

## Using the Crush Margin to Manage Profits Rather than Price: Yearling to Finish

Lee Schulz, Extension Livestock Economist, Iowa State University

October 2012

### Why calculate a crush margin?

Buying feeder cattle and corn and selling fed cattle at discrete times throughout the year exposes fed cattle producers to both input and output price risk. Feeder cattle and corn prices account for a significant share of total cost and are volatile, adding to a producer's risk. Managing the crush margin between the fed cattle revenue and the major input costs, feeder cattle and corn, that change with market conditions is very important. The term "crush" comes from the soybean processing sector where soybeans are crushed to produce oil and meal. Traders use the soybean, soybean oil, and soybean meal futures to find and manage profit opportunities as the three related markets trade months before the beans are physically processed. Similarly, prices for fed cattle, feeder cattle, and corn can be managed to protect a margin for a feedlot operator.

The margin is the remaining revenue used to pay all other costs and, hopefully, return a profit. The crush margin provides an indicator of return that takes into account the variables with the greatest price risk. It is also tied to the futures market, which can be used to manage the price risk for several months before the cattle are sold.

Iowa State University Extension and Outreach, Department of Economics, provides a crush margin analysis with the following objectives:

- Calculate and report the crush margin based on Wednesday futures closing prices for yearling to finish cattle that will be marketed more than a year into the future.
- Track how the margin for each contract has changed over time.

The crush margin calculation and tracked changes can serve as a quick indicator of risk management opportunities or pitfalls and help producers monitor the cattle and feed markets for current and future marketing.

### What is a crush margin?

The crush margin is defined in a variety of ways but what is important to understand is how the costs compare to the defined crush margin. In this analysis the crush margin (CM) is defined as the value of the fed steer less the cost of the feeder steer and corn. Specifically,

$$CM_T = (12.5 * LCF_{BT}) - (7.5 * FCF_{BT-5}) - (50 * CF_{BT-5})$$

$LCF_{BT}$  is the fed cattle futures that expire in month T (or one month after T in the case of off contract months) adjusted for the Iowa/Southern Minnesota basis (B) for month T. This price is multiplied by 12.5 for a 1,250 pound steer.  $FCF_{T-5}$  is the feeder cattle futures price adjusted for the combined Iowa feeder cattle basis at placement, five months prior to slaughter. This price is multiplied by 7.5 for a 750 pound feeder steer.  $CF_{BT-5}$  is the corn futures price at placement adjusted by the North Central Iowa basis multiplied by fifty bushels per steer.

At placement, the first week of the month, it is assumed that the feeder steer and corn are purchased in the spot market (S) at the weekly average price. The CM then becomes:

$$CM_T = (12.5 * LCF_{BT}) - (7.5 * FCS) - (50 * CS)$$

When the fed steers are sold in the spot market at time T the selling price is the weekly average price of Iowa/Southern Minnesota 65-80% choice steers. Upon such the final margin is calculated.

**What does the crush margin cover?**

The purpose of the crush margin is to serve as a simple indicator of potential returns and not as a measure of profit or loss to any one operation. There are two places that the crush can differ from an individual operation’s return. First is the weighting in the crush margin calculation. Individuals may have different carcass weights, feed requirements, or cattle pricing formulas. Second, is in the remaining cost that the crush margin must cover to sustain the enterprise. The weightings will differ between operations and even between groups of cattle, but the key is to use weightings that are accurate enough to signal the general direction and magnitude of margins.

The costs left to be covered by the crush margin also differ across operations and each individual operation should know how much margin is needed to meet its remaining costs. To frame the discussion, the values in Table 1 are from the Iowa State University Estimated Returns for Finishing Yearling Steers and total \$150/head to breakeven. Note that the facility fixed cost is an economic value representing depreciation, interest, repairs, and taxes rather than a cash flow cost reflecting debt service and maintenance. The costs in Table 1 are relatively constant over time while the prices for fed cattle, feeder cattle, and corn may change daily or weekly.

Table 1. Estimated Yearling to Finish Costs (Less Feeder Steer and Corn)

Cost Item	\$/Head
Hay, 0.25 ton	18.00
Supplement, 113 pounds	13.50
Interest @ 7% on \$1000 (steer and ½ the feed)	29.00
Animal health and/or veterinary/medical	11.50
Labor and administrative	31.00
Transportation	18.00
Facility fixed cost	15.50
Manure handling	2.00
Marketing and miscellaneous	6.50
Machinery and equipment	5.00
Total cost (less feeder steer and corn)	150.00

Source: Iowa State University Estimated Returns for Yearling to Finish

An operation may have different weighting of cattle prices and feed use and different costs that must be covered, and producers should evaluate how well the crush margin matches their own costs. Regardless, the crush margin can act as an indicator of hedging opportunities by alerting the producer when futures prices are in the desired range. However, it is important to note that the crush margin accounts for fed cattle, feeder cattle, and corn prices together to protect a margin. For example, locking in only a fed cattle price and not a feeder cattle and/or corn price leaves the producer exposed to margin risk.

### **How does one use the crush margin information?**

Once a favorable margin is identified the next step is to lock it in. Some producers have feed prices already set. For example, they may raise their own corn and price it to the cattle at the cost of production plus storage. Likewise, a producer may raise their own feeder cattle. These producers can still monitor the margin relative to their known prices, but they have fewer variables to monitor.

A challenge to using futures is that the contract sizes should be matched to the amount of cash commodity that producers are trying to protect. For example, 200 head of cattle in a finishing yard matches approximately 2 corn futures contracts and 3 feeder cattle futures contracts, but 6.25 live cattle futures contracts.

It is important to remember that basis risk still exists for all of the markets. Basis risk is found not only in the chance that actual basis is wider or narrower than was expected, but also in the timing of when to lift the hedge. Feeder cattle and live cattle futures contracts can be offset as cattle are placed and sold, but corn futures contracts are “lumpier” and a risk exists if you offset the futures position, but purchase only part of the corn in the cash market. Consider working with a supplier about forward contracting these inputs rather than a futures hedge to reduce this basis timing risk.

### **Summary**

Feedlots marketing cattle at discrete times throughout the year experience increased price risk exposure. Furthermore, increased price volatility in corn creates feed price risk that can be significant. As a result, cattle feeders should monitor and manage margins rather than focusing on cattle or feed prices alone. The crush margin is the return from selling a fed steer less the cost of the feeder steer and corn. These three variables have price risk but can also be hedged with futures, options, or livestock insurance. The crush margin is a generic index of yearling to finish returns and not an absolute measure of profitability for all operations. Comparing an operation's own costs, historic performance, and recent trends, the crush margin can provide a useful tool for evaluating risk management strategies for producers.