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

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Summary

Several corn hedging scenarios involving a combination of cash and futures market transactions were evaluated for calf-fed and yearling production systems. All yearling corn hedging scenarios assessed were effective in only slightly reducing profit risk, while the calf-fed corn hedging scenario actually increased profit risk. Calf-fed and yearling corn hedging scenarios generally generated positive average returns to hedging by lowering net corn prices. The yearling corn hedging scenarios initiated closer to feedlot placement were associated with greater average profits as compared to those hedges initiated when yearlings were initially purchased.

Introduction

Research has confirmed feedstuff prices are typically the second largest determinant of cattle profit risk, surpassed only by fed cattle and feeder cattle prices (Small et al., 2010 *Nebraska Beef Report*, pp. 46-49). Small et al. (2009 *Nebraska Beef Report*, pp. 40-42) demonstrated the magnitude of profit variations from 1996-2007 for calf-fed and yearling production systems, concluding that hedging corn or feedstuff prices would reduce year-to-year profit variability. Griffin et al. (2007 *Nebraska Beef Report*, pp. 58-60) described calf-fed and yearling production systems that involved finishing cattle for different lengths of time and at different times of the year, differences that may influence the success of corn hedging programs.

The calf-fed system involves placing heavier calves on feed in early November (following weaning) and finishing them in May. The yearling system places lighter weight calves on

winter crop residue in early November following weaning, followed by summer grass pasture, finishes them in the feedyard the following fall, and markets them in December. In many respects, cattle producers evaluating calf-fed versus yearling production systems have to weigh the risk of old crop corn price risk (for calf-fed finishing during the winter) with new crop corn price risk the following fall (for yearlings finished the next fall). The present study evaluates the use of a routine long futures hedge in the corn futures market established when the feeder cattle are purchased.

Procedure

Production systems data from Griffin et al. (2007) are used, along with CME Group corn futures prices, assuming that corn futures hedges would be lifted at different times throughout the feeding period corresponding to routine cash market corn purchases. The calf-fed system's feeding period

was divided into thirds, and the shorter yearling system's feeding period was divided into halves. The corn hedging scenarios associated with the yearling system were evaluated assuming futures entry occurred either a) when the cattle were purchased and placed on winter crop residue or b) a month before feedlot placement in the fall. Table 1 provides a list and brief explanation of the corn futures hedging scenarios evaluated.

On average, calf-feds entered the feedlot after weaning in November, following corn harvest when there are typically larger supplies of corn and lower prices. Therefore, because of these simultaneous actions in both the cattle sector and the crop sector, it follows that cash corn often can be purchased at a relatively cheap price when calf-feds are placed on feed. Thus, in CC1 (calf system, corn hedge, scenario one) it was assumed that a third of the corn needed to feed the steers for the entire ownership period

(Continued on next page)

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

Scenario	Label	Description
Calf-fed corn scenario one	CC1	Buy 1/3 of corn in cash market at feedlot placement. Buy March CME corn futures contracts at feedlot placement; lifted when 1/3 of corn is purchased in cash market in January. Buy May CME corn futures contracts at feedlot placement; lifted when 1/3 of corn is purchased in cash market in March.
Yearling corn scenario one	YC1	Buy December CME corn futures contracts at cornstalk placement; lifted when 1/2 of corn is purchased in cash market at feedlot placement in September. Buy December CME corn futures contracts at cornstalk placement; lifted when 1/2 of corn is purchased in cash market at feedlot midpoint in November.
Yearling corn scenario two	YC2	Buy December CME corn futures contracts at cornstalk placement; lifted when 1/2 of corn is purchased in cash market at feedlot placement in September. Buy 1/2 of corn in cash market at feedlot midpoint in November.
Yearling corn scenario three	YC3	Buy December CME corn futures contracts on first trading day of August (when steers are on pasture) and lifted when 1/2 of corn is purchased in cash market at feedlot placement in September. Buy December CME corn futures contracts on first trading day of August (when steers are on pasture); lifted when 1/2 of corn is purchased in cash market at feedlot midpoint in November.
Yearling corn scenario four	YC4	Buy December CME corn futures contracts on first trading day of August (when steers are on pasture); lifted when 1/2 of corn is purchased in cash market at feedlot placement in September. Buy 1/2 of corn in cash market at feedlot midpoint in November.

was purchased in the cash market on the day calves were placed on feed. It also was assumed that the second third of the corn needed for the feeding period was hedged by purchasing March corn futures contracts on the day calf-feds entered the feedlot. The final third of the corn required for the finishing ration also was hedged at feedlot entry by purchasing May corn futures contracts. The March corn futures contracts were offset in January when the second third of the corn was assumed to be purchased in the cash market. The final third of the corn was purchased in the cash market in March, at which point the May corn futures contracts were offset.

Because the yearlings' feeding period was divided into two parts, cash corn purchases were assumed to be made at two separate times. In YC1 (yearling system, corn hedge, scenario one), cash corn purchases were hedged by purchasing deferred December corn futures contracts when yearlings were placed on winter cornstalks in November. Note that these futures market transactions would have been occurring approximately 10 months before cattle were placed on feed. Half of the December corn futures contracts were offset on the day yearlings were placed on feed. Simultaneously, the amount of corn needed for the first half of the yearling feeding period was purchased in the cash market. The second half of the corn needed for the yearlings' feedlot ration was purchased in the cash market at the feeding period midpoint, which typically occurred in October or November. The remaining half of the December corn futures contracts were offset at this time.

YC2 (yearling system, corn hedge, scenario two) was similar to YC1 in that the first half of the corn needed for the feeding period was hedged by purchasing December corn futures contracts when yearlings were placed on winter cornstalks, and those corn futures contracts were offset about ten months later when yearlings entered the feedlot. However, the second half of the corn purchased at the feeding period midpoint was not hedged. Since the yearling feeding period

midpoint occurred at nearly the same time as harvest in Nebraska to take advantage of harvest price lows, the second half of the corn consumed by yearlings in YC2 was purchased strictly on a cash market basis.

The only difference between YC3 (yearling system, corn hedge, scenario three) and YC1 was the day the December CME corn futures contracts for the first and second half of the feeding period were initiated. In YC3, the corn futures contracts were purchased on the first trading day of August, while yearlings were on summer pasture, approximately one to two months before yearlings were placed in the feedlot. The December corn futures contracts were offset and cash market purchases in YC3 were analogous to the other two previously described yearling corn hedging scenarios (YC1 and YC2).

YC4 (yearling system, corn hedge, scenario four) was a combination of YC3 and YC2. As in YC3, it also was assumed in YC4 that the December corn futures contracts were purchased on the first trading day of August for the year that yearlings entered the feedlot. However, similar to YC2, the corn fed during the second half of the feeding period in YC4 was not hedged using futures contracts and assumed to be purchased in the cash market.

An actual purchase price was calculated for the corn hedging scenarios by subtracting the net gain on futures from the cash market purchase price paid for the corn and adding \$0.02/bushel for commission trading costs. The net on futures was the difference between the corn futures price at the conclusion of the hedge and the corn futures price when the hedge was initiated. To find the net on futures, daily futures closing prices for the March, May, and December corn futures contracts were used for those days when contracts were purchased and offset for 1996-2007, the years included in the study. Cash corn prices used for all cash market purchases, whether hedged or not, were weekly Omaha, Neb., cash corn prices corresponding to those weeks that cash market transactions occurred.

Results

The CC1 strategy decreased the average corn price by \$0.07/bushel, which was reflected in a \$3.14/head increase in average profits (holding everything else constant). Interestingly, as shown in Table 2, the standard deviation of hedged profits increased by \$0.39/head relative to the standard deviation of profits offered through cash market transactions.

This increase in standard deviation of profits in CC1 was opposite of expected. However, because one third of the corn was not hedged, it is understandable that standard deviations of profits would not be decreased substantially. In fact, cash corn price standard deviation, measured during those years included in the study, actually increased from a low in October until the beginning of February. In this scenario, the first third of the corn purchased in the cash market was purchased in November. Further, as Small et al. observed (2010 *Nebraska Beef Report*, pp. 46-49), cattle prices have a much larger impact on profit risk compared to corn prices. So, even though corn price risk was decreased using futures hedges, the relative impact of those corn futures hedges on overall profit risk was inconsequential in some cases.

YC1 evaluated the effect on profits from purchasing deferred December corn futures contracts in the previous November when cattle were placed on winter cornstalks. Cash corn purchases were made and futures contracts were offset at two times: when yearlings were placed on feed and at the midpoint of the yearling's feeding period. This scenario resulted in an increase in the average price paid for corn of \$0.07/bushel, causing average profits to decrease by \$1.58/head. Unlike CC1, standard deviation of profits declined by \$1.48/head (see Table 3).

In YC2, it was assumed that December corn contracts were purchased when yearlings were initially purchased and then offset when cattle entered the feedlot. The remainder of the corn consumed (which was assumed to equal half of the needed

Table 2. Corn hedging scenario for calf-fed production systems, 1996-2007.

	Corn Hedges	
	Calf-fed System	
	No hedge	CC1
Corn price, (\$/bu) ¹	2.43	2.36
Avg profit, (\$/hd)	9.80	12.94
Max profit, (\$/hd)	149.66	163.47
Min profit, (\$/hd)	-107.79	-113.73
Std dev profit, (\$/hd)	91.74	92.13
Profit difference, (\$/hd) ²		+3.14

¹Corn price (\$/bu) is on an as-is basis and does not include a dry rolled corn processing fee.

²Profit difference (\$/hd) is found by subtracting the average no hedge profit from the average hedged profit.

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

	Corn Hedges				
	Yearling System				
	No hedge	YC1	YC2	YC3	YC4
Corn price, (\$/bu) ¹	2.37	2.44	2.38	2.32	2.31
Avg profit, (\$/hd)	7.76	6.18	7.81	9.77	9.61
Max profit, (\$/hd)	360.49	357.56	360.51	363.64	363.56
Min profit, (\$/hd)	-158.37	-177.03	-166.88	-157.48	-157.10
Std dev profit, (\$/hd)	161.01	159.53	160.24	157.41	159.29
Profit difference, (\$/hd) ²		-1.58	+0.05	+2.01	+1.85

¹Corn price (\$/bu) is on an as-is basis and does not include a dry rolled corn processing fee.

²Profit difference (\$/hd) is found by subtracting the average no hedge profit from the average hedged profit.

corn) was purchased (unhedged) in the cash market at the midpoint of the feeding period to take advantage of the expected lower corn prices at harvest time. Table 3 shows that this hedging strategy yielded a similar average corn price as compared to buying the corn in the cash market throughout the entire feeding period. However, average profits increased to \$7.81/head (due to rounding), and standard deviation of profits declined by \$0.77/head.

Lower minimum profits were realized in YC1 and YC2 compared to the minimum profit from not hedging (Table 3). In all three situations (No Hedging, YC1, and YC2), the minimum profit was incurred in 1998, a year in which fed cattle sales prices were relatively low. Also in 1998, corn prices went from an unhedged price of \$1.91/bushel to \$2.51/bushel in YC1 and to \$2.18/bushel in YC2. Therefore, the low fed cattle sales price coupled with higher corn prices created an overall lower minimum profit in YC1 and YC2.

YC3 was based on the assumption that December corn futures contracts

were initiated on the first trading day in August, before yearlings were placed on feed. Similar to YC1, half of the contracts were offset when yearlings were placed on feed, while the others were offset at the midpoint of the yearling's feeding period. By hedging corn under this method, the average price of corn used in the yearlings' feedlot rations was reduced from \$2.37/bushel to approximately \$2.32/bushel. This reduction in corn price was reflected in an increase in average profit from \$7.76/head to \$9.77/head. Moreover, standard deviation of profits was reduced by \$3.60/head (see Table 3).

YC4 considered the results of hedging half the corn by purchasing December corn contracts on the first trading day of August, when yearlings were still on pasture, and purchasing the second half of the corn in the cash market at the midpoint of the feeding period during corn harvest. Standard deviation of profits was lowered from \$161.01/head to \$159.29/head (see Table 3). The average profit in this scenario was \$9.61/head, which was \$1.85/head more profitable than not hedging and \$0.16/head less profitable

than YC3. The average price of corn consumed by yearlings in this scenario was about \$2.31/bushel.

Notice that the average corn prices are nearly the same in Table 3 for YC3 and YC4. The only difference between YC3 and YC4 is that in YC3, the second half of the corn was hedged using December corn futures contracts purchased at the beginning of August and offset at the yearlings' feeding period midpoint (November); in YC4, the second half of the corn was purchased in the cash market at the feeding period midpoint. The weekly December corn futures price hedged at the beginning of August remained relatively unchanged from the yearlings' feeding period midpoint (November) when contracts were offset. With little change in futures prices from hedge initiation until hedge conclusion, the average net on futures was close to zero.

It was assumed that a lower corn price would be realized if corn was purchased at the midpoint of the feeding period, which corresponds to corn harvest. Typically corn harvest is associated with the lowest corn prices of the year. However, in 2006 and 2007, corn prices made a dramatic counter-seasonal move; thus, corn prices in these years actually increased to their highest prices during harvest and throughout the end of the calendar year. Due to these counter-seasonal price moves in 2006 and 2007, purchasing cash corn during harvest may have actually lowered the average profit reported in YC4.

In comparing YC1-YC4, it can be concluded that YC3 was the optimal yearling corn hedging scenario. YC3 had the lowest standard deviation of profits, just over 2.23% lower than the standard deviation of the profits resulting from cash market transactions only. Additionally, it yielded the highest average profit relative to the other yearling corn hedging scenarios.

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