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# Improving the Effectiveness of the Live Cattle Futures Contract

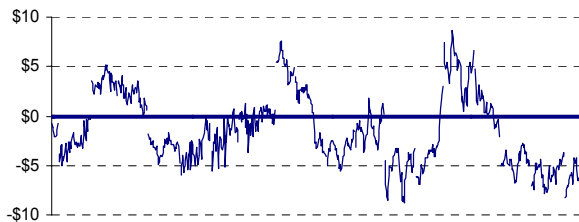
Bob Dix ~ ContiBeef LLC  
March 2003

## Overview

The live cattle futures contract traded on the Chicago Mercantile Exchange (CME) is the only hedging vehicle available to the cattle industry for fed cattle. The CME has recently increased the weight specifications of the contract. We acknowledge these changes as steps to improve the contract; however, we do not believe these changes will correct the contract's lack of convergence at delivery nor the extreme variability in the live cattle basis.

ContiBeef LLC markets over 900,000 head of cattle annually, making us one of the largest cattle feeders in the country. Since 1975, we have been using the CME live cattle futures contract as a tool to help us manage our cash price risk.

### 2000-2002 Nearby Live Cattle Basis



The contract improvements suggested in this paper are not meant to simply benefit the short hedgers; rather, these improvements will equally benefit both long and short participants through –

- *reducing* basis volatility
- *enabling* convergence at expiration
- *increasing* the deliverable supply of cattle

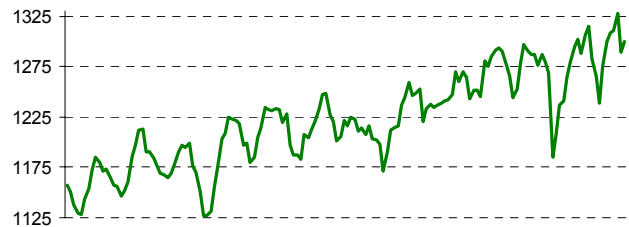
We would propose the following changes to the live cattle contract: (1) increase the upper weight limit specifications, (2) eliminate the 100 pound weight constraint for live deliveries, (3) allow heifer delivery, and (4) add a feedlot delivery option in addition to live and carcass delivery.

## Increase the Upside Weight Specifications

The average weight of live steers has been increasing over time. From January 1990 to December 2002, the monthly average weight of steers has increased 136 pounds, to a 2002 USDA average weight of 1277 pounds.

Beginning with the December 2003 live cattle contract, the CME will allow a maximum individual-animal, deliverable live weight of 1400 pounds. No individual animal weighing less than 1050 pounds or more than 1400 pounds can be delivered against the contract.

### Average Monthly Live Steer Weight

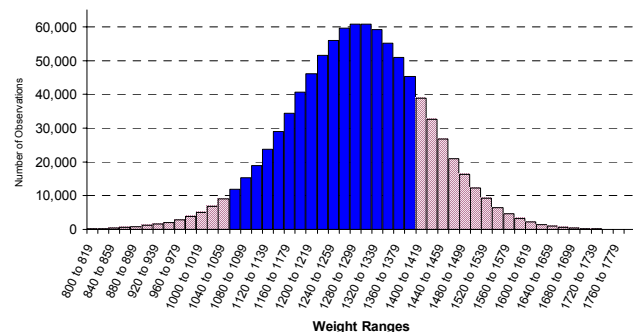


Source: 5 Area USDA Report 1990 to 2002

With the increase in fed cattle weights over the last decade, this new CME maximum weight of 1400 pounds does not adequately account for current weights of fed steers or the distribution of those weights around the US average weight.

The graph below shows the out-weight distribution on over 930,000 individual steers marketed by ContiBeef over the last two and a half years. It is a normal distribution, and because ContiBeef buys a large number of cattle each week, primarily from the High Plains feeder market, this out-weight distribution approximates the out-weight distribution of fed cattle marketed in the 5-state High Plains area.

### ContiBeef Steer LIVE Weight Distribution 930,000 Individual Steers ~ Years: 2000-2002



The dark bars represent cattle in the population that would be deliverable under the new 1050 to 1400 pound guidelines. Year-round, 21% of the live delivery steers would be too heavy or too light to deliver against the contract, and 23% of the rail delivery steers would be outside contract weight specifications.

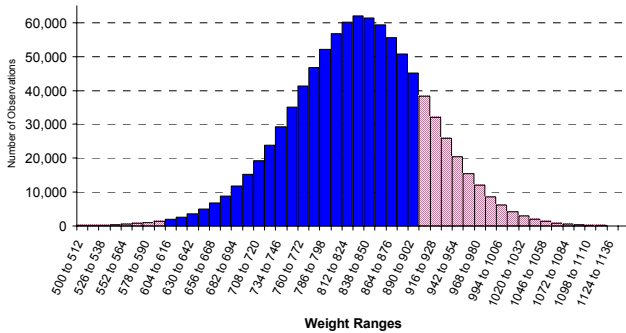
On average, 3.6% of the cattle are undeliverable under live delivery because the cattle weigh less than 1050 pounds. In order to equalize the CME deliverable specifications between heavies and lights and exclude only 3.6% of the heavier cattle, the CME contract's heavy weight specifications would need to be increased to 1504 pounds (a 962 pound carcass weight at a 64% yield) from the current 1400 pounds.

The situation is worse on a carcass basis. Using the USDA's 5-Area Weighted Price report data, the 2002 average carcass weight for steers was 838 pounds. The CME specifications for carcass delivery do not allow delivery of cattle carcasses weighing less than 600 pounds or more than 900 pounds without a price penalty discount. Less than 1% of cattle carcasses in the US weigh less than 600 pounds, but over 22% of cattle have a hot carcass weight of more than 900 pounds.

Most of the major packers' grids in use today do not start to discount carcasses unless the carcass weight is more than 950

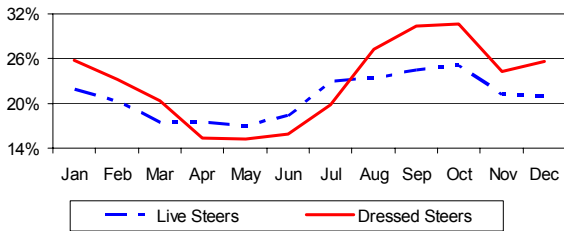
pounds, with many grid price discounts starting at 975 to 1000 pounds. If the CME were to increase the upward weight limit to 950 pounds in line with current industry practices, only 8% of the US cattle population would be excluded from delivery as “heavies,” rather than the 22% now being excluded. On a live delivery basis, to exclude that same 8% of “heavy” cattle would call for the upside live weight specifications to be increased to 1451 pounds from the present 1400 pounds

ContiBeef Steer CARCASS Weight Distribution  
930,000 Individual Steers ~ Years: 2000-2002



The chart below shows the combined percent of steers which are either *less* than 1050 pounds or *greater* than 1400 pounds for each marketing month in 2002. This illustrates that an even higher percent of cattle in the fall and winter months are not deliverable without price penalties under current guidelines.

Percent of US Steers in 2002  
Lighter or Heavier than CME Specs



During the past decade, cattle feeders have been moving toward “value-based marketing” as opposed to cattle sales in the cash market. The cattle feeding industry has embraced grid and formula pricing, which incents cattle feeders to produce heavier carcass weights. Economics has been the driver and this trend of heavier weights is expected to continue into the future. This upward weight trend and the current distribution of US steer weights demonstrate the need to increase the upside weights of the CME live cattle contract to 950 carcass pounds and 1450 live pounds.

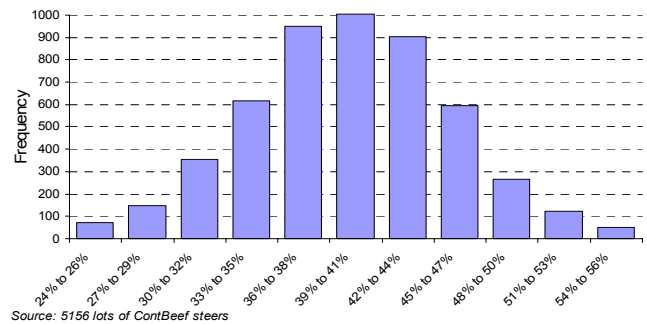
### Improve the Weight Specifications to Reflect Current Practices in the Beef Packing Industry

Packers pay feeders for their cattle based upon pounds sold, with discounts for light or heavy cattle. For cattle bought on a grid or in the cash market, there have *never* been discounts for cattle weighing a certain number of pounds below or above the average of the lot. In the CME live delivery specifications,

individual cattle are discounted if they weigh more than 100 pounds or less than 100 pounds above or below the average weight of the unit. This type of weight constraint for live deliveries is *not* found in the CME carcass delivery specifications. This weight constraint greatly increases the time it takes to sort cattle for delivery and unnecessarily adds to the burden of processing and grading delivered cattle. Again, this 100 pound constraint is not a business practice used by any packer.

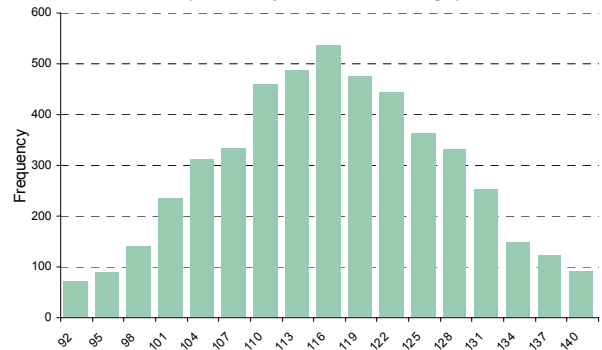
To see how many cattle are excluded under this CME guideline, 5156 individual lots of ContiBeef cattle were reviewed (a total of 930,000 steers). Individual lots were examined since a lot is the basic marketing unit for the cattle feeder. The average weight of each lot was calculated, and then, the weight of each of the steers within the lot was compared against the lot average weight to see what percent of the lot fell outside this plus/minus 100 pound CME delivery constraint.

Percent of Live Steers in the Lot Weighing More than 100 lbs or Less than 100 lbs from the Average Weight of the Lot



In almost every one of the 5156 lots, a minimum of 25% of the cattle would have been under or over the 100 pound weight limitation. In the majority of the lots, 40% of the cattle would not have been deliverable without extensive sorting, individual weighing, or would have been subject to substantial price discount penalties. Extrapolating to the US the individual steer population statistics for the 930,000 head, 43% of the US steer population is either 100 pounds below or above the US average live steer weight. Looking at the data on a pen level (40%) or individual animal level (43%) yields approximately the same answer – about 40% of steers fall outside the 100 pound weight constraint.

Standard Deviation within Steer pens  
(in Pounds per Head of Live Weight)



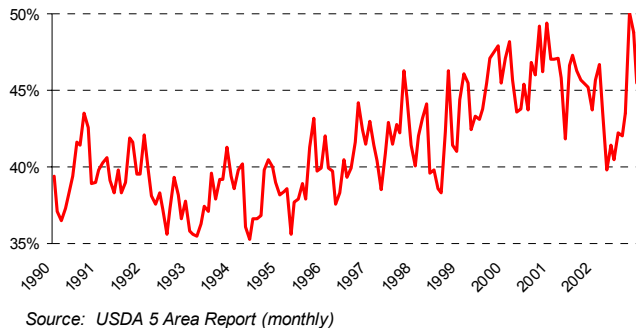
Source: 5156 lots of ContiBeef steers

The graph above shows the distribution of the within-pen standard deviations of live weight steers. The average within-pen standard deviation is 115.47 pounds. This means about 68% of the head in an average pen of steers will have weights within plus or minus 115.47 pounds from the average weight of the pen, and 32% of the head will have individual weights outside that range.

The CME should eliminate the plus/minus 100 pound delivery constraint on live animal deliveries in order to

- bring the live delivery specifications in line with current beef packer buying practices of discounting *only* extremely heavy or light cattle
- put live delivery on a level playing field with carcass delivery, which has no such weight constraint
- remove the current excessive pre-delivery cattle sorting that must take place to create deliverable lots
- eliminate the time bottleneck that is caused by requiring USDA graders to unnecessarily examine or weigh each individual animal

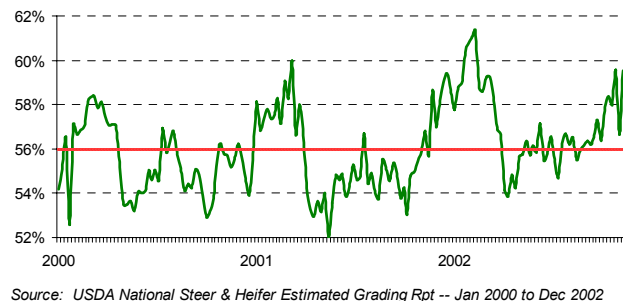
### Percentage of Heifers in Trade Mix



### Allow Heifer Delivery to Reflect the Cattle Actually Being Traded in the Cash Market

Increasing the deliverable supply of any commodity against its respective futures contract will lessen the chance for short squeezes and other market manipulations or price distortions. Since 2000, the average trade mix in the USDA's 5-Area regions has been 55% steers and 45% heifers. By allowing heifers to be delivered against the contract, it brings the futures specifications more in line with what is actually being traded in the cash cattle market.

### Percent Prime and Choice Steers and Heifers



The current CME quality grade specifications for the live cattle contract call for a par delivery unit of 55% Choice and 45% Select. The graph below is taken from the weekly grading report published by the USDA. Unfortunately steer and heifer data is not broken out. The steer/heifer average over the past three years has been 56% of the cattle grade Choice or better.

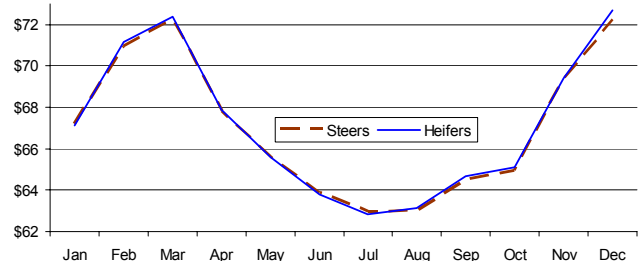
Heifer carcasses generally grade 8 to 9 percentage points higher than steers. This would indicate that the steer Choice or better percentage is about 52% and the heifer percentage is about 60% on an annual average. Seasonal and regional variation is much greater. Heifer delivery would bring the CME contract specifications more in line with the kind of cattle currently being traded in the cash market, and this will help in forcing convergence at expiration. With the current contract grade specifications at 55% and the actual steer percentage closer to 52%, the futures contract describes a "premium animal" from that being traded in the cash market. This tends to make futures prices trade at a premium to the cash market, which adds to the basis volatility of the live cattle contract.

Legitimate concerns have been raised about allowing heifer delivery, including heifer rates of hardbones, dark cutters, and fetus incidence vis-à-vis steers. These factors are purported to result in a lower price for heifers. On the other hand, heifers grade better than steers, resulting in fewer Standards and more Choice & Prime cattle, and heifers have higher carcass yields than steers. All of these issues are sorted-out and given the appropriate weighting in the actual price that packers are willing to pay for steers vs. heifers.

	Steers	Heifers	Heifer Premium
1998	\$ 61.68	\$ 61.76	\$ 0.08
1999	\$ 65.65	\$ 65.80	\$ 0.15
2000	\$ 69.79	\$ 69.86	\$ 0.07
2001	\$ 72.21	\$ 72.40	\$ 0.19
2002	\$ 67.23	\$ 67.40	\$ 0.17

The real-world marketplace nets-out these positives and negatives to essentially zero. Overall, packers are willing to pay the same price for heifers that they do for steers. This is shown above in the annual accumulated weighted average prices paid for steers and heifers from the USDA's 5-Area Report. In fact, heifers maintained a slight premium to steers in the live market.

### Steer Price vs. Heifer Price in 2002



Source: USDA 5 Area Weighted Average reports Jan 2002 to Dec 2002

The graph above shows the monthly average live cattle prices in 2002 for both steers and heifers. This chart illustrates how closely the prices track one another.

## How these Proposed Improvements Would Affect Deliverable Supply

So what might be the result if:

- the upside weight specifications of the CME contract were increased to 950 pounds for carcasses and 1450 pounds for live delivery
- the plus/minus 100 pound constraint on live deliveries were eliminated
- heifers, in addition to steers, were allowed to be delivered against the contract

	Current CME Contract Specifications	Proposed CME Contract Specifications
Total Federally Inspected Slaughter for 2001	34,771,000	34,771,000
Percent steers	49.2%	49.2%
Percent heifers	32.7%	32.7%
Total number of steers	17,107,332	17,107,332
Total number of heifers	0	11,370,117
Total number of cattle	17,107,332	28,447,449
Estimated percent of cattle in regions where futures deliveries can occur (TX, OK, NM, KS, CO, NE)	75%	75%
Total number of cattle available for delivery	12,830,499	21,358,087
Estimated percent of cattle available without heavy sorting due to cattle weights or phenotype of cattle	55%	75%
Total number of cattle available for delivery	7,056,775	16,018,565
Estimated percent of cattle available without heavy sorting due to quality grade	70%	75%
Total number of deliverable cattle population	4,939,742	12,013,924
Percent deliverable from total federally inspected fed slaughter for 2001	<b>14.2%</b>	<b>34.6%</b>
<b>PERCENTAGE INCREASE IN DELIVERABLE SUPPLY</b>		<b>244%</b>

By making these modifications, the CME should be able to increase the deliverable supply of cattle by about 250%. Allowing heifers to be delivered against the contract would help force the futures settlement price to converge at expiration with the price of the majority of cattle being traded in the country. Making the changes in weights (increasing the upside and eliminating the 100 pound constraint) would allow more people to deliver against the contract without excessive sorting. This makes delivery a greater threat and makes for a more

efficient convergence mechanism. This greater threat of delivery should force the basis to reduce both in absolute level and in its volatility around its average basis level.

The intent of these contract modifications is *not* to increase deliveries against the futures contract; rather the intent of these contract improvements is to increase the *available* deliverable supply of cattle. Allowing more animals to be delivered – without onerous price penalties – will allow better futures/cash market convergence at contract expiration, and thus a more consistent, viable hedging vehicle for all users of the CME live cattle futures contract.

## Feedlot Delivery

The CME might also consider allowing fed cattle to be delivered at feedlots, in addition to the current live and carcass delivery. Doing so will bring the live cattle contract more in line with normal business practices in the cattle industry.

By adding this option, futures market participants gain a number of benefits. The fed animals are not transported from one environment to another. From an animal husbandry standpoint, the animals are treated more humanely and there is less risk of injury to both humans and cattle. Also, moving cattle increases the occurrence of dark cutters and increases shrink as another economic variable that increases price risk.

Moving cattle through stockyards is a relic shipping practice from the past. Stockyards are no longer used in the normal course of business of marketing fed cattle, and adding this step to the process just adds costs and risks not normally found in the cattle business.

Everyone benefits by giving the buyer the option of keeping the delivered cattle in the same pen and eating the same feed ration to which the cattle have become acclimated.

### *Endnote on the Standard Deviations Used*

In the discussion on CME contract weights, much emphasis was given to the population statistics of the 930,000 ContiBeef steers. This extremely large data set was used in order to get a close approximation of the individual animal and within-pen standard deviation of the US steer population.

While there are many weighted average weights calculated by the USDA, there are no standard deviation statistics available for the US steer population as a whole. Because of the large and statistically significant sample size, the ContiBeef steer live weight and carcass weight standard deviations were used to approximate the variability statistics of the US steer population as a whole. ContiBeef average cattle weights were *not* used in this paper.

To calculate the percent of cattle which are above or below the CME weight limits, USDA 5-Area Report live and carcass weights were used as the base, and then “z-scores” were calculated using ContiBeef’s live and carcass standard deviations. A z-score gives the probability of an observation falling  $x$  standard deviations from the average in a normally distributed population. The cattle distribution bar graphs on page 1 and 2 of this paper illustrate that the live and carcass cattle weights follow a normally distributed bell-shaped curve.