Pricing Feedlot Services Through Cattle Futures

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IT IS NOW commonly accepted that the difference between the prices of grain for spot delivery and deferred delivery is a payment for storing grain. The difference is called the carrying charge or the price of storage. Thus, at harvest time, the prices for deferred grain deliveries exceed the prices for spot grain deliveries by an amount necessary to induce someone to store the grain.[1]

In an analogous way, the spot-forward spread between two forms of a commodity appears to be the market price for converting one form into the other. The authors recently made such a study of the soybean crushing industry (9).[2] It was shown that the spread between spot soybeans and forward soybean products is a competitive price for crushing services.

We now propose to establish that the spot-forward spread involving feeder cattle, feed, and fed cattle is a price for feedlot services. In the case of soybean processing, the value of a bushel of soybeans subtracted from the value of oil and meal derivable therefrom and deliverable at the end of the crushing period is the price of crushing; in the case of cattle, the value of a feeder and feed subtracted from the value of a fed animal derivable therefrom and deliverable at the end of the feeding period is the price of feedlot services. The hypothesis is that there exists a positive and significant relation between this price and quantity of cattle feeding services.[3]

Trading in fed steer futures for Midwest delivery has been continuous since its start on November 30, 1964, and the volume has been substantial. By the end of 1966, there were 16,539 contracts outstanding (15,474 open contracts on the Chicago Mercantile Exchange and 1,065 open contracts on the Chicago Board of Trade). This amounts to about 362,000 steers at 1,150 pounds per steer. If half of these contracts represented feedlot selling (the other half, spreading and speculation) and if the feedlot turnover averaged 5 months, then about 434,000 steers would be involved, on an annual basis. This is 8 percent of the estimated annual slaughter of Choice steers in the North Central States.[4]

While this percentage is small (and it was even smaller near the beginning of futures trading), it can fairly well reflect changing competitive relationships over a wide market area. Since cattle futures trading is new, the sparse historical data on it permit only a tentative interpretation. We need to rely on knowledge from other futures trading, particularly soybeans, to guide our inquiry.

But one must guard against pressing analogies too far. There are important differences between processing soybeans and feeding cattle. The latter process takes more time, can be entered into at almost any stage, and results in a nonstorable commodity. These differences have a bearing on the interpretation and handling of data.

[1] Strictly speaking, the word "spot" allows no interval between transaction and delivery dates. But in practice, short intervals enter, e.g., 3-day, 5-day, or 10-day shipment of grain. In the present discussion, we use the looser interpretation.

[2] Underscored numbers in parenthesis refer to items in the Bibliography, p. 45.

[3] In the short run, the quantity supplied would also depend on existing feedlot capacity and other factors. In view of the fact that this article examines data for only 2 years, we shall assume that changes in capacity have been relatively small. Some theoretical arguments on how to enter capacity in short-term supply response relations are discussed briefly in (9).

[4] There are no data showing the use of cattle futures for different purposes. In general, the most successful use of the Midwest contracts by feedlot operators would be in the North Central region.

Moreover, recent data show that in the cattle feeding business there exists an extensive system for pricing feedlot services through custom-feeding arrangements. These are the various arrangements entered into by feedlot operators to feed cattle owned by other operators for a fee. Hence, we also need to take the role of custom feeding into account, and show how it resembles and differs from futures trading. This will set the stage for examining the pricing of the feedlot services through futures and the relation of prices and costs. At the conclusion, some general implications of the overall analysis will be given.

Role of Custom Feeding

The rise of large feedlots and custom feeding tend to go together. Williams' recent survey of 15 States (16) shows that more than 40 percent of the cattle marketed by feedlots with capacities of 5,000 head or more were custom fed. Below 5,000 head, the importance of custom feeding tapered off rapidly. Above 30,000 head, custom feeding tended to give way to partnership and other enterprise-sharing arrangements (figure 1).

Logan and King (6), in a study of commercial feedlots in California, found that cattle marketings by 56 identical feedlots increased 87 percent from 1957 to 1963. They concluded that custom feeding accounted for almost all of this increase.

Various studies (5, 16) suggest that costs may be lowered by increasing capacity to 5,000 head. Additional economies in buying, transporting, and selling might be gained in larger operations. Capital requirements for a 5,000-head operation would be relatively large--over $1 million for feed, feeders, and feedlot services.

The need for outside equity is understandable. But the reason why such equity moves into

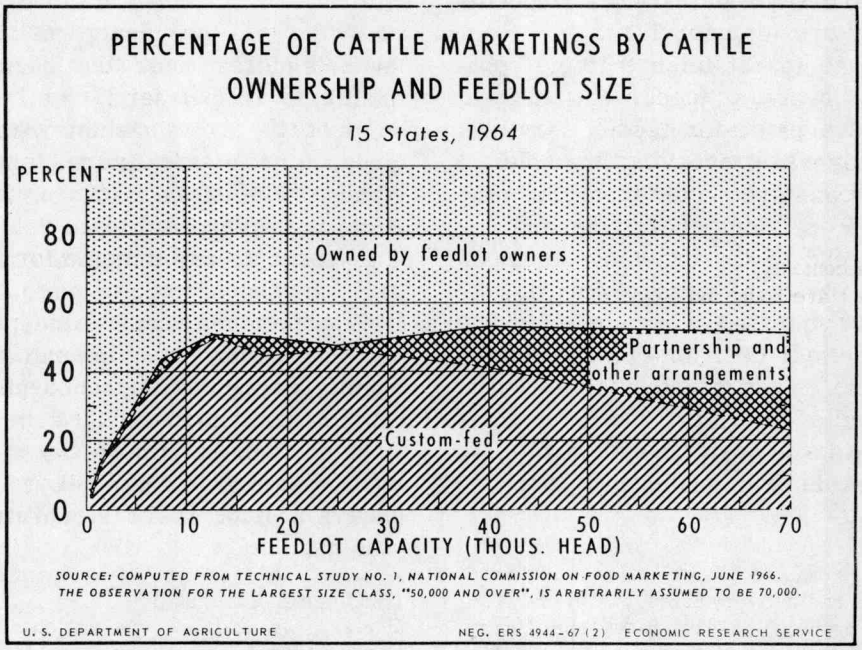

Figure 1

cattle feeding are beyond the scope of this paper.[5] It suffices to observe that large operators attract relatively more outside equity through custom feeding than small operators do, and thus they can use their plant more completely.

This is the view of some students of the industry (6, p. 24; 16, p. 20). It is supported by survey data showing that the ratio of cattle marketings to feedlot capacity rises as the feedlot capacity increases (table 1). In 1964, feedlots with 8,000 head or more capacity had over one-third more turnover than lots with less than 4,000 head capacity.[6]

The financing of production is subject to scale economies. Equity or loan funds usually can be provided more cheaply in large units than in small units, but we do not know the importance of such cost differentials. In any case, data in figure 1 and table 1 suggest that a feeder would need a capacity of about 10,000 head to attract the outside equity needed to operate close to its minimum average cost.[7] Logan and King (6) showed that virtually all the growth in cattle marketings in California between 1958 and 1964 was associated with increased numbers of feedlots with 10,000 head or more capacity. A plausible hypothesis is that financing and not operating economy is the strategic factor in growth of large feedlots.

Table 1.--Ratio of cattle marketings to capacity of feedlot, by capacity size groups, 32 States, 1964 [1]

Capacity of feedlot (head)	Number of feedlots	Ratio of marketings to average capacity of feedlot[2]
1,000 - 1,999..	808	0.84
2,000 - 3,999..	421	.87
4,000 - 7,999..	242	.92
8,000 - 15,999..	120	1.22
16,000 - 31,999..	34	1.33
32,000 and over..	10	(3)

[1] Based on data in (13).

[2] Average capacity is taken to be the midpoint of the class. See text, footnote 6.

[3] Not estimated because the class is open-ended.

Viewed diagrammatically (as an envelope of cost curves for plants of different scales), smaller feedlots operate higher on the descending phase of their own cost curves than large feedlots do. Hence, the differentials in realized costs between small and large feedlots tend to be greater than can be explained by the observable scale economies.

In general, any scheme for financing investment that becomes extensive tends to become institutionalized and to use sophisticated business methods. Financing cattle feeding through custom arrangements has undergone such development. Hopkin and Kramer (3) describe the most prevalent scheme in California: The feedlot operator seeks prospective customers and arranges bank loans on cattle and feed. The customer does not take title to the cattle and he may never lay eyes on them. He signs an agreement to purchase the cattle when they are ready for slaughter, at a cost equal to the original purchase price of the feeders, plus all feeding and handling charges, plus interest. His downpayment is about $30 per head. Unless the client is a packer, the cattle are sold in the name of the feedlot operator and all sales proceeds come to him. The returns above costs

[5] Such examination should focus on the balance-sheet composition of different participants in the cattle business and their asset and liability preferences. The latter would be evaluated in the light of the different conditions facing each group: range of economic opportunities (including tax considerations), uncertainties, and tastes. Questions about risk aversion and risk assumption would be handled in such a context.

[6] The data in table 1 are rough indicators only. Because of the J-shaped distribution, the use of midpoints of class intervals to figure the average turnover rate understates the average, particularly for the smaller size classes. Also, such data take no account of the possible correlation of average feeding period with average feedlot capacity and, therefore, might overstate or understate the differences in feedlot utilization.

[7] The information shown in figure 1 is, conceptually speaking, incomplete. Equity held by partnerships is not distributed between insiders and outsiders. This tends to overstate the importance of outside equity in cattle feeding. On the other hand, the equity of corporate feedlot operations is not distributed between the inside and outside shareholders. Hence, the importance of outside equity is also understated.

Corporate ownership of feedlots increases with the size of feedlot. Most feedlots with 5,000 head or more capacity are owned by corporations (8). Information is lacking on the degree to which outsider interests hold shares in them.

(plus downpayment) are paid to the customer. During 1963 and early 1964, there were many occasions when a net balance was owing to the feedlot operator because the loss was greater than the downpayment.

Such institutionalization of custom dealing shows the features it has in common with futures trading. In each, the buyer puts up a small margin on his commitment to take deferred delivery of a given quality and quantity of fed animals. He stands to gain or lose solely from the change in price of the contract between the time of entry and time of liquidation. The feedlot operator fixes his margin for a given length of feeding period. This margin is secure up to the limits of the buyer's credit worthiness (or the credit that stands behind him). Physical delivery of fed cattle to the buyer may or may not occur, according to the wishes of the participants in the contract; the settlement can be, and often is, purely financial.

Existence of these common features suggests that custom feeding and futures trading are, conceptually speaking, equivalents. This proposition can be shown directly.

Equivalence Between Custom Feeding and Cattle Futures

The equivalence may be shown by separating the futures contract into its two parts, namely, a transaction in (a) a spot commodity and in (b) a bundle of services. In cattle feeding, the spot commodity is some combination of feed and feeder animal. The bundle of services includes all things done to convert the spot commodity into the futures commodity.

Accordingly, the cattle feeding business can be subdivided into two ventures. One venture is to supply fed cattle on a given date; the other is to supply feedlot services during an interval that ends on the same date. (This is like the subdivision of enterprise responsibility that occurs in the construction industry between the "builder" and the "contractor.") Each of the two ventures is defined by its own set of transactions. These may be real transactions or they may be virtual transactions (i.e., the feedlot operator buys certain inputs from himself). A set of transactions may or may not include futures trades. But any two sets are economic equivalents if they give rise to an identical venture.

The argument is shown in table 2. All transactions are entered in December. One who simply ventures to supply fed cattle the following June (row A), but who does not care to supply feedlot services, can do so by purchasing (a) fed cattle futures for June delivery, or (b) feeder cattle and feed for December delivery, and feedlot services for December to June. The equals sign denotes the state of equivalence.

The physical outcome of the venture would be identical if the inputs that were purchased in the custom feeding arrangement, and the output purchased in futures, were elements of the same production function. The cost of the cattle supplied in June would also be identical, assuming perfect arbitrage.[8] For example, when the value of June cattle futures exceeds the combined value of feed, feeder animal, and feedlot services, profit could be made by simultaneously selling the former and buying the latter. Such arbitrage would depress the value of June delivery cattle and raise the value of the inputs until the two would come into line.

Next, in row B, the enterprise of supplying feedlot services is shown in terms of equivalent sets of transactions. The venture might be undertaken through a conventional hedging operation in futures: buy spot delivery of feeders, feed, and other inputs and sell futures delivery of fed cattle. Or it might be done through custom dealings: buy spot feeders and feed for the account of the client (denoted by both purchase and sale transactions, and their cancellation), and buy other inputs and sell custom feeding services. Again, assuming perfect arbitrage and the same production function, the outcome (in terms of quantity, quality, and price) would be the same whether one had entered one set of transactions or the other.

Entries in row C show the "proof." They are the sums of the entries listed in rows A and B. After canceling, both columns contain the identical transactions--buy feeders, buy feed, and buy other inputs. The canceled entries may be viewed as transactions that are internal

[8] Arbitrage is defined by Webster's New International Dictionary as "Simultaneous, or nearly simultaneous, purchasing, as of commodities, securities, or bills of exchange, in one market where the price is lower than in another, and selling in the other".

Table 2.--Equivalent transactions for a given enterprise entered through (a) cattle futures and (b) custom feeding

Enterprise that--	Transactions entered in December for delivery on date shown in the subscript, via--	
	Futures trading	Custom feeding
A. Supplies fed cattle in June	Buy fed cattle$_{\text{June}}$	= Buy feeders$_{\text{Dec.}}$ + Buy feed$_{\text{Dec.}}$ + Buy feedlot services$_{\text{Dec.} \rightarrow \text{June}}$
B. Supplies feedlot services, Dec. → June	Buy feeders$_{\text{Dec.}}$	= ~~Buy feeders~~$_{\text{Dec.}}$
	Buy feed$_{\text{Dec.}}$	= ~~Buy feed~~$_{\text{Dec.}}$
	Buy other inputs$_{\text{Dec.} \rightarrow \text{June}}$	= Buy other inputs$_{\text{Dec.} \rightarrow \text{June}}$
	Sell fed cattle$_{\text{June}}$	= ~~Sell feeders~~$_{\text{Dec.}}$ + ~~Sell feed~~$_{\text{Dec.}}$ + Sell feedlot services$_{\text{Dec.} \rightarrow \text{June}}$
C. (A + B). Supplies fed cattle in June and feedlot services, Dec. → June	Buy fed cattle$_{\text{June}}$	= ~~Buy feeders~~$_{\text{Dec.}}$ + Buy feed$_{\text{Dec.}}$ + Buy feedlot services$_{\text{Dec.} \rightarrow \text{June}}$
	Buy feeders$_{\text{Dec.}}$	= Buy feeders$_{\text{Dec.}}$
	Buy feed$_{\text{Dec.}}$	= Buy feed$_{\text{Dec.}}$
	Buy other inputs$_{\text{Dec.} \rightarrow \text{June}}$	= Buy other inputs$_{\text{Dec.} \rightarrow \text{June}}$
	Sell fed cattle$_{\text{June}}$	= ~~Sell feeders~~$_{\text{Dec.}}$ + Sell feed$_{\text{Dec.}}$ + Sell feedlot services$_{\text{Dec.} \rightarrow \text{June}}$

to the firm. The remaining transactions are what the ordinary farmer does when he decides to feed cattle--supply the fed cattle in June and the feedlot services from December to June.

The theoretical equivalences between custom dealing and futures trading may or may not be approximated in practice. This is a factual question which would need to be investigated. The problem is complicated by the many considerations of value that enter into the pricing of services.

In custom feeding, the specific terms are largely private matters. In some cases, the feed and feeder animal are supplied by the customer, and a fixed fee per head per day is agreed upon. In others, the operator provides all or part of the feed and this would be charged at cost or at a markup. The feeding charge might be figured per ton of feed or per pound of gain. In still other cases, both feed and animal are supplied by the operator. Innumerable variations in arrangements seem possible (3). If the terms of different transactions were known, it might be possible for the investigator to reduce them to a common basis. For example, in cases where custom feeders provide feed and feeder animals to customers, if these items were not billed at cost, the feeding charge could be adjusted accordingly.

In futures trading, the pricing of services is done through a spot-forward spread which would vary according to location of the feedlot operation (and other features). But by having futures prices for fed cattle at a central location, one could compute the prices for feedlot services at that or at other locations.

Custom feeding is largely a phenomenon of the West and Southwest (table 3), while futures trading is largely undertaken in the Midwest. But the two overlap. Extensive custom feeding is done in the Midwest, particularly in Nebraska and Kansas. Also, futures trading has a small foothold in the West, through a "western delivery" contract, and some thought is being given to adapting the terms to better fit market conditions.

Prices of Feedlot Services

A characteristic of biological and storage processes is that they take time. For this reason, an exchange economy can arrange for ways for the firm to take over the responsibility for them at almost any stage of the process. Thus, the firm can provide few or many services, as it chooses. The fewer the services, the smaller the payment. This feature is shown in figure 2 by the narrowing margin over the 10-month period of production as the target date approaches.

Table 3.--Number of fed cattle marketed, specified States, 1964
(1,000 head)

States	All feedlots[1]	Feedlots with 1,000 head and over	
		Total[1]	Custom fed[2]
Iowa and Nebraska	5,405	1,056	318
Kansas and Oklahoma	956	485	209
Texas	971	849	304
Colorado	951	636	109
Montana, Idaho, Utah, and Nevada	545	289	41
New Mexico and Arizona	766	725	281
California	2,061	2,011	911
Oregon and Washington	437	263	65
Total, 15 States	12,092	6,314	2,238

[1] From (13).
[2] Derived from percentages given in (8, p. 118).

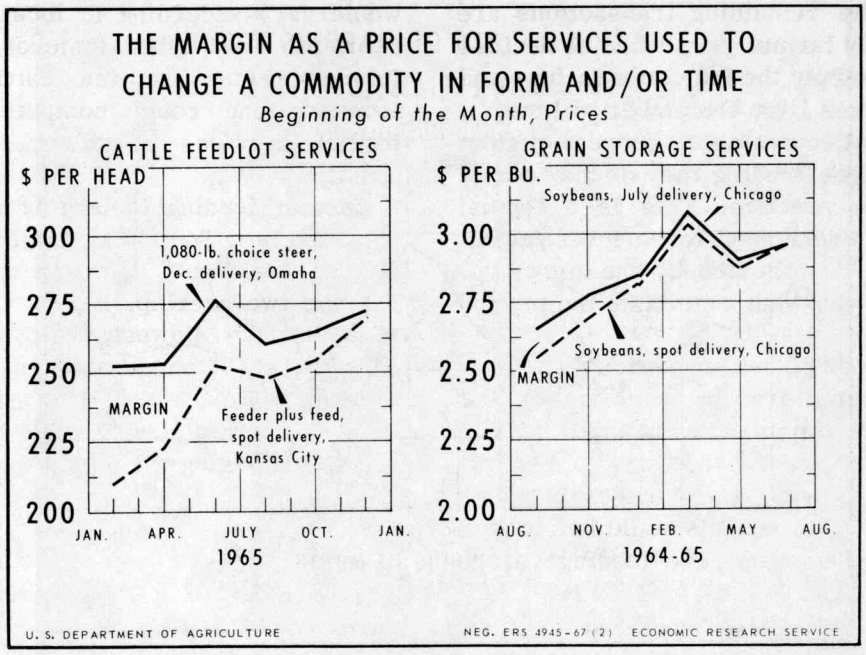

Figure 2

The margin registered on any date before the target date is a competitive price for the bundle of services to be provided to the target date. This price reacts to its own supply and demand forces and is fairly independent of the commodity prices from which it is derived.

Because the enterprise of cattle feeding can be undertaken at almost any stage in the production sequence, one might provide almost any amount of feedlot services decided upon. To produce a 1,080-pound steer for December delivery, a 480-pound calf could be fed for 10 months beginning in February; a 570-pound animal, for 8 months beginning in April; a 675-pound animal, for 6 months beginning in June; an 800-pound animal, for 4 months beginning in August; or a 950-pound animal, for 2 months beginning in October. The appropriate combination of feeder and feed would change with the passage of time. To derive the price for feedlot services of a given duration, one would price the relevant feeder animal and bundle of feed for spot delivery on the date the enterprise would be undertaken, and subtract this sum from the value of a 1,080-pound steer deliverable in December, as this value appears on the former date.

The results for 1965 are shown in figure 2. The solid line represents the value of a 1,080-pound Choice steer for December delivery (at Omaha). The dotted line is the value of the spot feeder and feed appropriate to each date (in the nearby area). The prices of corn and alfalfa are average prices received by farmers in Nebraska and Iowa. The prices of soybean meal are average prices paid by them.[9]

The margin tends to narrow as the year progresses--reflecting less additional services to bring the animal up to target weight. On any given date, the margin is also influenced by competitive forces, i.e., the demands for feedlot services, unused feedlot capacity available, and other conditions of supply.

The pattern is like the classical carrying charge exhibited by grain markets and shown here for soybeans (figure 2). This margin also tends to narrow as the season progresses--reflecting

[9] The price of the 1,080-pound steer is the average closing price for December delivery on the Chicago Mercantile Exchange for the first week of the month, minus 0.75 per cwt. for Omaha delivery. The prices for feeder animals are USDA market quotations at Kansas City, for choice feeder steers of the appropriate range, first week of the month. Prices for feeds were interpolated to represent beginning of the month prices. The weights of feeders, the feed rations, and the weight gain assumptions were predicated on data published in (2, 15).

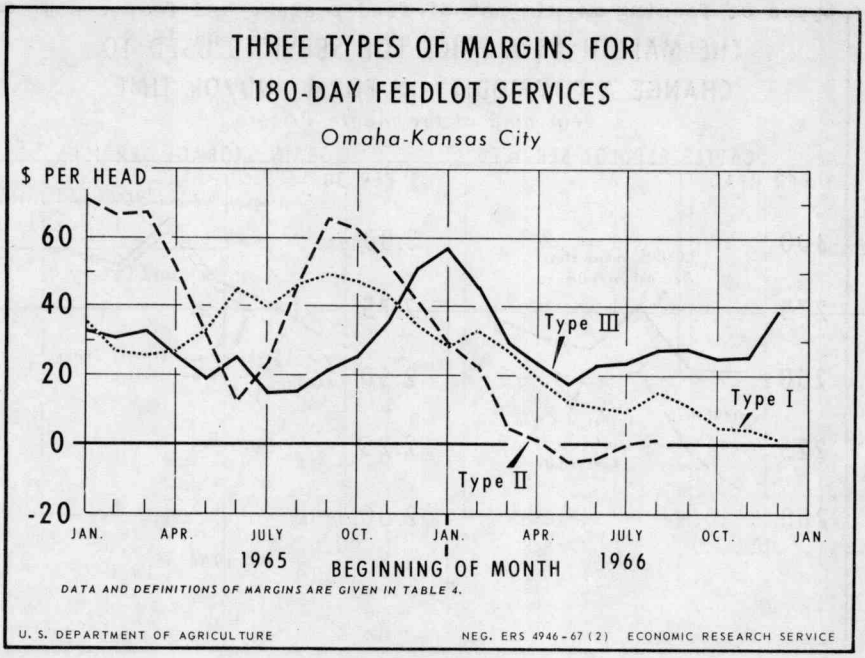

Figure 3

less storage services needed to carry soybeans to the target month. On any given date, the margin also is influenced by competitive forces such as the demand for grain storage, idle bin space, and other conditions of supply. It appears that in both the cattle and soybean illustrations, prices for services implied in the spread are fairly independent of the level of commodity prices.[10]

To show the changing market prices for services over time requires that the bundle of services be held constant. Such price variation should represent true price changes and not changes in qualities. We shall use as a constant the 6 months of feedlot services that are required to produce a Choice steer in the Omaha-Kansas City region. Specifically, 405 pounds of gain would be put on a 675-pound Choice yearling steer, using up 46.6 bushels of corn, 0.51 ton of alfalfa hay, and 180 pounds of soybean oil meal. This would result in a 1,080-pound steer deliverable on the futures contract (15). Any reasonable change in assumptions would not affect the pattern of prices appreciably, although it might change the average level.

This spot-forward spread has been computed at 30-day intervals during 1965 and 1966 and the results are recorded in figure 3 and table 4 as the Type III margin.[11] This spread is one to which producers can react. The implicit assumption, that the fed cattle are in fact delivered on the futures contract, is beside the point. Yet, account can be taken of the fact that most cattle hedged in futures are sold in the cash market and the futures contracts are offset by purchase. This gives rise to what trade jargon calls "basis gains and losses"--adjustments in outcome due to changes in the relative value of specific animals sold in a cash market delivered at a given time, and the value of standard specifications of the futures contract. The major movements of the two series are similar (table 4).

Besides the spot-forward spread, figure 3 shows the feeding margin computed on two traditional bases. One is the anticipated return that would have been realized at the completion of feeding, if the present margin between spot delivery of fed steers and spot feeders plus feed had held (Type I margin). The other margin

[10] Some degree of intercorrelation may exist between the two. See (9).

[11] This margin nomenclature is carried over from (9).

Table 4.--Three types of feeding margin net of feeder steer and feed costs, Omaha-Kansas City basis, Choice grade steers, 1965 and 1966

(Dollars per head)

Decision date (week ending)	Type I [1]	Type II [2]	Type III, with futures settled by--	
			Delivery [3]	Offset [4]
1965:				
Jan. 9	35.26	71.11	32.34	
Feb. 6	26.47	66.43	30.25	36.62
Mar. 6	24.96	67.62	32.41	
April 3	26.27	51.44	25.41	34.70
May 8	33.53	31.91	19.06	
June 5	45.00	17.78	25.02	21.46
July 3	39.10	23.66	15.56	
Aug. 7	46.03	46.14	15.68	12.77
Sept. 4	48.67	65.73	21.78	
Oct. 7	47.56	62.25	25.96	26.93
Nov. 6	42.36	52.51	35.88	
Dec. 4	34.05	40.53	51.44	53.82
Av. Jan.-Dec.	37.44	49.76	27.56	--
1966:				
Jan. 8	28.12	28.98	56.52	
Feb. 5	32.29	22.03	45.68	50.65
Mar. 5	30.82	5.66	29.42	
April 2	27.03	1.11	23.46	20.11
May 7	19.24	-5.38	17.73	
June 4	12.08	-4.01	22.56	16.30
July 9	9.71	-.01	23.43	
Aug. 6	14.54	1.15	27.28	28.90
Sept. 3	11.31	--	27.72	
Oct. 8	5.92	--	24.60	
Nov. 5	4.63	--	25.37	
Dec. 3	1.32	--	38.37	
Av. Jan.-Dec.	16.42	--	30.18	--
Av. Jan.-Aug.	21.73	6.19	30.77	--

[1] Price on decision date for spot delivery of feed and feeder steer subtracted from price on the same date for spot delivery of fed steer.

[2] Price on decision date for spot delivery of feed and feeder steer subtracted from price 6 months later for spot delivery of fed steer, at that time.

[3] Price on decision date for spot delivery of feed and feeder steer subtracted from price on the same date for delivery of fed steer 6 months later. (The latter price for January and for alternate months were interpolated from prices for fed steers for delivery 5 and 7 months later.)

[4] Same as footnote 3, but adjusted for disparities between the cash and the maturing futures prices during the first week of the futures delivery month.

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is the realized return between what was paid for feeders and feed on one date and what was received for the fed animal 6 months later (Type II margin). The three types of margins show quite different patterns.

Production Response to Price

While most fed cattle marketings in the North Central States have not been committed under forward transactions, cattle that have been committed might reflect competitive valuations at large. On this assumption, one can test the hypothesis that in the short run a low price for cattle feeding services would be associated with a small production response, and vice versa. Do feedlot margins computed as spot-forward price spreads show this relation? Is the fit any better than can be obtained by using anticipated margins, computed as a spread between concurrent spot prices?

The answers are shown in figure 4. The quarterly placements of cattle on feed in the North Central States during 1965 and 1966 are plotted against the quarterly margins. For present purposes we leave aside determinants of production other than price. When the spot-forward margin is used, the scatter suggests a classical supply-response curve, whereas using the concurrent spot margin, the scatter does not show this pattern. While the model may be too simple and the results do not "prove" the hypothesis, they are suggestive. They are similar to the results obtained for soybean processing services (9).

As additional data become available, there can be additional tests. One might try other measures of the spot-forward spread--e.g., feeding intervals shorter or longer than 6 months. Also, some refinement of the quantity variable might be made. Feedlot capacity and other factors affecting short-run supply of services should be included in the model. The interactions among variables should be investigated, using a system of equations.

The observed variations in prices and production in figure 4 are largely seasonal. High prices and placements occur in the fall. It would require more years of data to test whether the observed simple regression between price and quantity holds for annual, cyclical, and secular changes, and to test the explanatory power of more complete models.

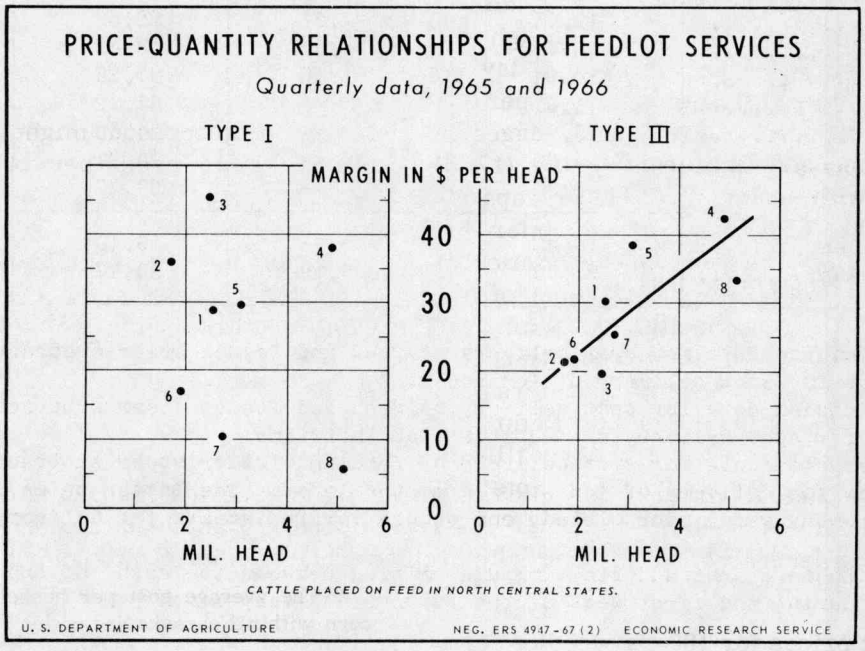

Figure 4

Table 5.--Costs of feeding operations, by size of feedlot

(Cents per head per day)

Source of data	Feedlot capacity: Number of head						
	100	500	1,000	2,500	5,000	7,500	10,000
Illinois[1]	13.4	--	--	--	--	--	--
California[2]	--	--	--	14.2	11.2	9.8	9.3
Oklahoma[3]	--	14.5	12.1	11.5	10.6	10.4	10.2

[1] From (7); accounting data submitted by sample of operators. A marketing cost for fed cattle has been added from data provided by (15). The 100-head capacity is approximate.

[2] From (3); accounting data submitted by sample of operators. Includes 1.2 cents to cover death losses. Interpolations of original data.

[3] From (17); synthetic budget estimates. Some data are interpolated.

Relation of Prices and Costs

How do the implicit prices for feedlot services compare with costs of producing the servcies? We draw on data from three recent studies that are most complete with respect to the costs that have been included for feedlots of different sizes (table 5). To make better comparisons, the cost data have been adjusted, where necessary, to include allowances for death losses and marketing charges. Also, the figures for given size feedlots have been interpolated and put on a "per head per day" basis.

The figures shown in table 5 are generally consistent. Small lots have relatively high unit costs--about 14 cents per head per day as compared with about 10 cents per head per day for the larger feedlots. Cost figures suggested by the Oklahoma and California studies (17, 3) for feedlots with under 5,000 head capacity might differ, in part, because the former is a budget study that assumes full utilization of facilities while the latter is a report of accounting records. Specifically, lots with over 5,000 head capacity may show a smaller discrepancy because big feedlot operators can better arrange to keep their feedlots full through custom feeding, as suggested before. The Illinois study is based on relatively small feedlots that are treated as part of a general farming enterprise. They enjoy certain cost advantages that tend to hold costs down for the small operator (14).

The implicit prices for 180-day feedlot services, for steers produced in the Iowa-Nebraska region, averaged $27.56 per head in 1965 and $30.18 in 1966 (table 4). On a per head per day basis, these are 15.3 cents and 16.8 cents, respectively. They are sufficient to cover all the costs of the feedlot operations shown above net of feed and feeder animals. To obtain such results, however, would have required that the cattle be hedged in futures in uniform volume throughout each year. This conclusion also seems to hold when basis gains and losses are taken into account.

The price-cost comparison is a first approximation. The costs of buying and transporting feeder cattle to the feedlot are not included in table 5. Also, commercial feedlots that purchase virtually all their concentrated might incur a higher cost of feed than we used. Those that buy corn not immediately available in the neighborhood might incur a marketing charge of 15 cents per bushel above prices received by farmers.[12] This is $7 per head (0.15 times 46.6 bushels), or 3.9 cents per head per day. It would leave 11.4 cents for 1965 and 12.9 cents for 1966, to cover costs. On the other hand, there were opportunities to save 1 cent per head by fixing corn and soybean oilmeal prices in futures, when forward deliveries within the 180-day feeding period were at a discount under nearby deliveries. For example, when a feeding project is undertaken, one-third of the required feed might be purchased for immediate delivery, one-third

[12] The average cost per bushel for rail movement of corn within Nebraska and within Iowa was about 11cents per bushel, according to ICC waybill data. Gross margins realized by country gain elevators, judging by Illinois data (10), may have been 3-1/2 to 5 cents per bushel.

for 60-day delivery, and one-third for 120-day delivery. These futures positions would be later offset when cash feed was purchased. The net gain from this market maneuver would depend on the size of the discount, the costs of on-premise storage, and changes in the basis between futures prices and cash prices. These and perhaps other factors would need to be appraised to learn more about the behavior of differently situated feedlot operators.

Conclusions and Implications

We showed why futures trading in cattle may be viewed as a means of pricing feedlot services and that, in this role, it is like custom feeding. Both are responses to a common set of forces. Both promote specialization of production, enlargement of scale, and fuller utilization of facilities.

Apparently, the underlying need is to mobilize capital for an industry whose rapid rate of expansion depends on reduction of costs. Both futures trading and custom feeding attract outside equity by partitioning the cattle feeding business into two different ventures: (1) supply fed cattle and (2) supply feedlot services. This partitioning allows outsiders to undertake responsibility for the former.

The other way to attract outside equity is to divide the cattle feeding enterprise into equal shares and to sell some to outsiders. Each share would represent an equal stake in the combined venture of supplying fed cattle and feedlot services. Partnership and corporate organizations are the institutional means of making such partitions.[13]

The large corporation with its permanent capital and its widespread shareholding can meet the need for continuous financing. But this begs the question. The question is whether an efficient corporate portfolio would include ownership of cattle. This is a complex matter to analyze and, as indicated before, lies beyond the reach of this paper.

Also, there is the question about the vertical coordination of the many specialized production processes that compose the feed-livestock-meat economy. Futures and custom contracts are vehicles for pricing commodities and the specialized services that enter into commodities. Corporate shares are primarily vehicles for pricing the yield prospects of a pool of capital. Futures trading and custom feeding seem inherently more capable of improving the coordination of the specialized production processes. These are important ideas to pursue, but they too extend beyond the scope of this paper.

Futures trading has several advantages over custom feeding. Organized futures trading is more accessible to some outsiders than custom feeding services. Its hallmark is the machinery for safeguarding the integrity of the contract, which enables loans to be made more freely against given collateral, and with more safety. Thus, the stranger can be fitted into the scheme with relative ease.

Also, futures trading gives the feedlot operator greater flexibility in changing his enterprise position; he can shorten or lengthen his ownership position in cattle overnight. In this respect, custom feeding arrangements are clumsy.

Futures trading may fit the small feeder as well as the large one and in this way might have more beneficial effects than custom feeding. The farmer who feeds (say) 200 to 500 head annually and has profitable alternatives for capital could benefit from fixing his feeding margin in advance through futures. If he were assured a margin of $30 per head above feed and feeder costs, the annual total would be from $6,000 to $15,000. It might be the annual increment he would need to commit himself to additional land, buildings, or equipment.

In general, extension of futures trading depends on overcoming some major difficulties. These include (1) difficulties of adapting futures contracts to suit different feeding situations without undue loss of precision; (2) problems of creating a larger body of informed hedgers and informed speculators; and (3) problems of developing hedging intermediaries to serve the smaller scale feeder--livestock dealers, packers, or others who may be in a position to offer the farmer a firm forward contract for (say) 200 head, take delivery, and make a mutually satisfactory settlement.

[13] Conceptually, partnerships and corporations might limit their interest to either supplying fed cattle or supplying feedlot services. This compounds the ways of drawing on outside equity.

A lesson that cattle futures teaches concerns the origins of futures trading. A widespread belief, shared by the authors, is that a precondition for successful futures trading is the existence of extensive cash forward dealings in the commodity. The origins of grain futures in "to arrive" contracts and the origins of futures trading in eggs and butter in various cash dealings show this clearly (4). In more recent times, it is shown by the development of soybean and soybean oil and meal futures from extensive cash forward trading in these commodities. Extensive cash forward dealings in a commodity are presumptive evidence of the economic need for more standardized trading methods.

But futures trading in fed cattle evidently has developed without appreciable cash forward trading in fed cattle. What did exist were extensive dealings in feedlot services. Apparently, we should generalize more broadly: a precondition for successful futures trading in a commodity is the existence of extensive transactions in some economic equivalent, whether it be dealings in the commodity itself or in services that enter into production of the commodity. A separate question of course is whether futures trading could be made technically feasible.

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