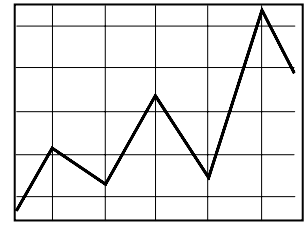


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Department of Agricultural and Applied Economics, College of Agricultural and Life Sciences, University of Wisconsin-Madison
Cooperative Extension, University of Wisconsin-Extension

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Effectiveness of ‘Naïve’ Class III Hedging Strategies

Ed Jesse and Jacob Schuelke¹

Dairy price risk management educational programs stress developing and following a marketing plan that identifies price levels triggering certain actions. Risk managers are urged to monitor markets closely and modify their marketing plans in light of changing market conditions. That is very good advice. Unfortunately, few follow it.

This raises the question of whether less sophisticated hedging or forward contracting strategies might benefit dairy farmers who don’t follow markets closely. For example, could a dairy farmer place a standing order with a broker to systematically take certain actions that would increase or stabilize returns relative to “taking the market?” Note that this kind of action would still represent a marketing plan, but one with static rather than evolving price goals or other hedging triggers.

In this paper, we look at the results of some systematic, or naïve, hedging strategies based on the Class III milk contract. These strategies were simulated over the period January 2000 (when the Class III contract first traded) through September 2004. Class III prices ranged from \$8.57 to \$20.58 per hundredweight during this time. This makes it a good period for testing systematic strategies that might be attractive only during times of high or low milk prices.

The strategies we examine apply only to selling futures (or, equivalently, accepting a cash forward price contract from a milk plant). We do not consider minimum pricing strategies employing options.

¹ Ed Jesse is professor and Extension dairy marketing specialist, Department of Agricultural and Applied Economics, University of Wisconsin-Madison/Extension. Jacob Schuelke is area farm business management specialist for Tompkins, Cortland, and Tioga Counties, Cornell Cooperative Extension.

Hedge and Hold Strategy

A simple hedging strategy is to sell futures (or sign a forward contract) if and when the futures price (contract price) reaches a specified level. This is accomplished by placing a limit order with your broker. A limit sell order instructs the broker to sell a futures contract in your name if and only if the price reaches the trigger level you specify. For example, a \$13 Class III limit order would trigger a sale only if the Class III futures price rose to reach \$13. If the futures price remained below \$13 throughout the trading period, then the order would not be filled.

There are three kinds of pricing targets. Absolute targets are specific prices, e.g., \$13 per hundredweight. Relative targets are prices in reference to some historical level, e.g., the average of the top 20 percent of March Class III prices over the last ten years.

The third kind of pricing target is in reference to a particular date you want your broker to sell rather than a specific or relative price target. This is often called a time limit order. Time-based targets are relative to expiration of the contract, e.g., sell the March contract at the market six months prior to the announcement of the March Class III price. With time-based targets, you would instruct your broker to sell a contract every month at a specific time instead of only if the futures price reached a specific level.²

We evaluated nine pricing targets:

- Absolute price targets: limit orders at \$12, \$13, and \$14;
- Relative monthly price targets based on the moving distribution of Class III prices for the month over the last ten years: limit orders at average price, top third, and top 20 percent, and;
- Time-based targets: time limit orders at 12, 6 and 3 months from contract expiration.

Our evaluation involved simulating the effect of using each of the nine options each month from January 2000 through September 2004. For each month, we calculated the net price from hedging, defined as the announced Class III price for the month plus/minus futures market gains/losses if a trade were triggered. Note that if the limit orders involving absolute or relative price targets did not trigger a sale in a month, then the net price for that month is the Class III price. Initially, we assumed “hedge and hold:” any position taken was cash settled against the announced Class III price. Brokerage commissions and basis were not considered.

The results are summarized below:

² Note that a time limit order could be in combination with a price limit order; e.g., sell 6 months out if and only if the futures price is higher than \$13. In this paper, we look only at “pure” time limit orders.

Hedging Results/Hold to Settlement: Jan 2000 to September 2004 Averages				
	Avg. Net Price	St. Dev.	Gain(+) Loss(-)	Mos. Traded

\$ per hundredweight

Announced Class III Price	11.85	2.71		
Absolute Price Targets:				
\$12	11.95	0.68	0.10	49
\$13	11.68	1.48	(0.17)	27
\$14	11.53	1.90	(0.32)	17
Relative Price Targets:				
10-yr avg.	12.08	0.81	0.23	53
Top 3rd/10-yr.	11.52	1.97	(0.33)	15
Top 5th/10-yr.	11.63	2.18	(0.22)	11
Time Targets:				
12 months out	11.85	0.62	(0.00)	57
6 months out	11.93	1.20	0.07	57
3 months out	11.57	1.73	(0.28)	57

The average net price is the 57-month simple average of the announced Class III price plus (minus) futures market gains (losses) in those months during which a contract was sold. The gain/loss column values are relative to the average announced Class III price. The months traded column indicates how many times a futures sale was triggered for each option.

Most of the options show futures market losses. The largest futures losses are associated with higher absolute and relative price targets. These targets were too high to allow advantageous hedging in low price years and triggered futures sales when prices were rising in high price years.

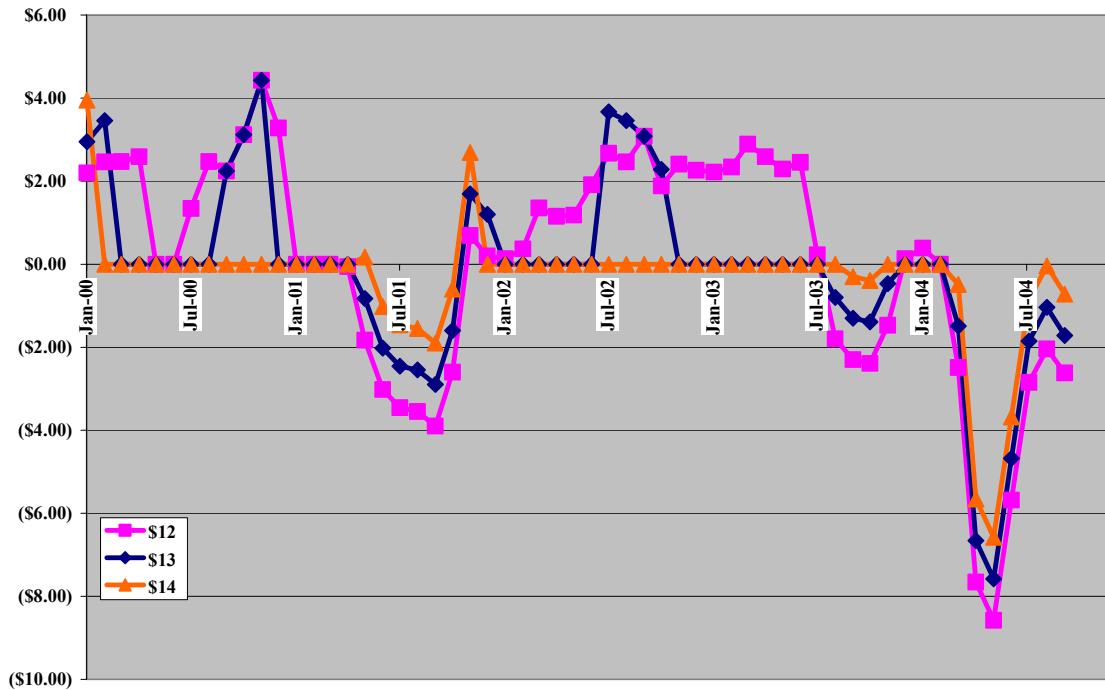
The lowest absolute and relative price target options show small futures market gains over the 57-month period. More important, the standard deviation of net price is less than 1/3 the standard deviation of the announced Class III price in both cases. In fact, the variability of net price is less than the variability of the Class III price in all of the options. This emphasizes the risk reduction element of hedging. Net price received (after factoring in futures gains and losses) may be less with systematic hedging because hedgers do not get the highs. But neither do they experience the extreme lows.

The three time-based target options also show a reduction in price volatility and the sell six months out option shows a small gain in net price. These results are influenced by the “\$12 phenomenon:” because of the absence of good information on future supply and demand conditions, distant Class III futures prices tend to trade within a narrow range of the long-run average Class III price. During the 57 month period of analysis, the Class III price averaged \$11.85 per hundredweight with a standard deviation of \$2.71. The opening price averaged \$11.77 with a standard deviation of \$0.57. Since January 2000, futures prices have more often than not declined over the life of the contract, yielding gains to hedges placed early.

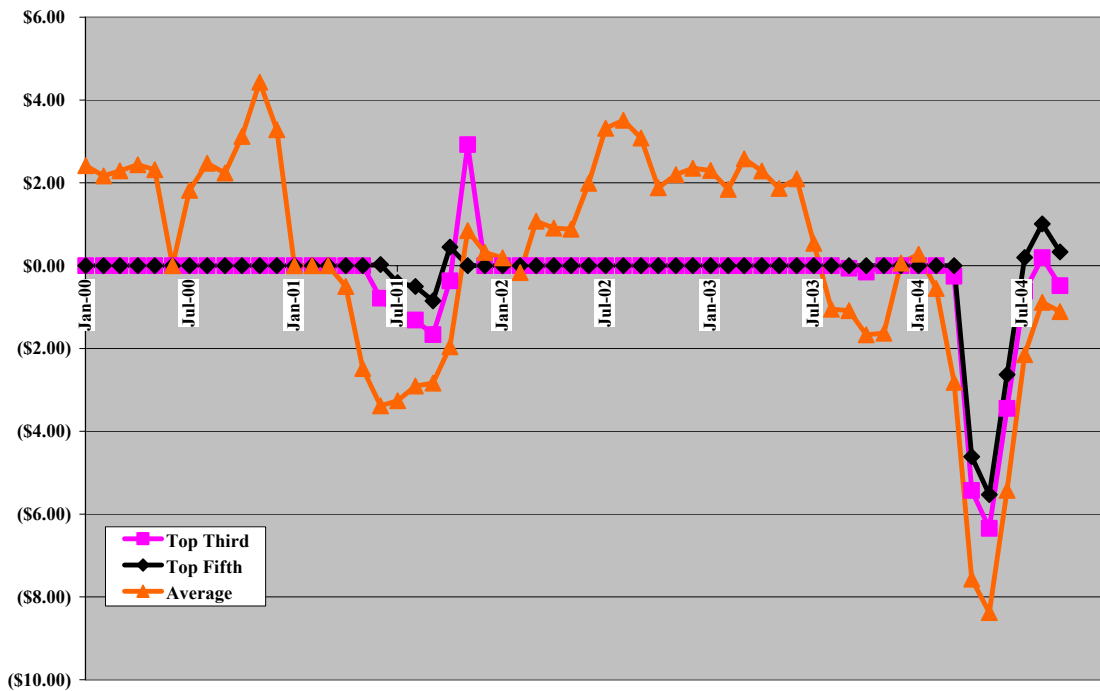
The volatility of futures prices increases steadily as the settlement date approaches and new information becomes available to traders. At one year from settlement, the 57-month standard deviation of Class III futures prices was \$0.54. At 9, 6, and 3 months from settlement, the standard deviation was \$0.71, \$1.20, and \$1.73, respectively.

The following three charts, which plot monthly gains/losses relative to not hedging, provide further insight into the performance of the nine hedge and hold options:

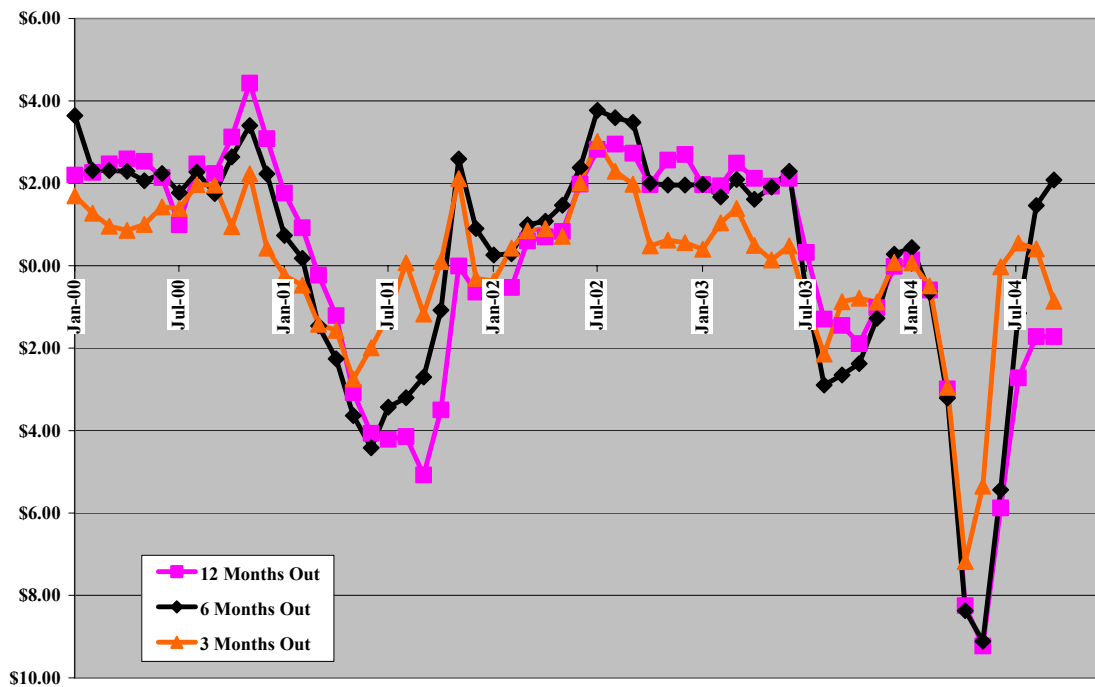
Hedging Results: Absolute Price Targets



Hedging Results: Relative Price Targets



Hedging Results: Time-Based Targets



The charts emphasize that high price targets tend to “close out” beneficial hedging in years with low prices. For example, consider the top fifth option, which triggers a hedge only when the futures price reaches 80 percent of the monthly high-low price range for the previous 10 years. A hedge is placed in only 11 of the 57 months, and in seven of those months, the hedge results in a lower net price than not hedging. This option typically triggers a sell when prices are rising rapidly and continue to rise until settlement.

The charts also illustrate the obvious: relative to taking the market, hedging yields good results in a lousy price year and lousy results in a good price year. The table below compares the results of the nine options for 2000, during which the Class III price averaged \$9.74 and 2004, during which the Class III price averaged \$15.50 through September.

Hedging Results/Hold to Settlement, Calendar Years 2000 and 2004								
	CY2000				CY2004 (Through Sep)			
	Avg. Net Price	St. Dev.	Gain(+) Loss(-)	Mos.	Avg. Net Price	St Dev	Gain(+) Loss(-)	Mos.
	<i>\$ per hundredweight</i>				<i>\$ per hundredweight</i>			
Class III Price	9.74	0.61			15.50	3.17		
Absolute Price Targets:								
\$12	11.96	1.26	2.22	10	12.00	0.05	(3.50)	8
\$13	11.09	1.75	1.35	5	12.72	0.56	(2.78)	7
\$14	10.07	1.38	0.33	1	13.50	0.99	(2.00)	7
Relative Price Targets:								
10-yr avg.	11.82	1.14	2.08	11	12.36	0.67	(3.14)	9
Top 3rd/10-yr.	9.74	0.61	0.00	0	13.68	1.10	(1.82)	7
Top 5th/10-yr.	9.74	0.61	0.00	0	14.25	1.43	(1.25)	6
Time Targets:								
12 months out	12.28	0.55	2.54	12	11.84	0.56	(3.66)	9
6 months out	12.15	0.63	2.41	12	12.84	2.05	(2.66)	9
3 months out	11.09	0.88	1.35	12	13.74	2.15	(1.76)	9

In 2000, all of the hedge and hold options except the two higher-price relative time targets resulted in large gains relative to the announced Class III price, four more than \$2.00 per hundredweight. In 2004, all of the strategies resulted in net prices substantially below the Class III price.

The results of hedging in bad and good price years leads to yo-yo interest in price protection among dairy farmers and related frustration among promoters of price risk management. Farmers are always pleased with the outcome of hedging when they “beat the market,” but often complain of “losing money” when they lock in a favorable price that turns out to be less than what they could have received without hedging. These “bad experiences” in a good price year often lead them to discontinue a risk management program, only to forego excellent forward pricing opportunities in the subsequent year. ***It is important to remember that the effectiveness of price risk management must be measured against whether a particular price objective was achieved, not against whether the highest price was achieved.***

Stop Loss Strategy

The results from simulating the hedge and hold strategy options suggest possible advantages to systematically modifying limit orders. In particular, the performance of this strategy in 2004 raises the question of whether a hedge should be maintained if it becomes clear that it is going to lose money. To prevent such losses, hedgers might place a stop loss order with their broker.

A stop loss order triggers liquidation of a futures position when prices move a specified amount in the direction causing a loss for the trader. For example, a Class III hedger could place a March 2005 limit sell order at \$13 and a contingent stop loss order at \$14. Then, the hedger would be placed in a short position if the March Class III futures reached \$13 and the position would be offset if the March futures subsequently reached \$14. This strategy would limit futures market losses to \$1 per hundredweight.

Limiting losses in this fashion comes at a considerable risk — the announced Class III price could fall after liquidation and end up below the original \$13 trigger. The hedger would then get hit twice: incurring the \$1 futures market loss and losing the opportunity to lock in a net Class III price higher than what materialized. Accordingly, hedgers should use stop loss orders judiciously, especially if considering an offset several months from settlement. It is seldom if ever crystal clear that a hedge is going to lose money.

Despite this risk, applying stop loss rules over the January 2000 – September 2004 period improved the performance of all nine of the hedging options relative to the hedge and hold strategy. All but three of the nine options yielded average gains per hundredweight of milk marketed. These gains ranged from \$0.15 to \$0.90 per hundredweight, considerably more than necessary to cover commissions on milk contracted. The high price targets yielded average net prices lower than the average Class III price, again because they failed to trigger beneficial hedges during periods of low prices. In contrast to the hedge and hold strategies, the stop loss strategies did not materially reduce the volatility of net prices. Hence, the gains came at the cost of greater price variability.

Hedging Results/Stop Loss @ \$1.00, Jan 2000 to September 2004 Averages					
	Avg. Net Price	St. Dev.	Gain(+) Loss(-)	Mos. Traded	Mos. Lifted

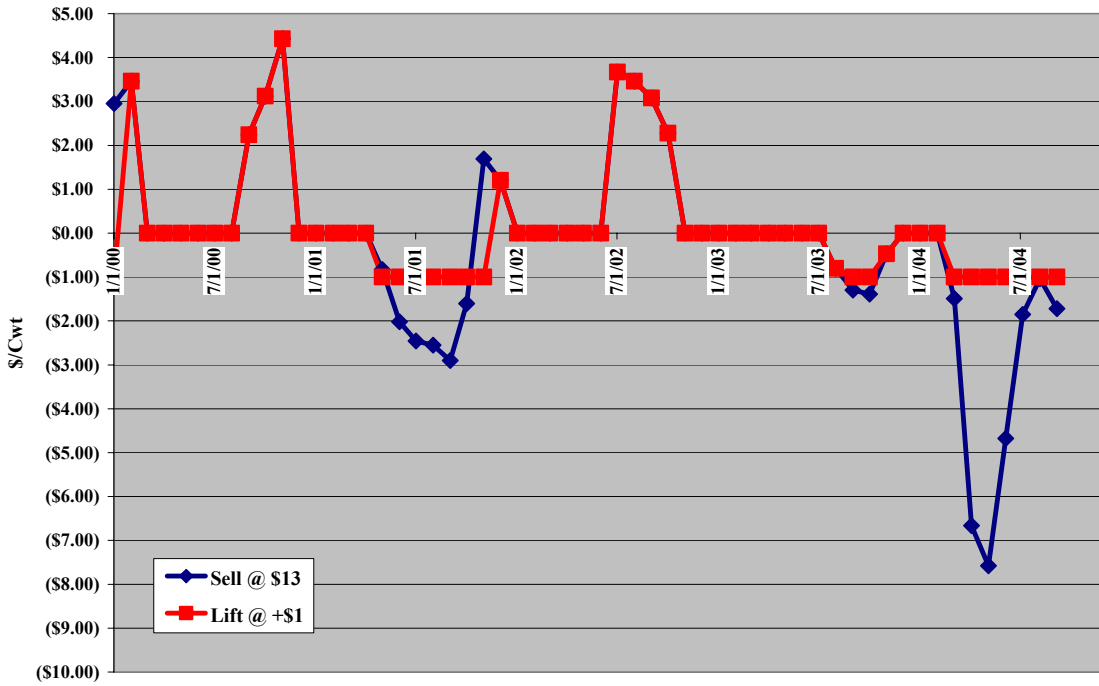
\$ per hundredweight

Announced Class III Price	11.85	2.71			
Absolute Price Targets:					
\$12	12.04	2.26	0.18	49	28
\$13	12.01	2.27	0.15	27	17
\$14	11.76	2.42	(0.09)	17	11
Relative Price Targets:					
10-yr avg.	12.49	1.91	0.64	53	21
Top 3rd/10-yr.	11.67	2.40	(0.18)	15	13
Top 5th/10-yr.	11.66	2.42	(0.19)	11	10
Time Targets:					
12 months out	12.43	1.92	0.58	57	25
6 months out	12.75	1.79	0.90	57	19
3 months out	12.09	2.07	0.24	57	17

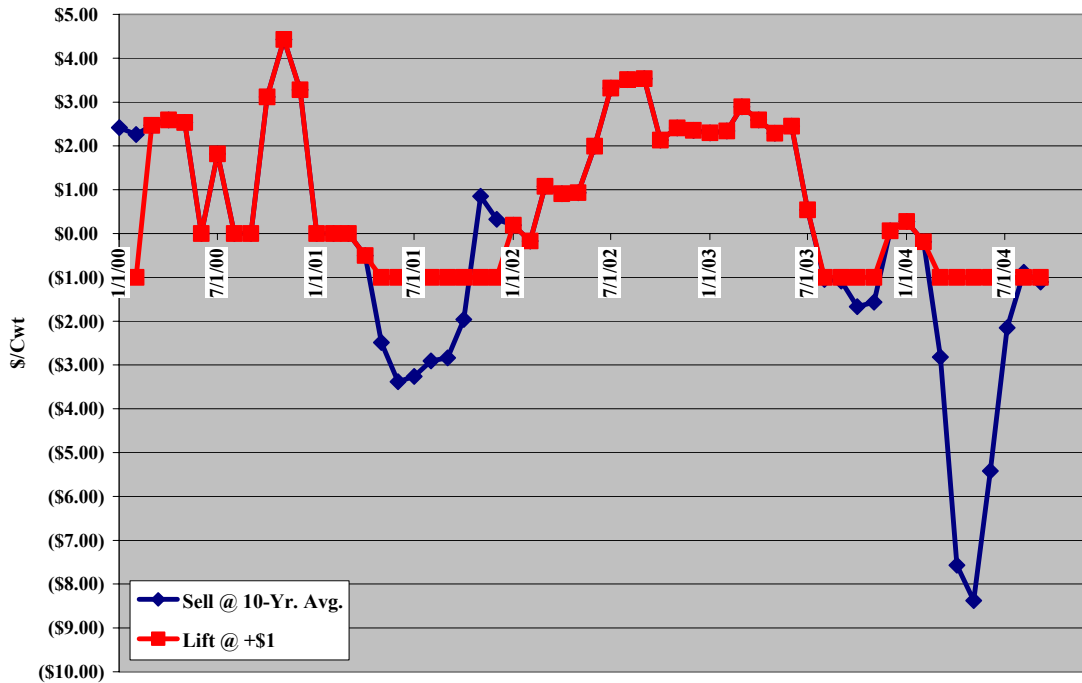
The reason that the stop loss strategy improves on the hedge and hold strategy is apparent from the following charts, which compare selected absolute price targets, relative price targets, and time-based targets with and without stop loss orders. Note that there are several cases where the stop loss order prevented mounting margin calls, most dramatically in 2004. On the other hand, there are very few cases where lifting a hedge resulted in a lower net price than holding it.

We need to emphasize that these results are contingent on the particular pattern of Class III futures prices observed during the time period that we examined. With greater volatility in milk prices, there is a greater risk of lifting hedges early, only to see prices subsequently plummet.

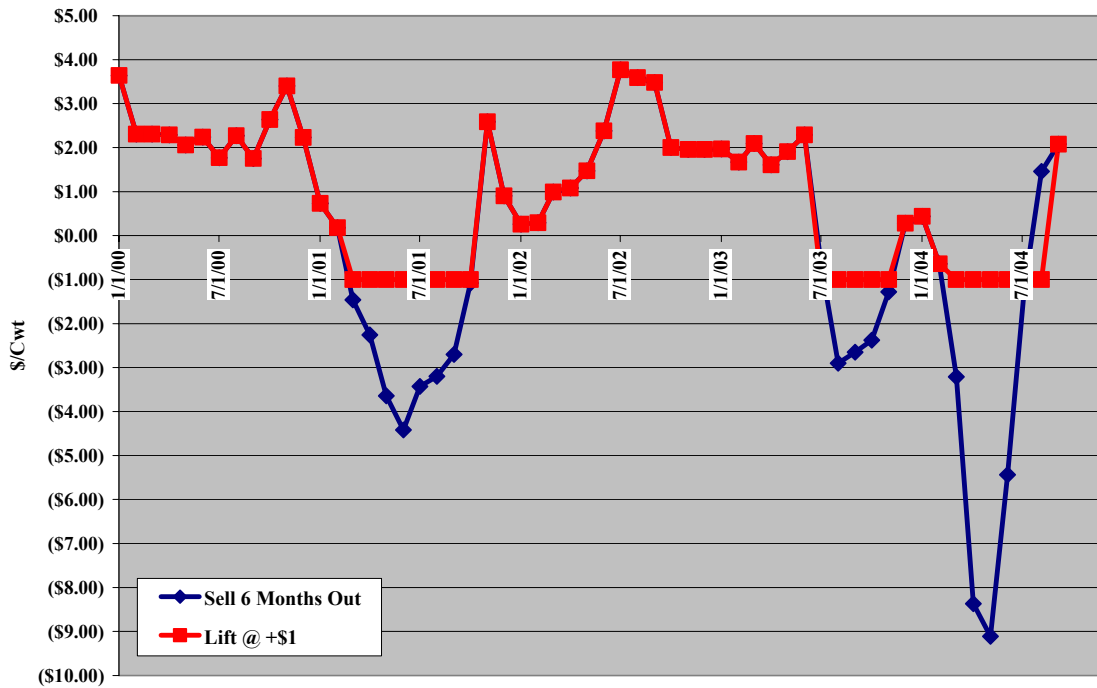
Effect of Stop Loss Order: \$13 Absolute Price Target



Effect of Stop Loss Order: Avg. 10-Yr. Rel. Price Target



Effect of Stop Loss Order: 6 Months Out Time Target



Realized gain strategy

Some brokers recommend a strategy that is the mirror image of a stop loss strategy; that is, to lift a hedge when prices move favorably and take the related gain. For example, a Class III hedger could place a March limit sell order at \$13 and a contingent stop order at \$11. The hedger would be placed in a short position if and when the March Class III futures reached \$13 and the position would be offset if the March futures subsequently fell to \$11. This strategy would limit futures market gains to \$2 per hundredweight, but at the same time, it would preserve the \$2 gain in the event that the Class III price moved higher after liquidation.

The underlying rationale for this approach is that it is better to take a small futures market gain than to take the risk that prices will recover and result in a futures market loss. Maybe so. But there is also a significant risk that prices will keep falling, and losing price protection for the sake of a small gain may be penny wise and pound foolish.

As it turns out, the take a \$2 gain strategy was generally inferior to hedge and hold during the 2000-2004 period.³ The 10-year average relative price target showed a small gain of 7 cents per hundredweight, 16 cents less than the comparable hedge and hold option.

³ Take gain options with gains ranging from \$1 to \$4 per hundredweight were simulated. The \$2 gain strategy yielded the best results in terms of net prices.

Even smaller gains are shown for the 3- and 6-month out time targets, although the 3-month out target gain of 3 cents per hundredweight compares with a loss for the comparable hedge and hold option.

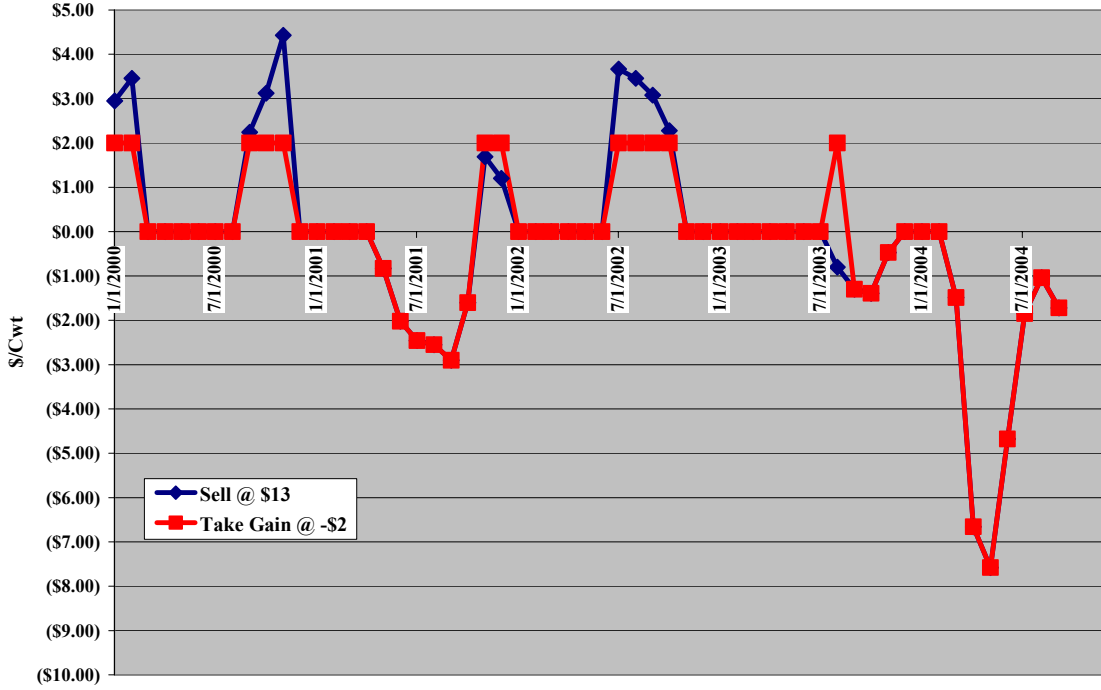
The \$2 take gain strategy was clearly inferior to the \$1 stop loss strategy. With the exception of the two higher relative price target options, the stop loss strategy yielded higher net prices, as much as 87 cents per hundredweight higher.

Hedging Results/Take Gain @ \$2.00, Jan. 2000 to Sep. 2004 Averages					
	Avg. Net Price	St. Dev.	Gain(+) Loss(-)	Mos. Traded	Mos. Lifted
<i>\$ per hundredweight</i>					
Announced Class III Price	11.85	2.71			
Absolute Price Targets:					
\$12	11.73	0.65	(0.12)	49	21
\$13	11.56	1.51	(0.29)	27	12
\$14	11.48	1.86	(0.37)	17	2
Relative Price Targets:					
10-yr avg.	11.92	1.09	0.07	53	23
Top 3rd/10-yr.	11.68	1.84	(0.17)	15	6
Top 5th/10-yr.	11.70	2.15	(0.15)	11	2
Time Targets:					
12 months out	11.65	0.54	(0.21)	57	23
6 months out	11.89	1.18	0.03	57	26
3 months out	11.89	1.74	0.03	57	8

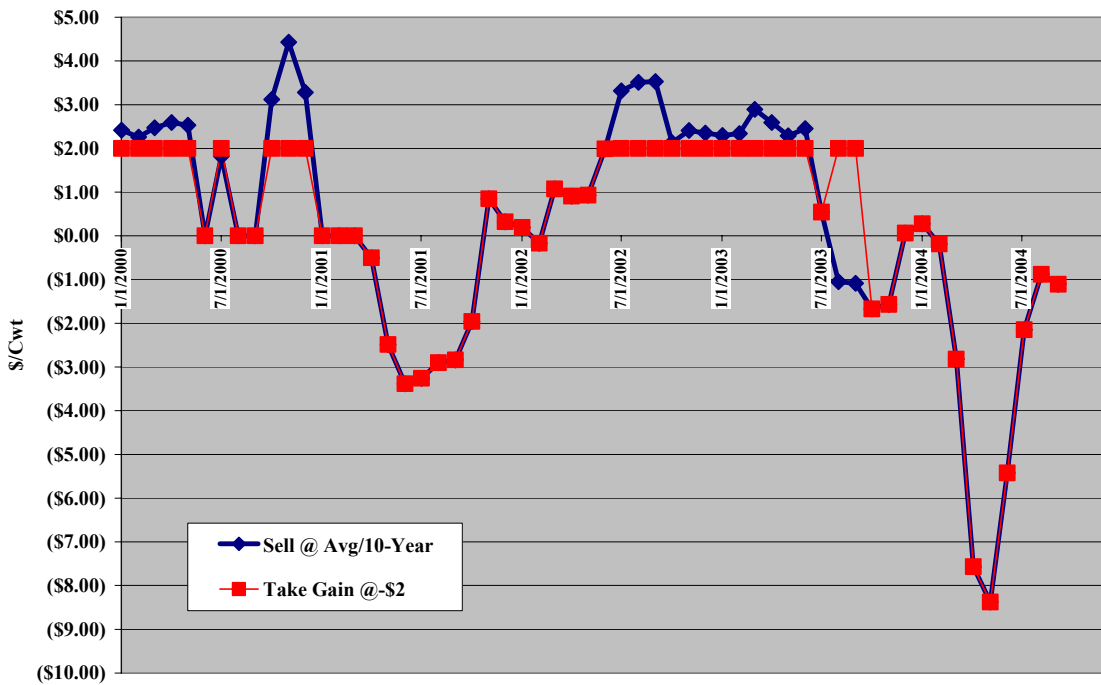
As apparent from the charts below, the relatively poor performance of the take gain strategy is attributable to its generally limiting price protection in falling markets. That is, prices often continue to fall after the gain is taken (see 2000 and 2002). There are a few cases where prices rebounded after taking the \$2 gain (e.g., see August and September 2003 in the relative price target example). However, this did not happen often enough to offset losses from premature lifting of hedges.

The take gain strategy results are influenced in part by the asymmetric nature of the Class III price distribution. The dairy price support program places a lower bound on the Class III price, but there is no similar upper bound. Consequently, if the futures price is at or near the Class III average when a sell occurs, there is a higher probability of prices rising by more than \$2.00 per hundredweight than falling \$2.00.

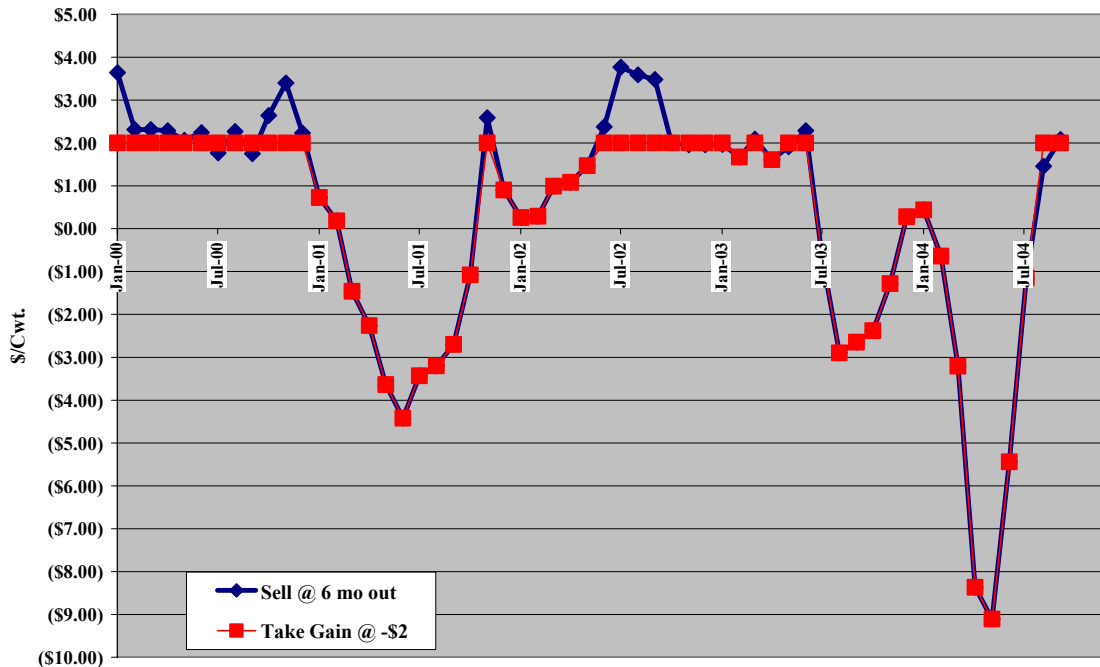
Effect of Take Gain Order: \$13 Absolute Price Target



Effect of Take Gain Order: Avg. 10-Yr Relative Price Target



Effect of Take Gain Order: 6 Months Out Time Target



Summary

Systematic Class III hedging strategies that can be implemented by using standing orders to brokers yielded a mixed bag with respect to their ability to consistently generate higher net milk prices between 2000 and 2004. Few hedge and hold options outperformed doing nothing as a marketing strategy to increase returns, but most of the hedge and hold options we evaluated resulted in net prices that were much less volatile than the Class III price. This illustrates the tradeoff between price level and variability. Options that involved target prices higher than recent averages were inferior to those with lower price targets and those with time-based targets because they precluded placing hedges when it was most advantageous to do so.

Using stop-loss orders substantially improved the ability of hedgers to garner higher net milk prices, mainly because offsetting short positions prevented large margin calls during the Class III price run-ups in 2001 and 2004. Because of the particular pattern of Class III prices demonstrated in the 2000-2004 period, there were few instances in which liquidating a hedge during rising prices was followed by a price turn-around.

For most of the nine target hedging options considered, the take gain strategy was inferior to hedge and hold and stop loss strategies. Taking a realized gain closed out subsequent price protection in falling markets more frequently than it preserved a gain in rising markets.

We conclude with two important caveats. First, we emphasize that the results of this analysis are specific to the period we analyzed; they cannot be generalized to the future. Our results show what would have been, not what will be. Different price patterns will yield different results. This emphasizes the need for producers to focus on outlook rather than hindsight.

Second, our purpose in conducting this analysis was to demonstrate how systematic hedging strategies would have performed, not to promote them. The strategies that we evaluated are called naïve or blind hedges for good reason. Hedging is generally more effective when practiced as part of a marketing plan to achieve a business objective. There are better ways to manage risk than blind hedging, including use of options and combination strategies based on changes in the marketplace. Active strategies based on a sound marketing plan take more time to implement, but have a high potential payoff.