Southern Carcass Improvement Project Review

Conducted by Gardiner Angus Ranch, 2009-2012

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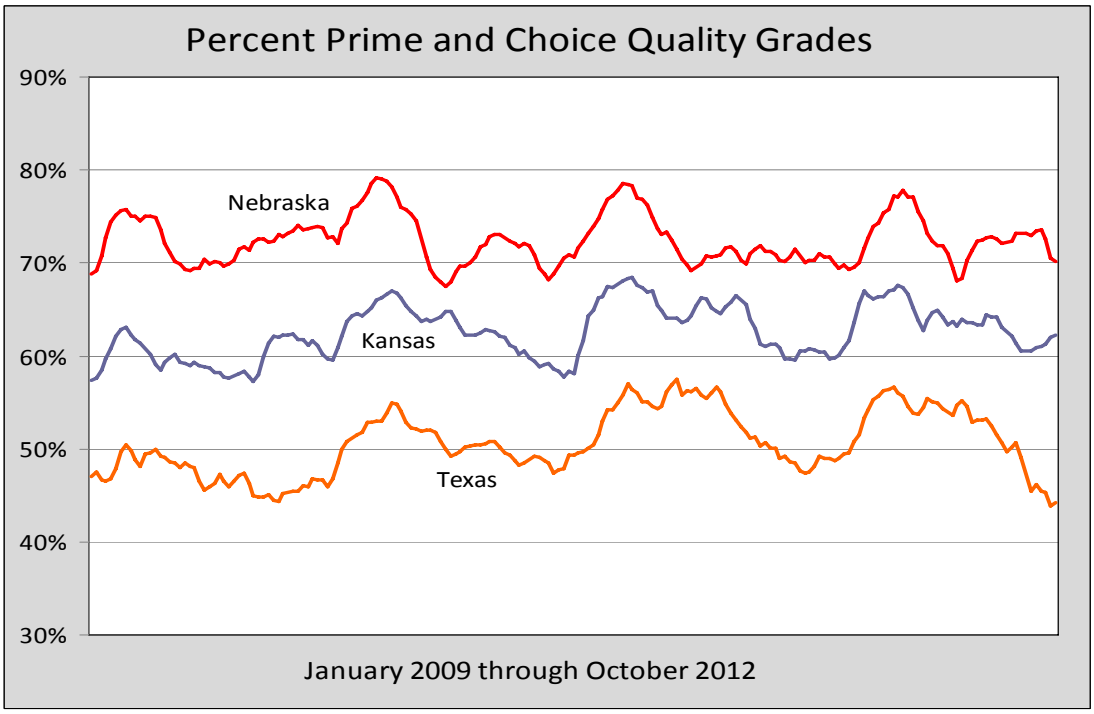
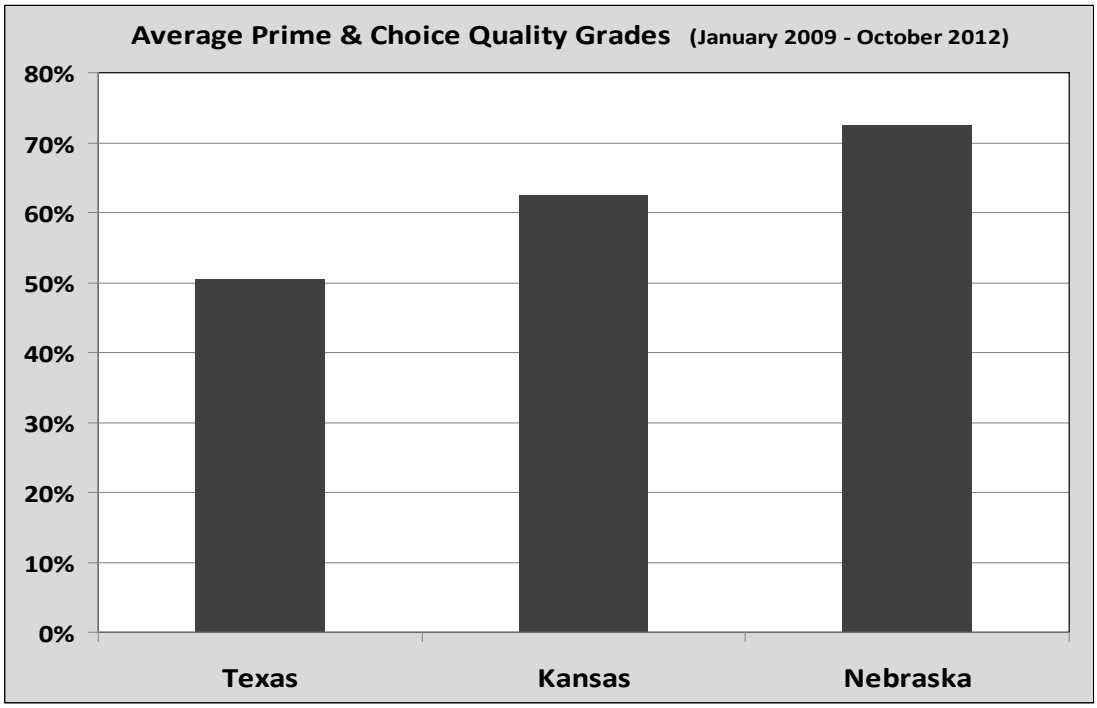
Background According to the 2011 National Beef Quality Audit (NBQA), U.S. beef producers are missing $43.66 per head in lost opportunities on fed steers and heifers due to nonconformance with ideal industry targets. This lost opportunity amounts to more than $1 billion annually. NBQA further determined that more than half of the total shortfall arises from low quality grades ($25.25 per head), and that is equivalent to more than $625 million per year. Low quality grades result in missed beef sales and lower prices for everyone in the beef supply chain. Nowhere is that deficiency more apparent than in Southern U.S. packing plants. Texas and Kansas plants run chronically below northern plants in cattle meeting Prime and Choice quality grades. From January 2009 through October 2012, Texas plants averaged 22-percentage points lower than Nebraska plants for Prime and Choice grading carcasses (50.5% versus 72.5%). Kansas was intermediate with an average of 62.6%.



During 2011, more than 11 million fed cattle were marketed by Texas, Oklahoma, and Kansas feedlots, representing close to 50% of total industry marketings. Given regionally-reported grading percentages, approximately 5 million finished cattle are being sold each year out of individual feedlot pens that fail to grade even 50% Choice. Therefore, a large portion of the industry's $625 million-plus annual loss from insufficient quality grade is found in the Southern Plains. Lower quality grades hurt cattle values in this region. Packers' ability to build value-added brands is also weakened, because many of these brands require mid-Choice or higher marbling levels. The undeniable implication is that fewer dollars in the hands of packers and feeders means fewer dollars are available to bid on the feeder cattle and calves raised by Southern producers. Financial losses associated with low quality grades extend from one end of the beef supply chain to the other, leaving no one immune.



Genetic differences between Northern- and Southern-origin cattle have long been recognized as the major cause of quality grade differences between Northern and Southern packing plants. Slaven Associates surveyed 135 feedlots in the Texas-Oklahoma-Kansas region a decade ago, asking them to rate various quality-related aspects of the Southern/Southeast-origin cattle. Responding feedlot managers identified genetics as the primary cause of regional quality grade differences, as captured in the summary statement below:

"High Plains cattle feeders recognize that quality grades run significantly lower in Texas and Kansas compared to Nebraska and other northern states. Eighty-five percent of responding feedyards say this deficit in mainly the result of genetic differences between Southern and Northern cattle." --Slaven Associates, 2002

Bos Indicus influence in many Southern cattle tends to reduce quality grades. These heat tolerant breeds offer adaptability advantages in the South's harshest climates, but most were not historically selected for desirable carcass characteristics. Another non-positive influence comes from the frequent crossing of Continental-breed bulls on Bos Indicus-based cows. The use of Continental-breed genetics tends to add weaning weight, muscle, and, in many cases, better feedlot performance to the southern gene pool. However, marbling ability improves very little or not at all with these crosses.

Cattle feeders often cite pens of Southern-oriented cattle that grade only 10% to 40% Choice. These cattle pull down average grading percentages in Texas and Kansas packing plants. Of course, not all Southern animals grade poorly. A gradually growing number are performing better as emphasis on carcass traits gains momentum in some Southern-specific breeds, and as higher-marbling Angus and Red Angus genetics are incorporated into a growing number of herds. Still, the South has significant work to do to catch the higher-grading Northern region.

As a recent case in point, on October 18, 2012, Jeff Stolle, Vice President of Marketing for the Nebraska Cattlemen's Association, e-mailed to members the following statement about cattle market conditions:

"Sources report that Choice grading percentages are really struggling in Texas, and to some extent in Kansas."

The Choice/Select spread was $15/cwt. at the time, and several packers with plants in Kansas were reaching north, buying cattle in Nebraska and Iowa to bolster their quality grading percentages. That same week, Texas grading percentages dropped to only 43% Choice.

Lower quality grades are a palpable problem in the beef industry's Southern plants and, unfortunately, improvement is occurring very slowly in absolute terms, and not at all from a relative perspective when compared to the higher-grading Northern plants.

Few would argue against the need for heat-tolerant genetics in southernmost areas of the U.S. Cows adapted to the heat, humidity, and insect challenges that exist below the 35th parallel are often a necessity. However, the progeny of these cows need better carcass traits to compete favorably with their northern-born counterparts.

Can there be a simple answer to this dilemma? This project was designed to test one potential solution that would allow Southern producers to leverage the benefits of a heat-adapted cow herd, while producing a calf fully capable of satisfying industry needs for higher quality beef.

Introduction In 2008, Gardiner Angus Ranch (GAR), Ashland, Kan., began to discuss the possibility of testing high marbling/high carcass value Angus sires on Southern-origin cows to determine how much carcass improvement could be made in one generation. The Angus breed had seen tremendous advancements in growth and carcass traits during the preceding 10 to 15 years (http://www.angus.org/Nce/GeneticTrends.aspx). This might make it possible to significantly increase the industry value of calves born to Southern dams in a single mating. GAR having produced a significant share of such Angus genetics, was interested in testing this concept using a group of heat-tolerant cows from the South. It was recognized that some "ear" is desirable in many southern cowherds, with 1/8- to 1/2-blood Bos Indicus influence suitable for adaptation in most southern locations. "We are not trying to change the southern cow," Mark Gardiner stated at the project outset. "We are trying to change the southern carcass."

GAR enlisted the oversight of Dr. Bill Beal and Dr. David R. Notter from Virginia Tech University to help develop a research protocol and the project began to take shape. Dr. Larry Corah of longtime Kansas State University background and current Certified Angus Beef staff, as well at the author of this paper also played a role in establishing the final structure of the field study.

Trial Design To determine how much carcass trait advancement could be accomplished in one generation, a standard test/control research protocol was used. Heat-adapted, Southern-origin cows were mated to both high carcass value Angus sires and sires from traditional Southern breeds. Calves resulting from Angus sire x Southern cow matings (AN x S) served as the Test Group, while Southern sire x Southern cow (S x S) progeny formed the Control Group. The Test Group's purpose was to discover how much carcass improvement could be achieved when traditional Southern cows were mated to high-value Angus sires. The Control Group served as the study's baseline, while also illustrating that generic mixing of Southern breeds frequently results in low grading/low value carcasses.

Embryo transfer was used to reduce genetic variation on the dam-side of the experiment. Using a limited number of Southern dams and flushing them alternately to Angus and Southern sires helped to isolate sire group effects. All calves were raised in identical environments from birth to harvest. Carcass traits such as marbling, ribeye area and carcass weight comprised the primary focus of the study. Growth curve differences were also of interest, because of the tremendous impact growth traits have on both top- and bottom-line value in beef production. Economic values, based on market values at the time of harvest, were also compared.

Methods In January and February 2009, a total of 22 Southern-origin cows of mixed breeding were purchased through auction markets in Georgia, Mississippi, and Texas, and relocated to GAR near Ashland, Kan. By visual appraisal, these cows contained an average of approximately 3/8 Bos Indicus influence. The remainder of their genetic makeup was comprised of various British and Continental breeds. Only 12 of these Southern-origin dams ultimately produced viable embryos used in the study. Initial flushes took place in March and April 2009, and continued every 60 days for approximately 12 months.

Southern sires were chosen randomly from eight different heat-tolerant breeds (Beefmaster, Braford, Brahman, Charbray, Red Brangus, Santa Gertrudis, Senepol, and Simbrah). One sire from each breed was utilized to create a generic mix of heat-tolerant breeds on the bull-side of the matings. Commercially available semen on these bulls was purchased through Bovine Elite, LLC (6 of 8 sires) or from individual seedstock breeders located in Texas (remaining 2 of the 8 sires). Semen cost ranged from $10 to $40 per unit. Angus sires selected for the study

were GAR Predestined, GAR New Design 5050, and B/R Ambush 28. All three of these proven sires rank near the top of the breed for growth traits and carcass value. The study was conducted in two successive years with two crops of Test and Control calves produced as detailed below. Igenity® DNA profiles were collected on all sires and dams, as well as Test and Control progeny.

Year One: The first group of research progeny calved at GAR from April 6 through May 10, 2010. Birth weight and calving information was collected on a total of 62 head, including 36 AN x S and 26 S x S calves. Bull calves were castrated and all calves implanted with Ralgro® in July at approximately 70 days of age.

After spending the summer and fall at the side of their recipient dams on native pasture, calves were weighed and weaned on November 7, 2010, at an average age of 202 days. Weaning weight on all calves averaged 597 pounds. Steers and heifers were implanted with Synovex® S or H, wormed, and vaccinated for clostridial and respiratory disease pathogens at weaning. Re-vaccination took place two weeks later. One S x S heifer calf was removed from the trial at weaning as an outlier. This calf was much lighter than the rest of the group at birth (52 pounds), and despite remaining healthy, weaned at only 352 pounds. No data from this calf was included in the study.

After weaning, all cattle remained together and were managed identically. Nutritional needs were met via wheat pasture grazing and supplementation with a wheat silage/grain mixture. Gain rates were better than expected, averaging 2.85 pounds per day for all cattle in the study during the 176-day growing period. Test and Control cattle were divided by sire group and placed on feed in adjacent pens at Triangle H Feedlot near Garden City, Kan., on May 2, 2011. Average weight across both groups (steers and heifers included) was 1,098 pounds. Age at placement was very close to one year. Steers and heifers were treated with a single implant (Revalor® S or H) at initial processing on May 5, 2011. Morbidity was minimal throughout the feeding period. Only one S x S animal needed short-duration medical treatment. None of the AN x S animals was treated for sickness. Neither group experienced any death loss in the feedlot. However, one S x S heifer prolapsed repeatedly and was removed from the study prior to harvest.

Based on visual appraisal, both Test and Control groups were divided into two drafts for shipment to the packing plant. Larger, more finished animals sold in the first draft and were harvested on June 30, 2011 at the National Beef Packing Plant in Dodge City, Kansas. This shipment included 18 AN x S animals, and 11 head from the S x S group. On July 27, 2011, remaining cattle trucked to the same plant and harvested (17 head from the AN x S group and another 11 head of S x S cattle). Brian Bertelsen, Vice President of Field Operations for U.S. Premium Beef LLC (USPB), oversaw carcass data collection on an individual-animal basis for both harvest groups. All cattle were valued on a standard USPB grid, reflecting market conditions at the time of harvest.

Year Two: The second research progeny group calved at GAR from April 12 through May 18, 2011. Birth weight and calving information was collected on a total of 61 head, including 36 S x S and 25 AN x S calves. Bull calves were castrated and all calves implanted with Ralgro® in July at approximately 60 days of age.

Calves were weighed and weaned on October 22, 2011, at an average age of 177 days. Average weaning weight across all calves was 504 pounds. Their 205-day adjusted weight was 568 pounds. As in year one, steers and heifers from both sire groups were implanted with Synovex® S or H, treated with an anthelmenic, vaccinated for clostridial and respiratory disease pathogens, then re-vaccinated two weeks later.

Post weaning, all cattle remained together and were managed the same, just as they had been since birth. Nutritional needs were met through grazing wheat pasture and supplementation with a wheat silage/grain mixture. The backgrounding phase lasted 107 days. Rate of gain averaged 1.93 pounds per day. On February 6, 2012, all cattle were shipped to Triangle H Feedlot near Garden City, Kansas, divided by sire group, and placed on feed in adjacent pens. The average weight across both Test and Control groups (steers and heifers included) was 711 pounds. Age at placement averaged 9 months. Cattle were revaccinated and implanted with Revalor® IS or IH. After approximately 60 days on feed, all cattle were re-implanted with Revalor® S or H.

Morbidity was minimal throughout the feeding period. Neither group experienced any death loss in the feedlot. Again as in year one, one S x S heifer prolapsed repeatedly and was removed from the study prior to harvest.

Based on visual appraisal, the cattle were divided into two drafts for shipment to the packing plant. Larger, more finished animals sold in the first draft and were harvested on July 18, 2012 at the National Beef Packing Plant in Dodge City, Kansas. This draft included 12 AN x S animals and 16 head from the S x S group. On August 21, 2012, remaining cattle shipped to the National Beef Packing Plant located in Liberal, Kansas and were harvested (12 head from the AN x S group and another 15 head of S x S cattle). Head-weighted average days on feed came to 179 days for the Control group, and 180 for the Test group cattle. As in year one, Brian Bertelsen of USPB oversaw carcass data collection on an individual-animal basis for both harvest groups. All cattle were valued on a standard USPB grid, reflecting market conditions at the time of harvest.

Results

The project was designed to give Test and Control cattle an equal number of days to create value and economic benefit. Angus and Southern-sired groups averaged 735 days from conception to harvest during year one, giving them equal opportunity to create value. During year two, both groups averaged 752 days from conception to carcass. Head-weighted average days from conception to harvest were 742 and 745 for the AN x S and S x S groups, respectively, giving the Southern-sired group a slight advantage. This difference was deemed small enough (less than 0.5%) that reported results were not adjusted for age at harvest.

Part 1: Growth Curve Summary

Carcass traits were the main focus of this project. However, growth traits were also evaluated, because these traits have tremendous influence on profitability at every level in the beef supply chain. Cow-calf producers prefer lower birth weights and less calving difficulty, but they also need ample weaning weights. Stocker and feedlot operators benefit from cattle that grow fast and efficiently and deliver heavy pay weights. Carcass weights have become increasingly important now that 70% of all U.S. fed cattle are priced on carcass-merit grids and formulas. Cattle feeders using such pricing systems, or that sell on a dressed-weight basis, are directly impacted by carcass weight. Thus, from birth to carcass, weight traits matter a great deal. As described in the Methods section of this report, standard weight metrics were recorded on all Test and Control group cattle. Comparisons discussed below represent both years' data combined.

Gestation Length and Birth Weight Angus-sired progeny had both shorter gestation lengths and lower birth weights compared to their Southern-sired counterparts. Results were consistent across both years on a total of 117 progeny (see table below). The Angus sires utilized in this project were not selected for low-birth-weight genetics. Their average birth weight EPD (expected progeny difference) was 2.7, which is at the 70th percentile of the Angus breed (Source: American Angus Association, November 2, 2012). Nonetheless, the Angus sires did produced notably lower birth weights, in part due to their shorter average gestation lengths. These results were consistent in both the 2010- and 2011-born calves.

Growth Curve Summary (All Progeny*)

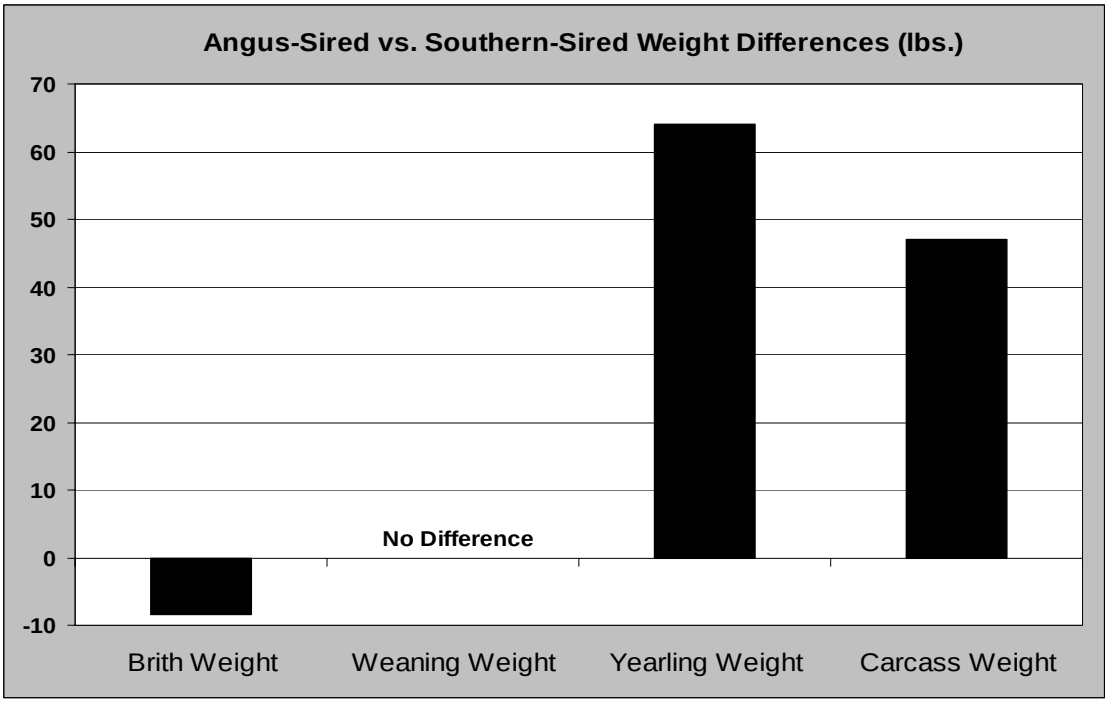
	Angus-sired versus Southern-sired	Statistically significant difference?	
Gestation length	-5.0 days	Yes (P<0.01)	n = 117
Birth weight	-8.5 lbs.	Yes (P<0.01)	n = 117
Weaning weight	---	No	n = 114
Yearling weight	+64 lbs.	Yes (P<0.01)	n = 114
Carcass weight	+47 lbs.	Yes (P<0.01)	n = 112

*Appropriate adjustments made for calf sex, year, and harvest group.

Weaning Weight Adjusted 205-day weights were calculated on 114 progeny that were weighed individually at weaning. There was no difference in weaning weight between the two sire groups. Furthermore, when the two calf crops were compared individually (within year born), no statistical difference in weaning weight was observed.

Yearling Weight 365-day weights were calculated on the same 114 progeny that had also been individually weighed at weaning. There was a sizable advantage of 64 pounds per head favoring the Angus-sired progeny. This difference was statistically significant ($P<0.01$). Yearling weight differences were also compared by sire group within each of the two calf crops, and in both cases, the Angus-sired cattle were heavier.

Carcass Weight The faster post-weaning growth and heavier yearling weights observed in the Angus-sired progeny carried through to final carcass weigh ups. The AN x S group advantage came to +47 pounds of carcass weight when modeled using all harvested progeny in the study (112 head). This is equivalent to approximately 73 pounds of live weight, indicating that the two sires groups continued to grow at different rates from yearling-age to harvest.



As shown in the above chart, the Angus-sired progeny displayed a more desirable growth pattern from birth to harvest. They were born at lighter weights, but were heavier both as yearlings and in final carcass form compared to their Southern-sired counterparts.

Part 2: Carcass Trait Summary

A key aspect of the project was to determine how much Choice quality grading percentages would rise with the use of high-carcass-value Angus sires on traditional Southern cows. The problem with low-grading carcasses in Texas and Kansas packing plants is caused by low-marbling genetics, so infusion of high-marbling genetics should be the solution. Other carcass traits were of interest as well. The table below shows the differences between Angus-sired progeny versus those by the Southern bulls for marbling score, ribeye area, backfat, and carcass weight (carcass weight is repeated from the growth-trait discussion in the preceding section). Overall, the Angus-sired progeny had much more desirable carcasses, displaying higher levels of marbling, more muscle, and heavier carcass weights. There was no difference in yield grade between the two sire groups. Each of these traits is now discussed individually, with emphasis on marbling and quality grade.

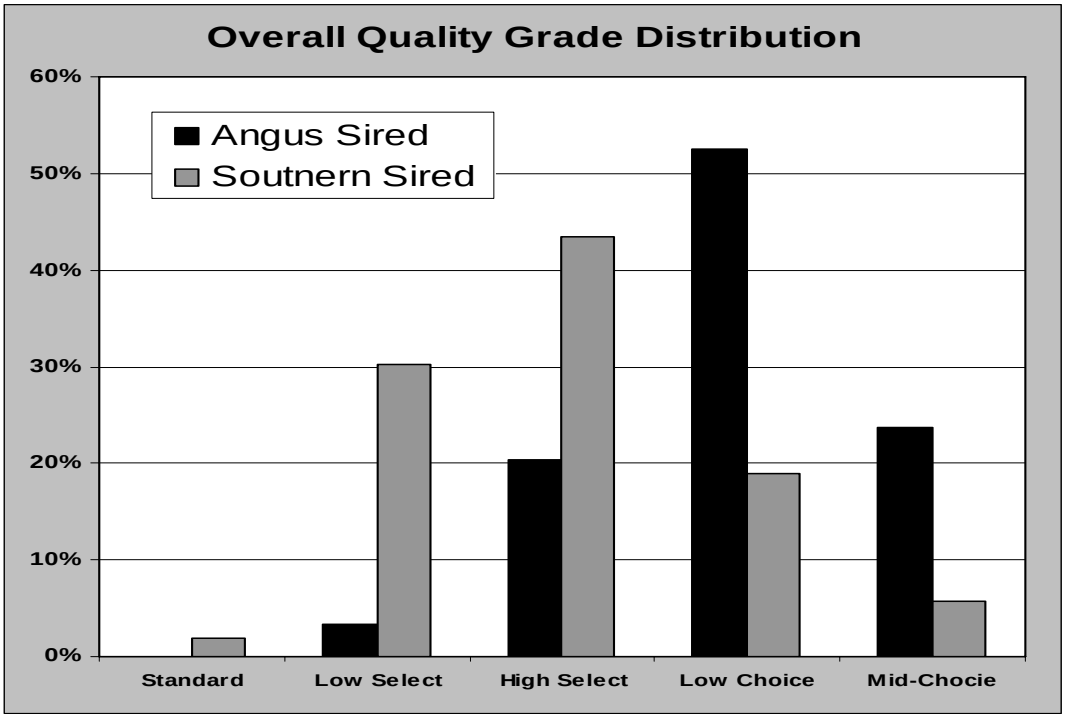
Carcass Trait Summary (All Progeny*)

	Angus-sired versus Southern-sired	**Statistically significant difference?**	
Marbling Score	+78 points	Yes (P<0.01)	n = 112
Ribeye Area	+0.71 sq. inches	Yes (P<0.01)	n = 112
Fat Thickness	+0.10 inches	Yes (P<0.01)	n = 112
Yield Grade	----	No	n = 112
Carcass weight	+47 lbs.	Yes (P<0.01)	n = 112

*Appropriate adjustments made for calf sex, year, and harvest group.

Marbling Adjusted marbling scores for the Angus- and Southern-sired groups averaged 546 (low Choice) and 468 (high Select), respectively. The Angus sires successfully added 78 points of marbling score compared to the Southern bulls when both were used on the Southern cow base assembled for this project. Such a sizable improvement enabled a large shift in cattle attaining the Choice grade. Across both the 2010- and 2011-born calf crops, Angus-sired progeny graded 76% Choice compared to only 25% for the Southern-sired group. Furthermore, the AN x S group had 24% mid-Choice cattle. Most of these qualified for a branded beef premium, such as those paid for carcasses that qualify for Certified Angus Beef. Among the Southern-sired progeny, only 6% reached mid-Choice levels of marbling.

The chart below illustrates the overall quality grade distribution for the two sire groups. Two fairly distinct "bell curves" are apparent when the black bars are observed as a unit (AN x S progeny) in comparison to the gray bars (S x S progeny). The AN x S cattle display a bell-curve pattern that is shifted to the right toward higher quality and higher overall value. In contrast, the S x S distribution is centered over the Select grade where carcass values are lower. Results with the S x S cattle are representative of the industry's problem with low-grading, Southern-oriented genetics. Cattle that grade only 25% will pull regional grading averages down, just as is seen on a regular basis in Texas and to a lesser degree in Kansas.



Ribeye Area The AN x S groups also excelled over their S x S counterparts via superior muscling. Ribeye sizes were statistically analyzed across all cattle in the study and found to be 0.71 square inches larger for the Angus-sired group. Some in the beef industry have suggested that ribeyes sized between 13 and 16 square inches are most desirable. Larger or smaller ribeyes tend to be less usable by packers as they seek to satisfy retailer and foodservice provider needs for consistency and steak-cut portion size. Using this range as the target, 73% of the AN x S group were ideally sized versus 57% of the S x S carcasses.

An interesting and perhaps unexpected outcome that reduced variation and created more right-sized ribeyes among the Angus-sired progeny is that muscling did not increase equally in both steers versus heifers. AN x S steer ribeyes were 0.50 square inches larger than S x S steers (difference in raw means). However, for heifers, the AN x S advantage was much larger at 1.23 square inches. The Angus sires beneficially added more muscle to their heifer progeny, where the problem tends to be with ribeyes that are too small. The more modest increase on steers can be viewed favorably as well, since the problem with steers tends toward too many over-sized ribeyes.

Fat Thickness As mentioned earlier, the project was designed to give both sire groups an equal number of days to create value. Age and time on feed were statistically the same for both groups. Therefore, the small difference in backfat is the result of differing growth curves. The Angus-sired group grew faster, as previously discussed, and they also finished earlier, having 0.1 inches of additional backfat at harvest compared to the Southern-sired group. Unadjusted averages for the AN x S and S x S groups were 0.62 and 0.52 inches, respectively. The fat end point reached by the S x S progeny was adequate for expression their marbling potential. Had they not been part of this research project targeting equal time on feed, the AN x S group could have been marketed a week or two earlier.

Yield Grades There was no statistical difference in USDA Yield Grades between the two sire groups. Unadjusted average yield grades for the AN x S and S x S groups were 3.18 and 3.04, respectively.

Part 3: Grid Premiums

Better carcass traits create extra value that producers can easily capture with today's marketing systems. High-quality cattle routinely generate sizable premiums when sold on grids and formulas. Earning $75 to $100 per head or more above the average market price is both possible and repeatable with the right genetics. As shown in the table below, the AN x S progeny performed well on the USPB grid, earning just over $72 per head above the average market at the time they were sold, not including Age and Source premiums, which added another $35 per head to both groups. Better-than-average dressing percentages, high quality grades, and branded beef premiums all contributed to make the AN x S cattle successful when valued on their actual carcass merit. The S x S cattle performed less impressively and received zero branded beef qualifications, but did earn a modest net grid premium of $15 per head. Their above-average dressing percentage did more than offset the discounts they received for sub-par quality grades. Compared to the average carcass price at the time they were sold, the Southern-sired group would have priced out at a discount.

Average Grid Premium Per Head*

Angus x Southern	$72.18
Southern x Southern	$15.19
Difference	$56.99

*Live weight basis, not including Age and Source Premiums.

In total, the AN x S group outdid their S x S herd mates by $57 per head on a live weight basis. One generation of high-carcass Angus sires successfully produced cattle that excelled on a typical industry grid.

Part 4: Overall Economics

Both top- and bottom-line economics matter to producers. Larger top-line revenue provides more opportunity for profit, while the bottom line is a direct measure of the profit cattle producers seek. AN x S cattle in the study generated both, better top- and bottom-line results. This group weighed more and sold for a higher price per pound. Their adjusted gross value per carcass was $117 per head higher than the S x S group (table below). As is common with

higher-performance cattle, they consumed more feed on a daily basis, which gave them a higher total cost while in the feedlot—$44 per head higher than the S x S progeny group. Calculating the net impact of these higher revenues and higher costs together revealed a $73-per-head economic advantage for the Angus-sired animals. This is substantial, considering that it was accomplished in a single generation on a generic Southern cow base.

Financial Results on All Harvested Cattle	**(per head)**
Angus vs. Southern Carcass Value Advantage	+$117
Angus vs. Southern Feedlot Cost Difference	- $44
Net Economic Advantage Angus-Sired Group	+$73

Cattle feeders will obviously pay more for cattle with this kind of performance. Sam Hands, owner/manager of Triangle H Feedlot where both years' research cattle were fed, calculated the equivalent breakeven feeder-weight value of the 2012 harvested cattle after final closeout information became available. His math showed the S x S animals would have been worth $129.74 per cwt. if purchased at their placement weight of 694 pounds. The AN x S cattle valued the same way came to $138.83 per cwt. at 700 pounds. This advantage of just over $9 per cwt. (more than $60 per head) is even more noteworthy considering that the AN x S group contained more heifers (67%) than did the S x S group (45%).

Part 5: Feeder Calf Value Comparison

A commonly asked question is, can the cow-calf producer get paid for using bulls with more valuable genetics? The evidence says so. Today's feeder cattle and calf market does a fairly good job assessing the value of different kinds and types of cattle and prices them differently at the same weight. For example on November 12, 2012, the Oklahoma City auction market valued #1-quality 550-pound steers at $159 per cwt. The price for #2-quality steers of the same weight was $18 lower at $141 per cwt. Mixed #1s and #2s, not surprisingly, were valued intermediately at $150 per cwt. The primary difference between #1s and #2s is the amount of "ear" they exhibit. Cattle with significant heat-tolerance influence, displaying visible ear and

other Bos Indicus-type characteristics will typically be classified #2s and discounted accordingly by the market place.

To establish feeder calf values for the two sire groups in this study, a survey was conducted with the 2010-born calves. Pictures of steers from each sire group were shown to a total of 95 auction-barn operators, stocker producers, and feedlot managers during the first half of 2011. Each survey participant was asked to individually price the AN x S and S x S groups according to current market values and what they would pay to purchase them as 700-pound feeder steers. Results of the survey are shown below.

None of the research cattle were actually sold prior to harvest. However, the survey results are a good indicator of their market value as short-yearlings. Those who provided pricing opinions for the two sire groups are continually active in the cattle market and are responsible for trading millions of feeder cattle and calves each year. They know the value of different qualities and kinds of cattle very well.

All survey respondents said the AN x S steers were worth more than the S x S steers at the same weight. The average difference in estimated value was greater than $9 per cwt., or nearly $65 per head at 700 pounds. In percentage terms, valuations of the two groups differed by 7.8%. At November 2012 market levels of $148 per cwt. on 700-pound steers, that difference would amount to $80 per head.

Survey Market Price Comparison* (700-lb. Steers)

	Average Price/cwt.	
Angus x Southern	$128.09	
Southern x Southern	$118.86	
Angus Price Advantage	$9.23	(P<0.01)
Difference in Value (per head)	$64.62	

*Participants were located in 12 Southern and Central Region states.

Part 6: DNA Scores for Marbling and Quality Grade

For the sake of brevity, only DNA marbling and quality grade will be discussed in this report. Igenity® scores for marbling and percent Choices are shown in the table below for all sires and dams on a progeny-weighted basis. Igenity® scores range from 1 to 10, with 10 being most

	DNA Marbling Score*	DNA %Choice Score*
Angus Sires	8.6	8.6
Southern Sires	4.7	4.7
Dams of AN x S Calves	5.7	5.7
Dams of S x S Calves	5.7	5.7

*Progeny weighted average.

favorable (highest level of marbling potential). Note that the Angus sires rank much higher in marbling and % Choice. They were nearly 4 points higher than the Southern sires. Recall that the Southern sires were selected at random from their respective breeds, without any knowledge of their marbling genetics. These Southern sires are representative of cattle that have not been historically selected for positive carcass traits, such as marbling.

The marbling potential among dams of the AN x S calves and the dams of the S x S calves was exactly equal (5.7 average for both marbling and % Choice). This is as expected, since most of the dams used in the project produced both Angus- and Southern-sired calves. The fact that the dams of both sire groups scored equally means the two sire groups were given equal opportunity to produce Choice grading offspring. As discussed earlier, the Angus-sired progeny out-graded the Southern-sired group 76% to 25% Choice, respectively.

Igentity® DNA scores were found to be a good predictor of actual quality grade results in this study. The table below compares the highest-marbling matings to the lowest marbling matings, according to DNA scores. The difference was dramatic, and suggests that both positive selection (using cattle with high DNA marbling scores) and negative selection (culling low-scoring breeding stock) can successfully be used to improve quality grades and overall carcass value.

	Sire DNA Marb Score	Dam DNA Marb Score	Resulting Progeny Quality Grade
High-Marbling Matings	8 or 9	6 or 7	80% choice*
Low-Marbling Matings	4	4 or 5	6% Choice**

*20 out of 25 Choice progeny, with 36% reaching upper 2/3 Choice.

**1 out of 17 head reached the Choice grade.

Summary

Bos Indicus influence is desirable in many Southern cow herds. Adaptability is an important trait heat-tolerant breeds bring to the table. Also important to understand is how such a cow base can produce feeder calves able to compete successfully with calves from other geographies as they move through the beef supply chain. Generic mixing of traditional Southern genetics, as well as crossing such cattle with Continental breeds, has resulted in lower average quality grades and lower overall carcass values in the important packing states of Texas and Kansas. As a potential solution to that problem, this project was designed to test the impact of one generation of high-carcass-value Angus sires on Southern-sourced/Bos Indicus-based cows (Test group progeny). The Control group was intended to reproduce the problem of low-grading carcasses via mating the same cows to bulls representing a variety of heat-tolerant breeds.

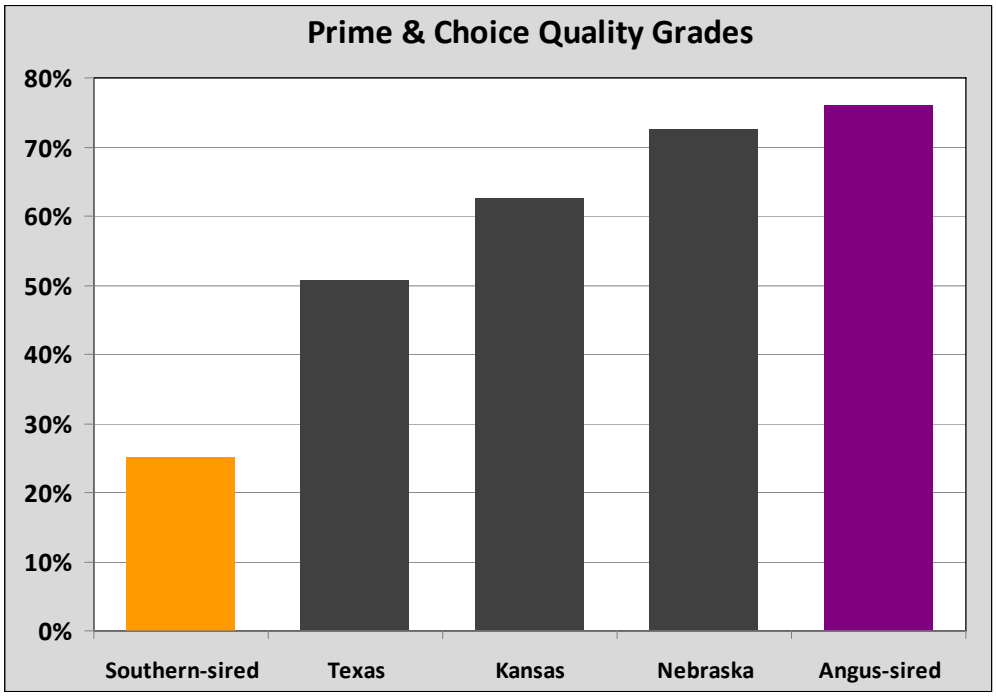
Project results demonstrated that substantial carcass improvement is possible by using a single generation of high-value Angus bulls on a generic Southern cow herd. Key project findings are listed below:

1. Angus-sired progeny produced excellent overall quality grades, with 76% grading Choice (24% mid-Choice).

2. Southern-sired cattle, which served as the Control group, graded 25% Choice. As expected, the generic mixing of Southern-oriented genetics was an easy way to produce low-grading/low-value carcasses.
3. Ribeye size also increased among the Angus-sired Test cattle versus the Southern-sired Controls. However, average yield grades were not different between the two groups.
4. Post-weaning growth rate, yearling weight, and carcass weight were also notable advantages for the Angus-sired group. Yearling weights were 62 pounds heavier, while carcass weights exceeded those of the Southern-sired group by 47 pounds.
5. Grid premiums were substantially larger for the Angus-sired cattle compared to those sired by the Southern bulls ($72.18 versus $15.19, for a difference of $57 per head). One generation of the high-carcass-value Angus sires on Southern-sourced cows created progeny that captured a sizable premium when sold on a typical industry grid.
6. Both gross value and net economic value were higher for the Angus-sired cattle. Gross value increased $117 per head, while net economic value (after subtracting differences in feed costs) improved by $73 per head. As is typical for higher-performance cattle, the Angus-sired group had higher daily feed intakes while in the feedlot. However, their faster growth rate and higher value carcasses more than offset their additional feed costs, creating a sizable economic benefit as compared to the Southern-sired cattle in the study.
7. Cow-calf producers can get paid for producing value-added genetics, such as those represented by the Angus-sired feeder calves in this study. A survey of stocker producers, auction market operators, and feedlots managers valued the Angus-sired group more than $9 per cwt. higher than the Southern-sired group, all weighing approximately 700 pounds ($65 per head difference).

Conclusion

Southern cow-calf producers who incorporate high-value Angus genetics into their herds can benefit both themselves and the entire beef supply chain. High-grading, high-value cattle can be created in one generation from a Bos Indicus-based cowherd with average to below average carcass genetics. Such cows, when mated to randomly-selected Southern sires, often produce low-quality-grading progeny that perform below Texas/Kansas averages, representing a problem and disadvantage for Southern packing plants. On the other hand, Angus-sired progeny by the same cows can meet or exceed plant average in any geography (chart below).



Southern producers can use appropriate levels of heat-tolerant genetics in their cow herds. Then by using high-performance, high-carcass-value Angus bulls, they can produce calf crops that perform and grade at or above regional averages. Furthermore, producers can be paid higher prices for these calves when they are sold at weaning or as yearlings. Cattle buyers recognize and reward those who create feeder cattle with superior value. Better genetics offer a simple and effective solution in making beef from Southern packing plants grade better. Producers win in giving the industry more of what it needs and in the process, the U.S. beef supply chain becomes more aligned with consumer demand.