FEED/CATTLE PRICE RELATIONSHIPS AND THE OPTIMUM SYSTEM AND LOCATION OF CATTLE FEEDING IN TEXAS

Ed Williams and Donald E. Farris*

Texas has developed into a major cattle feeding State during the past few years, mainly because of the existing favorable feed/cattle price relationships. These price relationships are the result of the surplus production of both grain sorghum and feeder cattle within the State and the demand for fed beef in Texas, in other Gulf Coast States, and in California.

Feedlots of various sizes have been built in practically every area of Texas but the cattle feeding industry has become centralized in the Panhandle Area where the grain sorghum prices are generally lower because of the concentration of production; whereas, higher prices prevail on the Gulf Coast because of export demand. However, other areas of the State are not without their advantages; for example, most of Texas' feeder calves are produced in the Eastern half of the State where the majority of the State's population reside. Therefore, feeder calf prices are generally lower in that area, and slaughter cattle prices are higher.

In the past, feeders in the Panhandle Area generally favored systems with lengthy feeding periods and heavier starting weights; whereas, feeders in South and East Texas generally used systems with lighter starting weights and shorter feeding periods. That is, there has been a tendency to economize in the use of the relatively scarce input, which has been feeder cattle in the Panhandle Area and grain in the South and East Texas Areas. The purpose of this study was to examine the effects of this principle on the competitive position of cattle feeding systems within and between specified areas of Texas. The approach was to use the linear programming framework to simultaneously determine the optimum feeding systems both within and between areas.

Specific objectives were to determine (1) the competitive advantage of feeding cattle in areas of Texas which have different feed/cattle price ratios, (2) the optimum area in which to use selected cattle feeding systems, and (3) the optimum cattle feeding system(s) within each area selected.

FEEDING SYSTEMS BUDGETED

To meet these objectives, costs and returns were budgeted for 20 cattle feeding systems in four areas of Texas for a 20,000 head capacity feedlot using 1966-68 average prices for feed and cattle at Amarillo, Ft. Worth, San Antonio, and Houston. These four cities represent four different areas of Texas which are defined by no particular radius about the cities but by locations at which the prices of cattle and grain sorghum are similar to those used in the study. Therefore, the results presented, herein, may be applied to other actual or potential feeding areas in other parts of the country where there are price relationships similar to those used in this study.

A cattle feeding system is a feeding enterprise for which an animal's sex, grade, starting weight, and finishing weight have been specified. There are many different systems from which a feeder may choose. The main criteria used in selecting the 20 systems was the degree to which they represent actual feeding systems used in Texas. An attempt was made to select systems which have different grain sorghum requirements and lengths of time on feed as reflected by the system's respective feed conversion ratios and rates of gain. Five finishing systems, two slaughter calf systems, one thin slaughter cow system, two feedlot backgrounding systems, three pasture backgrounding systems, two feedlot warm-up systems, three combinations of the pasture backgrounding and feedlot finishing systems, and two combinations of the feed-

*Respectively, research agricultural economist and associate professor in the Department of Agricultural Economics and Rural Sociology, Texas A&M University.

lot warm-up and feedlot finishing systems were specified.

The difference between the feedlot warm-up and the feedlot backgrounding system is the percent of grain and silage in the ration. The rations used in the backgrounding systems were primarily silage. Thus, calves in these systems tend to grow without fattening as much as those in the warm-up systems which receive a ration with a larger grain content.

Data on feed and operating capital requirements, rates of gain, costs, and returns for the 20 systems are presented in Table 1. Differences in the feed conversion ratios for the Amarillo Area, as shown in Table 1, are due to the different ration assumed for that area–not to the differences in climate among the specified areas of Texas which, according to Kuykendall and others [1], can be assumed to have no significant effect on either feed conversion or rate of gain.

RESULTS OF BUDGETS

As determined from the budgets, feed cost per pound of gain for feedlot finishing systems in the Amarillo Area varied from about 11.5 cents for the heifer slaughter calf system to 19.5 cents for the Choice heifer system. Feed cost for finishing Choice steers to 1,050 pounds and Good steers to 1,100 pounds was slightly over 18 cents per pound of gain in the Amarillo Area (Table 1). For comparable systems, feed cost per pound of gain was about two cents higher in the Ft. Worth Area than in the Amarillo Area and slightly more than two cents per pound of gain in the San Antonio and Houston Areas than in the Amarillo Area [2].

Total Costs

Total expenses per pound of net final weight[1] (or break-even price) for each system provides a more complete basis for comparing the costs associated with the twenty cattle feeding systems as well as the advantage or disadvantage of feeding cattle in the four areas of the State. Since feeder cattle prices are lower in the eastern half of the State, the advantage which the Amarillo Area has in feed cost per pound of gain is somewhat reduced. Total cost per pound of net final weight for systems in the Amarillo Area varied from 17.6 cents for the thin slaughter cow system to 26.3 cents for the Choice steer finishing system. The Amarillo Area had lower costs than the other areas for every system except the thin slaughter cow system which was lowest (17.2 cents) in the Houston Area. Lower feeder cattle prices in the Houston Area reduced the Amarillo total cost advantage to less than one cent per pound in most cases.

Of the five feedlot finishing systems, finishing Good heifers from 400 to 700 pounds had the lowest total expenses per pound of net final weight in both the Amarillo and the Houston Areas at 22.8 and 23.6 cents, respectively.

These data provided a better understanding of the pattern of cattle feeding in Texas. For example, feeding light heifers, slaughter calves, and thin cows were the predominate systems used in areas of Texas outside the Amarillo Area (and to some extent within that area) during the 1966-68 period. However, the cost data do not provide a complete measure of competitive advantage–returns must also be considered in the analysis.

Returns–Assuming Unlimited Capital

Given a set of feeding systems within an area, net returns largely depend on cattle prices, which change frequently. Prices used in this study were 1966-68 averages; a stable period during which cattle prices were slowly rising. It was expected that such a stable period would provide the best estimates of the relationships among different cattle prices.

The per head and annual net returns presented in Table 1 represent returns above all specified costs, including a return to management and a 7 percent return to investment capital. With unlimited capital, all systems showing a positive profit would be attractive investments. If this were the case, annual feedlot profit for the various systems would be the criterion by which one area could be selected over another area for a given system or by which one system could be selected over another system within a given area.

The combined backgrounding on pasture and feedlot finishing systems were the most profitable in both the Amarillo and the Houston Areas (Table 1). In the Amarillo Area, the next most profitable group was backgrounding both Good and Choice steers on wheat pasture. Finishing Good steers from 400 to 900 pounds and Good heifers from 400 to 700 pounds were also profitable systems in that area.

The thin cow system and the steer slaughter calf system were two which were relatively more profitable in the Houston Area than in the Amarillo Area.

[1]Total specified expenses for the animal divided by the final weight shrunk 4 percent. This is also the amount (in cents per pound) which must be received for the finished animal in order to break even.

TABLE 1. ESTIMATED LEVELS OF PERFORMANCE FOR 20 CATTLE FEEDING SYSTEMS IN THE TWO AREAS OF TEXAS, 20,000 HEAD CAPACITY FEEDLOT, 1966-68[a]

System and area	Gain per day	Feed per pound of gain	Milo in ration	Time on feed	Operating capital required[b]	Feed cost per pound of net gain[c]	Total cost/lb. of sale weight[d]	Net revenue[e] (or loss) Per head	Annual[f]
	lbs.	lbs.	%	days	$/head	$	$	$	$
Finishing									
Choice steer 600/1050									
Amarillo	2.70	8.89	71	167	247	.1816	.2631	(5.70)	(187,245)
Houston	2.70	8.52	75	167	252	.2061	.2687	(6.38)	(209,583)
Good steer 600/1100									
Amarillo	2.80	8.93	71	179	246	.1817	.2507	(4.40)	(134,640)
Houston	2.80	8.68	76	179	253	.2090	.2586	(7.46)	(228,276)
Good steer 400/900									
Amarillo	2.60	7.31	72	192	185	.1453	.2349	10.43	297,255
Houston	2.60	7.19	76	192	193	.1698	.2454	5.67	161,595
Choice heifer 600/850									
Amarillo	2.50	9.20	69	100	191	.1950	.2472	.73	39,968
Houston	2.50	8.88	72	100	198	.2223	.2563	(2.60)	(142,350)
Good heifer 400/700									
Amarillo	2.40	7.42	70	125	141	.1504	.2278	8.61	377,118
Houston	2.40	7.04	74	125	146	.1663	.2361	6.38	279,444
Slaughter calf									
Good steer 300/550									
Amarillo	2.30	5.78	69	109	118	.1165	.2418	(2.24)	(112,560)
Houston	2.30	5.65	73	109	119	.1344	.2456	(.51)	(25,628)
Good heifer 300/550									
Amarillo	2.20	6.36	69	114	110	.1285	.2257	6.30	302,400
Houston	2.20	6.17	73	114	114	.1477	.2360	4.56	218,880
Thin cow 800/950									
Amarillo	2.50	12.20	33	60	153	.1879	.1764	(3.27)	(298,224)
Houston	2.50	12.20	33	60	149	.2002	.1722	(1.83)	(166,896)
Backgrounding–feedlot									
Choice steer 350/600									
Amarillo	1.80	15.00	13	139	147	.1447	.2815	(3.98)	(157,011)
Houston	1.80	15.00	13	139	146	.1506	.2828	(9.57)	(377,537)
Good steer 350/600									
Amarillo	1.80	15.00	13	139	135	.1447	.2590	(1.04)	(41,028)
Houston	1.80	15.00	13	139	133	.1506	.2595	(6.18)	(243,801)

(continued)

TABLE 1. (continued)

System and area	Gain per day	Feed per pound of gain	Milo in ration	Time on feed	Operating capital required[b]	Feed cost per pound of net gain[c]	Total cost/lb. of sale weight[d]	Net revenue[e] (or loss) Per head	Net revenue[e] (or loss) Annual[f]
	lbs.	lbs.	%	days	$/head	$	$	$	$
Backgrounding—pasture									
Choice steer 350/600									
Amarillo	1.95	g	42	128	138	.0959	.2573	9.97	275,172
Houston	1.80	g	42	139	138	.1104	.2618	2.52	57,456
Good steer 350/600									
Amarillo	1.95	g	42	128	125	.0959	.2348	12.89	355,764
Houston	1.80	g	42	139	126	.1104	.2389	5.72	130,416
Choice heifer 350/600									
Amarillo	1.80	g	42	139	123	.1051	.2306	4.18	105,336
Houston	1.63	g	42	153	127	.1210	.2418	(1.35)	(27,743)
Warm-up—feedlot									
Choice steer 350/600									
Amarillo	2.20	9.82	26	114	141	.1181	.2583	3.62	173,760
Houston	2.20	9.82	26	114	140	.1273	.2708	(2.67)	(128,160)
Good steer 350/600									
Amarillo	2.20	9.82	26	114	129	.1181	.2459	6.49	311,520
Houston	2.20	9.82	26	114	128	.1273	.2477	.66	31,680
Combined pasture back-grounding and feedlot finishing									
Choice steer 350/1050									
Amarillo	2.37	g	71[h]	295	220	.14[illegible]5	.2406	16.94	314,322
Houston	2.29	g	75[h]	306	230	.1657	.2521	10.35	185,213
Good steer 350/1100									
Amarillo	2.44	g	71[h]	307	217	.1481	.2266	21.02	374,892
Houston	2.36	g	76[h]	318	230	.1703	.2400	12.12	208,706
Choice heifer 350/850									
Amarillo	2.09	g	69[h]	239	171	.1414	.2299	14.83	339,681
Houston	1.98	g	72[h]	253	181	.1617	.2439	7.50	162,338

(continued)

TABLE 1. (continued)

System and area	Gain per day	Feed per pound of gain	Milo in ration	Time on feed	Operating capital required[b]	Feed cost per pound of net gain[c]	Total cost/lb. of sale weight[d]	Net revenue[e] (or loss) Per head	Annual[f]
	lbs.	lbs.	%	days	$/head	$	$	$	$
Combined feedlot warm-up and feedlot finishing									
Choice steer 350/1050									
Amarillo	2.49	9.24	71[h]	281	224	.1532	.2469	10.59	206,346
Houston	2.49	9.01	75[h]	281	233	.1715	.2573	5.15	100,348
Good steer 350/1100									
Amarillo	2.56	9.26	71[h]	293	221	.1552	.2325	14.73	275,304
Houston	2.56	9.08	76[h]	293	232	.1758	.2448	7.05	131,765

[a] A cattle feeding system is a feeding enterprise for which the sex, grade, starting weight, and finishing weight, of the animal has been specified. To make the pasture systems comparable with the feedlot systems, it was assumed that enough pasture could be leased to accommodate 20,000 head at one time.

[b] Operating capital requirement includes the cost of feeder cattle, feed, variable labor, medicine, and other variable expenses, assuming 1966-68 average prices for feed and cattle.

[c] Net gain is the finishing weight with 4 percent shrink minus the starting weight.

[d] Total specified expenses for one head divided by the final weight shrunk 4 percent.

[e] Net revenue (or loss) is profit after all specified expenses including returns to management and a 7 percent return to investment, assuming 1966-68 average prices for feed and cattle.

[f] Annual net revenue for the pasture backgrounding systems was computed using the amount of time pasture was assumed to be available—210 days (Nov. 1-June 1) for the Amarillo Area and 190 days (Nov. 20-June 1) for the Houston Area. In all cases, 75 percent degree of utilization was assumed for both feedlot and pasture.

[g] Feed per pound of gain was not computed for the pasture backgrounding systems.

[h] This is the percent of milo in the finishing ration.

Although several systems had positive profit in the Houston Area, these two lost less in that area than in the Amarillo Area. Some systems were relatively more profitable on an annual basis than on a per head basis because of higher turnover ratios.[2]

OPERATING CAPITAL RESTRICTED

In the past, operating capital has been a significant restriction to most feedlot operations of reasonable size. Therefore, a linear programming model was used to maximize the objective function, annual feedlot profit, subject to annual feedlot capacity and operating capital restrictions.

The mathematical model is as follows:

$$\text{Maximize } Z = \sum_{j=1}^{m} c_j x_j$$

Subject to

$$\sum_{j=1}^{m} a_{ij} x_j \leq b_i$$

$$x_j \geq 0.$$

Where:

c_j = profit per head for the jth cattle feeding system

x_j = number of head fed using the jth cattle feeding system

a_{ij} = technical coefficients indicating the amount of feedlot capacity (in animal feedlot days) and operating capital required to feed one head

b_i = feedlot capacity and operating capital restrictions

m = number of feeding systems

To determine the competitive advantage of feeding cattle in each area and the optimum location for each system, a programming model was constructed with the State as an economic entity. Similarly, to determine the optimum cattle feeding system(s) for each area, a programming model was set up with each area as an economic entity. There were eighty enterprises (20 systems X four areas) in the State programming matrix and 20 enterprises in each area matrix.

Solution of the programming models provided a measure of annual reduced profit per head of feedlot capacity for each system. This is the amount annual feedlot profit would be reduced if one head of feedlot capacity were used by a non-optimum system for the entire year. Systems in the optimum solution will have zero reduced profit values by definition. All future references to reduced profit shall be in terms of absolute values, therefore, the lower the reduced profit value for a system, the more preferable the system.

Results of the Linear Programming Models

Using the State model, the difference between the lowest reduced profit in one area and the lowest reduced profit in another area may be used as a measure of the competitive advantage (or disadvantage) of feeding cattle in the areas being compared. The reduced profits from the State model may also be used as a criterion by which to judge one area superior to another for a given cattle feeding system. Similarly, the reduced profit from an area model may be used to rank the competitive advantage of the cattle feeding systems in that area. The reduced profit from the State model (Table 2) may be compared for any possible area–system combination. However, the reduced profit from an area model (Table 3) may only be used to compare systems within that area. Since the Ft. Worth and San Antonio Areas' prices of feed and cattle are between the extremes exhibited by the Amarillo and Houston Areas, only the latter two cities will be used in the interpretation of the reduced profit values.

Results–State Model

The Amarillo Area's advantage in price of grain sorghum was expected to give that area the competitive advantage in feeding cattle over the other areas. The zero reduced profits for two systems for the Amarillo Area indicate that this is the case (Table 2). The lowest reduced profit in the Houston Area, $6.37 per head of feedlot capacity per year, gives a measure of that area's disadvantage relative to Amarillo. The Ft. Worth Area has a slight advantage over Houston, but San Antonio is the least competitive of the four areas.

As expected, the finishing systems, which require more feed per pound of gain had lower reduced profits at Amarillo than at Houston. The slaughter calf, the thin slaughter cow, the feedlot and pasture

[2]Turnover ratio is 365 days divided by the number of days on feed for the feedlot systems. For the systems utilizing pasture, the turnover ratio is the number of days pasture was assumed to be available (210 for the Amarillo Area, 255 for the Ft. Worth and San Antonio Areas, and 190 for the Houston Area) divided by the number of days on pasture.

TABLE 2. **COMPETITIVE ADVANTAGE OF FOUR AREAS OF TEXAS FOR 20 SELECTED CATTLE FEEDING SYSTEMS, 1966-68[a,b]**

System	Annual reduced profit/head of feedlot capacity (in dollars)[c] — Area: Amarillo	Ft. Worth	San Antonio	Houston
Finishing				
Choice steer 600/1050	−55.69	−61.41	−61.13	−58.01
Good steer 600/1100	−52.00	−61.95	−63.26	−59.47
Good steer 400/900	−12.94	−24.28	−25.40	−23.35
Choice heifer 600/850	−31.21	−40.15	−45.41	−44.38
Good heifer 400/700	− .38	− 5.81	− 9.26	− 7.71
Slaughter calf				
Good steer 300/550	−29.08	−30.92	−28.81	−23.55
Good Heifer 300/550	60833[d]	− 7.14	− 8.96	− 6.37
Thin cow 800/950	−47.24	−55.51	−54.84	−37.88
Backgrounding—in feedlot				
Choice steer 350/600	−36.98	−47.21	−48.55	−51.39
Good steer 350/600	−27.19	−36.93	−38.24	−40.40
Backgrounding—on pasture				
Choice steer 350/600	− 6.74	−18.58	−19.15	−19.66
Good steer 350/600	21901[d]	−11.96	−12.52	−13.22
Choice heifer 350/600	−14.25	−24.91	−24.91	−22.99
Warm-up—in feedlot				
Choice steer 350/600	−14.05	−27.62	−30.24	−33.89
Good steer 350/600	− 2.66	−15.71	−18.37	−21.18
Combined pasture backgrounding and feedlot finishing				
Choice steer 350/1050	−16.84	−29.20	−29.78	−27.24
Good steer 350/1100	−12.35	−27.29	−28.64	−25.56
Choice heifer 350/850	− 6.72	−22.76	−24.42	−20.29
Combined feedlot warm-up and feedlot finishing				
Choice steer 350/1050	−25.51	−33.36	−34.57	−34.11
Good steer 350/1100	−20.34	−31.00	−33.15	−31.88

[a] In this (the State) model, all systems were programming activities competing for the same resources, therefore, the reduced profits from all possible area-system combinations can be legitimately compared. Fixed costs were included in the computation of profit; therefore, a situation in which assets are not fixed was represented.

[b] The operating capital restriction used in this model was $3,754,554. This is the amount required for a 20,000 head capacity feedlot in the Panhandle Area to operate at 76 percent of capacity using the base system, choice steer 600/1050, assuming 1966-68 average milo and feeder cattle prices in the Panhandle Area of Texas.

[c] Annual reduced profit/head of feedlot capacity is the amount feedlot profit would be reduced if one head of feedlot capacity were used for a non-optimum system for the entire year.

[d] This is the number of head fed/year as determined in the optimum solution for each area model.

TABLE 3. COMPETITIVE ADVANTAGE OF 20 SELECTED CATTLE FEEDING SYSTEMS IN EACH OF THE FOUR AREAS OF TEXAS, 1966-68[a,b]

System	Annual reduced profit/head of feedlot capacity (in dollars)[c]			
	Area			
	Amarillo	Ft. Worth	San Antonio	Houston
Finishing				
Choice steer 600/1050	–55.69	–45.44	–41.28	–39.20
Good steer 600/1100	–52.00	–45.88	–43.27	–40.53
Good steer 400/900	–12.94	–13.95	–11.46	–10.74
Choice heifer 600/850	–31.21	–29.53	–31.06	–31.28
Good heifer 400/700	– .38	55480[d]	55480[d]	55480[d]
Slaughter calf				
Good steer 300/550	–29.08	–27.47	–22.47	–18.66
Good heifer 300/550	60833[d]	– 4.32	– 2.94	– 2.05
Thin cow 800/950	–47.24	–48.52	–44.57	–29.91
Backgrounding–in feedlot				
Choice steer 350/600	–36.98	–41.16	–39.32	–43.76
Good steer 350/600	–27.19	–32.03	–30.22	–34.08
Backgrounding–on pasture				
Choice steer 350/600	– 6.74	– 5.46	– 5.40	– 5.15
Good steer 350/600	21901[d]	11244[d]	10682[d]	10584[d]
Choice heifer 350/600	–14.25	–12.90	–12.21	– 9.60
Warm-up–in feedlot				
Choice steer 350/600	–14.02	–22.08	–21.50	–26.78
Good steer 350/600	– 2.69	–11.39	–10.91	–15.39
Combined pasture backgrounding and feedlot finishing				
Choice steer 350/1050	–16.84	–11.34	– 9.44	– 7.20
Good steer 350/1100	–12.35	– 9.64	– 8.41	– 5.73
Choice heifer 350/850	– 6.72	– 8.33	– 8.08	– 4.25
Combined feedlot warm-up and feedlot finishing				
Choice steer 350/1050	–25.51	–19.33	–16.70	–17.33
Good steer 350/1100	–20.34	–17.09	–15.32	–15.18

[a] In each area model, the cattle feeding systems were programming activities competing for the same resources. Therefore, only the reduced profits from systems within the same area can be legitimately compared. Fixed costs were included in the computation of profit, therefore, a situation in which assets are not fixed was represented.

[b] The operating capital restriction used in this model was $3,754,554. This is the amount required for a 20,000 head capacity feedlot in each area to operate at 76 percent of capacity using the base system, choice steer 600/1050, assuming 1966-68 average milo and feeder cattle prices in the Panhandle Area of Texas.

[c] Annual reduced profit/head of feedlot capacity is the amount feedlot profit would be reduced if one head of feedlot capacity were used for a non-optimum system for the entire year.

[d] This is the number of head fed/year as determined in the optimum solution for each area model.

backgrounding and the feedlot warm-up systems have higher turnover ratios and utilize lighter weight feeder cattle which require relatively less grain sorghum per pound of gain. Therefore, these systems were expected to have lower reduced profits at Houston than at Amarillo. The State model reduced profit values only partially confirm this hypothesis. The thin cow and the steer slaughter calf systems were the only two which had lower reduced profits in the Houston Area than in the Amarillo Area (Table 2).

The results of the State model indicate that with the prices used, Amarillo has a distinct competitive advantage over the other areas selected. However, there are a few systems which are more competitive in the Houston Area than they are in the Amarillo Area.

Results–Area Models

The reduced profit values from the area models in Table 3 may be used to rank the competitive advantage of the systems within an area. The finishing systems were expected to have lower reduced profits at Amarillo than any other group of systems. This was not the case; in fact, with the prices used, these systems were some of the least competitive in that area. The two systems which were actually in the optimum solution at Amarillo were the heifer slaughter calf system and the Good steer pasture backgrounding system. Good alternatives to these systems seem to be the Good heifer finishing system and the Good steer warm-up system with reduced profit values of $.38 and $2.69, respectively (Table 3).

In the Houston Area, systems which have higher turnover ratios and which use cattle with relatively low grain sorghum requirements were expected to have lower reduced profit values than the finishing systems. Feeding Good heifers from 400 to 700 pounds and backgrounding Good steers on pasture were the two systems in the optimum solution in the Houston model. The heifer slaughter calf system seems to be a good alternative with a reduced profit value of $2.05 at Houston (Table 3).

The results of the area models indicate that the type of systems which were expected to have the lowest reduced profit values within the Houston Area also had the lowest reduced profit values within the Amarillo Area.

SUMMARY AND CONCLUSIONS

In this study, five criteria were developed with which to analyze both the competitive advantage of a system between areas and the competitive advantage of systems within an area. These criteria are (1) feed cost per pound of net gain, (2) total cost per pound of net final weight, (3) net revenue per head, (4) annual feedlot net revenue, and (5) annual reduced profit per head of feedlot capacity. In general, each criterion results in a slightly different ranking of the competitive advantage of systems within and between areas. The annual reduced profit per head of feedlot capacity value is the most complete of the five criteria.

With the prices used in this analysis, the reduced profits from the State model indicate that the Amarillo Area has a competitive advantage of $5.81, $6.37, and $8.96 over the Ft. Worth, Houston, and San Antonio Areas, respectively.

The thin slaughter cow and the steer slaughter calf systems were the only two which were not most competitive in the Amarillo Area. This is consistent with the expectation that systems with low grain sorghum requirements and high turnover ratios would be relatively more competitive in areas with higher grain prices, lower feeder cattle prices, and higher fed cattle prices.

The within–area analysis of the competitive advantage of systems indicates that for the prices used, feeding light weight heifers and backgrounding Good steers on pasture are the most competitive systems for all areas. This is contrary to the expectation that the finishing systems which have higher grain requirements and lower turnover ratios would be more competitive in the Amarillo Area. However, the relatively large operating capital and feedlot capacity requirements associated with the finishing systems make it necessary for them to have much higher annual feedlot profit than other systems in the Amarillo Area in order to be in the optimal solution. Possible bias in available price data could change the profitability of the finishing systems slightly, but the results above appear to be generally valid for the 1966-68 period.

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