t (f_t - f_{t+j}) e_{t+j} + G_t (x_t - x_{t+j}) \quad (10)$$

where  $Q_t$  is the quantity of livestock sold in the local cash market,  $H_t$  is the quantity of commodity futures contract sold at time  $t$  for a price  $f_t$  to be bought back at time  $t+j$ , and  $G_t$  is the quantity of currency futures contracts sold at time  $t$  and bought back at time  $t+j$ . To solve (10) we follow Sarassoro and Leuthold (1988), substitute (10) into (9), solve for the expectation and variance of  $NP_{t+j}$  and optimize with respect to  $Q_t$ ,  $H_t$ , and  $G_t$  and we obtain the following first order conditions,

$$Q_t = \frac{E(p_{t+j})}{2\lambda Var(p_{t+j})} - H_t \frac{Cov[p_{t+j}, (f_t - f_{t+j})e_{t+j}]}{Var(p_{t+j})} + G_t \frac{Cov(p_{t+j}, x_{t+j})}{Var(p_{t+j})} = L_1 - a_1 H_t + b_2 G_t \quad (11)$$

$$H_t = \frac{f_t E(e_{t+j}) - [Cov(f_{t+j}, e_{t+j}) + E(f_{t+j})E(e_{t+j})]}{2\lambda Var[(f_t - f_{t+j})e_{t+j}]} - Q_t \frac{Cov[p_{t+j}, (f_t - f_{t+j})e_{t+j}]}{Var[(f_t - f_{t+j})e_{t+j}]} + G_t \frac{Cov[(f_t - f_{t+j})e_{t+j}, x_{t+j}]}{Var[(f_t - f_{t+j})e_{t+j}]} = L_2 - b_0 Q_t + b_2 G_t \quad (12)$$

$$G_t = \frac{x_t - E(x_{t+j})}{2\lambda f_t Var(x_{t+j})} + Q_t \frac{Cov(p_{t+j}, x_{t+j})}{Var(x_{t+j})} + H_t \frac{Cov[(f_t - f_{t+j})e_{t+j}, x_{t+j}]}{Var(x_{t+j})} = L_3 + c_0 Q_t + c_1 H_t \quad (13)$$

Rearranging and solving the system (11)-(13) yields the following hedging ratios, as reported in Sarassoro and Leuthold (1988),

$$\frac{H_t}{Q_t} = \frac{L_1(b_2 c_0 - b_0) + L_2(1 - a_2 c_0) + L_3(b_2 - a_2 b_0)}{L_1(1 - b_2 c_1) + L_2(a_2 c_1 - a_1) + L_3(a_2 - a_1 b_2)} \quad (14)$$

$$\frac{G_t}{Q_t} = \frac{L_1(-b_0c_1 - a_2c_0) + L_2(-a_1c_0 + c_1) + L_3(1 - a_1b_0)}{L_1(1 - b_2c_1) + L_2(a_2c_1 - a_1) + L_3(a_2 - a_1b_2)} \quad (15)$$

## Data

We use weekly cash prices from the Winnipeg auction market for the period 2000-2010. Futures prices for the CME Group live cattle contract and spot exchange rate at the foreign exchange market are from the Commodity Research Bureau (CRB). Futures exchange rates contracts are those trading in the International Monetary Market and also come from CRB. The MSE, basis models and hedge ratio employ cash and futures prices for the third Tuesday of the expiration month ( $t+j$ ) at 3-month and 5-month hedging horizons. For the 3-month period we use February, June, and October contracts. For the 5-month period we use April and October contracts. The series are constructed so that there are no overlapping hedging periods. Figure 2 shows the seasonal behavior of the number of animals sold through Manitoba Auction markets. October and November are the months with the highest number of sales while in July sales are their minimum.

## Results

The estimates for the basis forecast model for three- and five-month horizons are presented in Table 1. For the five-month horizon the coefficient for  $B_t$  is closer to -1 and the constant is slightly closer to zero, indicating predictability improves at the longer forecast horizon. For both horizons, the estimated coefficients of the BSE dummy variable are negative, driving the intercept closer to zero. The constant term is the closest to zero in the longer horizon after BSE. Also, the ability to forecast the basis as measured by the adjusted  $R^2$  is higher for the 5-month forecast horizon. Overall, the forecast performance seems to be higher in the 5-month horizon, which could be explained by the lower level of noise as much of the short term is eliminated.

The short-run price risk measures are shown in Table 2 and Table 3 for the three and five-month horizons respectively. Each table shows the mean NP and associated MSE measures for the three strategies: no hedging, commodity hedging only, and the combined commodity and currency hedging. For both forecast horizons and all strategies, the NP is always lower after the BSE, and it changes little for the different strategies.

For the three-month forecast horizon, the commodity hedge reduces the price risk by about 17% and 35% before and after BSE respectively. By comparing (5) and (6) it can be seen that the reduction is due to the hedge when futures prices are assumed to be unbiased, leaving exchange rate risk (change in  $e_t$  to  $e_{t+j}$ ) and commodity basis risk (difference between  $\tilde{B}_{t+j}$  and  $B_{t+j}$ ).

Performing the combined commodity-currency hedge reduces risk by about 27% and 52% before and after BSE respectively, with respect to the no hedging strategy. The comparison of the commodity hedge with the combined hedge reveals the contribution of the exchange rate risk to the total price risk, which is 12% and 26% before and after BSE respectively. In all cases the price risk reduction is larger after the BSE.

For the five-month forecast horizon the results differ. Before the BSE, hedging cattle using futures markets increased the price risk by about 7%. However, after BSE the same hedge decreased the price risk by about 12%. The results of the earlier period are in line with the findings of Carter and Loyns (1985) suggesting that not hedging was associated with a lower price risk relative to different hedging strategies. When the currency hedge is added to the cattle hedge the reduction in price risk increases in both periods, before and after BSE, by about 61% and 55% respectively. The contribution of the exchange rate in this case is larger, being 64% and 49% before and after BSE respectively.

In both forecast horizons the contribution of the exchange rate to total price risk is higher after BSE relative to the period before BSE was discovered. These results were expected as the fluctuation of the exchange rate as shown in Figure 1 is higher in the most recent period after BSE. Also for both forecast horizons the role of the cattle hedging strategy in reducing price risk is stronger after BSE.

The optimal hedge ratios are shown in Table 4. For the three month forecast horizon the hedge ratio of 0.37 for cattle futures only is the highest. When the currency hedge is added the optimal hedge ratio decreases to 0.29. For the five-month forecast horizon the ratio for cattle futures only is the lowest, and increases to the same value as the shorter horizon when the combined hedge is performed. These results suggest that the exchange rate risk impacts the decision of hedging Canadian cattle using U.S. futures contracts. Finally, the currency optimal hedge ratio is slightly larger for the five-month horizon.

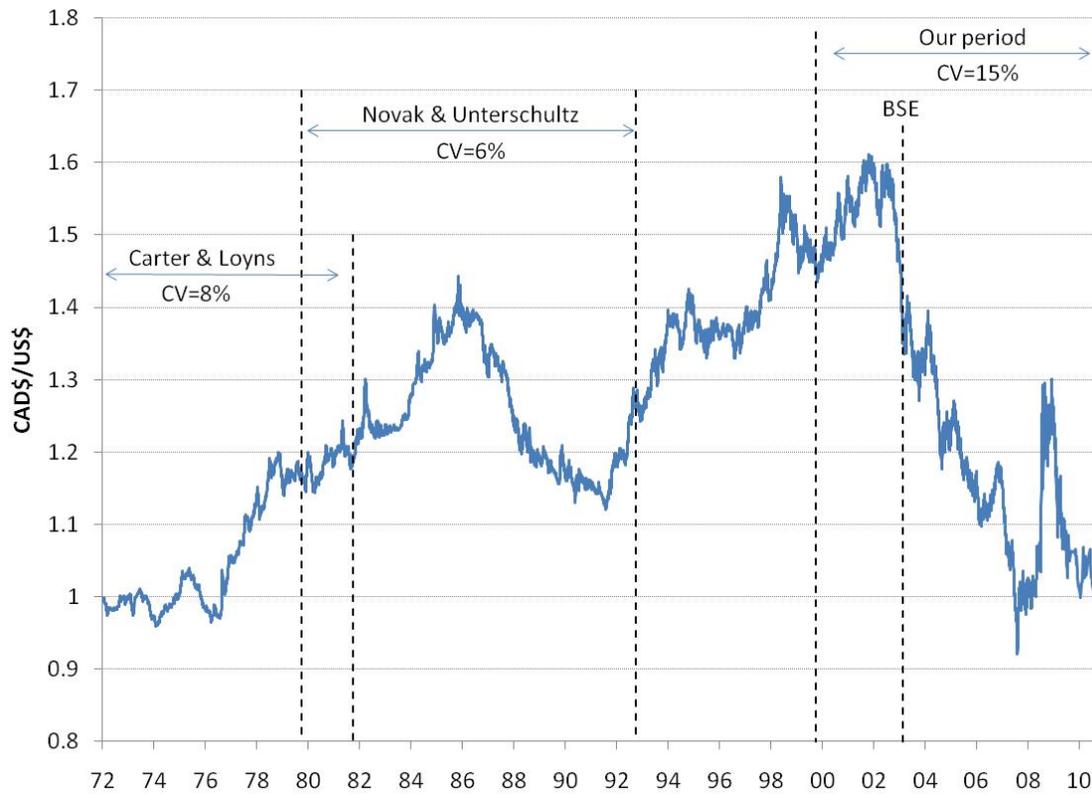
## **Summary and Conclusions**

Motivated by the sudden price drops observed in the Canadian cattle market after BSE, this study looked at hedging strategies for the Manitoba live cattle market. Including the effects of fluctuations of the exchange rate faced by Canadian hedgers using U.S. futures markets we decompose the short-run price risk implied by three different marketing strategies. We also assess the hedging usefulness of U.S. futures contracts in reducing the price risk. We find that short-term commodity hedges using U.S. futures markets appear to be effective in the most recent period (after BSE) to reduce price risk. Findings for the period before BSE using a 5-month forecast horizon are consistent with Carter & Loyns (1985) who found hedging to be risk increasing.

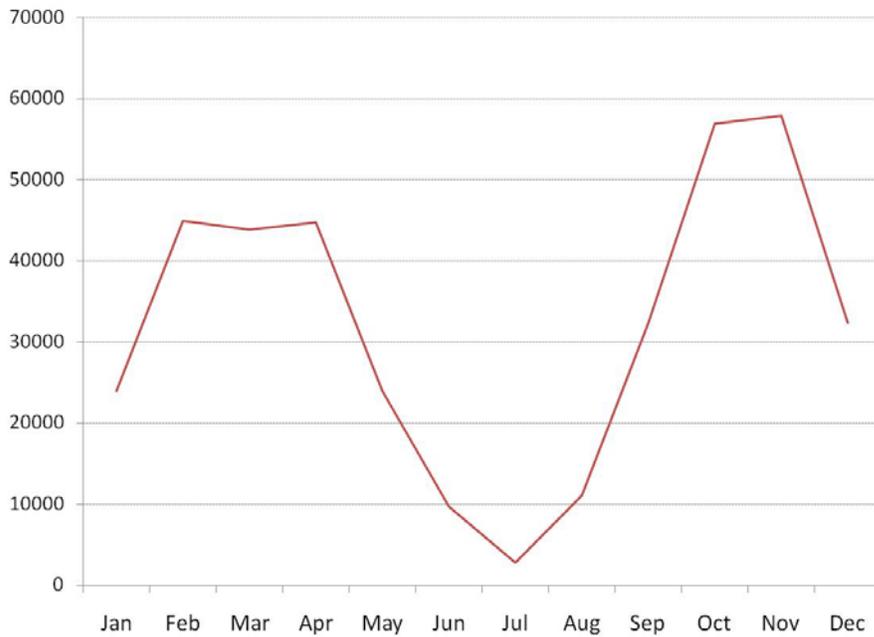
Our findings suggest that futures hedging after BSE removes approximately 35% (11%) of the risk for a three(five)-month hedging horizon. Combined commodity and currency hedging after BSE removes approximately 50% of the risk for both hedging horizons. The remaining price risk is due to the basis variability. In general, risk reduction is larger after BSE which may be due to more integrated and volatile markets in both live cattle and the U.S./Canadian exchange rate.

Finally, exposure to exchange rate risk has an effect on decisions to hedge commodity. Hedge ratios are in general low; for both three and five month hedging horizons the hedge ratio of cattle futures is 0.29 when a combined cattle-currency hedge is performed.

**Figure 1: CAD/US exchange rate, 1972-2010**



**Figure 2: Number of Feeders Sold Through Manitoba Auction Markets, 2001-2009**



**Table 1: Predictability of the basis for Canadian cash markets and U.S. futures markets, 2000-2010**

	<b>3-month</b>	<b>5-month</b>
<i>Constant</i>	52.55** (21.98)	40.84*** (9.03)
<i>B<sub>t</sub></i>	-0.49** (0.19)	-0.73*** (0.15)
<i>BSE</i>	-14.32* (7.60)	-35.98*** (7.99)
<i>D<sub>10</sub></i>	2.36 (3.94)	
<i>Adj. R<sup>2</sup></i>	0.11	0.53

Standard errors are between parentheses.  
Significance: \* 10%, \*\* 5%, \*\*\* 1%

**Table 2: NP and MSE of NP (\$/cwt) for Canadian cattle using U.S. futures markets, 3-month forecast horizon, 2000-2010**

<b>Strategy</b>	<b>Before BSE</b>		<b>After BSE</b>	
	Mean NP	MSE	Mean NP	MSE
No hedging	124.74	314.35	97.01	289.28
Commodity hedging	124.56	259.96 (17.30%)	96.05	189.23 (34.59%)
Commodity-currency hedging	125.20	229.72 (26.92%)	96.66	139.80 (51.67%)

Numbers in parentheses indicate the percentage reduction in the MSE (price risk) with respect to the no hedging strategy.

**Table 3: NP and MSE of NP (\$/cwt) for Canadian cattle using U.S. futures markets, 5-month forecast horizon, 2000-2010**

Strategy	Before BSE		After BSE	
	Mean NP	MSE	Mean NP	MSE
No hedging	126.33	51.51	98.25	207.32
Commodity hedging	128.35	54.90 (-6.57%)	95.51	183.43 (11.53%)
Commodity-currency hedging	129.26	19.86 (61.45%)	96.50	93.57 (54.87%)

Numbers in parentheses indicate the percentage reduction in the MSE (price risk) with respect to the no hedging strategy.

**Table 4: Optimal commodity and currency hedge ratios for Canadian cattle using U.S. futures markets, 2003-2010**

Strategy	$H_t/Q_t$		$G_t/Q_t$	
	3-month	5-month	3-month	5-month
Commodity hedging	0.37	0.20	--	--
Commodity currency hedging	0.29	0.29	0.15	0.24

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