Routine Hedging of Fed Cattle Sales Price for Calf-Fed and Yearling Production Systems

Rebecca M. Small
Darrell R. Mark
Terry J. Klopfenstein[1]

Summary

Short futures hedges in the Chicago Mercantile Exchange live cattle futures contract were evaluated to determine if profit variability could be decreased for calf-fed and yearling production systems. Results indicated standard deviations of calf-fed profits could be reduced by $35-$47/head through routine hedging. Routine hedges of yearling cattle, however, resulted in profit declining nearly $50/head, but profit variability also decreased.

Introduction

Research has shown that while several input prices and cattle performance variables impact profit risk, fed cattle sales prices are typically the largest determinant of cattle feeding profitability risk over time (Small et al., *2010 Nebraska Beef Report*, pp. 46-49). Small et al. (*2009 Nebraska Beef Report*, pp. 40-42) illustrated the magnitude of profit variations from 1996-2007 for both calf-fed and yearling production systems. These studies concluded that hedging fed cattle sales prices would have the largest impact on reducing profit risks across years. Because the calf-fed and yearling production systems described by Griffin et al. (*2007 Nebraska Beef Report*, pp. 58-60) result in fed cattle being marketed at different times of the year, differences in seasonal price patterns and other factors may result in different degrees of success with hedging programs.

Generally, heavier calves are placed on feed in early November (following weaning) and finished in May (calf-fed system), while lighter weight calves weaned in early November are backgrounded through the winter on crop residue, grown on grass pasture during the next summer, finished in the feedyard the following fall, and marketed in December (yearling system). The present study evaluated the use of a routine short futures hedge in the live cattle futures market, established at the time the feeder cattle are purchased. While some research has suggested that selective hedges produce higher average profits over time, strict routine hedges are used in this analysis in an effort to lower the riskiness of profits and because they are most easily initiated and maintained.

Procedure

Production systems data from Griffen et al. (2007) were used, along with CME Group live cattle futures prices. Fed cattle hedges associated with the calf-fed system were evaluated using two different live cattle contract months (April and June), although steers were generally expected to be finished in May. In all live cattle hedging scenarios for calf-feds, futures contracts were assumed to be sold when steers were placed on feed in November. Fed cattle hedges associated with the yearling system were evaluated assuming cattle were priced based on the deferred December live cattle contract month (the December approximately 13 months following weaning when the feeder cattle were placed into the yearling system). However, the yearling live cattle hedging scenarios were evaluated under the assumption that hedge initiation took place when either a) the steers were initially purchased and placed on winter cornstalks in early November, or b) the steers were placed in the feedlot in September after grazing summer pasture.

The live cattle hedging scenarios evaluated for calf-feds and yearlings are explained in Table 1.

In CL1 (calf-fed system, live cattle hedge in April futures), April CME live cattle futures contracts were sold when calf-feds entered the feedlot in November. These futures contracts were then offset (bought back to create an offsetting transaction) on the day cattle were marketed in April. For steers in the study that were marketed in May or June, the April CME live cattle futures contracts were offset on the day the April contract expired, at which point the fed cattle sales price was unhedged until the fed steers were sold in the cash market.

CL2 (calf-fed system, live cattle hedge in June futures) assumed cattle were hedged by selling the June CME live cattle futures contracts when cattle were placed on feed in November. Since all pens of calf-feds were marketed before the June CME live cattle futures contracts expired in every year of the study, all futures contracts were offset on the day cattle were marketed under CL2.

In YL1 (yearling system, live cattle

Table 1. Live cattle hedging scenarios evaluated for calf-feds and yearlings.

Label	Description
CL1	Sell April CME live cattle futures contracts at feedlot placement; lifted a) when fed cattle are sold in cash market in April, or b) at futures contract expiration.
CL2	Sell June CME live cattle futures contracts at feedlot placement; lifted when fed cattle are sold in cash market in April-June.
YL1	Sell December CME live cattle futures contracts at cornstalk placement; lifted a) when fed cattle are sold in cash market in December, or b) at futures contract expiration.
YL2	Sell December CME live cattle futures contracts at feedlot placement; lifted a) when fed cattle are sold in cash market in December, or b) at futures contract expiration.

Table 2. Live cattle hedging scenarios for calf-fed production systems, 1996-2007.

	Live Cattle Hedges		
	Calf-fed system		
	No hedge	CL1 (April)	CL2 (June)
Fed cattle price, ($/cwt)	74.29	75.52	73.90
Avg profit, ($/hd)	9.80	24.80	4.47
Max profit, ($/hd)	149.66	111.89	52.13
Min profit, ($/hd)	-107.79	-69.34	-87.11
Std dev profit, ($/hd)	91.74	56.21	44.53
Profit difference, ($/hd)[1]		+15.00	-5.33

[1]Profit difference ($/hd) is found by subtracting the average no hedge profit from the average hedged profit.

Table 3. Live cattle hedging scenarios for yearling production systems, 1996-2007.

	Live Cattle Hedges		
	Yearling system		
	No hedge	YL1	YL2
Fed cattle price, ($/cwt)	76.19	71.90	73.72
Avg profit, ($/hd)	7.76	-51.23	-25.76
Max profit, ($/hd)	360.49	94.31	146.11
Min profit, ($/hd)	-158.37	-231.68	-171.49
Std dev profit, ($/hd)	161.01	96.82	113.98
Profit difference, ($/hd)[1]		-58.99	-33.52

[1]Profit difference ($/hd) is found by subtracting the average no hedge profit from the average hedged profit.

hedge in December futures at weaning time), live cattle prices were hedged by selling December CME live cattle futures contracts when yearlings were initially purchased and placed on winter cornstalks in November. Therefore, entry into the live cattle futures market took place approximately 13 months before the futures contract was set to expire. These live cattle hedges were lifted on the day yearlings were marketed as fed cattle. However, yearlings that entered the feedlot in 1998, 1999, 2005, 2006, and 2007 were marketed in January of the following year. Thus, in those years the live cattle futures contracts were offset on the day the December contract expired, and fed cattle sales prices became unhedged for one to three weeks before fed steers were sold in the cash market.

The only difference between YL1 and YL2 (yearling system, live cattle hedge in December futures at feedlot placement time) is the day the December CME live cattle futures hedge was initiated. In YL2, the futures contracts were sold on the day cattle were placed in the feedlot in September. The live cattle hedges were offset when cattle were sold or when the December live cattle futures contract expired, whichever occurred first.

All live cattle futures prices used in the analysis were daily futures closing prices from the Commodity Research Bureau for either the April, June, or December CME live cattle futures contracts. These futures prices were used to determine the net on futures, which is equal to the difference in the futures price from hedge initiation when the contract is sold until the hedge is offset. The cash price used was the Nebraska weekly weighted average live steer price reported for the week cattle were marketed. A commission cost of $0.25/cwt also was applied to the actual sale price. Thus, the actual sale price was the sum of the cash market price plus the net on the futures trade, less the commission cost.

Results

Results of the hedges were compared to the fed cattle sales prices, average profits, and standard deviations of profit, assuming no hedging. In CL1, the live cattle hedge increased average profit by $15.00/head, as compared to not hedging, and substantially decreased the standard deviation of profits from $91.74 to $56.21/head (see Table 2). While it was expected that standard deviation of profits would decrease as a result of hedging in the futures market, it was not expected that average hedged profit would increase relative to unhedged average profit. The calf-fed's hedged profits in 2003 (a year of unusually high profits) were high enough to offset losses incurred in other years, thus creating an overall average hedged profit for those cattle hedged using the April CME live cattle futures contract. Standard deviation of profits is still lower, however, because of reduced variability in all the other years.

CL2 involved initiation of a June live cattle hedge when calf-feds were placed on feed, and futures contracts were offset when fed steers were sold. Unlike CL1, all cattle would have been sold in the cash market before contract expiration. Although the average standard deviation of profits declined to $44.53/head with the June live cattle hedges, the average hedged profit was $4.47/head. This decrease in profit relative to cash market transactions occurred because the average hedged cattle sales price was $0.39/cwt less than the average unhedged price of $74.29/cwt (see Table 2). The results of this scenario indicate that unhedged cash market sales were more profitable than hedging fed cattle sales in the futures market during the 1996-2007 time period.

Using a June live cattle futures contract to hedge fed cattle provided price protection during the entire production period, and the profit standard deviation was reduced by an average 51.46% compared to the standard deviation of profits in the cash market. Note that only 36% of

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the pens of calf-feds would have been marketed before the April live cattle contract expired. Thus, this was not an ideal hedge in that the majority of calf-feds would be exposed to price risk during the end of the production period in May. However, the April live cattle hedging scenario was the more optimal of the hedges, in that it allowed for a greater average profit relative to selling in the cash market or using a June live cattle contract, and because it resulted in a nearly 40% decrease in standard deviation of profits (see Table 2). Much of the profit difference between CL1 and CL2 is due to the seasonality of fed cattle prices, which typically reach a seasonal high in April and decline substantially into the summer months when more fed cattle are marketed.

As shown in Table 3, the YL1 hedge decreased the average fed cattle sales price by $4.29/cwt, which resulted in an average loss of $51.23/head. This average loss yielded a difference of $58.99/head between hedging and not hedging. Notice that standard deviation of profits was still reduced by $64.19/head, so profit variation decreased as expected with hedging. The average hedged profit was -$33.52/head less than the $7.76/head profit available without hedging for YL2 (Table 3). The average hedged cattle sales price was $2.47/cwt less than the average cash market price without hedging. Standard deviation of profits was decreased to $113.98/head.

The yearling production system loss generated by hedging live cattle futures contracts is due in part to the substantially greater fed cattle cash prices forgone in 2003, 2004, and 2007. In 2003 and 2004, fed cattle prices were unusually high due to increased domestic demand and overall lower supplies of beef due to a smaller cattle herd and ban on imports of cattle from Canada and other countries. The results also are confirmed by other research findings by Leuthold (1974), which indicated that dramatic changes in fed cattle prices cannot be very well estimated by the futures market and that hedges longer than four months may not help in stabilizing revenue. This may have been the cause of the large loss in YL1 when fed cattle sales prices were hedged approximately 13 months before cattle were marketed. Though both yearling live cattle hedging strategies were effective in decreasing standard deviation of profits, YL2 yielded a smaller average loss than did YL1.

So, depending upon an individual's risk preference, YL2 may be considered the optimal live cattle hedging strategy for the yearling system. Although YL1 was more effective in substantially decreasing standard deviation of profits, the larger average loss associated with this scenario makes it the least optimal strategy. Note that if 2003, 2004, and 2007 were not included in the analysis (years with large unexpected rallies in fed cattle prices), YL1 would be more optimal relative to YL2. Excluding these three years, YL1 would have an average hedged profit of -$32.01/head with a standard deviation of profits of $85.18/head, and YL2 would have an average hedge profit of -$50.51/head and a standard deviation of profits of $115.57/head.

Hedging live cattle using scenarios YL1 and YL2 did cause reductions in standard deviation of profits. This reduction was the result of large decreases of positive profits. Note that when compared to the maximum profit available in the cash market, the hedged maximum profits in YL1 and YL2 were $266.18/head and $214.38/head lower, respectively (Table 3). Interestingly, the minimum profits in both scenarios actually decreased relative to the minimum profit offered by cash market sales. These lower minimum profits were partially due to high corn prices in certain years (e.g, 2007). However, the ratio between fed cattle sales prices and feeder cattle purchase prices played a larger role in the lower minimum profits.

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[1]Rebecca M. Small, former graduate student, Darrell R. Mark, associate professor, Agricultural Economics; Terry J. Klopfenstein, professor, Animal Science, University of Nebraska, Lincoln, Neb.