FACTORS INFLUENCING PROFITABILITY OF FEEDLOT STEERS

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Story In Brief

The impact of live and carcass traits on profitability during the finishing phase was examined using 1560 steers fed in the Oklahoma Steer Feedout from 1990 to 1995. Steers weighed 620 ± 86 lb initially and consumed 22.9 ± 3.7 lb of feed daily for a feed:gain ratio of 6.90 ± 0.6 on a DM basis when fed for 169 ± 13 days. Cattle were sold at 1178 ± 131 lb and yielded hot carcasses weighing 716 ± 85 lb. Feeder steer prices were estimated using initial weight and prices reported in September, 1995. Cost of feed was assessed at $200/ton. Net return accounted for both actual and opportunity costs at a 9% interest rate. A pricing grid was simulated using prices reported in February, 1996 (base price was $96/cwt for low Choice YG3 carcasses). Premiums were added for YG1, YG2, upper 2/3 Choice and Prime carcasses, while discounts were applied to YG4, YG5, Select, Standard and carcasses weighing less than 550 or greater than 949 pounds. Net profits ranged from -$507.97 to $102.25 with an average loss of $119.02 per head. Accumulated data were analyzed to determine which factors significantly contributed to the net profit of the steers. The best model for predicting profitability of all steers in order of importance included medical cost, marbling score, dressing percentage, feed intake, ribeye area, daily gain, days on feed, fat thickness, sale weight and hot carcass weight. Factors of economic importance for steers with net profits in the top 25% in order of importance consisted of feed required per pound of gain, marbling score, dressing percentage, initial weight, medical cost, ribeye area, feed intake, hot carcass weight, daily gain and days on feed. Value of steers with net profits in the bottom 25% were best predicted using medical cost, dressing percentage, fat thickness, feed intake, daily gain, days on feed, hot carcass weight and sale weight. Data from this study indicate that profitability of feedlot steers is highly dependent on health, feed efficiency, marbling score, dressing percentage and weight.

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Introduction

Profit, the single most important factor determining the existence of an enterprise, is a word seldom spoken in today's cattle business. With production costs being at all-time highs and live value being exceedingly low, beef producers are faced with the tremendous challenge of producing and marketing "profitable" cattle. Anyone associated with feeding cattle understands that performance factors, such as average daily gain and feed efficiency, are of economic importance as they influence feed cost of gain. With cost of gain at record highs, these factors are of even greater importance to today's cattle feeders. Additionally, producers are aware of the importance of "high yielding" and "high quality" cattle as the beef industry moves toward value-based marketing. A study conducted by Texas A&M University (McNeill, 1995) reported health during the feedlot phase impacted the ability of steers to express their genetic potential. When a decrease in performance is combined with the cost associated with administering medication to animals, health during the finishing phase may be the factor of greatest importance in determining profitability for today's cattlemen; healthy steers had average returns of $92.26 more favorable than sick steers. Accordingly, the current study was conducted 1) to take a "snap-shot" of factors that determined profitability of steers if fed in 1995 and 2) determine if profitability of feedlot steers could be predicted and if so, what factors were important.

Materials and Methods

Animals. Spring- and fall-born steer calves fed in the Oklahoma Steer Feedout from 1990 to 1995 (n=1560) were used to determine factors of economic importance to the cattle feeding industry. Fall-born steers were born from late August to November and were placed on feed the following August. Spring-born calves were born from January to April and were placed on feed in early November. Prior to feedlot placement, steers must have been weaned for a minimum of three weeks, received proper vaccinations and were dehorned and treated for worms, grubs and lice. Steers had free access to a high concentrate ration and were observed daily for health problems by feed yard personnel; those deemed "sick" were pulled and treated accordingly. Feed efficiency was calculated using pen averages. Accordingly, the effect of individual feed efficiency is unknown.

Steers were processed at a commercial meat packing facility when 60% of the calves were subjectively estimated to have a subcutaneous (external) fat thickness of 0.5 inch. Following a 36 hour postmortem chill, data for yield and quality grade determinations (USDA, 1989) were collected by Oklahoma State Cooperative Extension Service personnel.

Value Determination. Feeder steer prices were estimated using initial weight and average prices per hundred pounds of live weight (cwt) reported in September, 1995: $71 for steers weighing less than 500 pounds, $69 for 501 to 600 lb, $66 for 601 to 700 lb, $65 for 701 to 800 lb, $63 for 801 to 850 lb and $61 for steers weighing over 850 pounds. Feedlot cost included ration costs of $200/ton and a daily cost of $.05/head. A processing fee of $30 was charged to each steer. Hide and offal values were estimated at $8.01/cwt live weight and a pricing grid was simulated using a base price of $94/cwt for low Choice YG3 carcasses (February 16, 1996). Premiums were added for YG1, YG2, upper 2/3 Choice and Prime carcasses ($2, $1, $3 and $10/cwt, respectively), while discounts were applied to YG4, YG5, Select, Standard and carcasses weighing less than 550 or greater than 949 pounds ($13, $18, $6, $15 and $22/cwt, respectively). Net return accounted for both actual and opportunity costs at a 9% interest rate. Note: the data used for predicting profitability in the present study were absent of"dark cutting" carcasses.

Accumulated data were analyzed using the PROC STEPWISE procedure of SAS to determine which factors significantly contributed to the net profit of: 1) all steers fed in the feedout (ALL), 2) steers with net returns in the top 25% (TOP25), 3) steers with net returns in the bottom 25% (LOW25), 4) spring vs fall-born steers and 5) steers within sire breed type. Differences in cow breed type were not accounted for in the present study. PROC TTEST was used to determine differences between TOP25 and LOW25 as well as spring vs fall means. Differences among sire breed type groups were partitioned using least squares means upon obtaining a significant F-test.

To determine factors of importance within sire breed, steers were grouped into one of four breed type classes. Sire breed types were: Angus (ANG) = purebred Angus; British (BRIT) = Hereford, Polled Hereford and Shorthorn; Continental (CONT) = Chianina, Charolais, Devon, Gelbvieh, Limousin, Maine Anjou, Saler, Simmental and Tarentaise; Brahman influenced (BRAINFL) = Brangus, Beefmaster, Charbray, Gelbray, Noble Line, Red Brangus, Santa Gertrudis and Simbrah.

Results and Discussion

Mean, minimum and maximum values for live performance and carcass characteristics as well as profitability of all feedlot steers are summarized in Table 1. When sold on averages, the traditional method of marketing, steers fed in the feedout met conformance standards proposed by Northcutt et al. (1994); however, when assessed on an individual animal basis, true value-based marketing, data in Table 1 indicate several steers were "nonconformers". Profitability values calculated for the present study are dependent on the 1995 purchase and 1996 selling prices. Accordingly, as feeder steer price, feed cost,

carcass value and other associated values change, the models for predicting profitability may differ from those reported.

All Steers. Considering ALL steers fed in the Oklahoma Steer Feedout from 1990 through 1995, the best model for predicting net profit was: - 2216.80 - 1.07 X medical cost + .34 X marbling score + 28.24 X dressing percentage - .10 X feed intake + 2.63 X ribeye area + 99.37 X average daily gain + 1.44 X days on feed - 55.47 X fat thickness + .90 X sale weight - 1.40 X hot carcass weight (R^2=.81: RSD=26.1: CP=8.9).

Steers With Net Values in the Top or Bottom 25%. The best predictive model of profitability for TOP25 steers was: - 706.07 - 14.94 X feed efficiency + .21 X marbling score + 7.42 X dressing percentage - .03 X initial weight - 1.00 X medical cost + 2.02 X ribeye area - .06 X total feed intake + .17 X carcass weight + 46.71 X average daily gain + .83 X days on feed (R^2=.84: RSD=8.8: CP=12.44). Data analyzed in this study indicated it was more difficult to predict steers with low net returns. The model predicting profitability for LOW25 was: - 3575.78 - .89 X medical cost + 52.64 X dressing percentage - 55.62 X fat thickness -. 06 X feed intake + 70.00 X average daily gain + 1.49 X days on feed - 3.76 X hot carcass weight + 2.29 X sale weight (R^2=.56: RSD=33.6: CP=4.76). Interestingly, TOP25 steers were lighter at placement and at time of sale, spent fewer days on feed and were fatter than LOW25 steers (Table 2). The TOP25 steers were more efficient, had higher daily gains, higher dressing percentages, more desirable marbling scores and lower medical costs.

Spring- vs Fall-born Steers. The best model for predicting profitability accounted for 84% of the variation in net profit for spring-born steers and included: - 2372.70 X medical cost + .33 X marbling + 31.03 X dressing percentage - .10 X feed intake + 99.64 X average daily gain + 1.36 X days on feed - 8.44 X yield grade + 1.07 X sale weight - 1.62 X carcass weight - 19.53 X fat thickness. The best model for fall-born steers consisted of: - 1054.32 + .36 X marbling score + 9.41 X dressing percentage - 1.40 X medical cost - .10 X feed intake + 95.67 daily gain + 1.54 X days on feed - 76.38 X fat thickness + 3.88 X ribeye area + 6.69 X percentage kidney, pelvic and heart fat, but represented only 74% of the variation in feedlot profitability.

Table 3 characterizes live performance, carcass and value characteristics of spring vs fall-born steers. Possibly due to age differences, spring-born steers were lighter at the time of feedlot placement and yielded lighter carcasses. Average daily gain, feed intake and feed efficiency of spring- and fall-born steers were not statistically different (P>.05). As a result of decreased performance and higher medical costs encountered by spring-born steers, fall-born steers were more profitable in the present study.

Steers Categorized by Sire Breed Type. Table 4 contains characteristics of steers fed in the OK Steer Feedout stratified by sire breed type. Among breed types, the most notable differences included daily feed intake, ribeye area, feed cost and medical cost. Marbling score was the most important economic factor for Angus and Brahman influenced sired steers, while medical cost was the driving factor of profit for steers sired by British (non-Angus) and Continental bulls.

Factors determining profitability of steers differed for various sire breed types. The ANG value was best predicted using: - 1060.41 + .31 X marbling score - 10.58 X dressing percentage - 1.09 X medical cost + 1.18 X days on feed - 15.09 X yield grade - .09 X feed intake + 89.86 X average daily gain + .12 X carcass weight and accounted for 83% of the variation in net profit. The BRIT steer profit was best determined using - 540.51 - 1.66 X medical cost - 55.43 X feed required per pound of gain + 11.34 X dressing percentage + .31 X marbling score - 26.32 X yield grade + .12 X initial weight but could only account for 75% of feedlot value. Drivers of CONT steer value explained 82% of the variation in net return and included: - 1326.36 - 1.05 X medical cost + 11.57 X dressing percentage + .38 X marbling score - .11 X feed intake + 116.38 X daily gain + 1.91 X days on feed - 44.70 X fat thickness + .05 X starting weight + .08 X age, while factors of significance to BRAINFL profitability consisted of: - 923.93 + .33 X marbling score - .91 X medical cost 11.53 X dressing percentage - 24.92 X feed required per pound of gain - 196.48 X fat thickness + 16.56 X ribeye area - .05 X feed intake + 31.31 X daily gain + 38.68 X yield grade and estimated 78% of the variability in net profit.

Implications

Results from this study indicate profitability of steers during the feedlot phase is highly influenced by several factors. In predicting profitability, the most important factor in the present study was medical cost; however, net profit of feedlot steers was also significantly influenced by feed efficiency, marbling score, dressing percentage and weight (both live and carcass). Differences in value for spring vs fall-born steers must also be recognized; medical cost was more of a "problem" for spring-born calves, while marbling score and feed efficiency were of greater importance for fall-born steers. Sire breed type comparisions in the current study are not meant to be representative of a population of cattle, but rather to illustrate differences in the profitability of various biological types. As profit margins continue to narrow in the beef industry, producers and cattle feeders must determine the point at which medicating is not economically feasible, what can be done to enhance efficiency of production and take the necessary steps to eliminate non-conforming (discounted) cattle from the production system.

Literature Cited

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Table 1. Characteristics of all steers fed in the OK Steer Feedout from 1990 to 1995.

Item	Mean	Minimum	Maximum	SD
Initial weight, lb	620	375	935	86
Sale weight, lb[a]	1178	715	1645	131
Final age, days	433	330	771	39
Days on feed	169	132	188	13
Daily feed intake, lb	22.9	11.1	39.8	3.7
Average daily gain, lb	3.3	1.4	5.1	.5
Feed:Gain	6.9	3.4	11.5	.6
Carcass weight, lb	716	439	1019	84.9
Dressing %	60.8	49.9	70.9	2.0
Fat thickness, in	.34	.05	2.00	.15
Ribeye area, sq in	12.6	8.0	18.0	1.5
KPH fat, %	2.50	1.00	3.75	.50
Yield grade	2.5	.5	7.3	.7
Marbling score[b]	Sm[09]	PD[90]	MAb[10]	68
Total calf cost, $/hd[c]	441.20	295.65	785.61	52.17
Total feed cost, $/hd	401.81	196.99	658.41	67.39
Medical cost, $/hd	8.16	0.00	359.30	23.35
Live value/cwt	61.36	41.01	71.94	3.88
Carcass value/cwt	100.98	78.21	114.85	5.24
Total feedlot cost, $/hd	843.01	553.14	1195.30	98.78
Gross live value, $/hd	723.99	343.35	1039.75	98.21
Net value, $/hd	-119.02	-507.97	102.25	59.65

[a] Sale weight did not assume shrink.

[b] Marbling score: "MAb" = moderately abundant, the minimum required for U.S. average prime; "Sm" = small, the minimum required for U.S. Choice; "PD" = practically devoid, the minimum required for U.S. Standard (USDA, 1989).

[c] Total calf cost includes medical cost, but due to the magnitude medical cost has on net value, it is also shown separately.

Table 2. Characteristics of Top 25% and Bottom 25% of steers in net profit fed in the OK SteerFeedout from 1990 to 1995.

Item	Top 25%	Bottom 25%
Steers	390	390
Initial weight, lb	609[e]	643[d]
Sale weight, lb[a]	1174[e]	1201[d]
Final age, days	436[d]	432[e]
Days on feed	162	175
Daily feed intake, lb	22.8	23.0
Average daily gain, lb	3.5[d]	3.2[e]
Feed:Gain	6.6[e]	7.2[d]
Carcass weight, lb	724[d]	718[e]
Dressing %	61.6[d]	59.7[e]
Fat thickness, in	.39[d]	.31[e]
Ribeye area, sq in	12.8[d]	12.4[e]
KPH fat, %	2.6[d]	2.3[e]
Yield grade	2.6[d]	2.4[e]
Marbling score[b]	Sm[68d]	Sl[68e]
% Prime	3.6	0
% Upper 2/3 Choice	32.6	1.8
% Low Choice	60.2	21.3
% Select	3.6	74.1
% Standard	0	2.8
Total calf cost, $/hd[c]	426.65	469.64
Total feed cost, $/hd	386.05	420.30
Medical cost, $/hd	1.13	21.86
Live value/cwt	64.60	57.80
Carcass value/cwt	104.76	96.68
Total feedlot cost, $/hd	812.70	889.94
Gross live value, $/hd	758.45	694.16
Net value, $/hd	-54.24	-195.78

[a] Sale weight did not assume shrink.

[b] Marbling score: "Sm" = small, the minimum required for U.S. Choice; "Sl" = slight degree, the minimum required for U.S. Select (USDA, 1989).

[c] Total calf cost includes medical cost, but due to the magnitude medical cost has on net value, it is also shown separately.

[d,e] Means in the same row with a common superscript letter do not differ (P>.05).

Table 3. Characteristics of spring- and fall-born steers fed in the OK Steer Feedout from 1990 to 1995.

Item	Spring	Fall
Steers	1070	490
Initial weight, lb	600	663
Sale weight, lb[a]	1148[e]	1244[d]
Final age, days	416[e]	470[d]
Days on feed	170[d]	165[e]
Daily feed intake, lb	22.4	24.1
Average daily gain, lb	3.2	3.5
Feed:Gain	7.0	6.8
Carcass weight, lb	698[e]	755[d]
Dressing %	60.8	60.7
Fat thickness, in	.32	.38
Ribeye area, sq in	12.4	13.1
KPH fat, %	2.4	2.4
Yield grade	2.4	2.5
Marbling score[b]	Sm^{07}	Sm^{16}
% Prime	.8	1.6
% Upper 2/3 Choice	12.4	8.8
% Low Choice	40.8	54.3
% Select	45.2	34.9
% Standard	.8	.4
Total calf cost, $/hd[c]	432.84	459.47
Total feed cost, $/hd	396.51	413.37
Medical cost, $/hd	10.55	2.95
Live value/cwt	61.32	61.71
Carcass value/cwt	100.86	101.68
Total feedlot cost, $/hd	829.36	872.83
Gross live value, $/hd	703.99	767.67
Net value, $/hd	-125.37	-105.16

[a] Sale weight did not assume shrink.

[b] Marbling score: "Sm" = small, the minimum required for U.S. Choice (USDA, 1989).

[c] Total calf cost includes medical cost, but due to the magnitude medical cost has on net value, it is also shown separately.

[d,e] Means in the same row with a common superscript letter do not differ (P>.05).

Table 4. Characteristics of steers fed in the OK Steer Feedout from 1990 to 1995 stratified by sire breed type.

Item	Angus	British	Continental	Brahman Influenced
Steers	413	123	747	254
Initial weight, lb	612[e]	586[f]	628[d]	618[de]
Sale weight, lb[a]	1154[e]	1127[f]	1208[d]	1144[ef]
Final age, days	423[f]	428[ef]	439[d]	432[e]
Days on feed	160[f]	159[f]	175 [d]	168[e]
Daily feed intake, lb	23.4[d]	21.9[e]	23.8[d]	21.6[e]
Average daily gain, lb	3.4[d]	3.4[d]	3.3[d]	3.2[e]
Feed:Gain	6.9[e]	6.5[f]	7.0[d]	6.9[e]
Carcass weight, lb	704 [f]	675[f]	735[d]	693[e]
Dressing %	61.0[e]	59.9[f]	60.8[de]	60.6[e]
Fat thickness, in	.41[d]	.40[de]	.28[f]	.38[e]
Ribeye area, sq in	12.3[e]	11.5[f]	13.1[d]	12.2[e]
KPH fat, %	2.4[e]	2.3[e]	2.4[e]	2.6[d]
Yield grade	2.7[de]	2.8[d]	2.2[f]	2.6[e]
Marbling score[b]	Sm[39d]	Sm[02ef]	Sl[96f]	Sm[07e]
% Prime	2.9	0	.1	1.2
% Upper 2/3 Choice	22.5	4.9	6.8	9.5
% Low Choice	49.6	56.9	40.8	43.7
% Select	24.7	37.4	51.4	44.9
% Standard	.2	.8	.8	.8
Total calf cost, $/hd[c]	432.39	418.88	449.27	438.80
Total feed cost, $/hd	389.13	363.03	423.24	377.22
Medical cost, $/hd	4.48	6.65	10.81	6.70
Live value/cwt	52.66	59.95	61.34	60.63
Carcass value/cwt	102.72	100.09	100.82	100.08
Total feedlot cost, $/hd	821.52	781.91	872.52	816.02
Gross live value, $/hd	723.15	675.59	741.00	693.58
Net value, $/hd	-98.37	-106.33	-131.52	-122.45

[a] Sale weight did not assume shrink.

[b] Marbling score: "Sm" = small, the minimum required for U.S. Choice; "Sl" = slight degree, the minimum required for U.S. Select (USDA, 1989).

[c] Total calf cost includes medical cost, but due to the magnitude medical cost has on net value, it is also shown separately.

[d,e,f] Means in the same row with a common superscript letter do not differ (P>.05).