

# **Live, In-the-Beef, or Formula: Is there a “Best” Method for Selling Fed Cattle?**

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### **Abstract**

Descriptions of grid pricing, formula pricing, and marketing alliances for fed cattle are provided. These pricing methods are compared with traditional live-weight and in-the-beef pricing. Expected revenue and revenue variability are compared as well as determining what type of cattle are most profitable under each pricing method.

## **Live, In-the-Beef, or Formula: Is there a “Best” Method for Selling Fed Cattle?**

Historically, most fed cattle were sold on a live-weight basis. Prior to the 1970's, much of the fed cattle trade occurred at terminal auction markets. As cattle feeding moved westward out of the cornbelt and into the southern plains, terminal auction market volume declined and direct selling to packers increased. Much of the direct selling continued to be done on a live-weight basis. Ward reported that in 1979, 98% of the cattle in the southern plains and 82% of the cattle in the western corn belt were sold on a live-weight basis. In 1990, live-weight pricing still accounted for 72% of the southern plains trade and 55% of the cornbelt trade (Packers and Stockyards Administration). A disadvantage to live-weight pricing is that it is based on averages; all cattle in a pen receive the same price regardless of the quality of the individual animal and the yield of the carcass. Carcass-weight pricing, in-the-beef, rewards higher yielding cattle, but there is still no price differential for quality; all cattle in a pen still receive the same price.

Over the last couple of years there has been a much greater emphasis on improving the quality and consistency of beef (National Cattlemen's Association). Cattle producers, breed associations, feed suppliers, and beef packers have all initiated new value based pricing methods. Grid pricing, formula pricing, and strategic alliances are examples of these new value based pricing methods. While these pricing methods may differ substantially in the carcass and management traits they seek to reward or penalize, they all have one common feature: price is established on each individual animal, based on various traits.

The goals of these new pricing methods are to price cattle based on their “true” value to consumers, to reduce problems of inconsistency in the final product, and to send appropriate market signals to producers. Are all of the different pricing methods equal in achieving the above goals? What type of cattle are likely to be rewarded under the different methods? What percent of cattle will likely be sold on these new systems? The objective of this paper is to describe these new pricing methods and provide answers to the above questions.

### **Description of Grids, Formulas, & Alliances**

There are numerous pricing grids, packer formulas, and strategic alliances now available to price fed cattle. The USDA-AMS is now reporting weekly from seven major packers the average and range of premiums and discounts being offered on their grids and formulas. A recent article in *Beef Today* (Ishmael) compared features of 20 different alliances. What is the difference between a grid, a formula, or an alliance?

#### **Pricing Grid**

Figure 1 contains a representation of a basic pricing grid. For most grids the base price is for a USDA Choice, Yield Grade 3, 550-950 pound carcass. The base price is generally tied to the relevant cash market, e.g., the five day average Nebraska top, or \$1 over the Kansas direct trade. The premiums and discounts may change weekly, based on supply and demand conditions, or may be fixed for some period of time. If the grid is a “packer grid” the premiums and discounts will generally change. However, some of the grids associated with specific breed alliances have fixed premiums and discounts.

<b>Example Grid Pricing Scheme (\$/cwt. Carcass Basis)</b>					
	<b>Yield Grades</b>				
Quality Grade	1	2	3	4	5
Prime	+7	+6	+5	-10	-15
CAB	+4	+3	+2		
Choice	+2	+1	<b>120</b>	-10	-15
Select	-13	-14	-15	-25	-30
Standard	-25	-25	-25	-35	-40
Out Cattle	-25				
Light Carcass <550 lb	-20				
Heavy Carcass >950 lb	-20				

Figure 1. An Example of a Pricing Grid for Fed Cattle.

#### Formula Price

A formula pricing agreement may appear the same as the grid displayed in Figure 1. However, there is a fundamental difference in how the base price is determined. As with the grid, the base price will be tied to the cash market, but it is also determined by the type of cattle being killed at the packing plant. For example, two packing plants may offer identical premiums and discounts associated with quality and yield grades, but their base price will be different dependant upon the percentage of cattle being slaughtered at the plant that fit into each grade category. The base price may also differ dependant upon the average dressing percentage at the plant.

An example of how these formulas work is displayed in Figure 2. There are two plants that have the same premiums and discounts associated with quality grades and both plants are using the same cash price for a reference. However, the percentage of cattle in

<b>Formula Example</b>							
	Plant A			Plant B		Pen of Cattle	
	Pre/Dis	Percent	Pre/Dis	Percent	Pre/Dis	Percent	Pre/Dis
Prime	+\$6	5%	\$0.30			2%	\$0.12
CAB	+\$3	10%	\$0.30	5%	\$0.15	8%	\$0.24
Choice		60%		50%		60%	
Select	-\$15	20%	(\$3.00)	40%	(\$6.00)	30%	(\$4.50)
Standard	-\$25	5%	\$1.50	5%	(\$1.25)		
<p style="text-align: center;">           Base Price = Mkt Price - SUM(Premiums &amp; Discounts)            Plant A \$115.90 = \$112 + \$3.90            Plant B \$119.10 = \$112 + \$7.10            Pen Net = Base Price + SUM(Premiums &amp; Discounts)            Plant A \$111.76 = \$115.90 - \$4.14            Plant B \$114.96 = \$119.10 - \$4.14         </p>							

Figure 2. Example of Formula Pricing Based on Plant Averages.

each grade differs at the two plants. The base price is arrived at by (1) multiplying the premium or discount by the percentage of cattle in that category, (2) summing these premiums and discounts, and (3) subtracting this sum from the cash market price. The net price for a pen of cattle sold at either plant is arrived at by (1) multiplying the premium or discount by the percentage of the pen in that category, (2) summing these premiums and discounts, and (3) adding this sum to the base price of the plant. In the example in Figure 2, the net price for the pen varies by \$3.20 per hundred of carcass weight depending upon the plant base. With Plant A the price from the formula, \$111.76, is less than the average cash price of \$112 per cwt. However, the net price at Plant B is above the average cash price.

A disadvantage of formula prices relative to grid prices is that the “true value” of a pen of cattle is now relative to the plant average and not an absolute based on the quality of the pen. In addition, from a market efficiency point of view, there are different market

signals being sent to producers, for producing a similar product. This clearly creates an inefficiency in the market place, and will impede the efforts of the beef industry to improve the quality and consistency of their product.

### Alliances

An alliance can be defined as any formal or informal agreement between different segments of the beef industry. Most of the alliances involve cow-calf producers and cattle feeders, and the cooperation of a specific beef packer. Almost all of the alliances are using a grid or formula to establish the fed cattle price. However, there are generally additional criteria the cattle have to meet to qualify to be sold through the alliance. Several of the cattle breed associations have established alliances that are based on cattle having some percentage of that breed. Some feed companies have established alliances for producers who use their feeds and follow a recommended feeding program. Other groups have established alliances based on location of cattle, organically produced cattle, or other management criteria.

A fundamental difference between alliances is that some are still selling commodity beef, while others are selling a branded product. Those alliances that are selling commodity beef are not increasing the amount of revenue coming back to producers; they are only changing the distribution of this revenue between producers. However, alliances that are selling a branded product have the possibility of increasing the amount of revenue to be shared by producers. Of course, this is dependant upon consumer acceptance and preference for the branded product. In general, the alliances that can increase the total



revenue to be shared will probably prove more successful over time, because they will be able to attract and retain a greater number of producers.

### **Comparison of Pricing Methods**

Actual live weight and in-the-beef prices and two different packer formula prices were all obtained for the same period of time and same market area. Three pens of cattle were constructed to represent above average, average, and below average quality cattle: Pen 1, Pen 2, and Pen 3, respectively, Table 1. The average live weight for the three pens was identical and dressing percentage was 63.5, 62.5 and 61.5 percent for the three pens.

With current marketing practices, if all three pens of cattle were being fed at the same feedlot, they would all sell for the same average live weight price or if they were sold in-the-beef, they would all sell for the same average carcass price. The average live price was \$68.20/cwt. and the average carcass price was \$112/cwt. Average revenue per head from selling on a live weight basis was \$810 (1188lbs X \$.682/lb = \$810) for all three pens. Average carcass weight was 756, 742, 733 pounds for the three pens. Average revenue was obtained by multiplying the carcass weight by the carcass price, \$1.12/lb. Revenue was \$847, \$832, and \$821 for the three pens.

If cattle are not sold on a live weight basis, then the seller generally pays for transportation to the packer. This cost will vary with distance. For this analysis, a \$10 per head transportation cost was charged, which is representative of about a 150 mile haul from the feedlot to the packing plant.

Table 1. Percentage of Cattle from Three Different Pens Which Meet Various Grid Specifications.

	Pen 3						
Prime	5	0	0	Yield Grade 1	16	13	10
Choice	35	18	8	Yield Grade 2	24	31	39
Low Choice	45	42	32	Yield Grade 3	59	52	46
Select	15	37	55	Yield Grade 4	1	4	5
Standard	0	3	5	Light Weight	0	1	1
Out Cattle	0	0	1	Heavy Weight	0	1	3

Table 2. Average Revenue per Head for Each Pen Sold Under Each Pricing Method.

	Live	Dressed	Formula A	Formula B
Pen 1	810	837	881	880
Pen 2	810	822	810	840
Pen 3	810	811	758	803
Average	810	823	816	841
Range	0	26	123	76

Note: Revenue for the dressed, formula A, and formula B pricing methods has been reduced by a \$10 per head transportation cost.

Each of the three pens was priced using the two actual packer formulas. The net carcass price ranged from \$117.81 to \$104.72. Average revenue per head for each pen on each selling method is displayed in Table 2.

From Table 2, it is apparent that the variability in revenue increases in going from live to dressed to the two formula price agreements. This revenue variability is a source of risk to cattle feeders. Feuz, Fausti and Wagner concluded that risk aversion on the part of sellers may explain the widespread use of live weight pricing and difference in risk aversion among sellers is a plausible explanation for the existence of multiple pricing systems in the cattle market. In a more recent paper, Fausti, Feuz and Wagner theorize

that many risk averse producers may be reluctant to sell on a grid or formula. Their assumption is that the expected return from the grid or formula will not be sufficiently higher than the expected return from live weight pricing to offset the additional variability in revenue. Certainly, this is the case with Formula A in the example above, where average revenue actually decreased relative to the live weight pricing method. However, the higher expected revenue from Formula B may be sufficiently higher to attract some risk averse sellers.

### Empirical Data

How do the results of the above three pens compare to empirical data? Actual carcass data was obtained on 42 pens of calf-fed steers. Most of these pens were mixed cattle from more than one source. However, some of the pens were uniform cattle all from the same ranch herd. Summary statistics on the carcass characteristics of the cattle are displayed in Table 3. Overall the steers graded 46 percent USDA Choice or higher, had an average yield grade of 2.75, and the average dressing percentage was slightly higher than 63 percent.

Revenue was simulated for the 42 pens as if they had been sold on the same \$68.20 live weight price, \$112 in-the-beef price, and the two actual packer formulas, Table 4. Average revenue was highest for the in-the-beef pricing method followed by live weight pricing and then the two formulas. The live weight pricing method had the

Table 3. Individual Carcass Characteristics of 42 pens (1471 head) of Calf Fed Steers.

Characteristic	Mean	Std. Dev.	Minimum	Maximum
Live Weight	1144	101.75	804	1511
Carcass Weight	717	71.38	464	964
Dressing Percent	63.17	2.0207	57.18	70.43
Marbling Score	4.84	0.6105	3.00	8.00
Yield Grade	2.74	0.6436	0.49	5.06

Note: Marbling Score and corresponding USDA Quality Grade: 3.00-Standard, 4.00-Select, 5.00-Low Choice, 6.00-Mid Choice, 7.00-High Choice, and 8.00-Prime.

Table 4. Simulated Revenue from Selling 42 pens of Calf Fed Steers on Alternative Pricing Methods (Dollars per Head).

Method	Mean	Std. Dev	CV	Min	Max
Live	778.88	32.6722	0.042	697	830
In-the-Beef	793.45	39.8303	0.050	709	856
Formula A	763.60	40.4674	0.053	657	835
Formula B	776.67	40.2835	0.052	671	845

Note: Revenue for the dressed, Formula A, and Formula B pricing methods has been reduced by a \$10 per head transportation cost.

least amount of revenue variation as measured by the standard deviation and the coefficient of variation. Variability, or risk, to sellers increased with in-the-beef pricing and increased even more with the two formula pricing methods.

Increased revenue variability may not necessarily imply increased risk, if sellers have a priori information regarding the expected quality of the carcass. Higher quality cattle are expected to receive a premium and lower quality cattle are expected to receive a discount when sold on a formula. However, if sellers believe that all their cattle are above average, then selling on a formula certainly increases revenue variability and risk.

Many believe that certain breeds of cattle are likely to be more profitable if sold on a grid. The 42 pens of cattle were classified according to the predominant breed in the

pen. The most profitable pricing method was identified for each of the 42 pens, Table 5. Pens that were predominantly Angus were also priced on the Scotch Cap Angus Alliance formula and pens that were predominantly Hereford were priced on the Certified Hereford Beef Grid.

The majority of the 42 pens were most profitable if sold in-the-beef. However, three out of four Hereford pens were most profitable on the Certified Hereford Beef Grid and four out of eleven Angus pens were most profitable on either Formula B or the Scotch Cap Angus Alliance. One pen of Simmental steers was most profitable if sold on Formula B.

Table 5. Most Profitable Selling Method by Predominant Breed of Steers in Pen.

Breed	No. Of Pens	Live	In-the-Beef	Formula B	Angus Alliance	Hereford Alliance
Angus	11	2	5	2	2	
Hereford	4		1			3
Gelbvieh	3		3			
Simmental	5	1	3	1		
Mixed	19	3	16			
Total	42	6	28	3	2	3

These 42 pens are probably not that representative of the entire fed cattle population. All of the pens were calf-fed steers, and they were all from the same feedlot. Different calf feeding programs and feeding yearlings rather than calves may alter the most profitable pricing method. However, in examining the characteristics of the pens that were most profitable on the formulas, some consistent traits can be identified that probably will hold true for the greater population of fed cattle.

To receive a higher net price from a grid or formula, the cattle generally need to grade over 65 percent USDA Choice.

To receive a higher net price from a grid or formula, less than 5 percent of the pen can be yield grade 4, light or heavy carcasses, USDA Standard, or other “Out” cattle.

To receive a higher net price from a formula, the carcass yield or dressing percentage of the pen needs to be equal to or greater than the plant average dressing percentage.

Predominantly Hereford cattle that meet the other eligibility criteria for the Certified Hereford Beef Grid will generally receive a higher price from the grid than from other pricing methods.

### **Implications**

The implications of these observations are that 1) some pens of cattle will never receive a higher price from a grid or formula and 2) pens that are going to be sold on a grid or formula should be sorted and any obvious “out” cattle, cattle that will receive a heavy discount, should be removed from the pen. These sorted “out” cattle could then be mixed with a pen that is not going to be sold on a grid or formula and receive the average price.

If a significant number of producers begin sorting their cattle and selling the higher quality cattle on a grid or formula and continue to sell the rest of the cattle on the live weight market or in-the-beef, then what are the implications for the quality and hence the price in the live or in-the-beef market? If packers identify that there is a quality difference

between formula priced cattle and live weight priced cattle, then they will obviously try and purchase the live weight cattle for a lower average price. However, if the grids and formulas base prices remained tied to the live or in-the-beef cash price, then the net price on the grid or formula will also decline. To be a “truly” value based pricing system, the premiums would have to increase if the base price declined for sellers to remain equally rewarded for producing a superior product.

An alternative solution to the above dilemma is to free the base price from the cash fed cattle market and to tie it to a box beef price or a weighted average wholesale beef price or index. From a market efficiency perspective, if an appropriate box beef or wholesale beef price could be used, then the price of fed cattle sold on a grid or formula would be tied more closely to the final consumer market. However, this base would not reflect changes in the hide and offal market that a packer bid may reflect.

As more cattle are sold on grids, formulas, and through alliances, the cash market will become thinner and may represent a different quality market. There are a number of pricing issues that we as agricultural economists need to continue to research and address.

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