

Crushing Miss Elsie

As the noted market analyst Steve Martin once observed, "Comedy is not pretty." Neither is the subject matter below, the so-called cattle crush spread, which involves trading feeder cattle and corn against live cattle.

You have to hand it to the futures industry: What other business would ever make life so difficult for its customers? Here's a spread trade involving three futures contracts, imperfectly aligned in both their size and timing, traded across three different futures pits on two exchanges. A Martian presented with the same problem might have created a single futures contract with the feedlot's margin as the underlying asset, but Excuuuse Meee! What do Martians know about running futures exchanges?

The Cattle Crush

A feedlot is a process margin operation whose economics can be reduced to regarding cattle on feed as a machine for converting low value corn to high value meat. It takes close to five months to fatten feeder cattle weighing between 700 and 800 pounds apiece to live cattle weighing between 1,100 and 1,350 pounds apiece. This time lag and weight differential account for the unusual mix of contracts required for this spread. The standard combination of contracts for the cattle crush spread is four corn (C), five feeder cattle (FC), and 10 live cattle (LC).

The month combinations, listed in order of the FC month involved, are:

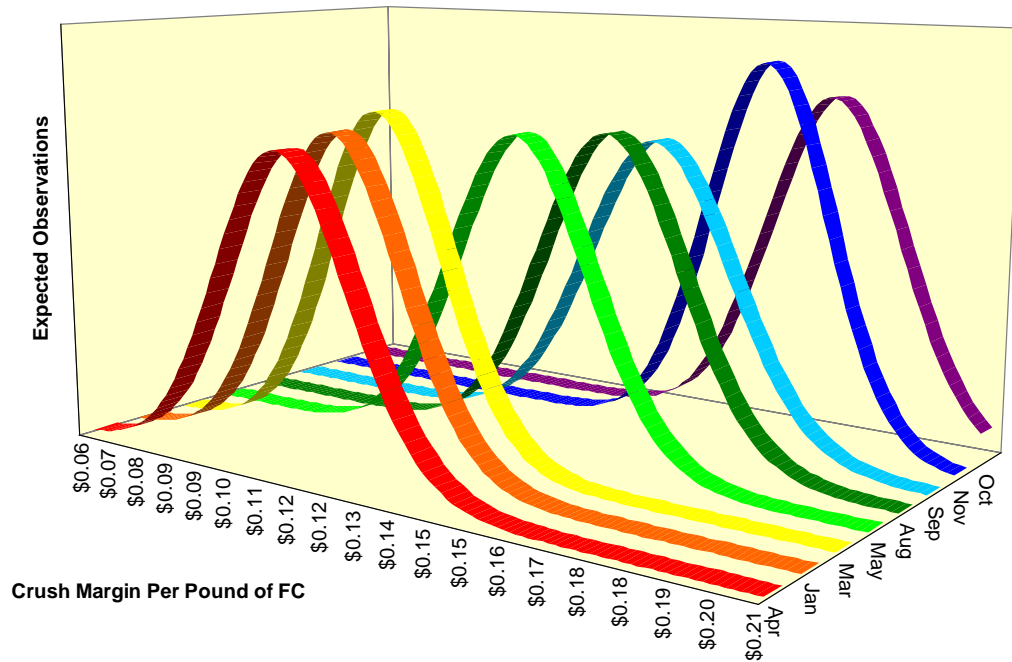
1. Jun LC - [Jan FC + Mar C]
2. Aug LC - [Mar FC + Mar C]
3. Aug LC - [Apr FC + May C]
4. Oct LC - [May FC + May C]
5. Dec LC - [Aug FC + Sep C]
6. Feb LC - [Sep FC + Sep C]
7. Apr LC - [Oct FC + Dec C]
8. Apr LC - [Nov FC + Dec C]

The spacing of the FC contracts through the year is a function of the breeding cycle of cattle, an indelicate topic on which we will not dwell further. The time on feed and the time of the year during which the cattle will be on feed create special considerations. First, several feed cycles cross the old crop / new crop division in the corn market; this is especially true for the August through November FC combinations. Second, cattle feedlots in the Texas panhandle and Oklahoma regions are subject to winter storms that stress and kill the cattle. Once again, the August through November FC combinations are most subject to this uncertainty. We should, therefore, expect these months to exhibit greater volatility and to be more subject to trends. Is this the case?

Cow Bells

We can calculate daily cattle crush margins for all the combinations listed above since the feeder cattle contract was changed to its present 50,000 pounds in 1993, and compare their distributions. Smoothed histograms of these values reveal some interesting patterns in the data.

Distribution of Crush Margins By FC Month



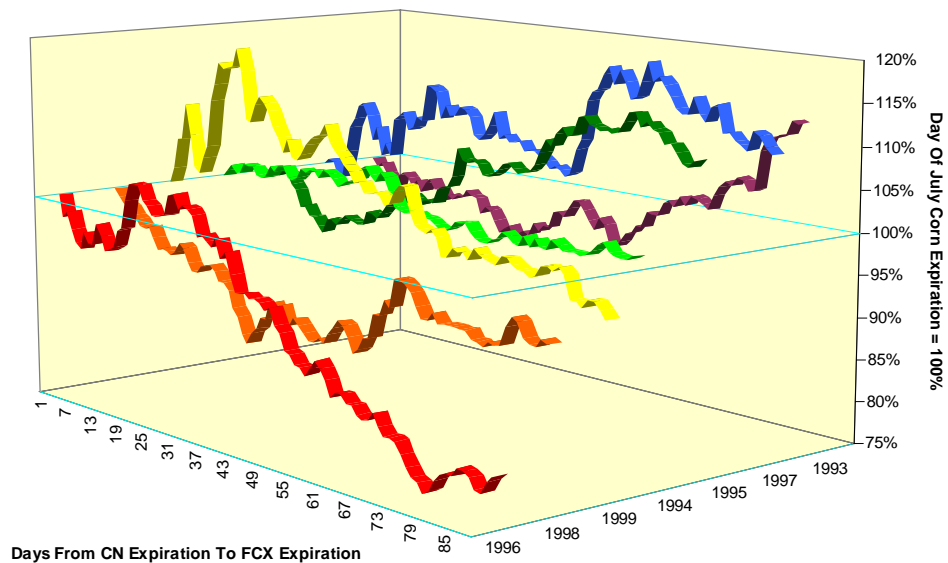
The most obvious characteristic is the split between the two halves of the year. The August through November FC combinations clearly have a greater mean than do the January through May combinations. The average for October is \$0.174 per pound of cattle placed on feed; this is 57.2% more than the \$0.111 per pound margin for cattle placed on feed in April. A second and less obvious differentiating characteristic is the lower standard deviation of margins for the two late autumn combinations.

How can we account for this seasonal split? One possibility is the generally weak new crop corn markets since 1993; under this scenario, the expanding margins for the second half FC combinations really represent little more than bear markets in new crop corn. Another possibility is a seasonal strength in LC prices for the months involved in the second half FC combinations. A third possibility is a seasonal weakness in FC prices created by the cattle breeding cycle. Let's examine each of these in turn.

New Crop Corn

Traders who came of age during the 1990s will never be able to understand either a bear market in equities or a bull market in grains. Both of these happen, to be sure, but the evidence is getting pretty scarce. If the stronger cattle crush margins observed for the second half FC combinations represented nothing more than bear markets in corn, then we should expect to see systematic declines in December corn prices between the expiration of July corn (CN) in the third week of July and the expiration of November feeder cattle (FCX) in the third week of November. This does not appear to be the case.

New Crop Corn Movement After July Corn Expiration

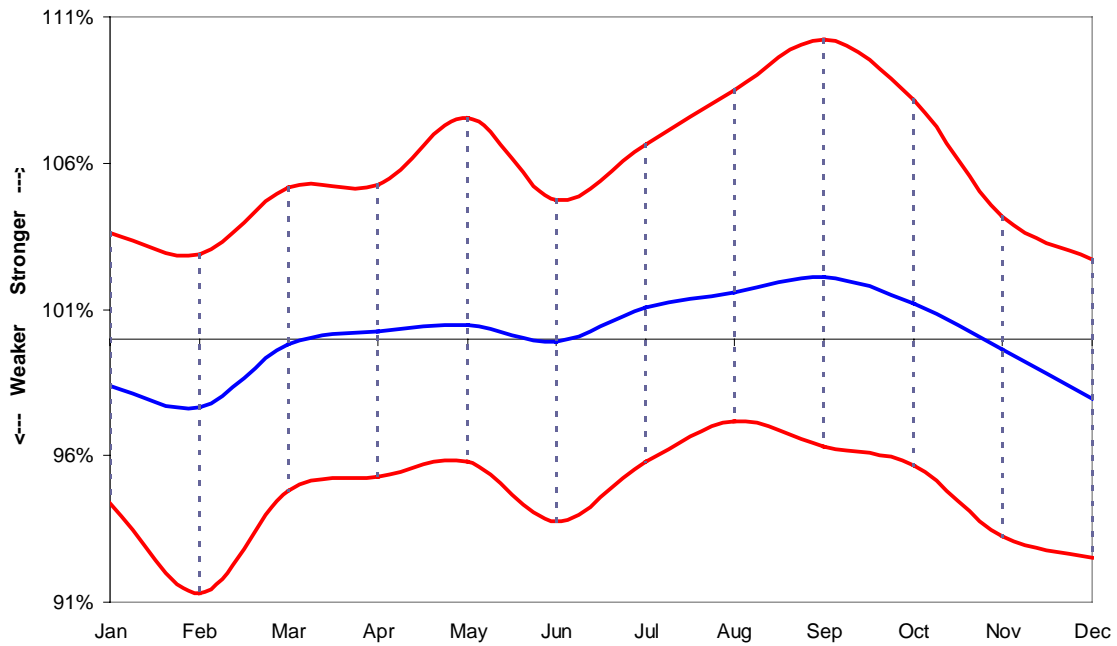


The only year in the sample to witness a significant decline in December corn prices during this interval, 1996, (see "[Out With The Old \(Crop\), In With The New](#)," *Futures*, May 1996) had a very stable cattle crush margin. The crush went from \$0.172 on July 19, 1996 to a low of \$0.152 on August 19, and never exceeded \$0.198. The lower corn prices were absorbed in a declining spread between November 1996 FC and April 1997 LC, a perfectly rational response on the part of feedlot operators. The opposite holds true as well: In 1993, the year in which December corn prices rose the most during this interval, crush margins never fell by more than \$0.01 from their July values. As variable as December corn prices can be, they do not seem to be the major determinant of crush margins.

Where's The Beef?

Beef demand and prices are set in competition with other foodstuffs, especially other meats. Since overall food demand is not seasonal, we should not expect to find strong seasonal patterns in live cattle prices, and we do not. Over a very long price history going back to 1904, we find a steady seasonal pattern of stronger LC prices in the late summer and early fall, and weaker LC prices in the winter. The extreme variations in this pattern reinforce this central tendency; the highest seasonal variations occur in September, and the lowest seasonal variations occur in February. This is exactly the opposite of what we might expect to find given our observation of higher crush margins for the combinations involving February and April LC, and the lowest crush margins for the combinations involving June and August LC.

**Average And Extreme Seasonal Factors:
Cash Live Cattle, 1904 - 2000**



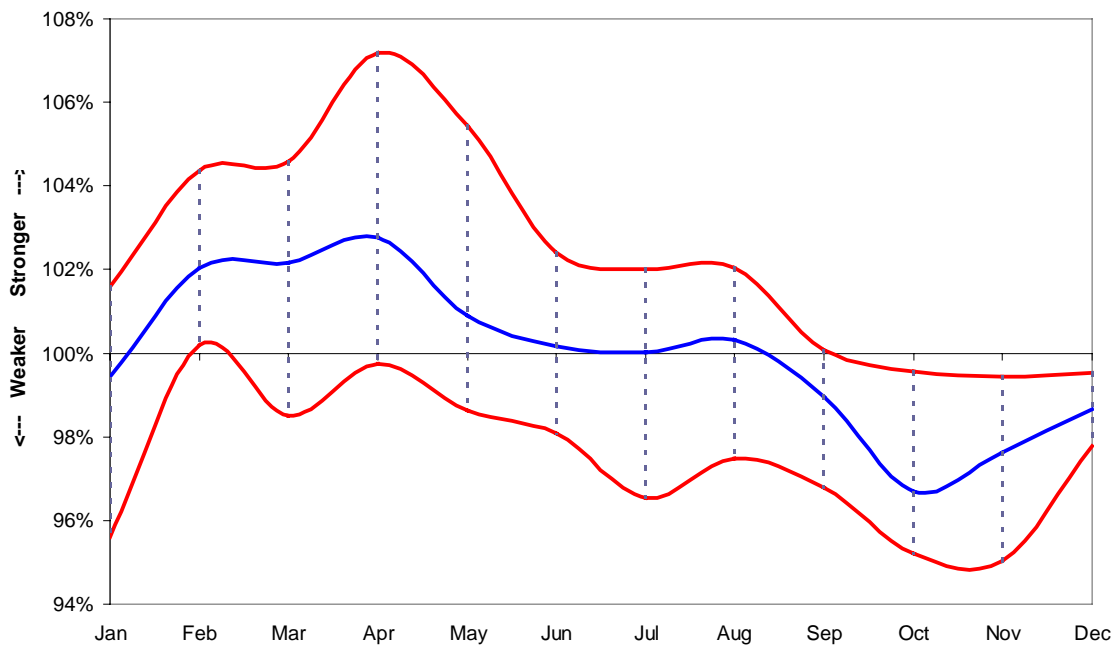
Just as we could rule out bear markets in December corn as the principal determinant of high crush margins for the second half FC combinations, we can rule out any seasonal tendencies in LC prices.

Real Food For Real People

This leaves a seasonal tendency for low FC prices in the second half as a logical determinant of high crush margins. Here we will not be disappointed: The seasonal tendency is for weak prices in the second half, with October and November occupying the trough. The highest prices, and the highest extreme tendencies, occur in the late winter and early spring, with April and May at the peak.

In general, patterns in markets work until they are recognized -- remember the January Effect? -- but here is a case where the pattern has persisted for a very long time, most likely as a function of bovine biology. We don't have to know very much about breeding cycles to look at the chart of FC seasonality and recognize when the Baby Boom goes from the cow-calf operations to the feedlots.

**Average And Extreme Seasonal Factors:
Cash Feeder Cattle, 1970 - 2000**



An economist can look at these cycles and see an industry crying out for innovation to take advantage of the price consequences of the cattle breeding cycle (of course, an economist is someone who would marry Pamela Anderson Lee for her money). The poultry industry turned chickens into an industrial product, for better or worse, over two generations ago, and the hog industry is striving to repeat this feat (see "[Let Us Now Praise Famous Hogs](#)," *Futures*, July 1999). The cattle industry is faced with larger animals, a slower breeding cycle, and the inability to do things like import large numbers of calves from Southern Hemisphere cow-calf operations in order to smooth out the seasonal cycle. For now, the apparent inefficiency is likely to remain.

The difficulties involved in trading this spread as a spread and the relative illiquidity of the FC contract as an outright position reduce the efficiency of the market further by raising the cost of information and price insurance to both commercial participants and speculators alike. Feedlot operators frequently trade both corn and LC positions outright, and generally on a futures-only basis, which is the most inefficient way of hedging any process margin (see "[No Margin For Error](#)," *Futures*, February 1999). Before these operators set up their own B2B trading Web site, the futures industry should seize the opportunity to meet their needs.