FACT SHEET

L-871

COSTS AND ECONOMIES OF SIZE IN TEXAS CATTLE FEEDLOT OPERATIONS

Raymond A. Dietrich*

Cattle feeding in Texas is characterized by large and highly mechanized commercial feedlot operations. Such operations represent one form of big business in a dynamic agricultural sector with large investments in capital equipment and resource inputs requiring both special management and labor skills.

Recent growth and expansion of large commercial feedlots in Texas have raised numerous questions concerning economies of size in cattle feeding operations, the location factor in feeding costs and the effect of various cost components on cattle feeding operations. A study was designed to analyze these questions, and it represents the second phase of a comprehensive economic analysis of the cattle feeding industry within Texas. The first study, dealing with cattle feeding systems and management practices, is summarized in Fact Sheet L-833.

Degree of Feedlot Utilization

The recent upsurge of large commercial feedlots in Texas has given rise to relatively large capital investments in fixed facilities which in turn tend to result in high levels of annual fixed costs. Rising levels of annual fixed costs have encouraged feedlot operators to maintain high levels of feedlot utilization rates. These utilization rates are an important index for analyzing variations in annual fixed costs among the various sizes of feedlots.

Yearly fixed costs which include items such as depreciation, interest, taxes, insurance, repairs and fixed labor are directly affected by the level of capital investment, but they are not affected by the volume or number of cattle placed on feed. Since these non-feed costs remain the same regardless of the number of cattle on feed, increased feedlot utilization rates result in spreading such costs over greater units of output. The degree of feedlot utilization index developed for this study follows:

$$\text{Degree of feedlot utilization} = \frac{\text{(Turn-over ratio)}\ \text{(Average days on feed)}}{365}$$

The degree of feedlot utilization varied more by size of feedlot than by feeding areas. The utilization rate varied from a high of almost 80 percent for feedlots with 10,000 head and over capacity to about 40 percent for the small farmer-feeder types. Less variation existed in utilization rates among feeding areas than among size groups since each feeding area also contained some of the larger type feeding operations.

Investment in Equipment and Facilities

Total capital investment in equipment and facilities by Texas feedlots averaged about $35 per head of capacity during 1966-67, table 1. Per head of capacity refers to the one-time feeding capacity. The two largest items of capital investments, accounting for more than half of the total fixed investments, were pens plus associated and milling equipment. Investments in pens and equipment averaged about $11 per head of capacity as compared to more than $8 per head for milling equipment.

Total fixed investments, by size group, varied from a low of $32 per head of capacity for feedlots in the 5,000 to 9,999 group to a high of almost $50 per head for lots with 1,000 to 1,999 capacity. Capital investments among feeding areas ranged from $28 to $40 per head of capacity. They were highest for feedlots in Gulf Coast-Rio Grande Plains and lowest in the Plateau-Pecos area.

Annual Fixed Costs

Annual fixed costs which include depreciation, interest, taxes, insurance, repairs and fixed labor averaged about 1.2 cents per pound of gain on a net market weight basis. Net market weight

*Assistant professor, Department of Agricultural Economics and Sociology, Texas A&M University.

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Table 1. Fixed Investments Per Head of Capacity, by Major Items of Equipment and Size of Feedlots, Texas Feedlots, 1966-67

Item	Less than 1,000 head capacity	1,000 to 1,999 head capacity	2,000 to 4,999 head capacity	5,000 to 9,999 head capacity	10,000 head and over capacity	Total
	Dollars					
Pens & equipment[1]	7.31	10.84	15.37	10.05	9.86	10.72
Water system	2.40	2.65	2.12	1.58	2.35	2.20
Milling equipment[2]	3.95	7.62	8.74	8.14	8.60	8.45
Feed storage facilities & equipment[3]	16.60	12.26	8.78	2.77	5.37	5.81
Feed distribution equipment[4]	5.25	3.81	3.25	2.02	1.71	2.10
Manure equipment	.52	1.84	1.22	.47	.38	.56
Transportation equipment	3.43	4.92	1.99	1.36	1.04	1.36
Land	2.81	3.13	3.11	3.04	2.15	2.47
Office & office equipment	.19	.61	.77	1.02	.68	.74
Scale & scale house	.87	2.04	1.46	1.20	.62	.88
Total	43.33	49.72	46.81	31.65	32.76	35.29

[1]Feeding pens, work pens and chute, hospital pens, feed trough and bunks and self feeders.

[2]Hammermill, roller, crimper, steam generator, feed mixer, molasses mixer, scales, etc.

[3]Silo, elevator, silage loader, tractor-powered scoop and loader, etc.

[4]Mechanical (auger-tube), auger-unloading bulk feed trucks, front-end loader, auger-mixer grain wagon, farm tractor, utility wagon, hand scoops, etc.

assumes a 4 percent shrink at the feedlot. Annual fixed costs ranged from 1.0 cents per pound of gain for feedlots with 10,000 head and over capacity to 2.7 cents per pound of gain for feedlots with less than 1,000 capacity. The most important items of annual fixed costs were depreciation and fixed labor which accounted for about 60 percent of the total. Interest on fixed investments and repairs ranked second in importance and made up 32 percent of the total fixed costs.

These costs averaged $7.88 on a per-head-of-capacity basis during 1966-67. They ranged from a low of $7 per head of capacity for feedlots with 10,000 head and over capacity to $10.90 per head of capacity for lots in the 2,000 to 4,999 group.

Variable Costs

Variable costs are those which vary with output or the volume of cattle placed on feed. Major items of variable costs are feed, interest on feeder cattle, labor, death loss and veterinarian costs. Fuel, power and communication expenses accounted for relatively smaller proportions of the total variable costs.

Variable costs averaged about 21.6 cents per pound of gain in Texas feedlots during 1966-67. Variable costs ranged from 21.4 cents per pound of gain for feedlots with 10,000 head and over capacity to 22.4 cents per pound for feedlots with 2,000 to 4,999 head feeding capacity.

Feed costs accounted for about 82 percent of the total variable costs and varied by size of feedlot and by feeding area. However, the relative importance of feed as a variable cost item is affected by the *annual price level* of the major feed ingredients. Other factors affecting feed costs per pound of gain are location, type of cattle placed on feed and feeding practices employed.

Total short-term interest cost, which accounted for 8 percent of the variable feeding costs, ranked second in importance. Interest on feeder cattle alone accounted for about 70 percent of the total short-term interest costs or about 6 percent of the total variable costs. Interest on feed accounted for most of the remaining short-term interest cost, while interest on operating capital for labor and other variable cost items were relatively minor.

Additional variable cost items were labor which made up 3.7 percent of the total, followed by death losses and veterinarian and medication expenses with 2.4 and 2.1 percent, respectively. The remaining 1.6 percent was accounted for by gas and oil, electricity, telephone and communications and other miscellaneous items.

Total Feeding Costs

During 1966-67, total feeding costs in Texas feedlots averaged about 22.8 cents per pound of gain. Variable costs accounted for 95 percent of these costs while annual fixed costs made up the remaining 5 percent. Total feeding costs ranged from about 22.4 cents per pound of gain for feedlots with 10,000 head and over capacity to 24.3 cents per pound for lots with less than 1,000 capacity and also for feeders with 2,000 to 4,999 head capacity.

Economies of Size

Figure 1 reveals that substantial economies of size existed in Texas and Oklahoma feedlot operations during 1966-67.** This figure suggests that feedlots with less than 5,000 to 10,000 head capacity are at a competitive disadvantage with respect to annual fixed costs per pound of gain compared to larger size feedlot operations. For example, feedlots with a one-time feeding capacity of 400 head experienced total annual fixed costs equivalent to about 3 cents per pound of gain as compared to 1.4 cents per pound of gain for feedlots with 10,000 head capacity. This differential is even greater when feedlots with more than 10,000 head capacity are considered.

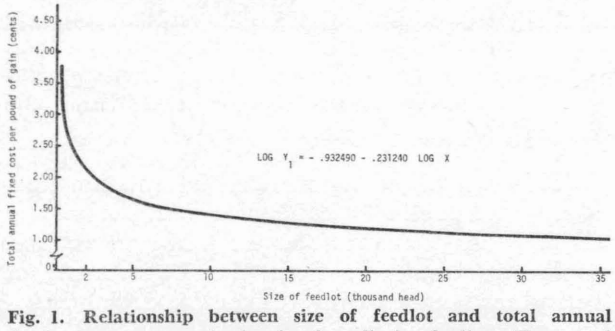

Fig. 1. Relationship between size of feedlot and total annual fixed costs, per pound of gain, for all size feedlots, Texas and Oklahoma, 1966-67.

The combined effect of feedlot size and 1966-67 feedlot utilization rates on total annual fixed costs is shown in figure 2. The higher cost curve for feedlots with 1,000 to 4,999 head capacity as compared to lots with 5,000 to 9,999 head capacity is the result of economies of size and differences in feedlot utilization rates. The effect of a relatively lower utilization rate is most noticeable for feedlots with 25,000 to 29,999 head capacity.

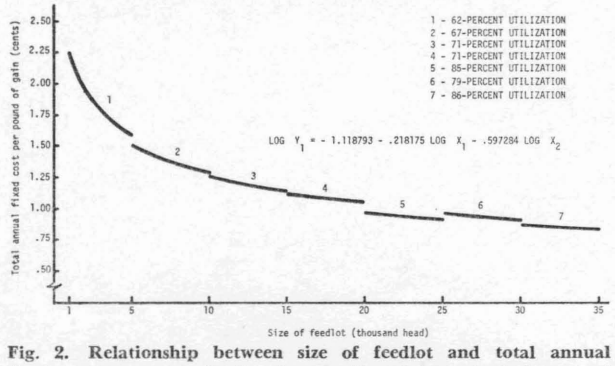

Fig. 2. Relationship between size of feedlot and total annual fixed costs, per pound of gain, as affected by actual degrees of feedlot utilization, Texas and Oklahoma, 1966-67.

The competitive advantage because of size, however, tends to decline when feedlot utilization rates

**The original study included data and analyses for Oklahoma feedlots. However, these cost curves are influenced predominantly by Texas feedlot operations.

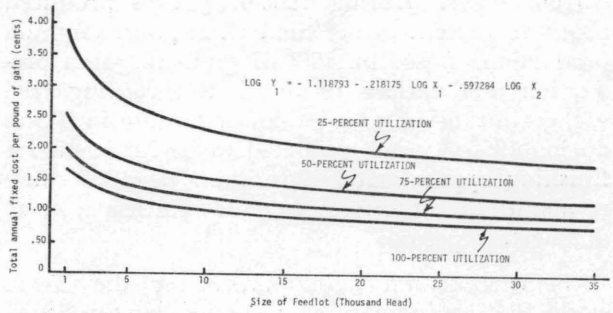

Fig. 3 Relationship between size of feedlot and total annual fixed costs, per pound of gain, with varying degrees of feedlot utilization, Texas and Oklahoma, 1966-67.

are held constant at consecutively higher levels over all size groups, figure 3. For example, when feedlot utilization rates are held constant at 25 percent in all size groups, total annual fixed costs are approximately 2 cents per pound of gain higher for feedlots with 1,000 head capacity as compared to feedlots approaching 35,000 head capacity. This difference declines to 1.2 cents per pound of gain when utilization rates are held constant at the 75 percent level. Figure 3 also shows that total annual fixed costs decrease substantially as feedlot utilization rates increase from 25 to 50 percent. For example, total annual fixed costs for feedlots with 1,000 head feeding capacity declined 1.3 cents per pound of gain as feedlot utilization rates increased from 25 to 50 percent. This compares to a decline of about .6 cent per pound of gain for feedlots with 35,000 head capacity.

Selected Implications

Results from this study suggest that large commercial feedlots may increase even more in size and number within Texas during the next decade, compared to the rapid growth since the early 1960's. This is especially true for the Rolling Plains and Panhandle.

Additional increases in number and size of large commercial feedlots raise questions concerning the adequacy of future feed resources and feeder cattle supplies as well as market outlets for beef. Current and potential supplies of grain sorghum are of prime importance under current feeding programs employed. A major factor governing the supply and production of grain sorghum is the future amount of irrigation water available in the Texas Panhandle and Plains areas. In the absence of a water importation program or the development of new grain sorghum varieties especially adapted to dryland growing conditions, grain sorghum production in these areas may decline from current levels in the Panhandle and Plains by 1980.

Texas, nevertheless, possesses substantial resources for greatly increasing cattle feeding above

current levels. During 1966-67, Texas produced about 45 percent of the total U. S. grain sorghum production. Based on 1966-67 grain sorghum production and various assumptions regarding feed use, grain sorghums available for feeding in Texas during 1966-67 were estimated to be sufficient for finishing approximately 5 million head of cattle or about triple the number of fed cattle marketed during that period.

Some potential developments for the Texas cattle feeding industry as suggested by this study include:

- The number and size of large feedlots, those with 10,000 or more head, will continue to increase. Smaller feedlots probably will decrease in number and size and account for an increasingly smaller proportion of cattle marketed from Texas feedlots.

- More emphasis will be plased on a high degree of feedlot utilization rates as feedlots increase in size and are faced with growing capital investments in fixed facilities.

- More refined management techniques and the adoption of high speed computer programs may become essential for large commercial feedlots as an aid to management for making decisions regarding feeding practices, as well as decisions relative to sources of feed, feeder cattle and market outlets.

- Contractural arrangements with feeder cattle producers may become necessary to insure adequate quantities and desired types of feeder cattle on a continuing basis as feeding facilities expand.

- To insure orderly growth and expansion within the cattle feeding industry and to expedite decision making, it may become necessary to project supplies of future feeder cattle and feed inputs, on a regional basis, given realistic assumptions relative to available resources.

- Based on feeding cost differentials between feeding areas and available sources of nearby feed supplies, cattle feeding will remain concentrated most heavily in the Texas Panhandle area. Optimum location of cattle feeding facilities and slaughtering firms will continue to be important considerations for firms seeking entry into the feeding and slaughtering industry.

This fact sheet summarizes information contained in Bulletin 1083, *Costs and Economies of Size in Texas-Oklahoma Cattle Feeding Operations.* Copies are available from the Department of Agricultural Information, Texas A&M University, College Station, Texas 77843.

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