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R.W. Porter

R. Jones

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ECONOMIES OF SCALE IN FINISHING CATTLE

R. W. Porter[1] and R. Jones[1]

Summary

The results of this study indicate that farmer-feeders who finish as few as 700 head per year can compete with the large commercial feedlots from a cost perspective. The lack of a sophisticated feed mill does not prevent the farmer-feeder from being competitive with the large commercial feedlots in feed costs. This might be explained by the farmer feeder producing much of the feed, which reduces transportation and transaction costs. The farmer-feeder has non-feed costs that average 64% more than those of the large commercial feedlots. The significantly greater costs for depreciation, repairs, and maintenance may be explained by having fewer numbers of cattle to spread the equipment over. As evidenced by the rapid structural change in the cattle feeding industry, it is not easy for the relatively smaller-scale farmer-feeder operation to compete in the cattle feeding industry. This cost-comparison study indicates that it is possible for well managed small-scale feeders to be competitive from an overall cost perspective.

Introduction

Given the dramatic structural changes in the cattle-feeding industry over the past 40 years, one might assume that economies of scale so strongly favor the large commercial feedlots that the small farmer-feeder could not possibly be competitive. This must not always be the true, however, because there are still small farmer-feeders who continue to feed cattle profitably. The issue of economies of scale always generates interesting debate among industry participants and observers.

With that said, surprisingly few previous studies have specifically examined the impact of size on the cost structure in cattle feeding. For cattle fed in Texas during 1980 and 1981, fixed costs were significantly lower for feedlots with more than 16,000 head capacity. In Iowa feedlots, the converse was true; non-feed costs were fairly flat over a range of sizes. Iowa feedlots tended to be diversified with farming and other livestock operations, however, so economies of scope might mask economies of scale. In Texas feedlots, non-feed costs were less for feedlots larger than 50,000 head capacity. Approximately one-third of the fixed costs of Texas feedlots are for the feed mill. Iowa feeders tend to transfer much of the feed-milling costs to higher costs for prepared feed.

Our evaluation compares operating-cost information for the small farmer/feeder with similar information obtained from large commercial feedlots. We compare various measures of costs for the two types of operations. Because the two classes of feedlots are dramatically different in size, we make all comparisons on cost per pound of gain. In addition, we attempt to determine what factors drive cost differences between the two types of operations.

[1]Department of Agricultural Economics.

Procedures

Economies of scale occur when more units are produced at a lower cost per unit. Economists suggest that division of labor, specialization, and spreading of overhead costs are the primary ways that economies of scale are achieved. In addition, larger feedlots may enjoy lower input costs because of volume discounts for inputs and more negotiating effort.

The data for our study come from the Kansas Farm Management Association (KFMA) and a sample of large commercial feedlots (LCF). The KFMA data represent 35 backgrounder-feeders who provided cattle-feeding-enterprise data for three consecutive years (1997, 1998, and 1999). These feeder operations ranged in size from operations that finished 100 head per year to those that finished 1900 head per year. The LCF data represent 55 feedlots, finishing an average of 78,251 head per year. The LCF data include lots from Kansas, Texas, and Oklahoma for the same 3-year time period.

The summary data for small and large KFMA feedlots (Table 1) were calculated by using the "best fit" equations presented in Figures 1 through 3, computed where the smallest (100 head) and largest (1900 head) intercept the trend line. The LCF data are averages from all of the large feedyards.

Additional data from LCF were results of a "Feed Yard Cost Survey." These data include a more comprehensive breakdown of cost categories that could be compared with KFMA cost categories. This LCF data comes from 19 to 28 feedlots (depending on year) that are not necessarily the same as the 55 feedlots in the previous data set.

The KFMA raw data were aggregated into categories that mirror a close-out from a commercial feedlot; all feed and non-feed costs were included. Not included were costs that would customarily be borne by the owner of cattle in a commercial feedlot. An example of excluded costs would be the interest costs on the cattle. In addition, no adjustment was made in the KFMA data for the expected returns above all accounting costs that a feedlot would expect to recover from operating a feedlot (returns to management and risk). Included interest cost (operating interest) was derived from the depreciation and variable interest costs. Transportation costs (either "to" or "from" the feedlot) were not included, although an argument can be made that a farmer-feeder would be more likely than the large feedlot to bear transportation costs, especially to the packer, as the cattle would more likely be sold on a grid.

The KFMA data are robust enough to demonstrate changes in costs as the size of the enterprise changes. The data from the large commercial feedlots could not be used to assess variation in costs as a function of feedlot size, however, because individual commercial feedlot size was not reported, to maintain confidentiality. Therefore, the KFMA individual firm data are compared to averages from LCF.

Results and Discussion

Figure 1 best summarizes the results of our study. The KFMA feedlots had a calculated average total cost of gain that started at $0.62 per pound of gain for the smallest feedlots (100 head per year), declining to $0.50 per pound of gain for the largest feedlots (1900 head per year). This compares to the LCF data that reveal a total cost of gain of $0.52 for feedlots averaging 78,252 head per year (Table 1). This comparison reveals that it is quite possible for the larger farmer-feeder operations to be competitive with the large feedlots from the perspective of total cost of gain.

Figure 2 summarizes feed-only costs of gain. The KFMA feeders had a calculated average feed-only cost of gain that started at $0.46 per pound of gain for the smallest feedlots (100 head per year), declining to $0.42

per pound of gain for the largest feedlots (1900 head per year). These results compare with the LCF average for feed-only cost of gain of $0.445 for feedlots averaging 78,252 head per year (Table 1).

Figure 3 summarizes the non-feed costs of gain. The KFMA feedlots had a calculated average non-feed cost of gain that started at $0.16 per pound of gain for the smallest feedlots (100 head per year), declining to $0.08 per pound of gain for the largest feedlots (1900 head per year.) The LCF had non-feed costs of gain of $0.075 for feedlots averaging 78,252 head per year (Table 1).

These results (Figures 1 to 3, and Table 1) show that larger KFMA feedlots can be competitive with the very large commercial feedlots on total cost of gain. It is surprising that the feed-only costs are similar for both. One might hypothesize that the worse feed efficiency from feeding dry-rolled grain in the KFMA feedlots was offset by the lesser processing costs from not having a steam flaker and a lesser grain cost because the farmer would otherwise be selling grain at wholesale prices, whereas the large commercial feedlots buy their grain at higher costs that include transaction costs. Hay and silage are usually priced much lower at the farm than at a large commercial feedlot. Another possible explanation for the farmer-feeders having lower feed costs is that many farmer feeders feed their own cattle and these cattle do not have to adapt to a new feedlot (private discussions with cattle feeders suggest that these "adaptation" costs can be quite high).

The most striking observation is that the KFMA feedlots had non-feed costs that were on average more than 60% higher than the non-feed cost for the very large commercial feedlots. Even the larger feedlots in the KFMA data set had non-feed costs that were slightly greater than the costs for the large commercial feedlots. A breakdown of data in Table 2 helps to explain why the KFMA feedlots had these higher non-feed costs.

Table 2 illustrates some striking differences in the non-feed costs between the KFMA feedlots and the LCF feedlots. An obvious problem with this data is that we do not know exactly how the allocations were made. The operators had a total cost that they had to allocate among the various categories, and some subjective allocation likely occurred. Thus, there is higher confidence in the aggregate of these non-feed costs than in each individual cost category.

With that said, results presented in Table 2 reveal that the labor cost for the KFMA data is only 78% of the cost for LCF. Operators of smaller feedlots may not account for all of the unpaid farm labor when reporting costs, or they may value their work at a lower rate. In addition, they are not subject to workman's compensation costs, and they would have a simpler feeding system, perhaps requiring less labor. The insurance cost for KFMA is 22% higher than for LCF. This is likely because the smaller feedlots have more value per head in buildings and equipment to insure.

The interest cost for KFMA is 3.72 times that for LCF. This is likely because the smaller feedlots have a higher investment cost per head. It is also possible that we were not able to adequately separate the interest cost on the cattle from the interest cost on the facilities, equipment, and variable costs. The tax cost for the KFMA is only 72% of the tax cost for LCF. This is hard to reconcile with the insurance and interest costs being higher because there is more facility cost per head. It is possible that the smaller feedlots are taxed at a lower rate because they are classified as agriculture, whereas the feedlots are classified as commercial. The utilities cost for KFMA is 21% higher than for LCF. It is possible that non-feedlot utilities were included in the reported cost measure because it is harder for the farmer/feeder to allocate such costs to the appropriate enterprises.

The depreciation, repair, maintenance, and machine hire costs for KFMA are 2.97 times as high as those for LCF. It is quite plausible that total machine costs are very subject to economies of scale, so it just costs the smaller operators more on a per-unit basis. Larger feedlots would have larger equipment, but it would be used more hours per day and would be spread over significantly more units of gain. The marketing and professional organization costs also are 3.27 times higher for the KFMA than for LCF. This is plausible because the smaller feedlot may have to hire someone to help in marketing the cattle, and they may sell cattle on a delivered basis (grade and yield) so that the smaller feedlot is responsible for the trucking cost to the packer. In contrast, the larger feedlots probably sell most of their cattle FOB the feedlot.

Modest-sized farmer-feeder operations can be cost competitive overall with the larger commercial feedlots. Feed-only costs seem to be the easiest to "keep in line". It may be much more difficult and require good management and attention to detail to achieve competitiveness in the non-feed cost categories.

Table 1. Summary Statistics for Cost

	KFMA Data			
Cost Category	100 head	1900 head	Average	Large Commercial Feedyards
	$/lb of Gain			
Total cost	$0.62	$0.50	$0.56	$0.52
Feed-only cost	$0.46	$0.42	$0.437	$0.445
Non-feed cost	$0.16	$0.08	$0.122	$0.075

Table 2. Breakdown of Non-feed Costs

Data Source	KFMA	LCF	KFMA/LCF
	------- $/lb of Gain --------		
Feed and medicine	0.4369	0.446	0.98
Labor	0.029	0.0373	0.78
Insurance	0.0022	0.001822	1.22
Interest	0.0248	0.0067	3.72
Taxes	0.0022	0.00301	0.72
Utilities	0.007	0.0058	1.21
Depreciation, repair, and maintenance	0.027	0.0091	2.97
Marketing and professional organization	0.0298	0.0091	3.27
Total non-feed costs	0.122	0.0745	1.64
Total cost of gain	0.5589	0.5205	1.07

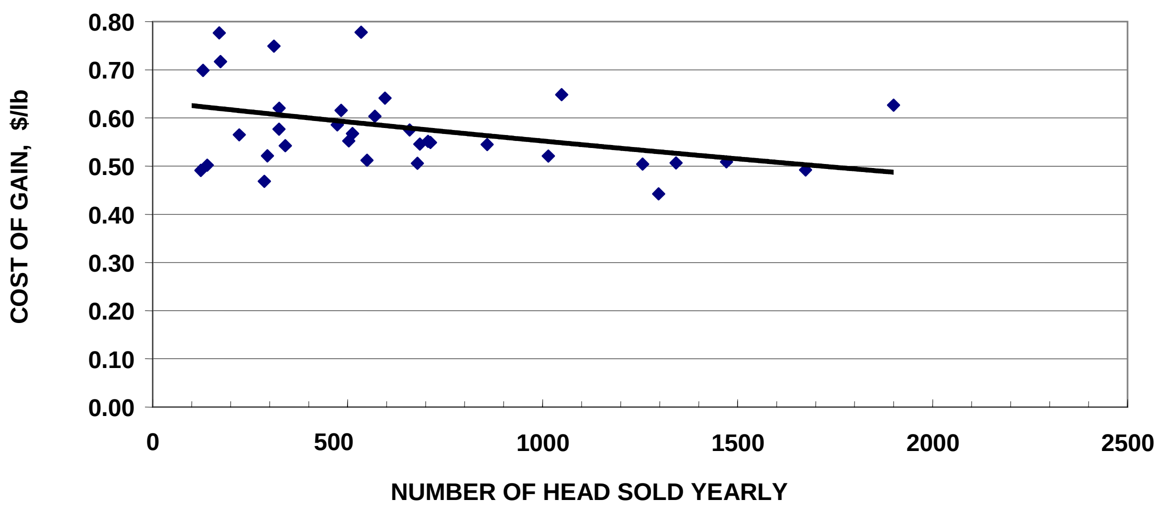

Figure 1. Total Cost of Gain for Farm Management for Backgrounder-Feeders (1997 – 1999).

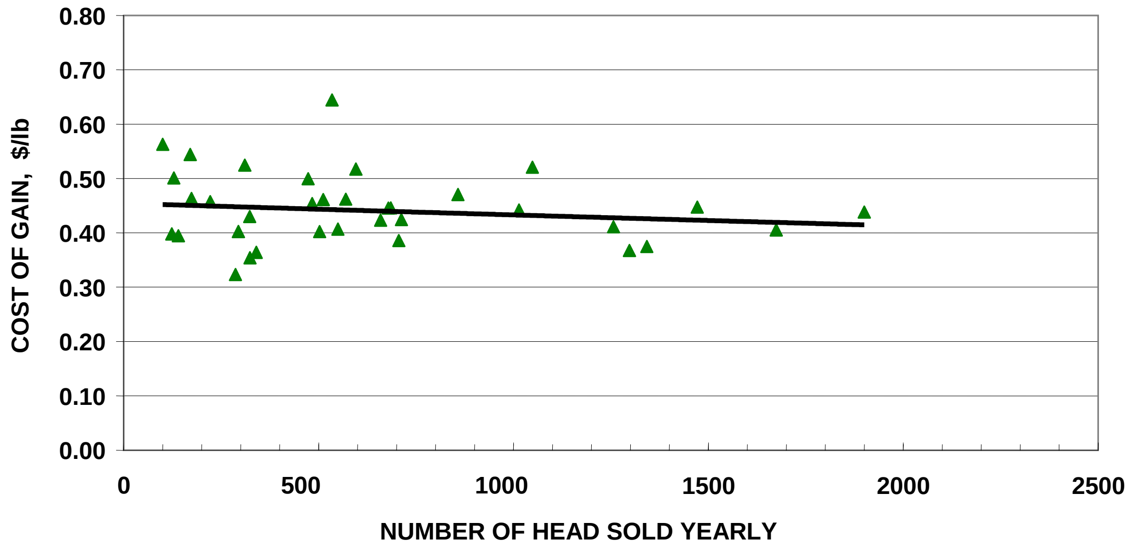

Figure 2. Feed Cost of Gain for Farm Management for Backgrounder-Feeders (1997 – 1999).

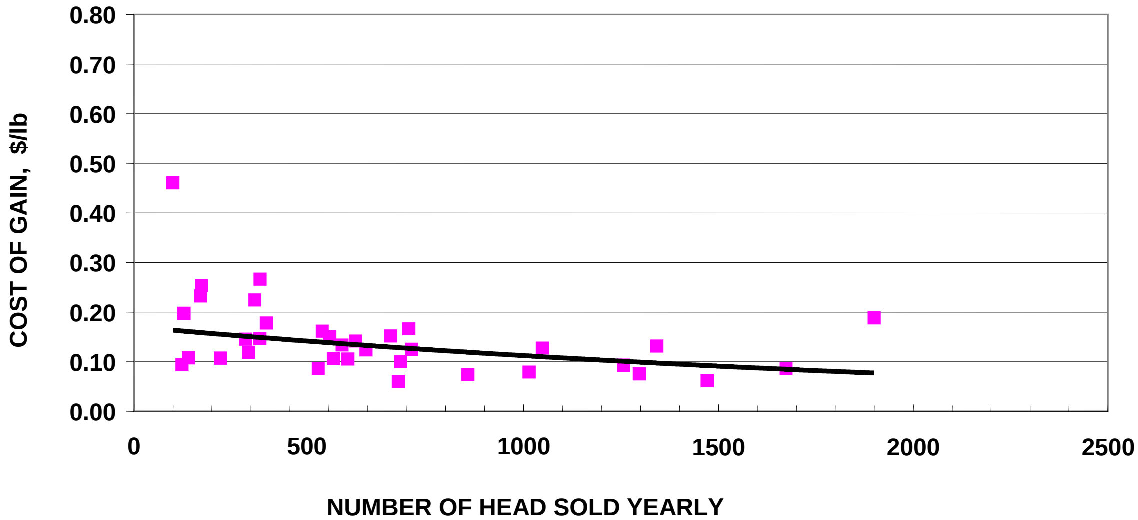

Figure 3. Non-Feed Cost of Gain for Farm Management for Backgrounder-Feeders (1997 – 1999).