Feeding-Margin
Hedging in the
Cattle Industry

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Historical records show that cattle feeding is a risky enterprise. In the 1970's alone, we have seen profit margins bounce back and forth from the extremes of high profits to large losses. Consequently, feedlot managers have searched for ways to reduce this variation in income, often with cash-forward contracts or futures contracts. One measure of this search is to observe that the volume of trading of the live-cattle futures contract has jumped from 0.6 million contracts in 1970 to 2.5 million in 1974 to 5.6 million contracts in 1978.

Some studies have demonstrated that selective use of the live-cattle futures market can stabilize, and sometimes increase, feedlot incomes relative to relying only on cash markets (Purcell, Hague, and Holland, 1972; Leuthold, 1975; McCoy and Price, 1975; Erickson, 1978). Basically, these studies showed that if the operator forward priced when the futures price exceeded production costs, and the futures market was ignored at other times, variances of incomes from feeding cattle were reduced, and sometimes incomes increased, relative to the cash market. Routine hedging always reduced risks, but at the cost of reducing incomes below levels which would have been acceptable to most producers. All of these studies assumed that production costs were fixed at the beginning of the feeding period.

The feeder-cattle contract, introduced in 1971, has increased alternatives and flexibility for the feedlot operator in attempting to manage risks. Feeding-margin hedging is the simultaneous forward pricing of major inputs and the output; for cattle this involves the simultaneous pricing of corn, feeder cattle, and fat cattle. An analogy, processor-margin hedging, has taken place in the soybean industry for years (Paul, 1966; Paul and Wesson, 1966) with many of the industry pricing strategies documented in Hieronymus (1977, pp. 231-32).

The question we focus on in this paper is: How sensitive are the futures market prices for major products in the livestock-feed grain sector to producer margins, and can producers use these futures markets to improve profit potentials and manage risks?

In the meat complex, three studies which examined feeding-margin hedging are known to exist. Kenyon and Shapiro (1978) investigated the expected broiler feeding margin by combining prices from corn, soybean meal, and iced broiler futures contracts up to nine months in the future. They found that selective hedging of the feeding margin simultaneously increased returns and reduced return variation to broiler producers. Shafer, Griffin, and Johnston (1978) examined the potential for simultaneous long hedging of corn and feeder cattle with short hedging of fat cattle for 47 pens of cattle located on the Texas high plains during 1972-1976. They found clear evidence that selective hedging only when a profitable margin was reflected—either the three-way hedge prior to feeding or a single live-cattle hedge during feeding—was superior to not hedging. That is, negative returns became positive due to hedging, and return variance was reduced substantially. Finally, Billings (1978) examined hedging policies together with the resulting increased financial leverage for Montana cattle feeders for the period 1966-1975. Relying largely on the cash contracting of inputs, he found that a hedging program increased annual earnings and reduced risks, and using that as a means to increase financial leverage usually, but not always, further reduced risks and improved return on equity.
In our study, we simulated a cattle feedlot typical of the Midwest and examined 234 feeding periods during 1972-1976. Futures prices were checked daily, beginning three months prior to the commencement of feeding, for the possibility of establishing a profitable feeding margin with a three-way hedge, the simultaneous long hedging of feeder cattle and corn and short hedging of fat cattle. If a profitable margin of a given size failed to appear prior to feeding, feeder cattle and corn were cash purchased and the search continued for a profitable feeding margin to establish a short live-cattle hedge. When using a modest $1 per hundredweight (cwt.) expected profit margin, hedging occurred in every feeding period. The highest profits were obtained when the operator waited for a $5.00 per cwt. profit margin to appear before forward pricing. Following simple profit-margin hedging strategies enhanced returns substantially, relative to the cash only strategy, while simultaneously reducing risks. Hence, a positive feeding margin occurred sometime during every observation and feeding period, allowing the feedlot operator an opportunity to establish profitable price levels. The main decision remaining for the feeder is the size of the margin to accept when forward pricing.

An open-lot shelter feedlot of 1,000 head capacity typical of Midwest conditions is simulated. Yearling feeder steers averaging 600 pounds are purchased and fed to a pay weight (after adjusting for 5 percent shrink) of 1,045 pounds. The 500 pounds of gain take approximately 175 days, meaning the lot has a production capacity of about 2,000 head per year. Allowing for a 15-year expected life of the feedlot, or 30,000 head, the capital investment of facilities and loan amortization results in a fixed overhead cost of $5.77 per head.

Nonfeed costs are adjusted on an annual basis. Veterinary and medical, energy, building and equipment repair, labor, and transportation costs are all calculated on a per head basis, and average about $17.60 per head during the 5-year period. Death loss and interest on borrowed capital for expenses are figured as a percentage of the cost of the 600-pound feeder steer. The percentage is adjusted annually to reflect interest rates.

The feed ration used for each animal is 49 bushels of corn, 1.32 tons of corn silage, 30 pounds of soybean meal, and 69 pounds of urea supplement (60 percent crude protein). All of the feed costs, except corn, are held constant during each calendar year, then adjusted annually. Corn silage prices are based on the annual price of corn. Soybean meal prices are averaged from seasonal prices quoted at Decatur. Supplement costs are determined from weighted annual values of urea, corn, molasses, salt, dical, and lime.

If the futures market is used, commission fees and interest on the margin money are included with the costs of the feeding operation. These costs are assumed constant within the year, but recalculated annually, and vary for different hedging procedures.

Two input costs, feeder cattle and corn, are determined separately for each feeding period, either from current cash prices or from adjusted futures prices.

Data sources. Daily futures prices for corn, feeder cattle, and fat cattle are obtained from either exchange yearbooks, or The Wall Street Journal. Weekly cash corn prices are obtained by averaging daily “track bid” prices as
quoted by I.H. French and Company of Champaign, Illinois. This price is f.o.b. and represents the price a feedlot would have to pay for corn in east central Illinois. The cash feeder-cattle price is the weekly average price for 600- to 700-pound Choice feeder steers at Omaha plus $0.80 per cwt., transportation adjustment. The cash fat-cattle price represents the weekly average for 900- to 1,100-pound “Illinois direct” Choice steers, the price paid at selected rural auctions in the state. Both of these latter prices are obtained from weekly issues of *Livestock, Meat and Wool Market News*—A Weekly Summary and Statistics.

The values of the nonfeed costs items were taken from either *Beef Cattle Feeding in Iowa 1974—Evaluation of Feedlot Systems*, Iowa State University, or *Farm Management Manual*, issues for 1973-1977, University of Illinois. Exact weighting schemes of these values can be found in *Mokler* (1978).

**Basis estimations.** In order to determine potential feeding margins for the feedlot from futures contract prices, the futures prices must be adjusted by the local basis. This allows the feedlot operator to determine target cash prices for feeder cattle, corn, and fat cattle.

Since corn is seasonally produced, and contracts are interspersed throughout the year, different basis adjustments are needed depending upon the season and the number of months before the maturity of the contract. Hence, seven different basis adjustment factors are calculated, ranging from 6 to 21 cents per bushel, each representing specific seasonal-storage situations. This adjustment factor is subtracted from the relevant futures contract price to determine a local cash-corn target price.

Only one local basis estimate, respectively, is calculated for feeder cattle and fat cattle. The target price for feeder cattle is determined by adding $.13 per cwt. to the relevant futures contract price, and for fat cattle $0.91 per cwt. is subtracted from the relevant futures prices. All of the above local basis estimates were determined statistically from cash-futures price data.

**Expected profit margin.** Prior to placing animals on feed, the expected profit margin (EPM) on a per hundredweight basis can be calculated daily using the following formula:

\[ EPM = [(\text{Fat cattle futures prices} - .91) \times 10.45 - (\text{Feeder cattle futures price} + .13) (1 + i) - \text{Corn futures price} - \text{basis}] + 0.49 - \text{Other variable costs} - \text{Fixed costs}] \div 10.45. \]

After adjusting each futures price by the basis to determine local target prices, this formula subtracts the expected total costs from the expected gross revenue to determine an expected profit margin per head. The result, when divided by the payout weight, is EPM per hundredweight. Note that an interest rate is multiplied by the expected cost of feeder animals to approximate capital charges and death loss. This rate is an annual cost of borrowing capital adjusted for time and other costs.

This formula can be modified to determine an expected profit margin, or “break-even margin” after feeding has commenced. Actual cash prices paid
for corn and feeder cattle can be substituted for the respective target cash prices.

Finally, another modification of the formula allows the calculation of net cash profits after feeding is completed, and that is the substitution of actual prices paid or received for target prices for fat cattle, feeder cattle, and corn. If the futures market is used, then gains or losses from these transactions, minus transaction costs, are combined with net cash profits to determine realized net profits.

One basic theme is utilized for all of the hedging strategies. Futures prices are compared daily beginning three months prior to feeding and if the EPM exceeds a specific predetermined value, feeder cattle, corn, and fat cattle are hedged simultaneously (three-way hedge). If the specific EPM is not met by the time feeding begins, feeder cattle and corn are cash purchased and the daily search for the EPM continues, but now all production costs are known. If the specified EPM is subsequently met during feeding, a single fat-cattle hedge is placed (single hedge). If the specific EPM is never found, no hedge is placed and final net profits are based on the cash operation alone.

The specific EPMs begin at $1.00 per cwt. and advance in $1.00 increments until there is no hedging in any of the 234 feeding periods. A strategy of using the cash market only and never hedging serves as a base for comparison. Hence, the feedlot is always filled to capacity.

Also, we examine if there are any advantages to searching for feeding-margin three-way hedges as opposed to searching only for a single hedge after feeding has begun, the procedure used in many of the studies cited above. Included are hedging strategies which search for the same specific EPMs, but involve only a single hedge. These latter strategies begin their search after feeding has commenced.

The first feeding period begins January 3, 1972, and ends June 19, 1972, while the last (234th) feeding period runs from June 14, 1976, to December 6, 1976. The feedlot purchased 77 head of 600-pound feeder steers biweekly, slightly more than one feeder-cattle futures contract, and markets alternately 39 and 38 head of fat cattle weekly, about the same as one fat-cattle contract each. Hedging corn is a bit more complicated since the 77 feeder animals are expected to consume 3,773 bushels of corn, and one contract calls for 5,000 bushels. Hence, a procedure was established to allocate corn needs among feeding periods and to hedge either 2, 4, or 6 feeding-period needs at once. In essence, the futures position in corn sometimes exceeded the cash position.

Hedges are placed in those contracts which will mature most immediately after the cash market must be entered for the respective commodity. Consequently, there is a five- to six-month time span from the feeder-cattle and corn contracts to the fat-cattle contract relating to any specific feeding period. Hedges are placed at the closing futures price of the day the specific EPM is reached, but since only weekly-average cash prices are available, hedges are lifted at the weekly-average futures price. Cash and futures markets are entered separately, albeit simultaneously, and delivery is not considered. If the three-way hedge is placed, the feeder cattle and corn hedges are lifted when the cash inputs are purchased, and the fat-cattle hedge is held until finished animals are marketed.
During the period from 1972-1976, the maximum EPM for three-way hedging was $6.00 per cwt. and the maximum EPM for single hedging was $18.00 per cwt. Thus, for EPMs from $7.00 to $18.00 per cwt., the results of the three-way and single hedges were identical since the three-way strategy automatically looked for a single hedge if no three-way hedging possibilities existed before feeding began.

Table 1 shows the number of feeding periods hedged at each EPM dollar increment. Note that at a $1.00 EPM, hedging occurred in every feeding period. Under the three-way hedge, this profit margin occurred 166 times before feeding began and 68 times after feeding started. As expected, the number of times hedging occurred decreased as EPM increased, and the number of lots of animals unhedged increased. Under the three-way hedge strategy, the number of lots hedged before feeding began decreased as EPM increased, while the number of hedges after feeding started increased up to a maximum at the $5.00 EPM. Hedging occurred in approximately one-half the feeding periods at the $6.00 EPM, and at the $18.00 EPM only two of the 234 lots were hedged.

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<th>Not Hedged</th>
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</tr>
<tr>
<td>5.00</td>
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<td>152</td>
<td>61</td>
</tr>
<tr>
<td>6.00</td>
<td>2</td>
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<td>144</td>
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<td>62</td>
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<td>12</td>
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<tr>
<td>5</td>
<td>259</td>
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<tr>
<td>2</td>
<td>232</td>
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More importantly—what are the risk-return trade offs between the various EPMs? As is customary in this type of analysis, risks will be represented by the variance of returns. The higher (lower) the variance, the higher (lower) the risks. Relative to some base, producers would prefer those strategies which generate higher mean returns at a lower risk, and not desire strategies with lower mean returns at higher risk levels. If both returns and risk are higher (lower) than some base, the most desirable strategy depends upon the individual’s preference for risk.
Figure 1 shows the relative risk-return positions of the various strategies for both single and three-way hedges (numerical results are in the Appendix). Note that all hedging strategies had a higher mean return than the cash only (unhedged) strategy, while strategies from $10.00 through $18.00 EPMs had higher risks than the cash strategy. Hence, all strategies with an EPM of less than $10.00 where clearly superior (preferable) to the cash strategy.

Most interesting is to compare the three-way hedge results with the single hedge results from $1.00 to $6.00 EPMs. This allows us to determine if searching for the three-way hedge before feeding was worth the effort.

\(^1\) Returns here are the realized net profits from the combined cash and futures market activities. These particular results do not include fixed costs, which would only shift the points slightly on the figure, but would not change their relative positions. Even at the $1.00 EPM, profits are high enough to cover fixed costs.
compared with just searching for a single hedge after feeding began. At the $6.00 EPM the results were virtually identical. For EPMs of $1.00 to $5.00, the respective means were higher for the three-way hedge compared with the single hedge, while respective risks were lower for the three-way hedge for EPMs from $2.00 to $5.00. Hence, the results demonstrate that the three-way hedge was clearly superior to the single-hedge strategy.

In both cases, the highest returns occurred at the $5.00 EPM, and that strategy was clearly superior to (dominated) all strategies with EPMs higher than $5.00 since the means were lower and risks higher for the latter compared with the $5.00 EPM. Which of the EPMs between $1.00 and $5.00 a feeder would choose depends upon the operator's aversion to risk. The more risk-averse person would tend toward the $1.00 EPM while the less risk-averse person would tend toward the $5.00 EPM.3

Between the $6.00 EPM and $14.00 EPM, the mean returns declined only slightly, while the risks virtually doubled. Close examination of the data revealed that during the 1972-1976 period, as every feedlot operator knows, there were times of large losses if no forward pricing was done. Forward pricing at even modest EPMs turned many of those feeding periods with negative profits into periods of gain.

**Implications**

Earlier studies cited above showed that applying selective hedging strategies to fat cattle sometimes produced results for a cattle feeder which were superior to not hedging in the sense that higher returns were generated at a lower risk relative to not hedging. Routine hedging has always reduced risks, but usually also reduced returns to unattractively low levels. Hence, the advantages of selectively forward-pricing fat cattle have been well documented. This study went further than previous works and examined whether the feeder ought to also forward price the major inputs, feeder cattle and corn, simultaneously with the fat cattle to establish a profit margin even before feeding began. The answer is clearly yes because between $2.00 and $5.00 EPMs, the respective risk-return results for the three-way hedge were superior to the single hedge.

Although we have not examined it empirically, one can imagine the financial implications of these results. If a feedlot operator can demonstrate to a lender how profits can be established prior to purchasing the feeder animals, considerable increased financial leverage ought to be obtained. Following such strategies should make it much easier for the feedlot to expand.

The other feature of this study distinguishing it from previous works is that one basic hedging strategy was used throughout with only the level of the EPM varying. The basic theme of this strategy was to compare the expected output price to either expected or known production costs. Most notable was that the $1.00 EPM hedging occurred in every feeding period. Hence, patience had its virtue in that sometime during the period immediately preceding

2 Data in Table 1 indicate that roughly 70 to 75 percent of the feeding periods involved hedging at $5.00 EPM.

3 Drawn on Figure 1 are income-variances efficient frontiers for the three-way hedge and single-hedge strategies. The optimal location on the frontier depends upon the individual decision-maker's utility function, and quadratic programming which combines means, variances, and covariances can be used to generate subjective risk-aversion coefficients.
feeding or during feeding itself a profitable feeding margin occurred. This characteristic is observed with the soybean processing margin; although often negative, it will become positive sometime so that a profit margin can be established. Hence, the cattle feeder must watch the futures markets and costs of production closely in order to take advantage of the varying profit margins. The timing of placing the hedges must be done selectively and not routinely. Highest profits were obtained in this sample when hedging occurred between 70 to 75 percent of the time.

This study raised some other issues which we will examine briefly. How close does the expected profit margin approximate the realized profit margin, or what were the basis risks? If a specific EPM was not reached by the time feeder cattle were to be purchased, was leaving the feedlot idle a reasonable alternative? And, if EPMs were large negatives, was “reverse” spreading possible and profitable?

*Basis risks.* We did a preliminary investigation of basis risk for the three-way hedge of EPMs of $1.00, $2.00, and $3.00, and found evidence to suggest that basis risks were fairly high. The mean difference between expected and realized profit margins were:

<table>
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<tr>
<th>EPM</th>
<th>Dollars per hundredweight</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>$1.00</td>
<td>-0.05</td>
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<tr>
<td>$2.00</td>
<td>-0.11</td>
</tr>
<tr>
<td>$3.00</td>
<td>-0.04</td>
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Although the means were fairly low, the variances of these differences were quite high. That is, sometimes the feeder made considerably more profit than expected, sometimes considerably less, but on average these swings cancelled each other out.

No attempt was made to identify which futures contract was causing the uncertainty in basis risk, but the cause was probably feeder cattle and/or fat cattle, and not corn. Previous studies have identified unstable basis relationships during the delivery month for livestock commodities (Bobst, 1979; Volink and Raikes, 1977; and O’Bryan, Bobst, and Davis, 1977).

The implication is that the producer should be aware of a potentially large basis existing during or near delivery month, and sometimes such relationships can be taken advantage of, but more importantly, the producer needs to be ready financially to withstand the unfavorable relationships which in the long run will be balanced with favorable basis relationships.

*Unused feedlot capacity.* Another alternative available to a feedlot operator is to leave the feedlot empty if an EPM of a specific size is not reached by the time feeder cattle are to be purchased. Again, a partial examination of this was made to get some indication of the pattern of results. The underlying operating assumption was that if a specific EPM was not reached, feeder cattle were not purchased for that feeding period. Whenever the next subsequent feeding period occurred where this specific EPM was reached, the whole feedlot was filled to capacity, regardless of whether the lot was empty or partially filled. This created “lumpiness” in the movement of stock through the lot. The results here ignore fixed costs, but they would have to be allocated...
over a fewer animals, a comparison we have not made. Hence, we cannot provide a final recommendation, only a comparative indication.

The above nonfeed strategy was tested for three-way EPMs of $1.00, $2.00, and $3.00. The results are:

<table>
<thead>
<tr>
<th>EPM</th>
<th>Number of periods feeding</th>
<th>Mean returns</th>
<th>Variance of returns</th>
</tr>
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<tbody>
<tr>
<td>$1.00</td>
<td>208</td>
<td>1.81</td>
<td>9.01</td>
</tr>
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<td>2.00</td>
<td>156</td>
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<td>3.00</td>
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The mean returns per head for $1.00 and $2.00 EPMs were nearly the same as for the previous results with continuous feeding, but these results were for less feeding periods. Thus, total annual profits would be less from leaving the feedlot empty on occasion. The comparative results for an EPM of $3.00 were more ambiguous as feeding occurred in only 130 periods. Once these returns were adjusted to account for the additional overhead per animal, and to reflect a full 234 periods, total profits on an annual basis for a $3.00 EPM would probably be about the same whether the feedlot was kept full continuously or allowed to be idle on occasion. Which procedure a feeder would prefer depends upon capital requirements, labor commitments, and so forth.

These results are in line with those of Shafer, Griffin, and Johnston (1978) where feeding cattle only when positive margins can be established gave desirable results, but feeding occurred in so few periods that total profits were often less than when feeding full time and hedging selectively. That is, strong evidence cannot be found which recommends that a feedlot operator leave the feedlot idle if a positive EPM is not observed prior to the time of placement. Rather, the operator should feed continuously and search for a positive EPM during the feeding period.

"Reverse" spreads. Looking for positive feeding margins raised the possibility that if the EPMs are large negative values, economic forces should eventually bring price relationships back to a positive position. Thus, an operator might consider a “reverse” spread when observing a specific negative EPM, that of simultaneously buying fat-cattle futures and selling corn or feeder-cattle futures. Similar strategies are practiced in the soybean processing industry.

Using the daily EPMs as calculated in this study, results from establishing hypothetical “reverse” spreads when the EPM reached a specific even dollar size were examined. Negative EPMs ranged from -$1.00 to -$7.00 per cwt. during the period studied here. The strategy tested was to establish and hold the “reverse” spread until shortly before maturity of the most nearby of the three contracts, then liquidate all three contracts simultaneously.4

Our results generated positive trading profits for each negative EPM. However, for -$1.00 and -$2.00 the variance was very high which might discourage many hopeful traders. The most promising results came in the -$3.00 to -$5.00 range.

4 Obviously this strategy could be followed by any investor, not just cattle feeders, if they are capable of calculating EPMs.
Specific results are not important here since they are not tied back into the feeding operation. However, they do suggest that cattle feeders should be aware of large negative EPMs which might be utilized to enhance the profits of feeding.

Conclusion

The results presented here demonstrate that selective use of the futures market by cattle feeders has a high payoff. Of course, many other risk-managing techniques are available and may be as attractive as the futures market, but complete avoidance of using any risk-management device is very costly. As shown here, application of a straightforward hedging strategy enhances profits considerably along with reducing risks.

Once using the futures market, our results show a considerable advantage of searching for a positive feeding margin before feeding begins in an attempt to establish a three-way hedge, as opposed to searching for only a single fat-cattle hedge after feeding commences. The futures prices for corn, fat cattle, and feeder cattle are apparently sensitive to each other in the context of required feeding margins.

These results show that at low EPMs, hedging could occur in every period. That is, sometime during the planning and feeding period, a positive feeding margin was observed. Of course, each feeder must decide whether to take market positions and establish a profit level when a positive margin first appears, or to wait for larger margins, knowing that some lots of animals will never be forward priced. Our maximum return was generated at a $5.00 EPM.

This study is only a partial investigation, and additional research is suggested concerning basis risk, idle feedlot capacity, incorporation of reverse spreads to increase positive margins, and the implications of feeding-margin hedging in potentially increasing financial leverage. The hedging procedures themselves can be made more realistic and flexible by integrating hedging with speculative judgments, altering the proportion of stock to be hedged in the search for an optimal hedging level, and searching for potential cycles in the profit margin. These latter suggestions are refinements of the current model and would be helpful, but would not detract from the basic conclusions and findings of this study.

Cattle feeders should realize the importance of a plan for managing risks while feeding cattle, and this study demonstrates advantages of managing feeding-margin levels through the futures contracts for corn, feeder cattle, and fat cattle.
References

### Appendix. Means and variances of hedging strategies

<table>
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Robert Josserand: As an old cowboy from Texas I feel a little out of place today with the academic records of everyone who is here. But I guess in each of these sessions they need somebody with farmer's boots on to talk about these things. I guess I qualify.

Similar studies, as Ray Leuthold mentioned, have been completed; and he quoted several of them as sources for this paper. I happen to be familiar only with the one handled in Texas and not as familiar with some of the others.

The problem that we in the cattle feeding industry have with any study—and I realize it cannot be done away with—is that these studies are theoretical findings versus what we call “the real world.” That real world is the place where the basis gets way out of balance, or the winter storm comes along and tears us up for three months. It is difficult for me to look at any theoretical study when I’m out there knee-deep in a blizzard. Also, in the real world, no operation is average. So, as I look at this particular study and other studies, I have trouble relating to the average. Ray alluded to this earlier when he said that this particular study and many others are rather inflexible in scope. Also, and I say this somewhat out of the side of my mouth, I think to interpret and apply findings about the average operation can certainly have detrimental effects for an individual business. This doesn’t detract, as far as I’m concerned, from these findings. But I think that it definitely does need to be noted.

I’m going to make some general comments and then possibly get into the specifics of this study. A very relevant aspect of this particular study is its time period, 1972-1976. The study noted that the highest profitability was obtained when 70 to 75 percent of the sample was hedged. Of course, most of these years fall into the bear-market situation that coincides with the liquidation phase of the cattle cycle. In my opinion, the results would differ quite significantly if the time period was during the expansion portion of the cattle cycle or in the current bull-market condition. In light of this, it’s difficult to come back to an average situation and talk about only a relatively bear market.

The treatment of cost is somewhat standard in this particular study, as it is in many others. I feel that perhaps this particular study has some shortcomings that could be overcome. With the exception of some very definite fixed costs, I do not believe we can annualize the other remaining costs. Of course, feeder cattle and corn costs were not annualized. When we annualize our other nonfixed costs, I feel that unrealistically locks us into an average situation.

One of the areas I have the most trouble with in this study is the wide fluctuation we have seen, particularly in the recent bull-market situation, in the relationship of basis. If this study was being completed right now, the basis relationship risk would be much higher than what it was at the time the study was done. That basis risk distorts the study in my mind to some extent. We’re delivering cattle every week; we’re delivering cattle in those months not covered by futures, other than down the road. I think this basis risk becomes an extremely explosive fact if we’re doing it in actuality.

Another problem is the position of that risk in relationship to feeder cattle and feeder cattle procurement. I realize that a farmer feeder in Illinois or the Corn Belt could possibly do a better job than those of us in the commercial cattle feeding business where we have to be concerned with large volumes of livestock. But one of the areas, again, that I had some difficulty with was procurement based upon feeder cattle contracts in a three-way hedge. The work that we have done in my organization has pretty much prevented us from covering a three-way feeding margin program. We had no problem with corn. We always had a problem either with converting the feeder cattle contract to cash cattle or we had a problem with the live cattle futures. So I feel it’s rather impractical for us as a group—that is, the
larger feed-yard operations—to talk to our customers or to anyone about a very viable program using feeder cattle contracts, live cattle contracts, and feed contracts. We certainly have not been able to make it work as, theoretically, it should work.

I liked Ray's first comment which said historic records show that cattle feeding is a risky enterprise. My father used to say you could always tell a cattle feeder because he either died very rich or very poor, depending upon when he died in relation to the cattle market. Those of us attempting to be in this risky business and to use the futures, I think, tend to overlook sometimes the advantages we have with the futures market. But also, in a sense we are unable in actuality to do some of the things that should be possible from a theoretical standpoint. We tried the negative-variance method back in 1973-1974 when we were losing our shirts, and it just helped us lose a little bit more. Perhaps that is a viable option to a student of the business from the investor's standpoint, but I seriously question if it is a feasible approach for the average cattle feeder.

Your figures on when to have cattle in the feedlot or not become clouded in my opinion. In our work, we have to have those pens full. Almost without exception, the cattle feeder, whether small or large, usually is better off having cattle in his pen.

In closing, I think the paper is a very fine basis for discussion, and certainly I find nothing in it different from what I would probably prepare on a theoretical basis. But I have to say that at no time during the period the paper considered could we, with our large feed yards, have hedged our cattle even at a $1 expected profit margin and made it very successful. We certainly have tried both in Texas and other parts of the Panhandle to make this type of program work, and we had to look at a minimum of $5 expected profit margin if we were to make the program work at all.

Raymond Leuthold: I think our results, Mr. Josserand, bear you out on the $1 profit margin. The means came so low that I don't think anybody could recommend that. I think one would have to look for at least about the $5 level. So, I think there's no conflict on that. I viewed the remarks to be primarily those of the problem with any empirical study. It has to abstract from reality a bit, and then it loses some of its realism. I would like to see the results also if we carry the study on through 1978 and into 1979. I think there could be some different results. But I don't think one could look at this paper and say that there are any conclusions to recommend to an individual feeder. I think the prime point of the paper is what's happening to the price relationships among the three commodities. We're finding that the price relationships at times do reflect a profit margin that can be attractive, and it's up to the individuals to decide how they want to use and take advantage of that margin. To this point in time there has not been much knowledge about the margin as reflected on the futures market. I think one has to take the results and interpret them according to his own situation. They will vary a lot from individual to individual.

Scott Mokler: I would like to comment only on the reverse spreading and the spread's narrowing in the first place. If, for example, we put the three-way spread on, and it gets to the time you put the cattle in the feedlot, and the margin is gone, then why even feed the cattle to begin with because the place you're going to make the profit is in the futures market. Now, if you come to a negative basis at the time of feeding, why buy the cattle? Why put them in the feedlot? That's what the whole thing is about. Bob Josserand indicated that reverse spreads did not apply to the feeder. Well, it's basically a speculative move anyway. I don't think it's fair to the feeding operation or to the futures markets to roll those profits into the feeding program, because it is a speculative move and you've already made that money. So why go back and plug that in and say this is what we made off feeding cattle? You feed the cattle, and you figure you're going to make the money in the cattle operation. Now, if you put the three-way hedge on, and you get to the time that you're going to go ahead and put the cattle in the feedlot, and you've contributed a large portion to the futures markets, then you have to go out and feed the cattle to recoup that. You cannot just say you are going to volunteer this to the market because then you plug it all back in; you put the cattle in the feedlot, and then you'll recoup those losses. I think that there's a lot of
leeway here in how you would actually handle this. There would be many times when you would never put the cattle in the feedlot. We never did look at how much you actually made in the futures market, and if it was worthwhile to go on and actually feed the cattle. So, really, the whole area of the spread and reverse spread action needs a lot more in-depth analysis before you can say at what optimal levels you cut it off. But as far as the feeder is concerned, reverse spreads should never be counted as part of the feeding operation. If you made money there, there's obviously no reason to feed the cattle.
Discussion

Ben Branch: It seems to me that there are two different aspects to this study. One, which I find very interesting, is to look at this as a trading rule. Never mind what happens in feedlots. Would it be possible to test the analysis as a trading rule, taking account of transaction costs and looking at the kind of return you would get on your investment in the contracts? Is there a profitable trading rule here on the basis of at least the past experience?

Scott Mokler: I hope so. We didn’t address it, and I don’t know what the full potential is. I feel that there is a very big potential if you’re willing to follow the method and to wait on it. I also think you ought to be ready to feed the cattle. If you put the three-way hedge on at a profitable position and they work against you, you can recoup your loss by being ready to feed cattle. So there are several methods one can use. I can’t quote any specific results, but it is my feeling after working on this that there is a lot of potential involved.

Hans Stoll: I had one overriding question as I was listening to you talk, Ray, which is: why is there a free lunch? It seemed to me that you were making money hand over fist here. I think that was Bob Josserand’s question as well. He didn’t seem to be able to do that during this period. Why was that? And I think I know the answer. You can take the data for any period, whether it was a bear period or a boom period, and figure out a rule after you know the prices that will be profitable. People who figure out trading rules, using actual data for some historical period, will come up with a profitable trading rule. There’s bound to be a rule that makes money. You’ve come up with a set of hedging strategies that did make money over that period. The question is whether the same set of strategies will be profitable in the future, and I would think it highly dubious.

One suggestion: apparently you didn’t do a stochastic simulation. In other words, you could estimate the means and variances over some historical period for feeder cattle, corn, and fat cattle. Then you could make random drawings from each of these distributions, rerun it many times, then give the results. They might show that 60 percent of the time profits will be within certain limits; 10 percent of the time there would be losses; and 10 percent of the time there would be profits. In other words, use the actual data and then find a set of rules that makes profits. The question cattle feeders are concerned about is the unknown future fluctuations. If you use inputs probability distributions on each of the futures contracts that you’re dealing with, you could better reflect those uncertainties in the future.

Ray Leuthold: On your latter point, I agree it would be an interesting thing to do. One thing that’s different from our study as opposed to other sorts of hedging strategy studies is that the others tended to do what you suggest; that is, put down a dozen different strategies to see which one comes out the best. Obviously, you cannot take that and project about the future. But our approach is slightly different in that really there’s only one strategy that’s being used, that is to look at the expected profit margin. Now, $5 came out to be the highest mean. Over the next period of time, it might not be $5. But there’s one basic theme throughout and that is searching for a profitable margin and attempting to take advantage of it.

Roger Gray: Ray, I just want to understand how you did the measurement of your reverse crush positions? It’s my impression that in a soybean processing operation, it’s on those occasions when you close your plant that you’ll put on a reverse crush. I thought I understood you to say that you run yours differently.

Ray Leuthold: One starts looking for a profitable margin three months before placing the cattle on feed. If it is negative and of whatever size you were looking for, you put on the reverse crush and hold that position until it is time to place the cattle on feed. So, we looked at just that
time span. It was not tied into the cattle feeding operation.

Roger Gray: So during the period you had on the reverse crush, you were not feeding cattle?

Ray Leuthold: No, the feedlot was full. It was during that time period you were searching for a profitable margin to put on a three-way hedge.

Roger Gray: You looked at a situation in which you said at certain times we'll just empty the feedlot, right? What if on only those occasions, you did in fact leave the feedlot empty and put on the reverse crush. Have you tested that result?

Ray Leuthold: No, but those decisions were made independently. The reverse crush was only held up until the time you decided to leave the feedlot empty, and then you removed your reverse crush.

Gordon Rauss: Two issues bother me with regard to the implementation of these sorts of results. First, when you're looking at markets—two of these markets at least—you can put on a spread by a price order. But in the case of the three-way hedge including corn as well, you're going to have to leg into the corn side of the three-way spread. And when you did the computer analysis, I don't presume you took into account the possibility that there may be a period of time in which the spread profit margin of $1 was there; but in terms of actually implementing the strategy, it wasn't there. That frequently happens with computer analysis when you look at different sorts of strategies. They come out very favorable until you take into account the uncertainty and risk associated with the actual implementation.

The second thing I was curious about is that you included interest on margin. I would think that these hedges would use T-bills. If they use T-bills, the risk they would face is maintenance calls in terms of liquidity risk. That is another risk you have to take into account since it certainly would exist when you had these periods of large losses.

In general, the overall analysis is very useful in calling attention to the possibility of placing these three-way spreads, but, at the same time, it is inflexible. You wouldn't take this framework to any particular feedlot operator and tell him to use it to determine at what points in time he should put on a three-way hedge. It seems to me, however, you could construct a framework in which judgmental assessments on the probability distributions of forecasting each of these three prices could be incorporated. In addition, you could also introduce the flexibility on the feeder weight and the live cattle weight. And if you went a step farther, you could incorporate probability distributions on the basis risk and the liquidity risk which are the two major risks that any hedger would face. Have you thought about that sort of framework?

Ray Leuthold: Yes, those extensions could be done and probably wouldn't be too difficult. However, about the margin cost, my guess is that it was fairly minor relative to all other costs. I grant that a larger trader will use the T-bills. I recognize that.

Gordon Rauss: But is that equally true if you're faced with a situation where you put the three-way spread on and each of the elements of the spread moves against you? Then you could be facing large losses and you would have to come up with additional funds which would be fairly important. Conceivably you could face large interest costs to maintain the three-way spread until the terminal point on the contracts.

Ray Leuthold: You have to remember though, that the person still has the opportunity to feed the cattle and recoup his losses there.

Scott Mukler: Other than that, if the cash market performs so poorly in comparison (and we assume the theory that cash and futures converge at delivery time) over the long haul, the producer would have actually made money because most of his profits would have come from the futures market. While that money is coming in, and your profits on your futures positions are accumulating, you would actually end up making more money if you were collecting interest on that money.

Gordon Rauss: But if you're talking about different locations, what do you mean by converge? Clearly the transaction costs of moving the product from one point to another could change over an eight-month horizon rather drastically, and have been known to do so.
That basis risk can't be swept under the rug because it is large and there's no way of divorcing yourself from that.

Ray Leuthold: I'd like to address what you were saying about legging into the spread, and one of my bigger reservations about what we've done. I don't think, as you say, the corn leg is really the problem. I think the liquidity in the corn market would be very easy to handle. In my mind, the problem with our study is that it ends at the end of 1976. That means the last feeder cattle contract was actually offset in the middle of the summer of 1976. One of the initial points we wanted to look at was the feeder cattle market and how it affected profit margins. If you take the feeder cattle market over the 1972 thru 1976 period, I think you'd find you would have a very tough time getting a lot of the spreads that were there. It wasn't a very liquid market. It is just now becoming liquid. I think that might have been one of the bigger problems involved in actually implementing the whole program. You would have your toughest time getting the feeder cattle prices that were necessary to make the profit margins what we say they are.

Allen Paul: Fed cattle are traded every other month and your exercise postulated delivery of cattle every week. Is the basis slippage worse between delivery months? Could your study throw light on this? Or, another way, you could choose to feed cattle every 60 days rather than every week. This would, of course, give you some kind of lumpiness. The cattle feeder market, as I now understand it, cannot be entered easily and there would then be additional problems. I can now realize some of these problems. My other comment stems from something Mr. Josserand said about the unrealism of this average exercise. What may not have been sufficiently brought out here is the linkage of poor bases, one with the other. If you have what used to be called a linkage of risks—that is, they come in bunches rather than randomly—you could go bust before you come out on top. This may be what Mr. Josserand was referring to.

Scott Mokler: First of all, on the nondelivery month contracts. One of the things that I questioned before we even started was the alternative of using the next deliverable contract after the time production was done. Suppose the December contract just expired and we're starting to use the February. (There's a January contract now, but there wasn't one when we did the study.) Why not, if you're in the first week of January, use the December option and just close it out two weeks early? I don't know. Maybe that would reduce the risk at that point because you're actually closer in December to the January completion.

Further study along this line might give us the answer as to how much more variability in the basis is attributable to those nondelivery months versus the months when the contract is actually coming due.

Anne Peck: I was just looking at your expected profit margin figures in Table 1. I was curious if you had any feel for why it was that the three-way hedge had a maximum expected profit margin over the life of the three-month prefeeding period of $6, whereas something that gets closer and closer to an actual profit margin got up to as much as $18.

Scott Mokler: Once you put the cattle on the feedlot, the price of the feeders can't go up on you. You're getting those $18 margins when you have the feedlot filled up. You're feeding the cattle, you've already paid for the corn, and there's a bull market in cattle. It just keeps going up.

Anne Peck: In fact, you would be looking at that set of spreads for your next feeding operation, and they're not reflecting anything like the current cash spreads.

Scott Mokler: No, because the feeders are going up and eating up that profit. You're going to be losing the feeder cattle contract and short the fat cattle contract. As the profit keeps increasing for those already in the feedlot, you're going to eat up those profits by putting on the short live cattle at the same time. They're going to be moving against each other. So from what we did, you can say that the band of the three-way spread is going to be a positive six to a minus seven, the same as our empirical results showed. Other than that, I just don't think you're going to be able to see anything. I think we all have questioned the ability to really get something off at that level anyway.
Anne Peck: You referred to the soybean crush. It was always my understanding that one was likely to get a larger crush out of futures at some one point during the year than he might if he did it “average cash” over the year. This seems to be the reverse of that.

Scott Mokler: If we actually put the dates down when these three-way hedges were placed, you would see that when the profit return reached the maximum of $5, you were putting a great number of cash on the spreads all at the same time. So at any one time over our 234-feed-period test, we may have put on 30 or 40 feed periods at the same time. So you are carrying a huge position.

Anne Peck: But your figures seem to me to be a reversed set of results. It is my impression that a soybean crusher could do better by placing it ahead than if he waited for the average cash results over the life of the crushing season. Here you’re suggesting that the maximum is much smaller than the maximum on the actual profit margin.

Scott Mokler: According to what you say, our cash would have better results than the actual hedging, but the cash was the worst of all. Admittedly in a bear market liquidation phase, it would be very interesting to carry our study through to see how the cash performed over a 10-year period including 1977 through 1981. I’m sure that the cash will not perform nearly as poorly over that whole time as it has over the five years covered in our study. I don’t think it’s really reasonable to assume that overall cattle feeding was unprofitable when we’ve seen a lot of people through the years do very well at it without ever hedging. Post-1973 prices have increased the volatility of the markets and have required a lot more capital to stay in business. But in any situation, typically, the highest risk situation should also be the highest profit. What we’ve seen is that really the highest risk of the viable alternatives was also the lowest profit, and I don’t think that you can expect that to hold over a longer time period.

David Rutledge: About these expected profit margin figures that you’re working with here—how do they translate into rates of return on capital tied up in a feedlot?
Bob Oehrtman: I'd like Bob Josserand to
comment on his statement that large feeders need
to have some cattle in their feedlots at all times.
In 1975, we saw a number of large feeders not
replacing their cattle when they come out of the
feedlot. It seems to me that your statement would
be true only if their fixed costs were pretty high.
I'd like to have a response to that.

Robert Josserand: I was referring to the large
feed yards in the Southwest particularly, but I
think it holds true anywhere. The debt overhead
is such that they must have those cattle in there in
order to service that debt. As for the situation in
1975, the only reason I think that we did not see
the number of cattle on feed was that many large
feeders who fed prior to that time had lost their
equity and were unable to come in.

Reynold Dahl: Mr. Josserand, you raised the
question about the success of the hedging
exercise in this paper as it related to the part of
the cattle cycle you were on. During that entire
period of 1972 to 1976 were we on a liquidation
part of the cattle cycle?

Ray Leuthold: In terms of inventory numbers,
yes. But prices were quite volatile in the interim.

Reynold Dahl: Well, during 1973-74, we had the
big run up in cattle prices. Then they came back
down. But your data period has not caught the
upward trend in prices we've had in the last year
or so which is now coinciding again with the
buildup phase of the cattle cycle.

Ray Leuthold: Right, we ought to go to 1976.
But during 1972 to 1976 prices went up and
down.

Robert Josserand: Let me just interject a
personal opinion. I cannot verify it nor do I
know if anyone can yet. Since we've started our
bull market early this year in 1979, I would
question if a similar type of hedging program as
studied here would do anything at all except
show a very minimal return or possibly a loss.
What we saw in the time frame studied here was
an expected price freeze, which caused some
gyrations in price we'll probably never see again.
We saw the consumer resistance movement. We
saw Nixon's price freeze. We saw a lot of things, I
think, we'll never experience again, or at least I
hope we won't. To be a valid study, this
particular situation needs to be extended over an
entire cattle cycle time frame.

Ray Leuthold: Sure, but don't forget that even
now in the bull run of 1979, both feeder cattle
and fat cattle are going up, and our analysis was
done really on the spreads. So you might get
different results looking at spreads as opposed to
levels.

Robert Josserand: This is true, Ray, but the
difference in those spreads and the difference in
the basis risk of those spreads, I think, would be
an entirely different picture than what we saw in
this study.

Gordon Rausser: I would agree with that
observation because as it turns out, if you look at
the feeder prices versus live cattle prices, that
spread is an all-time high with premium feeders.

Scott Mokler: It was recently but it's not right
now.

Gordon Rausser: In fact, I'm wondering why
everyone is calling this a bull market of 1979. I
thought it was increasing throughout 1978 aside
from late May and early June. The thing that
bothers me about your sample period of 1972-
1976 is that you had only about a year or a year
and a half of increasing prices.

Scott Mokler: That's fairly close.

Gordon Rausser: I have another observation on
the markets for these three-way spreads. As I
understand it, brokers will only deal in the
feeder/live cattle spread, but they won't deal in
all three spreads. Maybe this study will create the
necessary incentives for brokers to begin to deal
in all three spreads.

Scott Mokler: You're never going to put all three
in one spread. You will have to trade the corn on
its own, and then spread the feeders and live
cattle.

Gordon Rausser: No, I don't agree with that. If
you pay a high enough commission, you'll get all
three at once.
Allen Paul: Custom feeding is an alternative to placing cattle in lots and hedging them. Up until some date, there was a certain tax incentive to custom feed. Then something happened to the tax laws. I'd like someone who's informed on the realities and institutions of this market to give us a short summary of the comparative advantage or disadvantage of entering into these cattle feeding enterprises one way or another vis-à-vis the tax laws.

Robert Josserand: Contrary to what some people might think, there is considerable tax feeding still going on. In fact, in The Wall Street Journal today there's an article about it. We can't say that tax feeding has completely disappeared, but certainly it has diminished to a great extent. From my standpoint, hopefully, with this diminishing of tax feeding, both the actual cash cattle market and the futures market can be leveled out and adjusted to a more realistic fundamental basis than it could when we had all the tax cattle.