2010

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) 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 can often 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.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calf-fed corn scenario one</td>
<td>CC1</td>
<td>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.</td>
</tr>
<tr>
<td>Yearling corn scenario one</td>
<td>YC1</td>
<td>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 placement in September.</td>
</tr>
<tr>
<td>Yearling corn scenario two</td>
<td>YC2</td>
<td>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.</td>
</tr>
<tr>
<td>Yearling corn scenario three</td>
<td>YC3</td>
<td>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) and lifted when 1/2 of corn is purchased in cash market at feedlot placement in September.</td>
</tr>
<tr>
<td>Yearling corn scenario four</td>
<td>YC4</td>
<td>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 1/2 of corn in cash market at feedlot midpoint in November.</td>
</tr>
</tbody>
</table>
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 feed-
ing 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 mar-
ket 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 Novem-
ber. Note that these futures market
transactions would have been occur-
ing 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’ feed-
lot 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 feed-
ing 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 strict-
ly on a cash market basis.

The only difference between YC3
(yearling system, corn hedge, sce-
nario three) and YC1 was the day the
December CME corn futures con-
tracts 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 sce-
narios (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 cal-
culated 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 initi-
atied. To find the net on futures, daily
futures closing prices for the March,
May, and December corn futures con-
tracts 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
cash market purchases, whether
hedged or not, were weekly Omaha,
Neb., cash corn prices corresponding
to those weeks that cash market trans-
actions 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). Interest-
ingly, 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 devia-
tion of profits in CC1 was opposite
of expected. However, because one
third of the corn was not hedged, it is
understandable that standard devia-
tions of profits would not be decreased
substantially. In fact, cash corn price
standard deviation, measured during
those years included in the study, actu-
ally increased from a low in October
until the beginning of February. In
this scenario, the first third of the corn
was 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 com-
pared 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 mid-
point 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 pur-
chased 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
Corn hedge prices, ($/bu)\(^1\) are on an as-is basis and do not include a dry rolled corn processing fee. Profit difference, ($/hd)\(^2\) is found by subtracting the average no hedge profit from the average hedged profit. Table 2. Corn hedging scenario for calf-fed production systems, 1996-2007.

<table>
<thead>
<tr>
<th>Corn Hedges</th>
<th>Calf-fed System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No hedge</td>
</tr>
<tr>
<td>Corn price, ($/bu)(^1)</td>
<td>2.37</td>
</tr>
<tr>
<td>Avg profit, ($/hd)</td>
<td>7.76</td>
</tr>
<tr>
<td>Max profit, ($/hd)</td>
<td>360.49</td>
</tr>
<tr>
<td>Min profit, ($/hd)</td>
<td>-158.37</td>
</tr>
<tr>
<td>Std dev profit, ($/hd)</td>
<td>161.01</td>
</tr>
<tr>
<td>Profit difference, ($/hd)(^2)</td>
<td>2.01</td>
</tr>
</tbody>
</table>

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

Corn (unhedged) was purchased 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.


<table>
<thead>
<tr>
<th>Corn Hedges</th>
<th>Yearling System</th>
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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.