Managing Canola Price Risk

By George Flaskerud, William Wilson, and Bruce Dahl

Abstract

Correlations between futures and cash prices indicate that to manage price risk in canola, the use of futures at the Winnipeg Commodity Exchange is preferred to the use of futures for soybeans, soybean oil or soybean meal. Although traditionally hedges are 1:1, risk could be further reduced by using a hedge ratio of about .8 to .9. Hedging in futures was superior to other preharvest marketing strategies. Selective storage was the most profitable harvest/postharvest strategy. The analysis was based on 1993-2000 data.

Introduction

U.S. canola production is small compared to that of other countries, such as Canada, although it has grown rapidly in recent years due essentially to increases in planted acres. Production of canola in the U.S. occurs primarily in North Dakota and is concentrated in northern portions of the state. During 1999, North Dakota production of canola was 10.855 million hundredweight or 80 percent of U.S. production (North Dakota and National Agricultural Statistics). During 1991-99, North Dakota yields for canola averaged 1,347 pounds per acre and ranged from 1,180 pounds to 1,530 pounds.

Canola production has grown rapidly, partly because the USDA Commodity Credit Corporation Loan program has made oilseeds more profitable than many other crops (Swenson). In addition, disease in small grains has made it imperative to include as much oilseed in Northern Plains crop rotations as possible.

Canola is processed mainly for its oil. Concentration of production in northern North Dakota has been facilitated by the location of a major processing plant at Velva. Another processing plant of about the same crushing capacity is located at Altona, Manitoba. Multi-seed crushing plants that crush canola are located at West Fargo and Enderlin, North Dakota and Culbertson, Montana.



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Although canola often competes well economically with other crops, canola producers confront price risk. Risk management is as important for the non-traditional crops, such as canola, as it is for the major commodities, yet risk management strategies may not be as readily accessible.

Price and yield risk management concepts are thoroughly examined by Harwood, Heifner, Coble, Perry and Somwaru, and the concepts presented are applicable to canola producers. Further, the information needed to exercise “yield” risk management methods is generally available for most commodities from universities and the insurance industry. However, the information required to employ “price” risk management tools is largely limited to producers of major commodities.

An extensive body of knowledge exists for managing price risk for the major commodities. In North Dakota, for example, extension publications illustrate price risk (Flaskerud 1996), seasonal price patterns (Flaskerud and Johnson), basis (Flaskerud 1997), storage (Flaskerud 1992), futures and options (Flaskerud and Shane) and marketing strategies (Flaskerud 2001). Similar publications are available from other Land Grant Universities.

An understanding of seasonal price patterns, relationships between cash and futures prices, and marketing strategy implications are paramount to managing price risk for canola. As canola acres increase, demand for information on the effectiveness of price risk strategies will also increase. This article analyzes price risk management strategies for U.S. canola growers. Various time series of prices are analyzed to identify patterns and relationships useful for developing marketing strategies and preharvest and harvest/postharvest marketing strategies are evaluated.

Data and Methods

Agricultural commodities have historically exhibited seasonal price movements tied to the crop cycle. However, seasonal price movements vary, depending on supply and demand fundamentals. The seasonal distribution of prices and basis is summarized in this article using the annual average and standard deviation, which is employed as an indicator of variability.

Basis is the difference between a cash and futures price. The basis with respect to the nearby futures for canola is presented in this article. It is derived by subtracting the nearby futures contract price from the corresponding local cash price. Prices from the nearby futures contract month are used until the last Thursday in the month before the futures contract month. After that Thursday, prices from the following futures contract month are used. The calculated basis is summarized as monthly averages.

Data were gathered from several sources. Cash canola prices were obtained from ADM Processing, Velva, North Dakota. Canola futures were obtained from the Winnipeg Commodity Exchange (WCE). Soybean futures (soybeans, soybean oil, and soybean meal), were obtained from the Chicago Board of Trade (CBOT). Exchange rates were obtained from the Federal Reserve Bank of St. Louis. Data for canola prices (cash and futures) were monthly averages while other data were daily data, which were used to derive comparable monthly averages. Prices were converted to U.S. dollars per hundredweight ($US/cwt). Contract specifications and other information on canola futures can be found at www.wce.mb.ca.

Hedging of commodities relies on the relationship or correlation between futures and cash prices. Correlations were calculated since they indicate the degree that prices tend to move in the same direction. Higher correlations, between cash and futures prices, would indicate that prices move similarly, thus risk in cash prices can be offset by hedging with futures.

A hedge ratio is the proportion of the futures position required to minimize the risk associated with a cash position (production, inventory, and so on). Note that the emphasis is on minimizing risk, not maximizing returns. Hedging price risk for a commodity with both cash and futures markets is generally portrayed as taking equal and opposite positions in cash and futures markets. This implies a hedge ratio of one and is used in most examples of hedging. More refined hedge ratios can be estimated with regression analysis or simulation.

Regression analysis was used to estimate optimal hedge ratios for each of the different futures contracts (Blank, Carter, and Schmiesing). For this, cash and futures prices were converted to similar units and then cash prices were regressed as a function of futures contract prices as follows:

$$\text{Cash Canola} = F(\text{futures}) + e \quad (1)$$

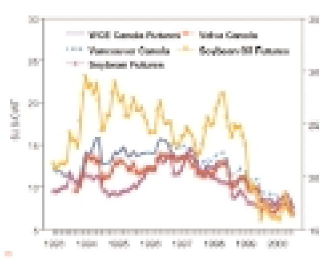
Separate equations were estimated for WCE canola futures and for CBOT soybean, soybean oil, and soybean meal futures. Ordinary least squares estimates were derived adjusting for auto-correlation when present.

Optimal hedge ratios were also derived using simulation (Winston). Distributions for price changes over prescribed periods including daily changes and correlations of price changes were derived. These were used within simulation software (@RISK) to simulate profit for holding portfolios of cash and futures with alternative hedge ratios over these time periods. A simple search procedure among alternative hedge ratios reveals the optimal hedge ratio.

Seasonal Price Patterns

The Canadian cash (Vancouver) and futures prices followed each other closely from 1993 to 2000 (Figure 1). The major deviation was the drop in futures relative to Vancouver cash that occurred in 1996, which reflects the change in basing points for canola futures from Vancouver to an area around Saskatoon, Saskatchewan. Comparison of Velva cash prices with other futures prices indicates changes in canola futures most closely reflect Velva cash price changes. Changes in soybean oil and soybean futures are not as representative of changes in Velva cash prices, although soybean oil follows Velva cash prices more closely than do soybean futures. Exchange rate variability was low over the usual life of a hedge.

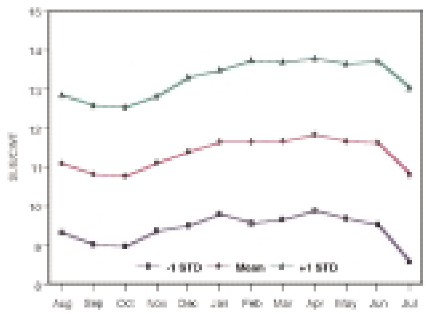
Figure 1. Prices for Canola, Soybeans and Soybean Oil



Velva Cash Canola Prices

Seasonal patterns for canola prices were examined for the marketing year, August to July. A broad range of price behavior occurred during individual years. Highs occurred in February for 1993 and 1994, May in 1995 and 1997, September in 1996, December in 1998 and April in 1999. However, the distribution of prices from 1993 to 2000 reveals that the pattern for Velva cash prices, on average, is to decline to lows in September and October and then increase to peaks in January and April before falling into the next marketing year (Figure 2).

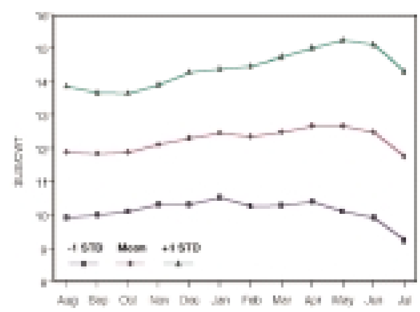
Figure 2: Distribution of 1993-99 Velva Cash Canola Prices.



Canola Nearby Futures

Seasonal patterns for nearby canola futures revealed a broad range of price behavior. Highs for nearby futures occurred in June in 1993, March in 1994, May in 1995 and 1997, August in 1996, December in 1998 and October in 1999. From 1993 to 1999, average nearby futures (Figure 3) indicate lows in September and October with prices increasing to April/May and then declining again to July, similar to that for Velva cash canola prices.

Figure 3. Distribution of 1993-99 Nearby WCE Canola Futures



Canola November and May Futures

Patterns were also examined for two specific contract months (November and May). These contracts may be used for preharvest and postharvest marketing strategies. On average, the history of the November contract (1993-1999) indicates highs occurring in May with lows occurring in August (Figure 4). In contrast, the May contract (Figure 5) exhibits a pattern where highs occur in November; May futures then decline to a low in February.

Figure 4. Distribution of 1993-99 November WCE Canola Futures

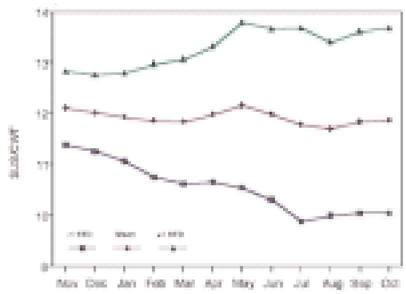
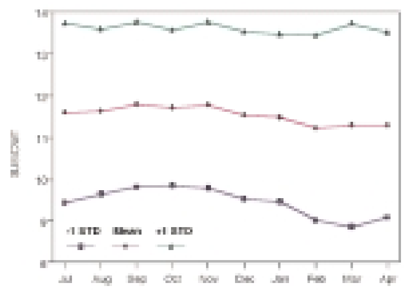


Figure 5. Distribution of 1993-99 May WCE Canola Futures

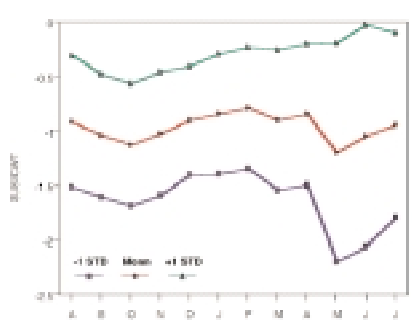


Basis

Relative to Canola Futures

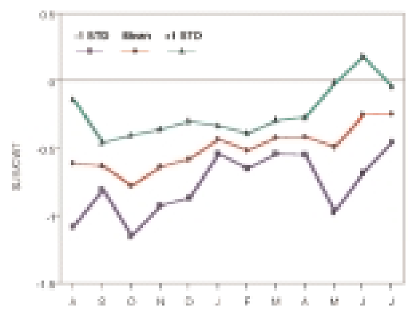
The tendency for Velva cash basis relative to canola futures from 1993 to 1999 has been to decline initially to a low in October, then to increase to a high in February, decline to a marketing year low in May, and then increase into the next crop year (Figure 6). However, this average is affected by the change in basing points for canola futures in 1996 from Vancouver to the Saskatoon area.

Figure 6. Velva Basis 1993-99 Relative to Nearby WCE Canola Futures



Another average was estimated for the 1996-99 marketing years (after the change in delivery). The cash basis since the change has a marketing year low that occurs in October and then the basis increases throughout the remainder of the marketing year (Figure 7). Further, the range of the basis is narrowest from January to April and is widest from May to October.

Figure 7. Velva Basis 1996-99 Relative to Nearby WCE Canola Futures

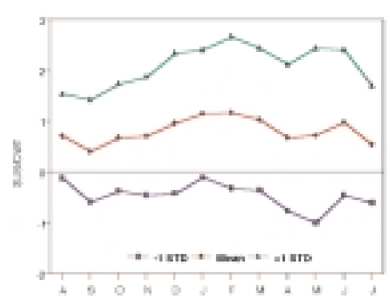


Relative to Soybean Futures

The Velva cash basis was also derived relative to soybean futures (cross-basis). It was derived by converting soybean futures values to dollars per cwt and then calculating the basis. The cross-basis relative to soybean futures for the canola marketing year was more variable than the basis relative to canola futures.

The cross-basis relative to soybeans ranged from a low of $2.00/cwt under soybean futures, in May of 1997 to a high of $4.00/cwt over soybean futures in February 1995. From 1993-99 the Velva cross-basis relative to soybean futures has shown a trend toward marketing year lows in September and highs in January-February (Figure 8).

Figure 8. Velva Cross Basis 1993-99 Relative to Nearby Soybean Futures

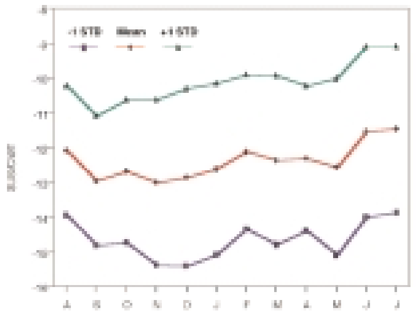


Relative to Soybean Oil Futures

Velva cash cross-basis was derived relative to soybean oil futures by marketing year. The cross-basis relative to soybean oil ranged from a low of $16.00/cwt under soybean oil to a high of about $7.00/cwt under soybean oil.

Throughout the canola marketing year, the cross-basis varied by as much as nearly $8.00/cwt in 1998-99 to as little as $2.00/cwt in 1996-97. The average cross-basis from 1993 to 1999 showed a pattern of marketing year lows in September and November and then increasing into the next canola crop marketing year (Figure 9). Further, from 1993 to 1999 the average range in the cross-basis was fairly constant throughout the marketing year unlike the basis relative to canola futures, which tended to widen during production and harvest and narrow from January to April. On the other hand, the variability (standard deviation) of the cross-basis relative to soybean oil futures is greater than for the basis relative to canola futures. This suggests lower basis risk when hedging with canola futures than with soybean oil futures.

Figure 9.Velva Cross-Basis 1993-99 Relative to Nearby Soybean Oil Futures

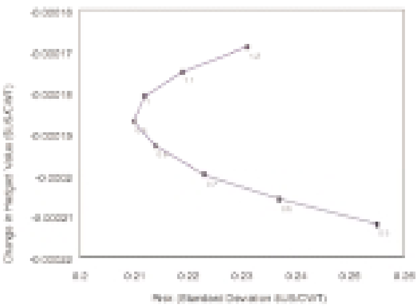


Correlations

Correlations were estimated among Velva cash canola prices; canola futures prices; soybean, soybean oil, and soybean meal futures prices; exchange rates and Vancouver cash canola prices. These correlations (Table 1) indicate that changes in Velva cash prices are most closely correlated with canola futures (correlation = .95). Soybean oil futures provide the next best correlation (.86) with Velva cash followed by Soybean futures (.76). These correlations suggest that canola futures should provide the most risk reduction for hedging Velva cash canola.

The results in Table 1 are strong evidence in favor of using WCE canola futures to manage price risk. To ensure that hedging in canola futures is the most appropriate strategy, correlations for additional combinations were analyzed.

Figure 10. Risk Return Frontier for Alternative Hedge Ratios for a 5-month Rolling Hedge in WCE Futures



Correlations were examined for contract values and specific periods (one-month price changes and four-month price changes). Contract values were in U.S. dollars per cwt. Correlation results for contract values were sim-

Table 1. Correlations of Prices, August 1993 - July 2000[a]

	Velva Canola	Canola Futures	Soybean Futures	Soyoil Futures	Soymeal Futures	Exchange Rate	Vancouver Canola
	Cts/bu	$C/mt	Cts/bu	Cts/lb	$/Ton	$C/$US	$C/mt
Velva Canola	1.00	.95	.76	.86	.57	-.61	.95
Canola Futures		1.00	.66	.87	.44	-.30	.96
Soybean Futures			1.00	.55	.94	-.49	.65
Soyoil Futures				1.00	.30	-.37	.79
Soymeal Futures					1.00	-.54	.43
Exchange Rate						1.00	--
Vancouver Canola							1.00

[a] Dashes indicate that correlation was not significant.

ilar to those for prices. Correlations for one-month changes indicate that canola futures still provide the strongest relationship and that weaker relationships prevail for soybeans and soybean oil. For four-month changes, canola futures and soybean oil futures were stronger than for one-month changes, while soybeans were worse.

This analysis shows that the indicators of current Velva cash canola prices and longer term price changes, from best to worst, are canola futures, soybean oil futures, soybean futures, and soybean meal futures.

Hedge Ratios

Hedge ratios (Table 2) were derived for hedging Velva cash canola with canola futures only and with combinations of canola futures, exchange rates, and soybean oil futures using regression analysis. These were also estimated for hedging during specific time periods. The hedge ratios were based on historical price data.

Hedge ratios were estimated for contracting 5,000 bushels (2,500 cwt) of canola using the value of futures contracts (this would indicate the number of futures contracts to use to hedge 2,500 cwt of a farmer's production). A hedge ratio of 4.76 contracts of canola futures was derived. Using this ratio, about 97 percent of the variability in prices could be eliminated.

The ratio indicates that 4.76 canola futures contracts should be used to hedge 5,000 bushels (2,500 cwt) of canola. Alternatively, .84 cwt of canola futures should be used to hedge each cwt of production. In other words, hedging 84 percent of production minimizes risk. Again, the emphasis with hedge ratios is on minimizing risk, not maximizing returns.

When hedging production with soybean oil futures, the cross-hedge ratio is 1.56 contracts to 5,000 bushels production. This strategy would provide less risk reduction (controlling 94 percent of price variability) than the canola futures strategy.

Hedges placed in multiple markets were examined using combinations of canola futures, soybean futures, soybean oil futures, soybean meal futures, and foreign exchange rate futures. These provided little if any additional risk reduction over a strategy using canola futures only. The added risk reduction potential would most likely be offset by the additional transaction costs required for the additional futures positions.

Alternative hedge ratios were examined using simulation for time periods farmers would traditionally use hedging strategies. These are provided to give an indication of how additional risk could be controlled, and to indicate how hedge ratios can change depending on the specific time period it is placed. Four periods were examined.

Table 2. Estimated Hedge Ratios, Based on August 1993 - July 2000 Data in $US, and Hedging Effectiveness for Alternative Hedging Strategies

Hedge Strategy	Hedge Ratio: Futures Contracts per 5,000 Bushels Production	Hedge Ratio: Futures cwt per cwt Production	Hedging Effectiveness
WCE Canola Futures	4.76	0.84[a]	.97
CBOT Soyoil Futures	1.56	0.37[b]	.94
Multi Market Hedge in:			
WCE Canola,	3.84	0.68	.93
CBOT Soybeans,	0.17	0.20	
CBOT Soyoil,	0.27	0.06	
Exchange Rate	0.09		
Implied Hedge Ratios for WCE Canola Futures Derived through Simulation[c]			
Rolling 5-Month Change	5.10	0.9	
Preharvest (May-Aug), November Contract	9.07	1.6	
Postharvest (Aug-Feb), March Contract	2.83	0.5	
Postharvest (Aug-Apr), May Contract	7.93	1.4	

[a] 4.76 * 20 MT * 22.046 / 2,500 = .84 where 22.046 is the number of cwt in a metric ton and 2,500 is the number of cwt equivalent to 5,000 bushels.

[b] 1.56 * 600 / 2,500 = .37 where 600 is the number of cwt in a soybean oil futures contract and 2,500 is the number of cwt equivalent to 5,000 bushels.

[c] These were simulated and not estimated with regression analysis so no effectiveness was derived.

First, a rolling hedge using canola futures was placed throughout the year and held for a period of five months. Results from the simulation reveal the tradeoff between risk and returns from these hedge ratios. Since the goal of hedging is to minimize risk, an optimal hedge ratio of .9 is derived (Table 2 and Figure 10). This hedge ratio (.9) provides the lowest level of risk (standard deviation = .21 $/cwt). This means 100 cwt of farm production should be hedged with 90 cwt of canola futures to minimize risk. Using a higher hedge ratio (1.2) results in a higher return measured as the net change in the value hedged (-.000169 $/cwt), but with a higher level of risk (standard deviation = .23 $/cwt). Similarly, using a lower hedge ratio (.7) results in a lower return (-.0002 $/cwt) and higher levels of risk (standard deviation = .223 $/cwt).

The change in return was very small within the range of hedge ratios analyzed (.5-1.2). However, the change in risk has important management implications. Also, only price risk is evaluated, not revenue risk, which would also consider variability of yields and gains/losses from hedging more than projected production.

Second, hedges were examined that were placed in May and lifted in August using the November canola futures, which is similar to the period a production hedge would be placed. In this May to August hedge, a hedge ratio of about 1.65 is indicated. The maximum reduction in risk would occur when 100 cwt of farm production is hedged with 165 cwt of canola futures.

A third case was a postharvest strategy where a purchase was made in August and held to February in the March canola futures to replace sold production. In this August to February strategy, a hedge ratio of .5 is indicated (the maximum reduction in risk would occur when 100 cwt of farm production is hedged with 50 cwt of canola futures).

The fourth example is also for a postharvest strategy where May canola futures are purchased in August and held to April. In this August to April hedge, a hedge ratio of 1.4 is indicated (the maximum reduction in risk would occur when 100 cwt of farm production is hedged with 140 cwt of canola futures).

Implications of Hedge Ratios

Due to the high correlation between Velva cash prices and canola futures, the best hedging strategy from a risk reduction perspective is opposite positions held in cash and canola futures. Although traditionally hedges are 1:1, risk could be reduced further in this case by using a hedge ratio of about .8 to .9. Risks could be reduced further by adding positions in other contracts including foreign exchange and soybean oil. However, the added risk reduction potential of these is relatively small and would most likely be offset by the additional transaction costs required for the additional futures positions.

Comparison of Marketing Strategies

Preharvest and harvest/postharvest marketing strategies are compared for the years 1994-1999. The illustrations provide a systematic framework for analyzing and planning marketing strategies. Caution must be exercised in generalizing about what might happen in the future based on the illustrations since relatively few years were analyzed. Illustrations matching future expectations can be examined for possible strategy outcomes. A fee of $.07/cwt ($30 per contract) was specified for each transaction (purchase and sale) of futures and options. A hedge ratio of 1:1 is used in the balance of the article.

Preharvest Marketing Strategies

Preharvest marketing strategies were initiated during May in this analysis. May was select-

Table 3. Preharvest Marketing Strategies, 1994-99

Strategy	Average Price	Standard Deviation	Minimum	Maximum
Cash (No Hedge)	11.09	1.76	7.96	13.64
Futures Hedge	11.61	1.68	8.41	14.07
Options:				
Put	11.03	1.68	7.99	13.44
Synthetic Put	11.28	1.58	8.20	13.48

Table 4. Harvest and Postharvest Marketing Strategies, 1994-95 to 1999-00.

Strategy	Average Price	Standard Deviation	Minimum	Maximum
Cash (No Hedge)	11.09	1.76	7.96	13.64
Selective Storage [a]	11.53	1.85	7.96	13.64
Futures:				
Aug to Feb	11.21	2.31	6.98	13.67
Aug to April	11.41	2.36	7.34	13.58
Options:				
Call – At Money	11.23	1.87	7.49	13.18
Call - + 3 Strikes	11.08	1.79	7.74	13.15

[a] Sales made during the month of highest returns net of storage costs. Statistics include sales during August (no storage) as well as other months. Storage was most profitable during three of the six years analyzed.

ed because the 1994-99 November futures contracts for canola peaked in May, on average. November was used because of a substantially higher volume in that contract than in the September contract in recent years. Strategies are summarized in Table 3.

Hedging in the November futures contract during May and offsetting in August was the most profitable preharvest strategy. This strategy provided a hedging profit of $.52/cwt, on average, during 1994-99, which yielded a net price of $11.61/cwt versus an average August cash price of $11.09/cwt. Hedging returns ranged from a $-.25 to $1.43. Hedging returns were negative during only one year of the six.

November at-the-money put options were purchased in May and offset in August. Option returns were a minus $.06/cwt, on average, during 1994-99, which returned a net price of $11.03/cwt versus an average August cash price of $11.09/cwt. Returns ranged from a $-.50 to $.12. Returns were negative two years of the six.

Synthetic put options were implemented in the November contract during May and offset in August. The futures hedge was used along with call options. The options were purchased three strikes out-of-the-money to capture a portion of significant increases in the futures market that might materialize, partly to manage price risk and partly to manage margin requirements. The call options lost $.34/cwt, on average, during 1994-99. A net price of $11.28/cwt resulted versus an average August cash price of $11.09/cwt.

Harvest and Postharvest Marketing Strategies

Selective storage was the most profitable harvest/postharvest strategy (Table 4). The highest average price was achieved through selective storage, and with a smaller increase in price variability than with most other strategies. The minimum

Table 5. Profitability of Storing Canola at Velva, North Dakota, in U.S. Cents per cwt.

Calendar Month	Nearby Futures Month	Nearby Canola Price	Velva Nearby Basis	Velva Expected Price	Storage Costs [a]	Expected Net Price
Aug	Sep	758	-60	698		698
Sep	Nov	777	-62	715	26	689
Oct	Nov	777	-80	697	32	665
Nov	Jan	795	-62	733	38	695
Dec	Jan	795	-58	737	44	693
Jan	Mar	813	-40	773	50	723
Feb	Mar	813	-50	763	56	707
Mar	May	829	-38	791	62	729
Apr	May	829	-37	792	68	724
May	Jul	844	-50	794	74	720

[a] Storage costs included an in/out charge of $.20 per cwt plus a cost per month equal to 10 percent (annual basis) of the price for the previous month.

price received was no worse than from the cash sale at harvest strategy while the high prices received from both were equal.

Storage was profitable during 1994, 1995 and 1998. During those years, storage provided an average net selling price of $11.94/cwt versus an average August cash selling price of $11.05/cwt, in effect, a return to storage of $.89/cwt, on average. Note that this analysis assumes that sales are made during the month of highest returns net of storage costs. The practicality of doing this is addressed in the next section of this article.

Futures strategies focused on selling the cash canola at harvest and replacing the sold canola with a long futures position. March futures were purchased in August and offset in February. May/June futures were purchased in August and offset in April. The May contract traded during 1997-00 and the June contract traded during 1994-96.

Holding a May/June futures position was more profitable, on average, than holding a March position during 1994/95-1999/00. The March futures position gained an average of $.12/cwt versus $.32/cwt for the May/June position. Gains resulted in three of the six years in both positions.

The best gain in the March position was $2.31/cwt and in the May/June position it was $2.22/cwt. The worst loss in the March position was $.98/cwt and in the May/June position it was $.99/cwt.

Call options were purchased in the January contract during August. Limited volume could make the more distant contracts somewhat difficult to purchase. The call options were purchased in mid August and sold in mid December. At-the-money (ATM) call option results and out-of-the-money (OTM) call option results are presented. The call options are three strikes OTM.

The ATM calls gained an average of $.14/cwt while the OTM calls lost $.01/cwt, on average, during the seven-years. The ATM calls were profitable during three of the seven years. The OTM calls made money during one of the seven years.

Practicality of Selective Storage

The challenge with selective storage is to determine which years to store and then when to sell (Flaskerud, Dahl and Wilson). The net selling price in Table 5 must be calculated whenever futures prices and basis expectations significantly change until a sell signal is given. In addition, judgement must be exercised since the table of calculations does not always give the correct signal; it is only a guide.

The example in Table 5 for Velva, North Dakota, indicates that storage until March should be profitable. The highest net price occurred in March when it was 31 cents/cwt higher than at harvest.

Summary and Conclusions

Canola production in the U.S. has been increasing, and while generally profitable, revenue varies greatly. Risk management is as important for the non-traditional crops, such as canola, as it is for the major commodities, yet risk management strategies may not be as readily accessible. An understanding of seasonal price patterns, relationships between cash and futures prices, and marketing strategy implications are paramount to managing price risk for canola. This study analyzed various time series of prices to identify patterns and relationships and evaluated alternative marketing strategies for U.S. canola producers.

Prices and marketing strategies were analyzed using data gathered from several sources. The availability of price data for cash canola prices, limited the analysis to the 1993-2000 period.

Seasonal patterns for canola prices were examined for the marketing year, August to July. The pattern for Velva cash prices, on average, is to decline to lows in September and October and then increase to peaks in January and April. The pattern for nearby canola futures prices was similar. The history of the November contract indicates highs occurring in May with lows occurring in August, on average. In contrast, the May contract exhibits a pattern where highs occur in November and the lows in February, on average.

The Velva cash basis, after the 1996 basing point change, has a marketing year low that occurs in October and then increases throughout the remainder of the marketing year. The range of the basis is narrowest from January to April and is widest from May to October. The Velva cash basis was also derived relative to soybean futures and soybean oil futures.

Hedging of commodities relies on the relationship or correlation between futures and cash prices. Results strongly indicate that WCE canola futures would be the most effective market to manage price risk as opposed to futures for soybeans, soybean oil or soybean meal.

Using the canola futures market to establish a hedge in a distant futures contract means that the hedge is subject to uncertainty about changes in the exchange rate. The exchange rate could be hedged just as the canola price is hedged. But, exchange rate variability is low over the usual life of a hedge. In addition, including an exchange rate hedge would increase the transaction cost. For these reasons, hedging the exchange rate appears unnecessary at this time.

A hedge ratio is the proportion of the futures position required to minimize risk associated with a cash position. Although traditionally hedges are 1:1, risk could be further reduced by using a hedge ratio of about .8 to .9. Risks could also be further reduced by adding positions in other contracts including foreign exchange and soybean oil. However, the added risk reduction potential of these is relatively small and would most likely be offset by the additional transaction costs required for the additional futures positions.

Preharvest and harvest/postharvest marketing strategies were analyzed. Caution must be exercised in generalizing about what might happen in the future based on the study since relatively few years were analyzed. A hedge ratio of 1:1 was used.

The preharvest futures hedging strategy was superior to the other preharvest marketing strategies. Not only was the highest average price achieved but it was achieved with considerably less variability than from the cash sales at harvest strategy. The futures hedge also achieved the highest minimum and maximum prices of all the strategies.

Selective storage was the most profitable harvest/postharvest strategy. Storage was profitable during three of the six years analyzed. The challenge with selective storage is to determine which years to store and then when to sell. The net selling price must be calculated whenever futures prices and basis expectations significantly change until a sell signal is given. Even then, judgement must be exercised since the table of calculations is only a guide.

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