Tri-County Steer Carcass Futurity Data

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Abstract

Tri-County Steer Carcass Steer Carcass Futurity (TCSCF) was started by Pottawattamie, Cass and Shelby County Cattleman's Association in 1982. The nine member board wanted to know "what was the most profitable steer to feed?" In 2002, the SW Iowa cow-calf consigners utilizing the TCSCF program formed a service cooperative. The current 10 member board has 7 cow-calf producers, two allied industry representatives and one veterinarian.

Cow-calf producers who retain ownership are financially responsible for the genetics, health and management of their calves. Common traits of TCSCF consignors are 1 – early adopters of genetic evaluation tools, 2 – utilize a team of advisors to adopt available technologies to improve calf health and performance, 3 – tired of someone else benefiting from their efforts in genetics, health and management, 4 – believe in working together and sharing information with other producers.

The TCSCF program is about beef producers working together to identify problems they have control over, evaluating alternatives, selecting the best alternative, collecting and analyzing data, and sharing the results to become better beef producers each and every day. The TCSCF Board and consignors have worked with many Extension workers across the US and Canada and partnered with Certified Angus Beef, Iowa Beef Center, Igenity, Pfizer, Fort Dodge Animal Health, Boehringer-Ingelheim, Iowa Beef Industry Council and National Cattleman's Beef Association.

Consignors are able to utilize growth, health and carcass data to make changes in their cowherd. Comparing 1 year and 4 or more years of participation, steers had higher ADG (2.98 vs. 3.25), with lower standard deviations (.62 vs. .24), respectively. Non-weaned calves were 3.4 times more likely to experience BRD than weaned calves, independent of differences in age, test center, or vaccine status. Calves vaccinated with killed vaccines were 2.2 times more likely to experience BRD than calves vaccinated with MLV vaccines, independent of other factors.

Calves not treated compared to calves treated two or more times gained better (3.21 vs. 2.93 lb/day), produced more Choice carcasses (52% vs. 42%), and were more profitable ($52.45 vs. -$137.30/hd). Calves with evidence of lung adhesions after harvest had higher health treatment costs ($12.23 vs. $5.29), poorer ADG (3.01 vs. 3.19), lighter final live weight (1160 vs. 1176) and hot carcass weight (723 vs. 725), lower marbling scores (SM 10 vs. SM 27) and made less money ($1.65 vs. $45.27) than those without lung adhesions. Untreated calves at the feedyard produced carcasses that had lower Warner-Bratzler shear values (0.46 $\pm$ .18 lb) compared to treated calves.

The heritability estimate of BRD incidence and the number of treatments were 0.07 $\pm$ 0.04 and 0.05 $\pm$ 0.04, respectively. Because of the high economic cost associated with BRD

incidence, even these modest estimates for heritability of BRD resistance should be considered for incorporation into beef cattle breeding programs.

Southeast calves compared to Midwest calves were older on feedlot arrival (320 vs. 255) had fewer pulls (15.81% vs. 22.11%) and higher CAB acceptance rates (18.43% vs. 16.91%). Midwest calves compared to Southeast calves produced heavy carcasses (725 vs. 723), larger ribeye areas (12.46 vs. 12.33) and higher % Choice – (52.93% vs.50.32%). When considering feedlot and carcass traits and all associated costs including trucking to the feedlot, the Southeast calves had a profit/head of $37.34 versus $23.79 for Midwest calves.

Docile cattle compared to aggressive cattle gain less in the feedlot (3.17 vs. 2.91), produce fewer Choice carcasses (72.4% vs. 58.1%), more Select carcasses (23.3% vs. 36.2%) and the black hided cattle produce a higher percentage CAB carcasses (29.1% vs. 14.3%). Morbidity rates are similar across disposition scores but death loss increases significantly as disposition scores increases. Non-replacement heifers have higher disposition scores than steer mates, as cow-calf producers select for more docile replacement heifers. Average profit for docile cattle was $46.63/head compared to $7.62/head for aggressive cattle.

Marbling score remains the most important variable over the range of feed and carcass prices considered when evaluating factors impacting net return. Feed to gain, placement weight and hot carcass weight are the most sensitive variables to changes in feed costs. Placement weight and hot carcass weight are more important with lower feed costs and feed to gain is more important with higher feed costs. Hot carcass weight is the only variable to show much change due to a change in base price. It is more important at higher prices and less important at lower prices.

Lots consisting of heifers had higher ($P<.05$) low Choice and above rates than lots of steers or mixed-sex pens. The greater the amount of Angus influence in the cattle, the higher the low Choice and above rate ($P<.0001$). An inverse relationship existed between feedlot in-weight and lot low Choice and above rate; those cattle with lighter feedlot arrival weights had higher % Choice and above rates ($P=.0007$). Cattle with lower disposition scores (calmer cattle) had higher % Choice and above rates ($P=.0496$). Low Choice and above rate increased as cattle became less efficient in converting feed to gain ($P=.0027$). An inverse relationship existed between cost of gain and low Choice and above rate; those cattle with lower cost of gain had higher low Choice and above rates ($P=.0043$). Lot low Choice and above rate increased as average daily gain increased ($P=.0094$).

Introduction

Tri-County Steer Carcass Steer Carcass Futurity (TCSCF) was started by Pottawattamie, Cass and Shelby County Cattleman’s Association in 1982. The nine member board wanted to know “what was the most profitable steer to feed?” They recruited 35 SW Iowa cow-calf producers to consign 106 steers. In 2002, the SW Iowa cow-calf consigners utilizing the TCSCF program formed a service cooperative. The current 10 member board has 7 cow-calf producers, 1 pharmaceutical representative, one industry representative and one veterinarian. The TCSCF board since its inception identifies problems facing cow-calf producers evaluates alternatives that can be demonstrated and shared with fellow consignors. The cow-calf producers on the TCSCF board serve as the feedlot selection committee each year. Feedlots submit bids each year to feed cattle for TCSCF and the committee must answer the question “Do I want my cattle fed in this feedlot?” The reality is their cattle will be fed in one of the TCSCF feedlots.

Suggested health protocol is available at TCSCF.com. Consignors are encouraged to wean calves a minimum of 30 days and preferably 45 days prior to entering the feedlot. We recommend two rounds of modified-live vaccines, preferably preweaning and at weaning, so we encourage consignors to consult with their veterinarian before using MLV vaccines on calves nursing pregnant cows. Consignors' forward sire, dam and birth date information that is utilized in our reports. The more information they send the more analysis we are able to do for them. The majority of calves are assigned USDA Feeder Grades for Frame Score and Muscling Score by USDA Market Reporters in their home state. The USDA Market Reporter assigns a value per cwt for each individual calf based on current feeder calf prices in the consignor's home region. Trucking cost to the feedlot are calculated from the individual arrival weights collected at the feedlot.

Long haul calves were rested before arrival processing. Most groups of long haul calves have recovered their shrink at arrival processing. Within four days calves were weighed, body condition scored, vaccinated and implanted. A common dietary energy level was used at all feedlots. After 28 to 35 days on feed; calves were weighed and disposition scored. At re-implant time, calves were weighed, re-implanted and disposition scored. Five days prior to harvest calves were weighed and disposition scored. Three people decide harvest group, two TCSCF staff and one feedlot staff member sort the cattle based on estimated fat cover, weight, frame, and gain since re-implant. Calves were sorted and harvested when they were visually assessed to have 0.40 inch of fat cover. Upon harvest, detailed carcass data was collected.

After all cattle within a group are harvested, a Final Report and Financial Report are prepared. Individual feed usage within the lot is determined utilizing the Cornell Net Carbohydrate Model as described in the Nutrient Requirements for Beef Cattle. The Final Report contains the genetic, growth, disposition and carcass data for all cattle within the group. The Financial Report contains the income and expenses allocated to each calf for the individual consignor and the average, minimum and maximum for all cattle within the group. Utilizing the beginning value of calf as determined by the USDA Market Reporter in their home state the profit or loss is presented for each calf.

From 1992 to 2010, we have taken subsets from the TCSCF data base and presented the results in ISU Animal Industry Reports at iowabeefcenter.org, TCSCF.com or the Journal of Animal Science.

Do Consignors Make Changes When Given Growth and Carcass Data?

Our first question was – were producers utilizing the information we were collecting to make changes in their cowherd? From 1983 to 1991, 1,584 steers were consigned and growth and carcass data reported to consignors (Hall 1993). A comparison of means of 11 traits was made by year and for variance within year. The analysis of the means of animal traits by years of producer participation revealed limited differences between groups. A notable exception was that the ADG of steers entered by multi-year participants was significantly greater than that entered by one-time participants. A clear pattern emerged from comparing standard deviations between producer groups. Multiple-year participants achieved a greater degree of uniformity as evidenced by smaller standard deviations for hot carcass weights, ADG, fat thickness, percentage KPH, ribeye area, yield grade and retail product per day on feed.

Table 1. Means and standard deviations for selected traits grouped by years of participation.

Trait	1 year		2 to 3 years		4 to 9 years	
No of consignors	53		63		61	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
On Test Wt, lb	740	102	743	70	738	54
Final Weight, lb	1196 [a]	108	1231 [b]	67	1240 [b]	47
Hot Carcass Wt, lb	735 [a]	72	757 [b]	43	761 [b]	29
Average daily gain, lb	2.98 [a]	.62	3.14 [b]	.36	3.25 [b]	.24
Fat cover, in	.34	.13	.36	.08	.36	.07
Ribeye area, sq. in.	13.14	1.49	13.56	.79	13.44	.61
Calculated Yield Grade	2.33	.62	2.37	.39	2.41	.33
Marbling score	SL 61	87	SL 69	58	SL 73	36

[ab] Means with the same row with different superscript differ ($p<.05$).

The costs and predictive factors of bovine respiratory disease

A retrospective study of 2,146 feedlot cattle fed in 17 groups from 1988 to 1997 was conducted to determine the impact of bovine respiratory disease (BRD) on veterinary treatment costs, average daily gain, carcass traits, mortality, and net profit(Faber 1999). Morbidity caused by BRD was 20.6%. The average cost to treat each case of BRD was $12.39. Mortality rate of calves diagnosed and treated for BRD was 5.9% vs. .35% for those not diagnosed with BRD. Average daily gain differed between treated and non-treated steers during the first 28 days on feed but did not differ from 28 days to harvest. Net profit was $57.48 lower for treated steers. Eighty-two percent of this difference was due to a combination of mortality and treatment costs. Eighteen percent of the net profit difference was due to improved performance and carcass value of the non-treated steers. Data from 496 steers and heifers in nine feedlot tests were used to determine the effects of age, weaning, and use of modified live virus or killed vaccines prior to the test to predict BRD. Younger calves, non-weaned calves, and calves vaccinated with killed vaccines prior to the test had higher BRD morbidity than those that were older, weaned, or vaccinated with modified live virus vaccines, respectively. Treatment regimes that precluded relapse resulting in re-treatment prevented reduced performance and loss of carcass value. Using modified live virus vaccines and weaning calves 30 days prior to shipment reduced the incidence of BRD.

Table 2 depicts all steers, including those that died or left the test due to chronic disease. Net profit differences between BRD treatment group least squares means are greater than in Table 2 because mortality was higher for steers that experienced BRD. This higher mortality caused lower sale values, as demonstrated by the group that was treated 3 or more times (>=3x). Twenty percent of the >=3x group died or were culled before completing the test, which reduced the average gross sale value to $650. Additionally, BRD treatment costs were $53.70/hd for the >=3x group, further reducing their net profit. Tables 2 and 3 demonstrate that BRD does not cause large performance differences but accounts for increased mortality, culling, and treatment costs, significantly affecting net profit.

Table 2. Least squares means for net profit and mortality of 2,146 steers in the TCS and MACEP tests, 1988 to 1997. These data include steers that died.

BRD Status (Number of treatments)	Number of steers	Net Profit ($/Head)	Case Fatality [a] %	Sell Value [b] ($/Head)	BRD Treatment Costs ($/Head)
Not Treated	1705	61[c]	.35 %	840[c]	0[c]
1	270	31[d]	3.3 %	820[d]	12.7[d]
2	102	10[e]	3.9 %	813[d]	24.9[e]
>=3	69	-108[f]	20.3 %	650[e]	53.7[f]
All Treated	441	3[g]	5.9 %	793[g]	20.6[g]

[a] Of the steers in the BRD group (row), the percentage that died or left the test due to chronic disease.
[b] The value of the steers leaving the test, including those sold at harvest, those that died, and those that left the test due to chronic disease.
[c-f] Least squares means within a column without a common superscript differ (p<.05).
[g] Least squares means differ between treated and non-treated steers (p<.05).

Both non-weaned calves and calves weaned less than 30 days had higher BRD rates than calves weaned more than 30 days. Again, calves weaned more than 30 days were older than those that were not weaned or weaned fewer than 30 days. The percentage of treated calves that relapsed, or required treatment again was numerically highest for those weaned less than 30 days. Calves vaccinated at least 10 days before the test with killed IBR, BVD, BRSV, and PI-3 vaccines had higher BRD rates than those vaccinated with modified live (MLV) products. Fifty-two percent of treated calves relapsed in each group. The most important difference between the two vaccine groups is the higher percentage of killed vaccine calves that required treatment 3 or more times. Calves treated 3 or more times earned $174 less net profit than those that were not treated.

Table 3. The effect of weaning status on BRD morbidity in TCSCF and MACEP tests, 1988to 1997.

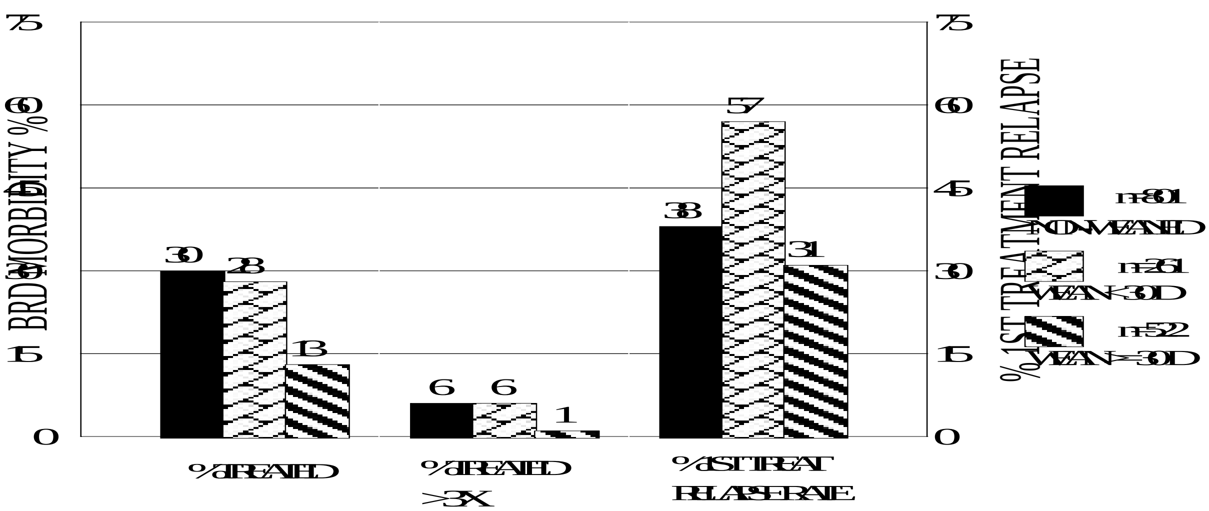
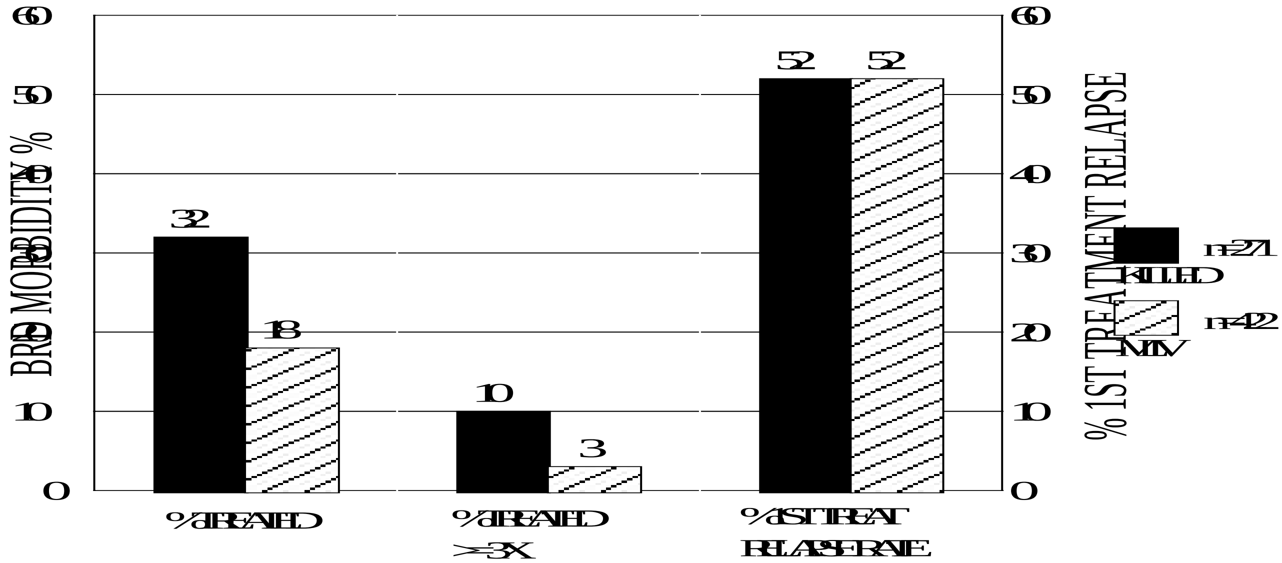


Table 4. The effect of pre-trial vaccine type (MLV or killed) on BRD morbidity in TCSCF and MACEP tests, 1995 to 1997.



Although treated steers were younger at the start of the test than non-treated steers, they were not lighter. Weight per day of age at the beginning of the test was higher ($p < .05$) for treated than non-treated steers for all years combined.

The results of the logistic regression analysis of factors that predict BRD are presented in the table below. The purpose of this analysis was to determine the significance of age, weaning status (weaned or non-weaned), and vaccine group (MLV or killed) on BRD. Age, weaning status, and vaccine group (killed or MLV) were the independent variables and BRD status (whether treatment occurred or not) was the dependent variable. Age was an important predictor of BRD ($p < .01$), but an odds ratio could not be determined because age is not a discrete event like weaning or vaccine status. The result of each factor is presented as an odds ratio, and each result is statistically adjusted for the other factors. Non-weaned calves were 3.4 times more likely to experience BRD than weaned calves, independent of differences in age, test center, or vaccine status. Calves vaccinated with killed vaccines were 2.2 times more likely to experience BRD than calves vaccinated with MLV vaccines, independent of other factors.

Table 5. Risk of BRD for non-weaned vs. weaned calves and calves vaccinated with killed vs. MLV vaccines in the TCS and MACEP tests, 1995 to 1997.

	Odds ratio[a]
Weaning status	
Weaned	1.0
Non-Weaned	3.4[b]
Vaccine Type	
MLV	1.0
Killed	2.2[c]

[a] The final model adjusts all odds ratios for the effect of age, center, weaning status, and vaccine type.
[b] Odds that non-weaned calves will experience BRD compared with weaned calves ($p<.01$).

[c] Odds that calves vaccinated with killed vaccines will experience BRD compared with calves vaccinated with MLV vaccines (p<.01).

Effect of health treatments on feedlot performance, carcass traits and profitability.

Beef calves (n=47,764) fed at 18 SW Iowa feedlots through the Iowa Tri-County Steer Carcass Futurity over eight years (2002-09) were used to evaluate the effect of the number of health treatments on feedlot performance, carcass traits and profitability(Fike 2010a). Calves were divided into three groups based on the number of times the animal was treated for disease conditions: non-treated calves (NT), calves that were treated once (1T) and calves that were treated two or more times (2T).

Table 6. Effect of health treatments on feedlot performance, carcass traits and profitability.

Item	Non-Treated	Once Treated	Treated 2 or more times
No of cattle	39,188	5,750	2,826
Delivery weight, lb	649[a]	616[b]	602[c]
Age on delivery, days	303[a]	274[b]	264[c]
Final weight, lb	1181[a]	1153[b]	1132[c]
Days on feed	167 [a]	178 [b]	184 [c]
ADG,lb	3.21 [a]	3.06 [b]	2.93 [c]
Estimated. Feed to Gain	6.89 [a]	6.76 [b]	6.66 [c]
Estimated Dry Matter Intake. lb	22.12	20.69	19.51
Treatment cost, $/Hd	$0.00[a]	$24.04[b]	$61.41[c]
Mortality rate %	0.09% [a]	4.21% [b]	15.46% [c]
Profit $/Hd	$52.45[a]	-$15.16[b]	-$137.30[c]
Hot carcass weight, lb	727[a]	710[b]	699[c]
Fat cover, in.	.46[a]	.44[b]	.40[c]
Calculated Yield Grade	2.86[a]	2.75[b]	2.63[c]
Marbling score	SM 29[a]	SM 14[b]	SL 96[c]
% Prime	1.02[a]	0.77[b]	0.65[c]
% Choice & Choice +	15.45[a]	11.64[b]	9.12[c]
% Choice -	52.26[a]	47.53[b]	42.25[c]
% Select	29.13[a]	36.26[b]	39.59[c]
% Standard	2.13[a]	3.80[b]	8.38[c]
% CAB	18.7[a]	14.4[b]	11.2[c]
% YG 1&2's	57.64[a]	63.97[b]	71.93[c]
% YG 3's	39.96[a]	34.36[b]	27.06[c]
% YG 4's	2.40[a]	1.67[b]	1.00[c]

[abc] Means within a row with unlike superscripts differ (P<0.05).

Calves that remained healthy during the feeding period had improved feedlot performance and carcass merit, and were more profitable compared with calves that were treated one or more times for disease conditions.

Effect of lung adhesions on feedlot performance, carcass traits and profitability.

Beef calves (n=47,764) fed at 18 SW Iowa feedlots through the Iowa Tri-County Steer Carcass Futurity over eight years (2002-09) were used to evaluate the effect of lung adhesions on feedlot performance, carcass traits and profitability. Carcasses were identified that required trimming at harvest to separate the lung tissue from the rib cage.

Table 7. Effect of lung adhesions on feedlot performance, carcass traits and profitalbity.

Item	No Lung Adhesion	Lung Adhesions
No of carcasses	44,856	1,895
Delivery weight, lb	643[a]	635[b]
Final weight, lb	1176[a]	1160[b]
Days on feed	169 [a]	176 [b]
ADG,lb	3.19 [a]	3.01 [b]
Estimated. Feed to Gain	6.86 [a]	6.89 [b]
Estimated Dry Matter Intake. lb	21.9	20.7
Number of time treated	.23 [a]	.51 [b]
Morbidity rate %	16.25 [a]	29.50 [b]
Treatment cost, $/Hd	$5.29[a]	$12.23[b]
Profit $/Hd	$45.27[a]	$1.65[b]
Hot carcass weight, lb	725[a]	703[b]
Dressing percent	61.52[a]	60.59[b]
Fat cover, in.	.45[a]	.43[b]
Calculated Yield Grade	2.84[a]	2.77[b]
Marbling score	SM 27[a]	SM 10[b]
% Prime	1.00[a]	0.48[b]
% Choice & Choice +	14.86[a]	10.77[b]
% Choice -	51.34[a]	48.47[b]
% Select	30.26[a]	35.43[b]
% Standard	2.54[a]	4.86[b]
% CAB	18.12[a]	12.46[b]
% YG 1&2's	58.90[a]	63.27[b]
% YG 3's	38.83[a]	34.83[b]
% YG 4's	2.26[a]	1.90[b]

Calves with evidence of lung adhesions after harvest had higher health treatment costs, poorer feedlot performance, lighter final live weight and hot carcass weight, lower marbling scores and made less money than those who did not. The winter of 2009-10 produced 5 major blizzards in the SW Iowa area. From mid-January to late April, lung adhesion rates have increased from 4% to 16 to 20% for many groups of cattle. Environmental conditions also have an impact on the incidence of lung adhesions.

Health treatments impact on tenderness

Five Iowa cow/calf producers retained ownership on 359 calves in two Midwestern feedyards. Calves were evaluated for morbidity at the ranch of origin by the owner and treated in conjunction with the herd veterinarian (Engelken2009). At the feedyard, cattle were monitored by experienced personnel and were treated according to established protocols. Calf treatment records during suckling, preconditioning, and finishing were maintained and used to determine the effects on feedyard ADG, feed efficiency, and feed cost of gain. Carcass traits of interest included HCW, REA, marbling score, quality grade, YG, dressing percent, and lung lesion scores. Beef tenderness was evaluated by using Warner-Bratzler shear (WBS) force testing. The effect of calf morbidity at the ranch of origin and at the feedyard on profitability was also evaluated. Incidence of calf morbidity during the suckling and preconditioning periods was extremely low and observed at a rate of 7% (25 calves). During the feeding phase, 43.5% of the calves were treated at least one time and 15.6% were treated more than once. Eight calves died before reaching harvest weight (2.2%). Calf morbidity at the ranch of origin had no effect on health or feeding performance during the feedlot phase and did not impact carcass characteristics at harvest.

Feedyard morbidity had significant effects on feeding performance and carcass traits. Compared to calves treated twice or more, untreated calves had significantly better ADG (0.24 ± 0.07 lb), marbling score (52.31 ± 20.25), and quality grade. Calves that recovered after a single treatment had improved ADG (0.26 ± 0.07 lb) compared to calves treated multiple times. Untreated calves at the feedyard had lower WBS values (0.46 ± .18 lb) compared to calves treated once, but were not different than calves treated twice or more. There was an unexplained interaction between treatment at the ranch of origin and feedlot treatment which improved tenderness at harvest. As a result of this interaction, calves treated both at the ranch of origin and once at the feedyard had significantly lower WBS values compared to calves treated only a single time at the feedyard (1.85 ± 0.51 lb) or calves treated two times or more (1.85 ± 0.53 lb) during the feeding phase. For feedlot treatments, untreated calves and calves treated only once were $100.45 and $97.21 more profitable, respectively, when compared to calves treated multiple times.

Evaluation of fixed sources of variation and estimation of genetic parameters for incidence of bovine respiratory disease in preweaned and feedlot cattle

The primary objective of this study was to estimate variance components and heritability of bovine respiratory disease (BRD) incidence in beef calves prior to weaning and during the finishing phase (Schneider 2010). The second objective was to investigate the impact of BRD incidence and treatment frequency on performance and carcass traits. BRD is the biggest and most costly health challenge facing the cattle industry. The two populations used consisted of 1,499 head of prewean calves and 3,138 head of feedlot cattle. Prewean calves BRD incidence rate was 11.14%, with 83.2% treated once, 14.4% were treated twice, and 2.4% were treated three times or more. The incidence of BRD (P = 0.35) and the number of treatment (P = 0.77) had no significant effect on weaning weight. Heritability estimates for the entire prewean population for BRD resistance and number of treatments were 0.12 ± 0.06 and 0.08 ± 0.05, respectively. The genetic correlation estimates for BRD incidence with weaning weight and birth weight were low (0.00 ± 0.37 and 0.03 ± 0.27, respectively). The same estimate for the number of BRD treatment with weaning weight and birth weight was 0.04 ± 0.42 and 0.19 ± 0.30, respectively.

The BRD incidence rate for feedlot cattle was observed at 8.32%, and had significant ($P < 0.05$) effects on overall ADG with a reduction of 0.13 ± 0.026 lb/d, and 0.95 ± 0.086 lb/d during the early time period after arrival to the feedlot. Carcass traits were also significantly ($P < 0.05$) affected by BRD incidence as untreated cattle had a 20.5 ± 3.74 lb heavier hot carcass weight. Results were similar in the analysis of treatment frequency. The heritability estimate of BRD incidence and the number of treatments were 0.07 ± 0.04 and 0.05 ± 0.04, respectively. Estimates of genetic correlations of BRD incidence with production traits were: -0.90 ± 0.20 for acclimation ADG, 0.14 ± 0.25 for on-test ADG, -0.35 ± 0.22 for overall ADG, -0.43 ± 0.21 for final weight, 0.00 ± 0.23 for hot carcass weight, 0.02 ± 0.23 for ribeye area, -0.03 ± 0.26 for fat cover, and -0.42 ± 0.21 for marbling score. Similar results for the number of treatments and production traits were: -0.94 ± 0.21 for acclimation ADG, 0.18 ± 0.30 for on-test ADG, -0.40 ± 0.25 for overall ADG, -0.55 ± 0.24 for final weight, -0.21 ± 0.27 for hot carcass weight, -0.03 ± 0.27 for ribeye area, 0.00 ± 0.31 for fat cover, and -0.32 ± 0.26 for marbling score. Because of the high economic cost associated with BRD incidence, even these modest estimates for heritability of BRD resistance should be considered for incorporation into beef cattle breeding programs.

Comparison of Southeast and Midwest calves on feedlot performance, carcass traits and profitability.

Calves (n=47,526) from 19 states fed at 18 Iowa feedlots through the Iowa Tri-County Steer Carcass Futurity over eight years (2002-09) were used to evaluate the effect of origin of calves on feedlot performance and carcass traits(Busby 2010). Twelve Southeast (SE) states (n=31,155) and seven Midwest (M) states (n=16,371) were represented.

Table 8. Comparison of Southeast and Midwest calves on feedlot performance, carcass traits and profitability.

Item	SE Calves	Midwest Calves
No of calves	31,155	16,371
Delivery weight, lb	649[a]	629[b]
Age on arrival	320[a]	255[b]
Final weight, lb	1174[a]	1177[b]
Age at harvest	488[a]	430[b]
Average disposition score	1.84[a]	1.80[b]
Days on feed	167[a]	174[b]
ADG,lb	3.18	3.18
Estimated. Feed to Gain	6.92[a]	6.76[b]
Estimated Dry Matter Intake. lb	22.0	21.5
Morbidity rate %	15.81[a]	22.11[b]
Mortality rate %	1.35[a]	1.81[b]
Treatment cost, $/Hd	$5.53[a]	$8.49[b]
Profit $/Hd	$37.34[a]	$23.79[b]

Item	SE Calves	Midwest Calves
Hot carcass weight, lb	723[a]	725[b]
Fat cover, in.	.450[a]	.435[b]
Ribeye area, sq. in.	12.33[a]	12.46[b]
Calculated Yield Grade	2.86[a]	2.80[b]
Marbling score	SM 26	SM 25
% Prime	1.08[a]	0.80[b]
% Choice & Choice +	14.94[a]	14.34[b]
% Choice -	50.32[a]	52.93[b]
% Select	30.99[a]	29.41[b]
% Standard	2.68[a]	2.52[b]
% CAB	18.43[a]	16.91[b]
% YG 1&2's	57.28[a]	62.42[b]
% YG 3's	40.20[a]	35.84[b]
% YG 4's	2.52[a]	1.74[b]

When considering feedlot and carcass traits and all associated costs including trucking to the feedlot, the SE calves had a profit/head of \$37.34 versus \$23.79 for M calves (P<0.001). Southeast calves had fewer health problems, higher CAB® acceptance rates and more profit/head.

Analysis of disposition scores from 2002 to 2006

Further analysis of the TCSCF disposition data (Reinhardt, et al 2009) (n=21,096) , adds additional insight into the differences between steers and non-replacement heifers, as well as the changes in feedlot management regarding poor disposition cattle.

Table 9. Impact of disposition on growth, morbidity and mortality.

Item	Docile Steers	Restless Steers	Aggressive Steers	Docile Heifers	Restless Heifers	Aggressive Heifers	Sex	D X Sex
No of Head	10,740	3,707	875	3,721	1,578	475		
% of Sex Total	70.1%	24.2%	5.7%	64.4%	27.3%	8.2%		
Arrival Wt	673	664	644	629	625	614	<0.001	0.03
ADG	3.56	3.45	3.37	3.26	3.19	3.06	<0.001	0.44
Final Wt	1,201	1,190	1,177	1,120	1,112	1,106	<0.001	0.08
No of Treatments	.27	.24	.29	.19	.15	.16	0.02	0.81
Mortality Rate	1.1%	1.3%	2.4%	1.0%	0.4%	1.0%	<0.01	0.02

Consignors have indicated they are culling heifers based on disposition. Our data confirms that decision, with 5.7% of the steers being aggressive compared to 8.2% of the non-replacement heifers being aggressive. Wilder cattle had significantly lighter arrival weights and steers were impacted more than heifers. Docile cattle had significantly higher average daily gains resulting in significantly heavier final weights. Death loss is significantly higher for aggressive cattle and aggressive steers die prematurely at a higher rate than heifers.

Table 10. Impact of disposition on carcass traits.

Item	Docile Steers	Restless Steers	Aggressive Steers	Docile Heifers	Restless Heifers	Aggressive Heifers	Sex	D X Sex
No of Head	10,740	3,707	875	3,721	1,578	475		
Hot Carcass Wt	737	733	728	688	687	684	<0.001	0.26
Fat Cover	.43	.42	.39	.47	.46	.43	<0.001	0.36
REA sq in	12.4	12.3	12.2	12.1	12.1	12.0	<0.001	0.82
REA/cwt of Hot Carcass Wt	1.68	1.68	1.67	1.76	1.76	1.75	<0.001	0.05
% CH & +	16.6%	15.0%	8.6%	22.7%	18.3%	15.7%	<0.001	0.06
% CH -	51.8%	51.4%	47.8%	50.0%	56.0%	55.6%	0.004	<0.001
% Select	23.0%	24.5%	31.8%	16.8%	17.4%	21.2%	<0.001	0.57
% Std	1.2%	1.2%	1.8%	0.7%	0.6%	0.9%	<0.001	0.86
% YG 1 & 2	61.3%	65.5%	74.7%	55.1%	58.8%	67.8%	<0.001	0.80
% YG 4 & 5	1.6%	1.2%	0.3%	3.4%	3.5%	1.6%	<0.001	0.54

More docile steers and heifers produce significantly heavier carcasses, with more fat cover and larger ribeyes than the aggressive steers and heifers. More docile cattle produce higher quality carcasses with fewer YG 1&2's. Heifers produce significantly higher quality carcasses than steers with similar disposition scores.

Docile cattle had an average profit of $46.63/head compared to the restless cattle average profit of $26.16/head and aggressive cattle average profit of $7.62/head. Disposition is more than a convenience trait. Calves with poor dispositions gained less, had higher mortality rates, reduced quality grades, and reduced CAB® acceptance rates when compared to docile calves.

Assessing the Cost of Beef Quality Revisited

This analysis of nearly 15,000 head of fall placed calf-feds found similar results to (Forristall 2002) in spite of 22% higher corn prices and 38 % higher cattle prices (Ibarburu-Blanc 2010). The data does show strong correlations between economically important carcass and production variables, some of which are antagonistic. Carcass weight has a strong positive correlation with ribeye area and average daily gain; that is faster growing cattle have larger carcasses with larger ribeyes. As marbling score increases so does feed cost and feed to gain; thus higher marbling cattle put on more external fat and require more feed per pound of gain. Also, as average daily gain increases feed to gain decreases a favorable outcome. Marbling is less correlated than some variables, but has a positive relationship with ADG, but negative with ribeye area, placement weight and health treatment.

In both studies marbling was identified as having the largest relative impact on net returns for feedlot cattle when the Choice-Select spread is $8/cwt or higher. The Choice-Select spread where the relative importance of marbling score is equal to other factors is approximately $6/cwt in the current analysis. The relative importance ranking of carcass and management variable was similar in both analysis. Hot carcass weight and feed to gain were next behind marbling followed by ribeye area. Placement weight is strongly correlated to carcass weight and statistically may be capturing part of the variation that was explained by carcass weigh in the earlier model.

Models were estimated for steers and heifers placed in the fourth quarter in Table 11. The R^2 were 0.78 for nearly 10,400 steers and 0.73 for 3,255 heifers indicating that 78% to 73% on the variation in net returns is explained by the variables indicated in the model. The Regression Beta is the output of the ordinary least square regression model. All variables are highly significant ($P< .01$) and have the expected sign.

The Standardize Beta number is the percent of variation in net return explained by that variable. The larger the Standardize Beta in absolute value the more important the variable is to net return. The most important variable explaining net return in the baseline scenario is marbling score with a Standardized Beta of 0.42 for steers and heifers. For heifers hot carcass weight, placement weight and feed to gain had Standardize Beta coefficients that explained approximately 30% of variation in net return. Placement Weight is the second most important explanatory variable for steers net return.

The Regression Beta coefficients are the dollar impact on net return for a one unit change in the independent variable, but may be difficult to interpret. Table 12 scales the regression beta into units that are more commonly used by producers. For example, multiplying the marbling score beta by ten degrees of marbling points is equivalent from $Modest^0$ to $Modest^{10}$, and is associated with increasing net return by $5.17/head in steers and $4.17/head in heifers. Similarly, a 10 lb increase in hot carcass weight is associated with increasing net return by $3.50/head in steers and $4.60/head in heifers. An increase in one-tenth pound increase in average daily gain increases net return by $3.58/head head in steers and $2.15/head in heifers. The steer net return decreased $1.29/head for every dollar spent in health treatments, therefore there is an effect beyond the treatment cost itself. Other variables associated with lower net return were feed cost, feed to gain and placement weight. The other variables are interpreted similarly.

The Standardized Beta from Table 11 and the Economic Values from Table 12 should be used together. For example, the Economic Value of increasing placement weight 10 pounds is a decrease in net return of $3.40 per head which seems small, but the Standardized Beta is 0.34 for steers, making it the second most important variable impacting net retrun. The reason is that it relatively easy to change placement weight 10 lbs, but more difficult to change it one standard deviation which is 95 lbs.

A sensitivity analysis was applied to the steer model to analyze how the results change when the Choice-Select spread, base carcass price and feed prices change (Table 13). Choice-Select spread initial baseline was set at $8 and is examined at $4, $12, or $16 per cwt carcass. Feed prices were adjusted up and down by 20% and the base carcass price is evaluated at $10/cwt higher and lower.

The importance of marbling score on net return is directly related to the Choice-Select spread. At $4/cwt it is the second most important variable, slightly lower than placement weight. However, at $8 (baseline) and higher Choice-Select spread values marbling score is increasingly important and increases in importance with the spread. As marbling becomes more important the other variables become relatively less important in explaining net return. The Regression Beta for marbling score is the dollar value from increasing the marbling score one degree. One-third of a quality grade (33.3 degrees) is worth $12.65 per head at a $4 Choice-Select spread and $31.30 per head at a $16 spread. At a Choice-Select spread of approximately $6/cwt marbling score and placement weight have Standardized Betas that are nearly equal and larger than the other variables.

Marbling score remains the most important variable over the range of feed and carcass prices considered. Feed to gain, placement weight and hot carcass weight are the most sensitive variables to changes in feed costs (also compare to Table 11). Placement weight and hot carcass weight are more important with lower feed costs and feed to gain is more important with higher feed costs. Hot carcass weight is the only variable to show much change due to a change in base price. It is more important at higher prices and less important a lower prices.

Table 11. Regression results for Tri-County Steer Carcass Futurity cattle placed on feed in fourth quarter. Dependent variable is net return per head.

	Steers placed in 4th quarter			Heifers placed in 4th quarter		
R2 & obs are:	0.78		10,384	0.73		3,255
Variable	Regression Beta*	Std Error	Standardize Beta	Regression Beta*	Std Error	Standardize Beta
Intercept	-649.04	10.20	0.00	-496.39	17.86	0.00
Hot Carcass Wt	0.35	0.01	0.25	0.46	0.02	0.31
Fat Cover	-53.67	3.77	-0.08	-106.46	6.04	-0.19
Ribeye Area	12.10	0.46	0.15	12.12	0.91	0.16
Marbling Score	0.52	0.01	0.42	0.42	0.01	0.42
Feed To Gain	-26.05	0.82	-0.23	-28.71	1.24	-0.33
Daily Gain	35.82	1.41	0.20	21.54	2.44	0.12
Placement Weight	-0.34	0.01	-0.34	-0.29	0.01	-0.32
Health treatments	-1.29	0.03	-0.23	-1.24	0.05	-0.24

Table 12. Economic value of a one unit change in the independent variable on the net returns for steers and heifers placed in the fourth quarter

Variable	One Unit	Steers	Heifers
Intercept		-649.04	-496.39
Hot Carcass Wt	10 pound	3.50	4.60
Fat Cover	1/10 inch	-5.37	-10.65
Ribeye Area	1 sq. inch	12.10	12.12
Marbling Score	10 degrees	5.17	4.17
Feed To Gain	1/10 pound	-2.61	-2.87
Daily Gain	1/10 pound	3.58	2.15
Placement Weight	10 pound	-3.40	-2.90
Health treatments	1 dollar	-1.29	-1.24

Table 13. Sensitivity analysis of Choice-Select spread, base price and feed price changes on the net return to Tri-County Steer Carcass Futurity steers placed in the fourth quarter.

Sensitivity	Ch-Sel $4		Baseline		Ch-Sel $12		Ch-Sel $16	
R-square is:	0.77		0.78		0.78		0.77	
Variable	Regrsn Beta	Strd Beta	Regrsn Beta	Strd Beta	Regrsn Beta	Strd Beta	Regrsn Beta	Strd Beta
Intercept	-504	0	-649	0	-939	0	-1084	0
Hot Carcass Wt	0.37	0.28	0.35	0.25	0.32	0.20	0.30	0.17
Fat Cover	-54.78	-0.08	-53.67	-0.08	-51.44	-0.06	-50.32	-0.06
Ribeye Area	12.42	0.17	12.10	0.15	11.47	0.13	11.15	0.11
Marbling Score	0.38	0.32	0.52	0.42	0.80	0.56	0.94	0.60
Feed To Gain	-26.58	-0.25	-26.05	-0.23	-25.00	-0.19	-24.48	-0.17
Daily Gain	34.66	0.20	35.82	0.20	38.14	0.18	39.30	0.17
Placement Weight	-0.34	-0.36	-0.34	-0.34	-0.34	-0.30	-0.34	-0.27
Health treatments	-1.28	-0.24	-1.29	-0.23	-1.31	-0.20	-1.31	-0.18

Sensitivity	Feed +20%		Feed -20%		Base Price +$10		Base Price -$10	
R-square is:	0.75		0.81		0.79		0.77	
Variable	Regrsn Beta	Strd Beta	Regrsn Beta	Strd Beta	Regrsn Beta	Strd Beta	Regrsn Beta	Strd Beta
Intercept	-632	0	-666	0	-649	0	-649	0
Hot Carcass Wt	0.23	0.17	0.48	0.34	0.45	0.32	0.25	0.19
Fat Cover	-52.95	-0.08	-54.38	-0.07	-53.67	-0.07	-53.67	-0.08
Ribeye Area	12.85	0.17	11.35	0.14	12.10	0.15	12.10	0.16
Marbling Score	0.52	0.43	0.51	0.41	0.52	0.41	0.52	0.43
Feed To Gain	-30.83	-0.28	-21.28	-0.19	-26.05	-0.23	-26.05	-0.24
Daily Gain	34.64	0.19	37.00	0.20	35.82	0.19	35.82	0.20
Placement Weight	-0.27	-0.27	-0.41	-0.41	-0.34	-0.33	-0.34	-0.35
Health treatments	-1.32	-0.23	-1.27	-0.22	-1.29	-0.22	-1.29	-0.23

Factors affecting lot low Choice and above and lot premium Choice acceptance rate of beef calves

Data describing 220 lots of beef cattle from 2003 through 2007 were analyzed using a multiple regression statistical model to determine specific factors that influence lot low Choice and above rate and lot premium Choice (Certified Angus Beef©) acceptance rate (Busby 2008). Lot low Choice and above rate was similar for years 2005-2007. This rate was significantly lower in 2003 than 2004 but both the 2003 and 2004 rates were similar to the rate in all other years. Lots consisting of heifers had higher ($P<.05$) low Choice and above rates than lots of steers or mixed-sex pens. The greater the amount of Angus influence in the cattle, the higher the low Choice and above rate ($P<.0001$). An inverse relationship existed between feedlot in-weight and lot low Choice and above rate; those cattle with lighter feedlot arrival weights had higher %

Choice and above rates (P=.0007). Cattle with lower disposition scores (calmer cattle) had higher % Choice and above rates (P=.0496). Low Choice and above rate increased as cattle became less efficient in converting feed to gain (P=.0027). An inverse relationship existed between cost of gain and low Choice and above rate; those cattle with lower cost of gain had higher low Choice and above rates (P=.0043). Lot low Choice and above rate increased as average daily gain increased (P=.0094). Factors examined that did not have a significant effect on lot low Choice and above rate were: mud score at final sort, geographic region of origin, lot mortality rate, number of harvest groups within each lot, days on feed, adjusted final weight, individual treatment cost per head, lot size, and season of harvest.

Lot premium Choice acceptance rate was similar in each year from 2003-2006 but was significantly lower in 2007 compared with all other years. Lots consisting of heifers had higher (P<.05) premium Choice acceptance rates than lots of steers or mixed-sex pens. Cattle harvested during the months October through December had a lower lot premium Choice acceptance rate than those harvested during January through March, April through June, or July through September (P<.05). The greater the amount of Angus influence in the cattle, the higher the lot premium Choice acceptance rate (P<.0064). An inverse relationship existed between feedlot in-weight and lot premium Choice acceptance rate; those cattle with lighter feedlot arrival weights had higher premium Choice acceptance rates (P<.0001). Lot premium Choice acceptance rate increased as average daily gain increased (P=.0003); however lots of cattle that were less efficient at converting feed into gain had higher premium Choice acceptance rates (P<.0104). Factors examined that did not have a significant effect on lot premium Choice acceptance rate were: mud score at final sort, individual treatment cost per head, number of harvest groups within each lot, days on feed, cost of gain, lot size, geographic region of origin, average disposition score, adjusted final weight, and lot mortality rate.

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