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Economics of Cattle Feeding Systems for West Texas

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IN COOPERATION WITH THE U. S. DEPARTMENT OF AGRICULTURE

SUMMARY

The purpose of the study reported here is to assist West Texas farmers to appraise the opportunities for marketing sorghum grain through cattle at a profit.

To do this, systems of cattle feeding were selected which "fitted in" with cash-crop production. These systems were selected from among feeding trials conducted at Substation No. 7 at Spur and at the Big Spring Field Station. Current farm prices and costs were applied to experimental results.

Most farmers do not have the lots, feed troughs, grain storage or other facilities for a cattle feeding enterprise. The facilities, including a silage field cutter, which farmers will need to add to feed 100 cattle will cost about $4,800. Without a silage cutter, the cost will be about $2,600. The additional facilities required to feed 500 head will cost about $18,000.

At prices that prevailed during the fall of 1956 and the spring of 1957, cattle feeding was profitable as a way to market grain sorghum. One favorable factor was the spring cattle market in which slaughter cattle brought 4 or 5 cents more per pound than they cost as feeders the previous fall.

As calculated in this study, it would be profitable to feed a relatively heavy grain ration to calves and light weight steers with a 2-cent-per-pound margin in price of slaughter cattle over feeder cattle and with sorghum grain at $2.00 per hundredweight. With $1.25 grain sorghum, feeding systems 1, 2 and 4 would be profitable with a margin of only 1 cent per pound between the price of feeders and the price of slaughter cattle.

Rations high in grain and low in roughage were the most profitable with cheap grain, but the comparative position of high-forage rations is enhanced when grain prices are high.

Satisfactory results have been obtained with cottonseed hulls as the principal roughage. Hulls are easy to feed and may be handled mechanically. When handled by hand, less labor is required to feed hulls than to feed silage. By feeding hulls a farmer can avoid purchasing the equipment and facilities for making silage.

THE COVER PICTURE

Cattle being started on feeding tests at Substation No. 7 at Spur. Data obtained with such cattle at Spur and Big Spring provided the basis for this bulletin.

ACKNOWLEDGMENT

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Economics of Cattle Feeding Systems for West Texas

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WEST TEXAS FARMERS have centered their attention on the production of cash crops. This has been done, in many instances, to the exclusion of livestock enterprises. Where cotton is adapted, the basic cropping system consists of cotton and grain sorghum, and in some localities it includes wheat. Where cotton is not adapted, the major crops are wheat and grain sorghum.

Current allotments for cotton and wheat limit the acreage planted to these crops and increase the acreage available for grain sorghum throughout West Texas. Despite widespread drouth, which has reduced the production of feed grain in Texas, the recent trend of grain sorghum prices has been downward. With the widespread adoption of hybrid sorghums and with more favorable rainfall, the production of grain sorghum probably will increase and the downward trend in prices likely will continue for some time. With these prospects, farmers are looking for other and more profitable ways of marketing grain sorghum. One of the alternatives considered is marketing grain sorghum through beef cattle.

Few West Texas farmers have had experience in feeding cattle. Consequently, numerous questions concerning management problems are raised. These questions concern the ways of fitting a cattle feeding enterprise into a system of cash-crop farming, the cost of facilities needed to feed cattle, the results that normally may be expected from different systems of feeding and the conditions under which cattle feeding is likely to be profitable.

PURPOSE AND PROCEDURE

The purpose of this study is to provide information that may serve as a general guide to West Texas farmers who wish to consider the "pros and cons" of cattle feeding.

Farmers in the area who feed cattle were contacted to learn the additional investment required.

Systems of cattle feeding were then selected which "fit in" with cash-crop production. These systems were selected from among feeding trials conducted at Substation No. 7 at Spur and at the Big Spring Field Station. In each instance, records were available as to the kinds and quantities of feed used, the length of the feeding period, the rate of gain and other necessary details. Current farm prices and costs were then applied to experimental results. In this study, it was assumed that farmers will grow grain sorghum and that the problem is one of choosing the most profitable way in which to market the grain.

The approach was to figure the added costs and the returns likely to result from cattle feeding as compared with the returns from grain sorghum on the cash market. With this information, a farmer can better appraise his own situation with regard to cattle feeding.

Because price relationships change rapidly, each system of cattle feeding was evaluated with

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several prices for grain sorghum and with varying margins between the purchase price of feeders in the fall and the selling price of slaughter cattle in the following spring.

CATTLE AND CASH-CROP FARMING

Ordinarily, cotton farmers in West Texas are busy with crop production from about May 1 until approximately a month after frost. During the remaining 4½ to 5 months, most farmers do not utilize fully their time with farm operations. As a rule, wheat growers have more free time than cotton growers. Wheat farmers usually plan to devote full time to crop production from the middle of May through most of the summer or into the early fall.

For each system of farming, the slack period comes in the winter and early spring, or during part of the fall, the winter and spring. When unused labor is available, labor efficiency may be increased by feeding cattle as long as the added returns exceed the added costs. Cattle work at any other time likely would interfere with crop production.

In making this study, it was assumed that a period of not to exceed 150 days normally would be available for drylot cattle feeding. Frequently, farmers would be able to devote enough time to cattle during the fall to permit some grazing of stalk fields.

ADDED INVESTMENT FOR FEEDING CATTLE

To feed cattle, most farmers will need to build feeding pens and to provide other facilities and improvements. Information obtained from cattle feeders in Moore and Hale counties was used in calculating the cost of suitable facilities for a cattle-feeding enterprise. Two hundred square feet of lot space should be provided per animal fed. On this basis, a lot 100 x 200 feet would provide enough space for 100 cattle.

TABLE 1. ADDITIONAL INVESTMENT COMMONLY REQUIRED FOR A CATTLE FEEDING ENTERPRISE ON WEST TEXAS FARMS

Items	For 100 head		For 500 head	
	Quantity of material	Cost, dollars	Quantity of material	Cost, dollars
FEEDING PENS				
Creosoted posts (no.)	60	90	300	450
½" used cable (ft.)	3,750	75	20,000	400
Gates and loading chute		150		350
Material for bracing		40		200
Labor		100		500
Total		455		1,900
FEED TROUGH				
Ready-mixed concrete Slab 30" x 4" x 100' (cu.yd.)	4	64	18	288
No. 6, 6" x 6" welded wire (ft.)	100	6	500	30
Lumber – 2" x 12" rough (ft.)	300	24	1,500	120
Bolts, clamps and misc.		25		125
Labor		80		400
Total		199		963
WATER FACILITIES				
New well and pump				1,500
Water line		200		300
Water tank (no.)	1–8 ft.	60	5–8 ft.	300
Water heater (no.)	1	40	5	200
Total		300		2,300
OTHER FACILITIES				
Grain storage (no.) 1–2200 bu.		740		4,500
Feed grinder		160		600
Trench silo		300		1,500
Field silage cutter		2,200		2,200
Front-end tractor loader		395		395
Mixing and feeding truck				3,550
Miscellaneous equipment		75		75
Total		3,870		12,820
Total—additional investment		4,824		17,983

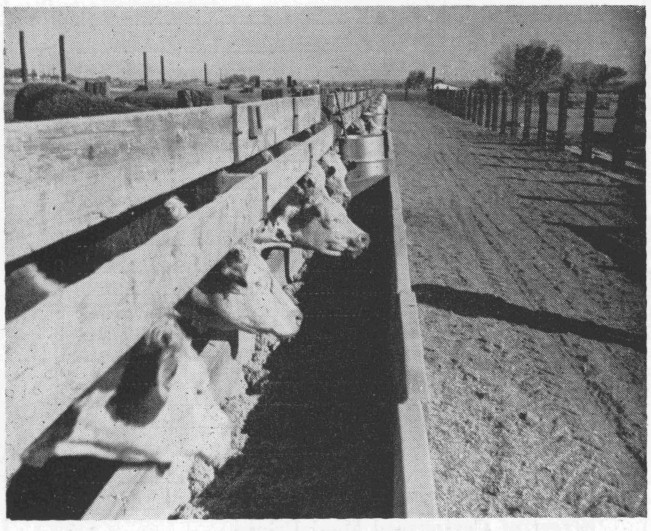

Figure 1. Typical feedlot arrangement on a West Texas farm. The feed trough runs the length of the pen on one side. The alley way permits unloading feed from a truck directly into the feed trough quickly and without disturbing the cattle. Some feeders prefer to slope the outer side of the trough.

Satisfactory pens have been constructed by running 6 or 7 strands of used oil field cable through evenly-spaced holes bored in creosoted posts. Some feeders have used old cross ties for posts. As shown in Table 1, the initial investment for feeding pens for 100 head will average about $4.50 per animal. Pens for feeding 500 head will cost about $3.80 per head.

Farmers report good results with a trough consisting of a concrete bottom, 3 or 4 inches thick and 30 inches wide, with one straight and one sloping side of 2 x 12-inch rough lumber. Two pieces of 2 x 12's are used to make the sloping side of the trough while only one is used for the straight side. The initial cost of such a trough will be about $2.00 per linear foot.

Most farmers who have fed cattle in the area do not consider it necessary to provide shelter for animals on feed.

The present water supply on most farms is ample for 200 feedlot animals. The laying of some additional pipe and providing a drinking tank will be necessary. In most cases, an additional well and pump will be needed if more than 200 animals are to be watered. Feeders, particularly those in the northern part of the area, use heaters to provide warm water during the winter. The cost of the water facilities added is estimated in Table 1 to range from about $3.00 to $4.50 per head capacity.

Some farmers have ample storage for the grain needed for drylot feeding. Others store grain in nearby elevators and haul it to the farm as needed. The grain may or may not be ground or crushed on the farm. In either case, there is an added cost. One 2,200-bushel steel bin will provide storage for grain to feed out 100 cattle. As shown in Table 1, a bin can be installed at present prices for about $740.

Silage stored in trench silos is a satisfactory roughage for drylot feeding. Trench silos can be constructed for about 75 cents per ton capacity. The size and number of silos needed will depend on the feeding program to be followed. The investment in trench silos shown in Table 1 was based on 400 tons for 100 head. This capacity would permit heavy use of silage. With relatively heavy feeding of grain, the investment in trench silos would be less than is indicated here.

Because of year to year variations in yield, a reserve of forage is needed to sustain a continuing feeding program, particularly under dryland conditions. Most feeders find it convenient to have more than one silo.

A small feeding enterprise does not justify owning a field silage cutter. In some localities, a farmer can hire silage cut and put in the trench. In Moore county, this work was contracted for in 1956 at the rate of $2 per ton. Farmers with small acreages of a silage crop preferred this method of harvesting, whereas large producers of silage owned one or more field cutters and put up their own crops.

In a few localities, irrigated sorghum for silage is grown as a cash crop. In 1956, green silage was delivered in the trench for $7.00 to $8.00 per ton. If this service is available, it probably is the most convenient and a relatively cheap way to put up 100 or so tons of silage.

In estimating the cost of facilities needed, Table 1, a power scoop or front-end tractor loader was included. This tool would be used in loading silage and in cleaning out feedlots.

It was assumed that, in general, farmers would have the trucks or trailers needed for feeding 100 head of cattle. However, for a relatively large feeding enterprise, it is considered that a truck with a mixing bed would be used.

A total investment of approximately $4,800 will be needed to provide the facilities for feeding 100 cattle. Nearly half of this amount is for a field silage cutter. This part of the investment can be avoided through custom harvesting. The man who already has grain storage can reduce his added investment by about $750.

It is estimated that the facilities with which to make and feed silage and to care for 500 cattle in the feedlot will require an investment of about $18,000.

SOURCES OF FEEDER CATTLE

Feeder calves of Commercial to Choice grade are produced on nearby ranches and are available in a weight range of 300 to 500 pounds. Yearling cattle of varying grades and weights also are available. The price of feeder animals normally is lowest in the fall when heavy marketings occur. During recent years, the price of Good grade feeder cattle has averaged lower in October than in any other month.

Feeder cattle produced on nearby ranches are of high quality and are much in demand for northern feedlots. Consequently, if West Texas farmers are to buy cattle locally, they must compete with experienced Corn Belt feeders.

The October 1956 price of local feeder steer calves of Good grade was approximately 18 cents per pound. Choice grade calves sold at higher prices. In either instance, the local price was about 2 cents per pound above October prices for calves of similar quality on the Fort Worth market. West Texas ranchmen also sold yearling steers above the Fort Worth market. Because of the strong demand on the part of Corn Belt farmers, the price paid for feeder cattle (either calves or yearlings) is normally about 2 cents per pound above the Fort Worth price for feeders of Good grade.

In the fall, calves sell higher than yearling feeder steers of similar quality, Figure 2. On the Fort Worth market, the average price quoted during October 1956 for Good 500 to 800-pound steers was approximately 2 cents a pound less than the price of Good calves. More commonly, steers are 1 to 1½ cents per pound cheaper than calves. Since 1945, the average October price of Good calves has ranged from 50 cents to $3.00 per hundredweight higher on the Fort Worth market than the average October price of Good steers.

Cattle feeders should watch this spread between the price of calves and older cattle. A widening of this spread, such as occurred in 1949 and 1950, Figure 2, could easily offset any advantages there might be in feeding calves. On the other hand, with a narrow spread, as was the

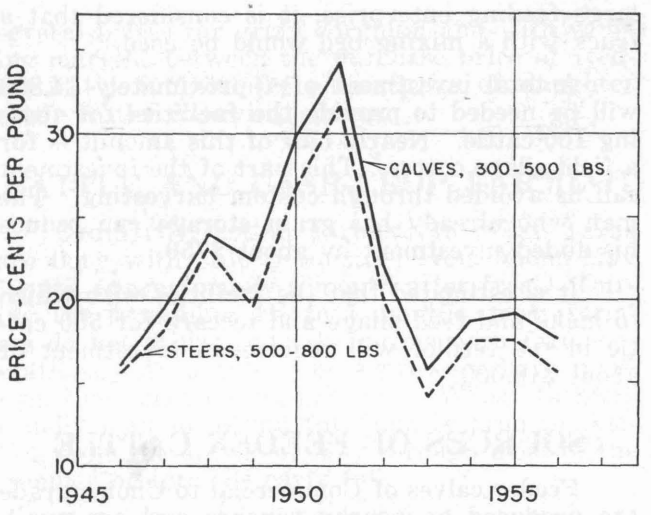

Figure 2. Average October price for Good feeder calves and steers on the Fort Worth market, 1946-56.

case in 1946, it may be advantageous to feed calves rather than steers.

In this study, it was assumed that Good yearling feeder steers could have been bought locally for 17 cents a pound, or 1 cent a pound less than the price of Good calves.

A number of High Plains cattle feeders purchased cattle during the fall of 1956 at Fort Worth or in other parts of the State at less than the cost of feeders from nearby ranches. Prospective buyers of feeder animals may be able to save money by "shopping around" before buying.

Because of the relatively strong demand for slaughter cattle weighing 700 to 1,000 pounds, it is good planning to choose feeder animals that can be fattened within this approximate weight range. Even though big cattle often make rapid gains in the feedlot, they are likely to be heavier than the market demands by the time they are finished.

Some good results have been obtained with heifers in the feedlot. Heifers cost less to buy and they fatten faster than steers. Farmers who feed heifers usually prefer calves or short-age yearlings. For best results, heifers should be sold at light weights and young ages.

FEED SUPPLIES

Sorghum grain is plentiful on West Texas farms, but in many instances forages are not. Results of both research and the experience of farmers show that silage is the most satisfactory homegrown forage for beef cattle. With irrigation, silage yields of 15 to 30 tons per acre are reported. A yield of 20 tons per acre is considered normal with good cropping practices. A dryland silage yield of 6 tons per acre is considered a reasonable expectation.

When farmers feed silage, it is not necessary to feed alfalfa for vitamin A. However, tests at Spur show the feeding of 2 pounds of alfalfa hay per head daily increased cattle gain by 0.15 pound per head daily. At this rate, a feeder can pay $30 per ton for alfalfa hay as long as cattle will bring 21 cents or more per pound.

In this study, alfalfa is shown as a cash cost when it is included in the feedlot ration because it is grown on only a relatively few farms.

In feeding tests at Spur, the rate of gain was increased and feed consumption and feed costs per 100 pounds of gain were reduced when steers were fed a small amount of either stilbestrol or an antibiotic such as terramycin, aureomycin or ilotimycin. In these feeding trials, the greatest response from these materials was obtained with yearling cattle given a medium to long feeding period. Stilbestrol or the antibiotics were mixed with cottonseed meal prior to feeding.

Farmers are not equipped to do this mixing, but cottonseed meal with the proper amounts of stilbestrol added for cattle feeding is now on the market.

Calculations for this report were made on the basis of feeding cottonseed meal to which stilbestrol had been added. Fed in this way, the extra cost for adding the hormone to the ration is less than 1 cent per head daily. An economic analysis of feeding trials shows such an expenditure is profitable in most instances.

During recent years there has been some demand for stalk field grazing to provide for drouth-stricken cattle from nearby ranches. Normally, there is little demand for this type of grazing and no use is made of a large acreage of stalk fields.

If fences are in shape and water available, cattle grazing stalk fields require little attention. Consequently, by grazing stalk fields during October and November, advantage may be taken of a favorable market on which to buy feeders without interfering greatly with fall work.

The rate of cattle gain on stalk fields is not high, but it is obtained at low cost. In this study, no charge was made for stalk field grazing. It was considered that normally stalk field grazing would not be in demand.

CROPPING ADJUSTMENTS

To have silage, most West Texas farmers would need to shift some acreage from sorghum grain to silage production. Such a shift would have little effect on preharvesting requirements or costs.

With irrigation, about 5 acres normally would be needed for each 100 tons of silage. On dryland farms, approximately 17 acres with average yields would be required for 100 tons of silage. A farmer who planned to feed 25 pounds of silage per head daily to 100 steers for 120 days would

need to devote 8 or 9 acres of irrigated or about 26 acres of dry land to silage crops.

There likely will be 5 to 10 percent spoilage in silage and some additional loss in feeding.

CATTLE FEEDING SYSTEMS

Six systems of cattle feeding, each of which can be fitted in with the production of cash crops, were selected from experimental results at Spur and Big Spring, and the profit or loss that might be expected from cattle feeding under different price relationships were calculated. For the systems selected, the approximate weight of animals used, the quantities of feed used and the gain obtained in feeding periods of different lengths were the same as recorded in feeding tests.

Based on the results of feeding tests, it is believed that, on the average, thrifty cattle fed according to any of these systems of feeding would grade Good or higher at the end of the feeding period. Market demand for this grade of slaughter cattle is relatively strong.

A summary of the labor and feed requirements, both the average daily ration and the total pounds fed per steer, for each system is shown in Table 2. Also shown are the average weights going into the feedlot, the length of feeding period and the gains obtained. The weight at the end of the feeding period is the market weight after the cattle have been shrunk.

The first system is a calf feeding enterprise. According to the plan, 400-pound calves would be purchased about October 1, near the time when

Figure 3. Two trench silos, one full and one empty. Unlined silos such as these can be provided in West Texas for about 75 cents per ton capacity.

feeder cattle prices normally are the lowest. Such calves could be run on grain sorghum stalk fields for about 60 days before going in the feedlot about December 1. Cotton harvesting and other fall work should be well along by that time.

This system of feeding has been followed at Big Spring. Calves averaging 450 pounds when they went in the feedlot ate approximately 9 pounds of sorghum grain, 2 pounds of cottonseed meal and nearly 14 pounds of silage per head daily for 150 days. Calves have limited capacity for roughage. Hence, they need a ration high in concentrates to fatten in 150 days or less. The average daily gain of 2.2 pounds per calf is similar to gains reported by farmers feeding comparable rations to calves.

Feeding system 2 involves light weight yearlings averaging about 650 pounds that are run 60 days on stalk fields before going on feed. Gains of 300 pounds per steer were reported for the

TABLE 2. SUMMARY OF FEED AND LABOR REQUIREMENTS FOR DIFFERENT WEIGHTS AND AGES OF CATTLE FED HIGH AND LOW GRAIN RATIONS[1]

Feeding system		High-grain ration				High-roughage ration					
		Calves 1		Light weight yearling steers 2		Yearling steers 3		Light weight yearling steers 4		Yearling steers 5		Yearling steers 6	
Animals purchased	(no.)	100		100		100		100		100		100	
Average weight	(lbs.)	400		600		750		600		750		750	
Period grazed	(days)	60		60				60					
Period in feedlot	(days	150		120		100		120		140		100	
Average per steer:													
Weight going into feedlot	(lbs.)	450		650		750		650		750		750	
Final market weight	(lbs.)	790		950		1,030		900		1,070		975	
Average daily gain		2.2		2.5		2.8		2.1		2.3		2.2	
Labor with steers:													
Total	(hrs.)	560		470		350		390		610		450	
Per steer	(hrs.)	5.6		4.7		3.5		3.9		6.1		4.5	
		Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer
Feed used per steer, lbs. daily and total:													
Ground sorghum grain		9.1	1,365	14.7	1,760	15.0	1,500	9.3	1,116	6.4	900	5.0	500
Cottonseed meal		2.0	300	2.0	240	2.0	200	2.0	240	2.0	280	2.0	200
Sorghum silage		13.3	2,000	23.4	2,800	25.0	2,500	40.0	4,800	54.0	7,560	55.0	5,500
Alfalfa hay						2.0	200			2.0	280	2.0	200
Salt			10		12		10		12		15		12

[1]Based on the results of feeding tests conducted at Substation No. 7 at Spur and at the Big Spring Field Station.

TABLE 3. PRICES USED IN CALCULATING COSTS OF THE CATTLE FEEDING ENTERPRISES, 1956

Item	Unit	Per unit cost
COST ITEMS		
Sorghum grain	cwt.	$ 2.00
Cottonseed meal (with stilbestrol)	ton	70.00
Homegrown silage (home harvested)	ton	5.50
Homegrown silage (custom harvested)	ton	6.50
Cottonseed hulls	ton	15.00[1]
Alfalfa hay	ton	40.00
Salt	cwt.	1.25
Feeder calves (grade of Good) f.o.b. farm	cwt.	18.00
Feeder steers (grade of Good) f.o.b. farm	cwt.	17.00
Marketing expense—based on market weight	cwt.	1.00
MARKET PRICE		
Slaughter calves—grade of Good	cwt.	22.00
Slaughter yearlings—grade of Good	cwt.	22.00

[1]For purposes of comparison, 1955 prices were used for cottonseed hulls.

120-day feeding period from an average daily ration of 16.7 pounds of concentrates and 23.4 pounds of silage.

Yearlings eat more and make higher gains than calves and they fatten in less time. But this does not necessarily mean that yearlings make cheaper gains than calves.

Feeding system 3 is for 750-pound yearlings given a high proportion of concentrates. Steers fed 15 pounds of sorghum grain, 2 pounds of cottonseed meal, 25 pounds of silage and 2 pounds of alfalfa per head head daily gained 280 pounds in 100 days.

Good results have been obtained at Spur with rations high in roughage. Yearling cattle can use large quantities of roughage and will fatten on high roughage rations. To do this, it is necessary to feed good quality roughage that cattle will consume in large quantities.

In system 4, light weight yearling steers were first grazed on stalk fields before drylot feeding. In the feedlot, the ration consisted of 11 to 12 pounds of concentrates and all the silage the steers would take. With this method of feeding, 250 pounds of gain was obtained per steer in 120 days. This system combines high consumption of roughage with a moderate consumption of grain.

Feeding systems 5 and 6 combine a low level of grain feeding with heavy use of roughage. System 6 is best suited for cattle carrying considerable finish into the feedlot. System 5 would be suitable for relatively thin cattle which require additional time to fatten on a ration high in roughage.

The inexperienced cattle feeder should consider that it is easier to keep cattle "on feed" with a ration relatively high in roughage than with one very high in grain. The richer the ration, the more likelihood there is of trouble from bloat or other digestive disorders.

However, a ration high in concentrates is necessary to get cattle fat in a short feeding period.

Labor requirements for feeding cattle vary greatly from farm to farm. Some have more convenient arrangements than others. With silage loaders and trucks that mix and unload the feed mechanically, one man can feed 600 or more cattle. Farmers who have little or no special feeding equipment report that 3 to 4 hours of labor are required daily to feed 100 head of cattle. A large part of the labor of feeding cattle is for handling silage.

ESTIMATED COSTS

The estimated costs of feeding 100 steers with six feeding systems are shown in Table 4. Both operating and overhead costs are included. In calculating these costs, 1956-57 prices were used, Table 3.

Cattle Costs

The cost of feeder calves is figured at 18 cents a pound and the cost of yearling feeder steers at 17 cents a pound. These prices were typical of the amount paid for good feeders during the fall of 1956. It is recognized that many West Texas farmers put cattle in the feedlot early which cost more, while other feeders cost less than 17 or 18 cents per pound.

Feed Costs

Homegrown sorghum grain was valued at $2.00 per hundredweight, which was representative of the price at which the grain could have been sold at or near harvest time in 1956.

Two kinds of costs were considered in arriving at a value for silage. First, there is the cost of growing and putting up silage. The cost of owning and operating silage harvesting equipment was included as a part of this expense. Second, to grow silage, it is necessary to use land that otherwise could be used profitably in growing a cash crop. The farmer has the cost of growing and putting up silage plus the loss of the opportunity to make a profit from the crop that silage replaces. In most instances, the crop replaced would be grain sorghum.

It was assumed that alfalfa, cottonseed meal and minerals would be purchased at prices which prevailed during the fall of 1956.

Marketing Expense

This item includes trucking and other expenses associated with transporting the fat cattle to market and yardage and commission expenses.

This cost was calculated at $1.00 per hundredweight for the total liveweight sold and was based on recent costs of shipping cattle from Lubbock to the Fort Worth market. A farmer who sold cattle locally probably would have marketing costs of less than $1.00 per hundredweight. This saving likely would be offset to some extent by an adjustment in the price received for cattle.

Veterinary and Miscellaneous

Veterinary costs have been light for cattle fed at the Spur station and it was considered that 25 cents per head would more than cover this item.

Depreciation

This is an overhead cost resulting from the investment in feed pens, additional storage, trench silos and other facilities required for a feeding enterprise.

Interest

Interest on improvements and facilities added for cattle feeding were figured at 6 percent of the depreciated value. Interest on the capital invested in cattle was calculated at 6 percent for the length of the feeding period or the combined grazing and feeding period.

The farmer has money tied up in homegrown feed until his cattle are sold. Consequently, interest was charged on the value of the grain sorghum and silage used.

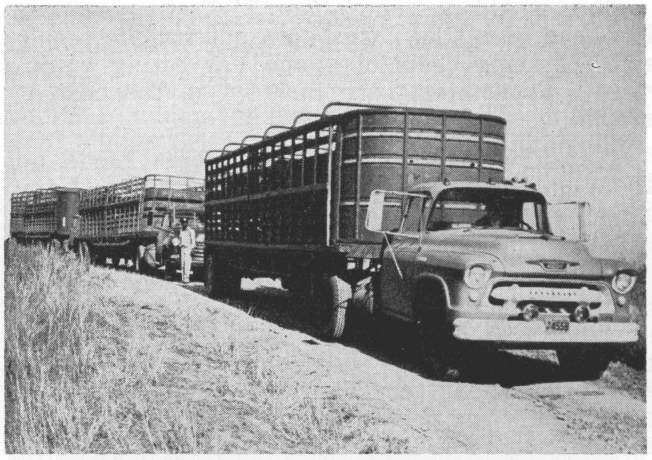

Figure 4. Cattle trucks lined up ready to load slaughter cattle for delivery on the Fort Worth market. The expense of marketing fat cattle is an important item of cost. The cost of trucking cattle from West Texas to Fort Worth, with yardage, feed, selling commission and other marketing expenses, averages about $1.00 per hundredweight marketed.

Repairs and Operating Costs

Estimated repair and operating costs on feedlots, grain storage, feed grinders, silos and other facilities directly connected with cattle

Table 4. ESTIMATED COSTS AND RETURNS FROM SIX SYSTEMS OF CATTLE FEEDING, 1956 PRICES

Feeding system	High-grain ration			High-roughage ration		
	Calves 1	Light weight yearling steers 2	Yearling steers 3	Light weight yearling steers 4	Yearling steers 5	Yearling steers 6
	Dollars					
Steers purchased (100 head) [1]	7,200	10,200	12,750	10,200	12,750	12,750
Other Costs:						
Homegrown sorghum grain	2,716	3,503	2,985	2,221	1,791	995
Cottonseed meal and salt	1,133	910	759	908	1,063	761
Homegrown silage	650	910	813	1,554	2,068	1,507
Alfalfa hay			398		557	398
Marketing expense	782	941	1,020	891	1,059	965
Veterinary and miscellaneous	25	25	25	25	25	25
Depreciation [2]	159	159	159	159	159	159
Interest [3]	421	420	351	259	514	346
Repairs and operation—added equipment	180	180	180	180	180	180
Total for feeding enterprise	13,266	17,248	19,440	16,397	20,166	18,086
Cattle sales:						
Animals sold (no.)	99	99	99	99	99	99
Average market weight (lbs.)	790	950	1,030	900	1,070	975
Total weight sold (lbs.)	78,210	94,050	101,970	89,100	105,930	96,525
Price per cwt. (dol.)	22	22	22	22	22	22
Gross cattle sales (dol.)	17,206	20,691	22,433	19,602	23,305	21,236
Profits from beef enterprise: [4]						
1956-57 prices (dol.)	3,940	3,443	2,993	3,205	3,139	3,150
With 3-cent margin [5] (dol.)	3,158	1,903	1,223	1,665	1,330	1,535
With 2-cent margin [5] (dol.)	2,378	963	204	724	270	469
With 1-cent margin [5] (dol.)	1,594	22	−816	−216	−789	−496
With no margin [5] (dol.)	812	−918	−1,837	−1,157	−1,849	−1,462

[1] See Table 2 for more detailed information as to weights, gains, etc., and Table 3 for price information.
[2] For improvements and equipment added for a beef feeding enterprise.
[3] For the added investment in improvements, equipment, grain, silage and cattle.
[4] As used in this report, profit represents the difference between cattle sales and the added cost of the cattle feeding enterprise exclusive of labor and management. This return is commonly referred to as labor and management income.
[5] Difference in the price received per pound for slaughter cattle over the price paid for feeder cattle.

feeding would average about $180 per year per 100 head of cattle. This does not include repair and operating costs of silage harvesting equipment. These items are included in the cost of silage.

At 1956 prices, cattle purchases made up about half to two-thirds of the total costs of the cattle enterprise. The next most important cash expense was for cottonseed meal.

It is assumed that many farmers have labor that could be used in cattle feeding. Consequently, labor was not added as a charge. However, the farmer who uses hired labor for the feeding enterprise should consider this labor as a cash cost item. One percent death loss was assumed in calculating the liveweight of cattle sold. This is higher than losses sustained at Spur, but not as high as those at Big Spring.

ESTIMATED CATTLE SALES

Cattle should be marketed by May 1 to fit in well with cash crop production in West Texas. Good slaughter cattle weighing 700 to 1,100 pounds brought 21 to 23 cents per pound on the Fort Worth market during April 1957. A price of 22 cents a pound, market weight basis, was used in calculating the value of cattle sales. This is a margin of 4 cents a pound for calves and 5 cents for steers between the buying and selling price. Some West Texas feeders report a larger margin on cattle purchased during September and October 1956 and sold during March, April and May 1957.

PROFITS FROM FEEDING CATTLE

The difference between cattle sales and costs, exclusive of labor, represents the profit, footnote 3, Table 4, that a farmer might expect from a cattle feeding enterprise with cattle and feed prices that prevailed during the fall of 1956 and the spring of 1957.

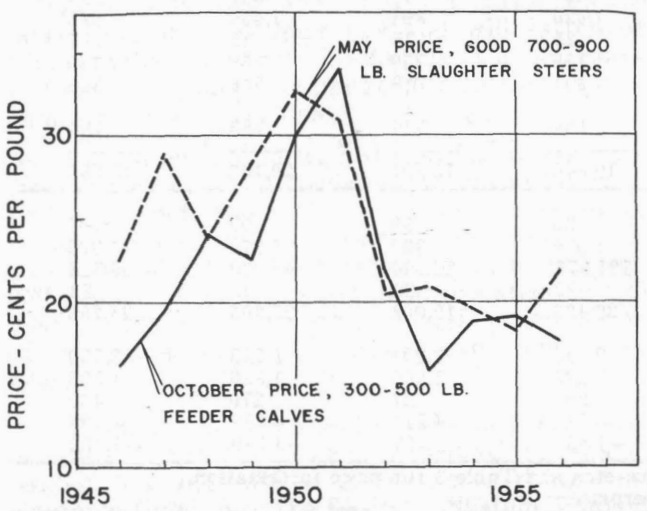

Figure 5. Average October price of Good feeder steer calves and the price the following May of 700-900-pound slaughter steers on the Fort Worth market, 1946-57.

With slaughter cattle bringing 4 or 5 cents a pound more than the feeder animals cost the previous fall, each system of feeding studied would be profitable. By using any of the six systems, a farmer could expect to make a substantial profit by feeding his sorghum grain to cattle rather than by selling it at $2.00 per hundredweight at harvest time. By feeding 100 head, profits were calculated at $31.00 to $39.00 per head, depending on the system of feeding.

Stated differently, at 1956-57 cattle and feed prices, a farmer could earn $1 per hour for the labor involved and, in addition, make $2,500 to $3,300 more from his sorghum grain marketed through 100 steers than would have been realized by selling the grain at $2.00 per hundredweight.

These profits are in line with the experience of farmers who did a good job of feeding cattle put in the feedlot during the fall of 1956.

It is not the purpose of this study to evaluate the results of experimental cattle feeding research or to compare different feeding trials. The various feeding trials used in making the calculations shown in Table 4 were not all conducted at the same time, or at the same place or under exactly the same conditions.

The relatively low feed cost per pound of gain on calves tends to be offset by the fact that Good feeder steer calves cost more per pound than Good feeder steer yearlings, Figure 2. At the same time, fat calves and fat steers grading Good tend to sell for about the same price, Figures 5 and 6. Thus, the margin between the price paid for feeders and the price received for slaughter animals is likely to be less with calves than with yearling steers.

Systems 1, 2 and 4 had the advantage of stalk field grazing for which there was no charge. Research shows that 60 days of stalk field grazing should provide an average of 50 pounds of gain per steer.

During the past 11 years, the spread on the Fort Worth market between the cost of Good feeder calves in October and the price paid for Good slaughter calves the following May has averaged about 2½ cents per pound, Figure 5.

However, during years of severely declining cattle prices, such as occurred during 1951 and 1952, slaughter calves sold in May brought less per pound than feeder calves cost the previous fall. Such a situation existed during 3 of the past 11 years. In 1 year there was no margin between the buying and selling price.

Only once in the past 11 years was the cost of Good feeder yearling steers higher than the price paid for Good slaughter steers. However, there is considerable year-to-year variation in the spread between buying costs and selling prices per pound of both calves and yearlings.

Because of this variation, profits were calculated for each system of cattle feeding, assuming different margins between feeder and slaughter prices. In each instance, 1956-57 costs were used. The selling price was adjusted in each case to obtain the different price margins.

With a margin of 3 cents per pound and $2.00 sorghum grain, it was estimated that system 1 would return more than $30 per head for profit and the operator's time and management. The least profitable of the systems (numbers 3 and 5) would return $12 to $13 per head profit with a 3-cent margin.

Based on a 2-cent margin, 100 head of calves or light weight yearlings (systems 1, 2 and 4) were calculated to return $700 to $2,300 profit. However, with only a 2-cent margin, it is doubtful whether the opportunities for profit with systems 3, 5 and 6 justify the risk involved.

With a 1-cent margin, system 1 is the only one that would have been profitable with grain sorghum at $2.00 per hundredweight.

For the systems of cattle feeding outlined in Table 4, a change of 1 cent per pound in the margin between purchase and selling prices of cattle means a difference of $8 to $10 per head in the profits or losses of the cattle feeding enterprise. Thus, with a margin of 4 cents per pound, there is a likelihood of $16 to $20 greater profit per head than with a margin of 2 cents a pound. The heavier the cattle sold, the greater is the effect of a change of margin on profits per head.

By careful buying, a farmer has an opportunity to widen the margin between the purchase and selling prices of cattle put in the feedlot. Every cent or fraction of a cent per pound that can be saved in buying the quality of cattle desired is that much added to this margin. Wise buying is the best way to assure a favorable margin.

Except during years when the general level of cattle prices are declining sharply, the cattle feeder who buys wisely in October usually can count on a favorable margin for slaughter cattle sold in April or May that grade Good or higher. Although there is year-to-year variation in this margin, with the present outlook for grain sorghum prices, a well-managed cattle feeding enterprise can return a profit at an average margin.

Year-after-year operations are likely to be less risky in the long run than an in-and-out operation. With year-after-year operations, the feeder always is in position to benefit when prices are particularly favorable. The favorable years should make up for the seasons when the profit margin is small.

Once a cattle feeding enterprise has been added to the system of farming, there are many decisions to be made yearly. These decisions con-

TABLE 5. ESTIMATED PROFITS AND LOSSES FROM 100 STEERS FED IN DRYLOT USING SIX SYSTEMS OF FEEDING AND WITH VARYING PRICES FOR GRAIN SORGHUM, VARYING MARGINS IN CATTLE PRICES AND OTHER COSTS AT THE 1956-57 LEVEL

Feeding system	1	2	3	4	5	6
	Dollars					
Grain sorghum at $2.50 per cwt. and a cattle price margin of:[1]						
4 cents	3,108	1,759	1,670	1,965	2,614	1,784
3 cents	2,326	819	650	1,025	1,555	819
2 cents	1,544	122	-369	84	505	-147
1 cent	762	-1,062	-1,389	-856	-564	-1,112
none	-20	-2,003	-2,388	-1,797	-1,624	-2,078
Grain sorghum at $2.00 per cwt. and a cattle price margin of:[1]						
4 cents	3,940	2,843	2,243	2,605	2,389	2,500
3 cents	3,158	1,903	1,223	1,665	1,330	1,535
2 cents	2,378	963	204	724	270	469
1 cent	1,594	22	-816	-216	-789	-496
none	812	-918	-1,837	-1,157	-1,849	-1,462
Grain sorghum at $1.50 per cwt. and a cattle price margin of:[1]						
4 cents	4,747	3,893	3,282	3,462	3,358	2,934
3 cents	3,965	2,953	2,262	2,522	2,299	1,969
2 cents	3,183	2,012	1,243	1,581	1,239	1,003
1 cent	2,401	1,072	223	641	180	38
none	1,619	131	-796	-300	-880	-928
Grain sorghum at $1.25 per cwt. and a cattle price margin of:[1]						
4 cents	5,185	4,466	3,747	4,109	3,927	3,246
3 cents	4,403	3,526	2,727	3,169	2,868	2,281
2 cents	3,621	2,585	1,708	2,228	1,708	1,315
1 cent	2,839	1,646	688	1,288	649	350
none	2,057	706	-331	347	-411	-616

[1] The difference in price received per pound for slaughter cattle over the price paid for feeder cattle.

cern the kind and quality of cattle to buy and the kind of ration to feed. Feeders should consider the prospective demand and supply for the various weights and grades of cattle, together with the cost outlook for feed grains.

A comparison of system 1 (where calves are fed) with the other systems (involving yearling steers), shows that calves require less feed per pound of gain than larger animals. However, calves normally cost more per pound as feeders than yearling steers (Figure 2). Consequently, since slaughter calves and steers of the same grade sell for about the same price, a cattle feeder is likely to have less margin with calves than with steers. Stated differently, during a year that the cattle feeder has a margin of 2 cents per pound when feeding calves, he is likely to have a larger margin by feeding yearling steers.

EFFECT OF GRAIN SORGHUM PRICE

To this point, consideration has centered around cattle feeding as an alternative to selling sorghum grain at $2.00 per hundredweight. However, the price of grain sorghum greatly affects the profitableness of cattle feeding.

The cotton and wheat allotment programs have greatly increased the acreage available for producing grain sorghum on many Texas farms. Lower prices for grain sorghum likely will result from increased production.

Price expectations for both grain sorghum and cattle are important considerations in planning a feeding enterprise. Estimates of the profits and losses that might be expected from cattle feeding with grain sorghum at varying prices are summarized in Table 5. Except for homegrown feed, all costs are those that prevailed in 1956-57, as shown in Table 3. Estimates also are shown for five different margins between the buying and the selling price of cattle for the different prices of grain sorghum.

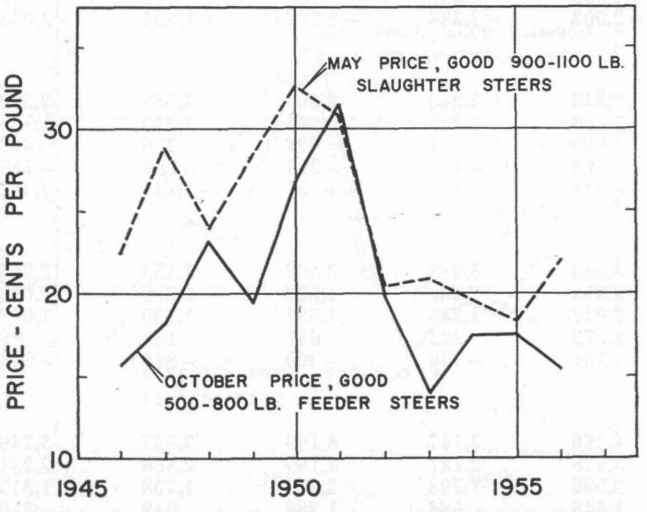

Figure 6. Average October price of Good feeder steers and the price the following May of Good slaughter steers on the Fort Worth market, 1946-57.

Tables 5 and 8 may serve as a rough guide in appraising the opportunities for profit from cattle feeding. This information also can be used in evaluating different systems of feeding under different price prospects for feed and for feeder and slaughter cattle.

In planning a cattle feeding enterprise, careful attention should be given to the price outlook for slaughter animals. A knowledge of the outlook is basic to a wise selection in choosing the grade, age and weight of cattle to purchase. This knowledge also is basic in selecting the best-suited ration.

Rations high in grain and low in roughage are the most profitable when grain is cheap, and high forage rations tend to be more favorable when grain prices are high.

Except for grain sorghum, costs associated with a feeding enterprise are not expected to decline. Therefore, the lower the price of grain sorghum, the greater the advantage of using a relatively heavy grain ration.

With $2.50 grain sorghum, a price margin of at least 3 or 4 cents a pound is necessary for cattle feeding to provide a profitable market for grain. Over a period of years, farmers cannot depend on such a favorable price margin. With other costs at the 1956-57 level, there is a high degree of risk in feeding $2.50 grain sorghum to cattle.

On the other hand, with grain sorghum bringing $1.50 per hundredweight, feeding a high grain ration is likely to be profitable with a 2-cent margin in the price of slaughter cattle over the cost of feeders. With grain sorghum selling for $1.25, feeding systems 1, 2 and 4 offer a fair opportunity for profit with only a 1-cent favorable margin in cattle prices.

Table 5 shows that even with low-priced grain, slaughter cattle must sell for more per pound than the feeders cost if cattle feeding is to be profitable. Cattle feeding is risky unless there is prospect of such a margin. The higher the price of grain sorghum the wider is the margin needed. Careful buying of feeder animals is a possible way of increasing this margin. A cattle feeder should consider various aspects of the outlook for slaughter cattle in planning his year-to-year cattle feeding operations. Sometimes slaughter prices are not as good as expected and the price margin is not as wide as anticipated. Estimates shown in Table 5 may serve as a guide to farmers and others in calculating the risk involved in a cattle feeding enterprise should slaughter prices be less than expected.

EFFECT OF COTTONSEED MEAL PRICE

Cottonseed meal is the high protein feed most commonly used in balancing a beef cattle ration. With most rations, this can be done by feeding 2 pounds of meal per animal daily.

TABLE 6. SUMMARY OF FEED AND LABOR REQUIREMENTS FOR THREE SYSTEMS OF CATTLE FEEDING, WITH COTTONSEED HULLS USED AS THE PRINCIPAL ROUGHAGE

Feeding system	Calves		Yearling steers		Yearling steers	
	7		8		9	
Animals purchased (no.)	100		100		100	
Average weight (lbs.)	400		750		750	
Period grazed (days)	60		0		0	
Period in feedlot (days)	150		100		140	
Average per steer:						
Weight going into feedlot (lbs.)	450		750		750	
Final market weight (lbs.)	765		980		1,030	
Average daily gain (lbs.)	2.1		2.3		2.0	
Labor with steers:						
Total (hrs.)	500		300		470	
Per steer (hrs.)	5		3		4.7	
	Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer	Av. lbs. per day	Total lbs. per steer
Feed used per steer:						
Ground sorghum grain (lbs.)	9.1	1,365	11	1,100	6.4	900
Cottonseed meal (lbs.)	2.0	300	2	200	2.0	280
Cottonseed hulls (lbs.)	6.1	920	9	900	15.0	2,100
Alfalfa hay (lbs.)	2.0	300	2	200	2.0	280
Salt (lbs.)		10		10		15

Consequently, a $10 change per ton in the cost of cottonseed meal changes the cost of feeding a calf or steer by 1 cent per day. For a feeding period of 150 days, this difference amounts to $1.50 per head fed, or a total of $150 in feeding 100 steers for a period of 150 days.

FEEDING COTTONSEED HULLS

Satisfactory results have been obtained with cottonseed hulls as the principal roughage in feeding trials at Spur and Big Spring. The danger of vitamin A deficiency in these rations was avoided by feeding 2 pounds of alfalfa hay per head daily.

Cottonseed hulls are easy to feed and may be handled mechanically. When handled by hand, less labor is required to feed hulls than to feed silage.

By feeding hulls instead of silage, a farmer can provide the facilities necessary to feed 100 cattle for about $2,300, as compared with $4,800 when silage-making equipment is purchased.

Three systems of cattle feeding, 7, 8 and 9, in which cottonseed hulls are used, are summarized in Table 6. System 7 is for calves handled very much as in system 1, Table 2, except that the roughage consisted of 6.1 pounds of cottonseed hulls and 2 pounds of alfalfa hay instead of silage. Daily gains averaged 2.1 pounds per head.

With systems 8 and 9, 750-pound steers were fed 100 and 140 days, respectively. The ration in system 8 was relatively high in grain, whereas that in system 9 was low in grain and high in roughage. Except for the kind of roughage, systems 8 and 9 are similar to systems 3 and 5, respectively, for which data are summarized in Tables 2 and 4.

Cottonseed hulls were abnormally expensive in 1956 because of drouth. In this study, hulls were figured at $15 per ton to more nearly illustrate a normal cost situation.

With prices that prevailed during 1956-57, it would have been profitable to use cottonseed hulls at $15.00 per ton in a fattening ration for either calves or yearling steers, Table 7. Systems 7 and 8, both relatively high in concentrates, had little advantage over system 9, a high roughage and low grain ration, from the standpoint of profits.

However, with the price relationships used in this study, there were advantages in feeding silage. For instance, it was estimated that 450-pound calves fed silage and concentrates, system 1, Table 4, made nearly $8.00 more profit per

TABLE 7. ESTIMATED COSTS AND RETURNS FROM THREE SYSTEMS OF CATTLE FEEDING, WITH COTTONSEED HULLS USED AS THE PRINCIPAL ROUGHAGE, 1956-57 PRICES

Feeding system	Calves	Yearling steers	Yearling steers
	7	8	9
	— — — — Dollars — — — —		
COSTS			
100 steers purchased	7,200	12,750	12,750
Homegrown grain sorghum	2,716	2,189	1,791
Cottonseed meal and salt	1,057	709	994
Cottonseed hulls	612	672	1,567
Alfalfa hay	398	398	557
Marketing expense	758	970	1,030
Miscellaneous	25	25	25
Depreciation — added investment	134	134	134
Interest — added investment	454	320	417
Repairs and operation — added facilities	172	172	172
Total	13,526	18,339	19,537
CATTLE SALES			
Animals sold (no.)	99	99	99
Average market weight (lbs.)	765	980	1,030
Total weight sold (lbs.)	75,735	97,020	101,970
Price per cwt. (dol.)	22	22	22
Gross cattle sales (dol.)	16,662	21,344	22,433
Profits—1956-57 prices ($2.00 grain sorghum) (dol.)	3,136	3,005	2,896

TABLE 8. ESTIMATED PROFITS AND LOSSES FROM 100 STEERS FED RATIONS WHICH INCLUDE COTTONSEED HULLS WITH VARYING PRICES FOR GRAIN SORGHUM

Feeding system	Calves	Yearling steers	Yearling steers
	7	8	9
		Dollars	
Grain sorghum at $2.50 per cwt. and a cattle price margin of:[1]			
4 cents	2,433	1,477	1,499
3 cents	1,675	507	479
2 cents	918	-463	-541
1 cent	161	-1,433	-1,560
Grain sorghum at $2.00 per cwt. and a cattle price margin of:[1]			
4 cents	3,136	2,035	1,877
3 cents	2,378	1,065	857
2 cents	1,621	95	-163
1 cent	864	-875	-1,182
Grain sorghum at $1.50 per cwt. and a cattle price margin of:[1]			
4 cents	3,839	2,593	2,418
3 cents	3,081	1,623	1,398
2 cents	2,324	653	378
1 cent	1,567	-317	-641
Grain sorghum at $1.25 per cwt. and a cattle price margin of:[1]			
4 cents	4,190	2,872	2,648
3 cents	3,432	1,902	1,628
2 cents	2,675	932	608
1 cent	1,918	-38	-411

[1]Margin is the difference in price received per pound for slaughter cattle over the price paid for feeder cattle.

head than calves fed a similar quantity of concentrates with cottonseed hulls, system 7, Table 7. Yearling steers fed silage were estimated to be more profitable than those fed cottonseed hulls, systems 8 and 9, Table 7, compared with systems 3 and 5, respectively, Table 4.

Table 8 shows the estimated profits and losses from steers fed rations containing cottonseed hulls with varying prices of grain, and estimates of profits and losses with different margins between the buying and selling price of the cattle fed.

With grain sorghum at $2.00 or more per hundredweight, a satisfactory profit with each of the three feeding systems that include cottonseed hulls depends on a favorable margin of 3 or 4 cents a pound between the buying and the selling price of cattle.

Estimates shown in Tables 8 and 5 may serve in evaluating alternative roughages available for drylot feeding.

OTHER BENEFITS OF FEEDING CATTLE

Considerable manure results from feeding cattle in a drylot. Manure is a valuable source of fertility and humus. Farmers report good responses from applications of manure with irrigated crops. The response to manure on dry land has been less pronounced.

The methods of storing or handling the manure before it is spread on the field will affect both the quantity and quality of this fertilzer, and the time of year that manure is available will affect its usefulness. For these reasons, it is difficult to place a value on this by-product of the cattle feeding enterprise.