Project 31

Creating High Value Beef Cattle is Now Easy and Fast

By

Top Dollar Angus, Inc.

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Introduction. Cow-calf producers have tremendous selection tools available for making financially rewarding breeding decisions. When utilized to identify outstanding sire genetics, high-value beef cattle can be created with ease. Superior genetics can rapidly improve the bottom line of any ranching operation. To demonstrate this fact, Top Dollar Angus recently completed a simple genetic demonstration project in cooperation with four like-minded industry partners.

This field study was designed to illustrate that (1) EPDs and $Indexes are highly effective selection tools, yielding predictable phenotypic and financial outcomes, and (2) high-value cattle can be produced easily by utilizing these tools correctly in sire selection. Cow-calf producers who purchase bulls with superior EPDs and $Indexes can be confident they are infusing high-value genetics into their herds. The result is more valuable calf crops that can be marketed at higher prices, while still benefitting downstream industry participants from feedlot to consumer.

Project Objective. The goal of this project was to test and evaluate the EPDs of one high growth/high carcass value Angus sire against a low growth/low carcass Angus sire via direct progeny comparison. Both bulls' offspring were raised, finished and harvested together. Thus, our main emphasis here is on final carcass results, mimicking a rancher who retains ownership of his calves through the feedlot and markets them on a grid. By raising and feeding the two sire groups together, management and environmental influences were normalized, enabling more precise measurement of genetic differences between the two sires. Our expected result was that the high growth/high carcass sire's progeny would perform better in multiple traits and create more net income. Actual results fully met this expectation.

Breeding through Weaning and Backgrounding. Project partner Mike John, Huntsville, MO, volunteered 53 head of his F1 Hereford x Angus 2018 fall-born heifers for the project's use. Heifers were DNA tested with Igenity Beef® during the fall of 2019, then randomly assigned to be mated to one of the two project sires. Heifers were synchronized and bred artificially on November 11, 2019. Twelve head were rebred after observed heats on November 30 and December 1, 2019.

Semen from the two Angus sires was donated by Sydenstricker Genetics, Mexico, MO. Sydenstricker had raised both bulls. The high growth/high carcass sire, SydGen Enhance (AAA 18170041), was born in 2015 and has been an Angus breed staple during recent years. SAF Focus of ER (AAA 12618076), the low growth/low carcass bull, was born in 1996 and was also a popular sire in his day.

Resulting A.I.-sired calves, 31 head in total, were born August 8 through September 7, 2020. Birth weights averaged 63 pounds. Calves were DNA tested with Igenity Beef and sire verified. Eighteen calves verified to Enhance, while the remaining 13 head sire matched to Focus of ER. All the calves were weaned on March 26, 2021, at an average age of 220 days. Average weight for steers and heifers was 542 pounds.

Backgrounding on the ranch of origin took place from weaning through June 18, 2021 (84 days). Gains averaged near 2.0 pounds per day. Health remained good on the calves during this stage of development.

On to the Feedyard and Harvest. Project cattle were shipped from Missouri and arrived at Triangle H East Feedyard, Garden City, Kansas, on June 19, 2021. Sam Hands and his daughter Marisa Kleysteuber are the owners and operators of Triangle H and were our feeding partners for the field study.

Average weight on June 25th was 692 pounds. Health remained favorable, with only a handful of cattle treated for pinkeye and minor respiratory issues during the entire feeding period. No death loss was experienced. Heifers were spayed on August 1, 2021, because the steers and heifers were being fed together. All cattle were implanted twice. Once with Revalor® shortly after arrival, and again on October 7, 2021 with Component® TE 200.

After 110 days on feed and an average gain rate of 3.61 pounds per day, the entire group weighed 1,089 pounds (steer and heifer average). Progeny of Enhance, the high growth/high carcass sire, outweighed the other sire's progeny by 24 pounds on a sex-constant basis.

The entire group was harvested at National Beef in Liberal, Kansas on January 12, 2022, after 207 days on feed. Steers weighed 1,442 pounds, with a closeout average daily gain of 3.78 pounds. Heifers weighed 1,389 pounds and had a daily gain rate of 3.39 pounds. Final settlement price was $148.09 per cwt. live, which beat the $137.01 grid base price by $11.08 per cwt. Combined steer and heifer grid premium was outstanding at +$157.56 per head.

Carcass Results. The impact of genetic differences between the two sire groups is clearly visible in Table 1. Enhance-sired progeny weighed more on the rail, marbled better and had larger ribeyes, just as expected, given his superior EPDs for those traits. Enhance progeny also rang the bell financially, creating $218.91 more gross value per head compared to their Focus-sired counterparts.

Table 1.

	Enhance	Focus of ER	
Top Dollar Angus Sire	Yes	No	
Progeny Evaluated (head)	18	13	Difference
Carcass Weight* (lbs.)	926	889	37
Marbling Score	668	562	106
Ribeye Area^ (sq. inches)	14.90	14.37	0.53
Backfat (inches)	0.76	0.72	0.04
Calculated Yield Grade	3.5	3.4	0.1
Value Per Head^	$2,193.49	$1,974.57	$218.91
*Sex and age constant. ^Steer equivalent.			

As mentioned above, the two progeny groups were raised together from birth to harvest and consequently experienced the same management and environmental conditions throughout their lifetimes. The observed carcass differences are, therefore, almost entirely the result of genetic differences between the two sires. Differences in sire EPDs are evident in the trait levels achieved, and also in the comparative financial results. Selecting the right bull with superior genetic merit has a genuine impact on real-world outcomes, as these data attest.

We now turn the discussion to individual trait results and provide a comparison of sire EPDs, progeny DNA scores and phenotypic results.

Growth and Carcass Weight. As presented in Table 2, SydGen Enhance has significantly higher growth EPDs compared to Focus of ER. Therefore, we expected Enhance progeny to grow faster than those sired by Focus. Our expectations were met. Creating more value through a greater number of salable pounds, Enhance-sired progeny exhibited faster growth rates during their lifetimes, resulting in heavier live and carcass weights.

Differing growth-trait EPDs between the two sires proved to be good predictors of progeny performance, which is what EPDs are designed to do. Actual phenotypic outcomes did not precisely match sire EPD differences. However, the EPDs were directionally accurate, pointing the way toward what became a sizable separation in progeny growth rates and weight. Despite the project's small head counts, these results support the usefulness of EPDs in generating real-world performance differences.

Table 2.

Sire Growth EPDs, Progeny DNA Scores and Performance Results			
	Enhance	Focus of ER	Difference
Yearling Weight EPD*	138	77	61
Carcass Weight EPD*	63	12	51
*March 4, 2022.	Enhance Progeny	Focus of ER Progeny	Difference
Head Count	18	13	
Igenity Beef Score ADG (1-10 scale)	4.9	4.4	0.5
Igenity Beef Score Carcass Weight (1-10 scale)	6.4	4.8	1.7
Weight Per Day of Age at 415 Days (lbs.)	2.62	2.56	0.06
Weight at 415 Days of Age (lbs.)	1,105	1,081	24
Feedlot ADG (lbs.)	3.89	3.66	0.23
Age at Harvest (days)	511	514	-3
Lifetime Weight Per Day of Age (lbs.)	2.86	2.72	0.13
Live Weight at Harvest (lbs.)	1,459	1,400	59
Hot Carcass Weight (lbs.)	926	889	37
Note: All of the above gain rates and weights are shown on a steer-equivalent basis.			

Average Igenity Beef DNA scores between the two sire groups also performed well in characterizing their genetic differences for growth. As shown in the blue-shaded area of the table above, Igenity Beef scores for average daily gain and carcass weight were higher for the Enhance progeny group, which matches their faster growth rates and heavier finish weights. The efficacy of Igenity Beef for DNA testing commercial cattle is illustrated in this outcome. Project results also verify the 1-2-3 alignment between (1) sire EPDs, (2) progeny DNA scores and (3) actual progeny performance. These three data points line up in a cohesive manner, which suggests producers can leverage these tools to control cattle performance and financial outcomes with meaningful precision. See illustration below.

Higher Sire Growth EPDs

Higher Progeny DNA Scores for Growth

Faster Growth Rates and Heavier Pay Weights
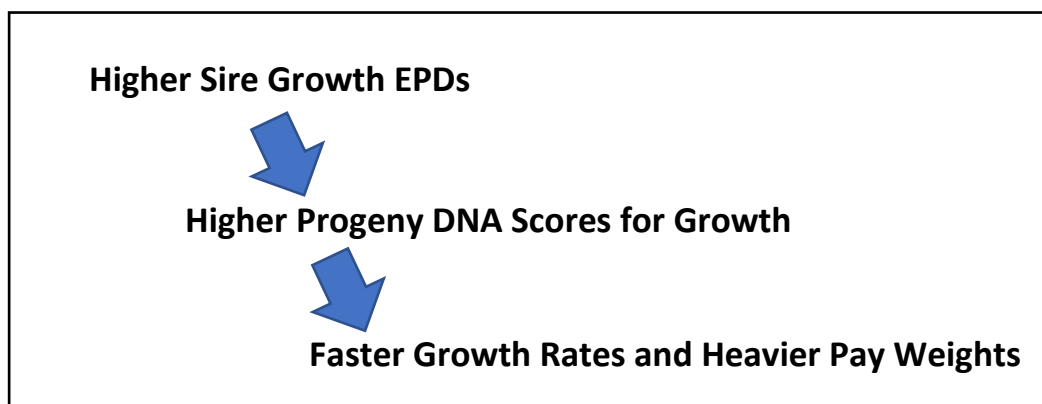
Marbling and Quality Grade. As shown below in Table 3, all cattle in the field study performed well from a marbling and quality grade standpoint, which contributed significantly to the large grid premiums they received. There were no Select grade carcasses produced in either sire group. The result, in part, of these cattle being adequately finished with average backfat of 0.74 inches.

When split by sire, the final data are well matched to sire EPDs and progeny Igenity Beef DNA scores, indicating both were useful in predicting different marbling outcomes between the two groups.
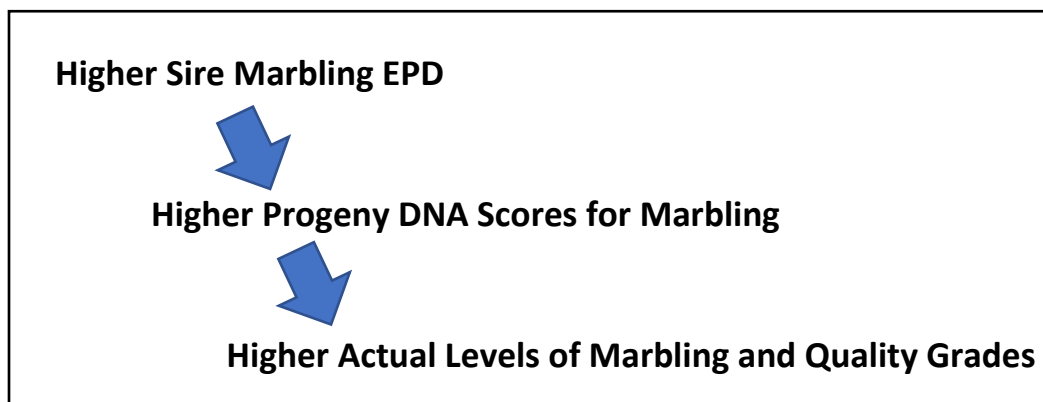
Table 3.

Sire Marbling EPDs, Progeny DNA Scores and Carcass Quality Results			
	Enhance	Focus of ER	Difference
Marbling EPD*	1.22	0.56	0.66
*March 4, 2022.	Enhance Progeny	Focus of ER Progeny	Difference
Head Count	18	13	
Igenity Beef Score Marbling (1-10 scale)	7.6	6.0	1.6
Marbling Score	668	562	106
Prime	50%	0%	50%
CAB and Prime	89%	62%	27%
Low Choice	11%	38%	-27%

Enhance progeny displayed an average marbling score 106 points higher than those sired by Focus, even larger than the difference in their current marbling EPDs. The 0.66 EPD difference between the two sires equates to a marbling score difference of 66 points. Top Dollar Angus-qualified sire Enhance also produced an impressive 50% Prime carcass percentage (9/18 head), and only 11% low Choice carcasses. Focus progeny also did well with 62% reaching Certified Angus Beef status. However, they were outmatched by the better marbling genetics Enhance transmitted to his progeny.

We often remind cow-calf producers that "there is money in marbling." That statement was certainly true the week these cattle were harvested. Prime grade carcasses brought $29.33 per cwt. more than Choice, which made Enhance's elite marbling genetics golden.

Igenity Beef also did an excellent job characterizing genetic marbling potential between the two sire groups. As shown in the blue-shaded area of Table 3, average Igenity Beef scores for Enhance progeny were 1.6 units higher using Igenity's 1-10 scale, compared to the Focus-sired group. These results again demonstrate favorable alignment between sire EPDs, progeny DNA scores and actual phenotypic results.

Higher Sire Marbling EPD

Higher Progeny DNA Scores for Marbling

Higher Actual Levels of Marbling and Quality Grades

Ribeye Area. Current Ribeye Area EPDs for our two project sires, as shown below, suggested that Enhance progeny would have larger average ribeye sizes. They did, with a 0.53 square inch advantage. This difference is smaller than the EPDs predicted, though still directionally accurate and of meaningful

Table 4.

Sire Ribeye Area EPDs, Progeny DNA Scores and Carcass Ribeye Results			
	Enhance	Focus of ER	Difference
Ribeye Area EPD*	0.86	0.08	0.78
*March 4, 2022.	Enhance Progeny	Focus of ER Progeny	Difference
Head Count	18	13	
Igenity Beef Score Ribeye Area (1-10 scale)	6.1	4.8	1.3
Steer Equivalent Ribeye Area (sq. inches)	14.90	14.37	0.53

magnitude. Again, it is important to recognize that the project's small head counts, while large enough to reveal genetic differences, may not be adequate for precise expression of the EPD spread between the two sires. Nonetheless, it is obvious that the Ribeye Area EPDs, as calculated by the American Angus Association, did their job successfully in predicting phenotypic ribeye differences between our two sire groups. Said simply, EPDs work. When time is taken equalize environmental influences, we get a clear

picture concerning just how useful these prediction tools are for making valuable cattle that put more dollars in rancher pockets.

Ignity Beef scores for Ribeye Area also appropriately identified genetic differences between the two groups. Average scores for Enhance progeny came in 1.3 units higher on Ignity's 1-10 scale versus Focus progeny, as shown in the blue-shaded area of Table 4. Ignity Beef correctly identified the group most likely to have larger ribeyes, which was borne out in the final carcass results.

Higher Sire Ribeye Area EPD

Higher Progeny DNA Scores for Ribeye Area

Larger Actual Carcass Ribeye Size
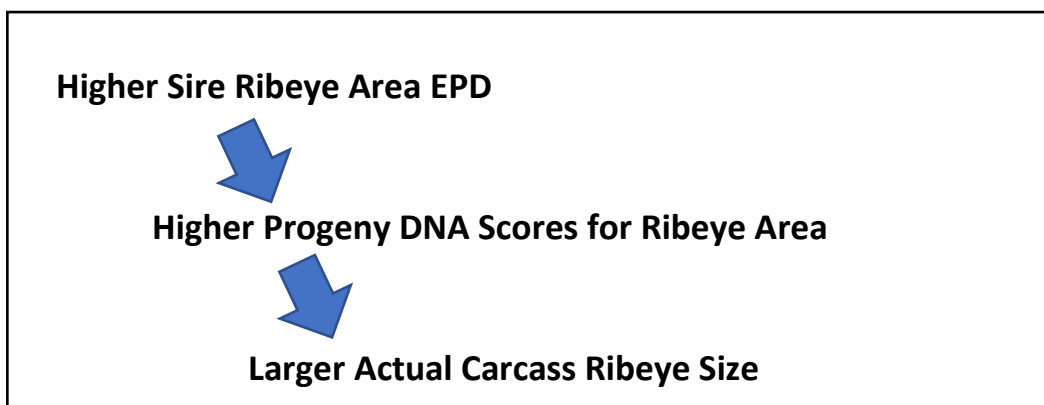
Carcass Value. The growth, weight and other carcass advantages discussed above all favored SydGen Enhance, the Top Dollar Angus-qualified, high growth/high carcass sire selected for the project. Enhance progeny grew faster, weighed more at harvest, exhibited higher quality grades and had larger ribeyes. On a steer-equivalent basis, their average carcass value exceeded that of the Focus sire group by a whopping $218.91 per head (+11%). This difference was statistically significant (p<0.001).

To complete this comparison, we must also account for the extra feed Enhance progeny likely consumed while in the feedyard. Enhance's Dry Matter Intake EPD is +1.55, compared to +0.18 for Focus (+1.37 pounds per day difference). When we multiply this 1.37-pounds of added daily intake times 207 days on feed, the result is 284 additional pounds of dry feed consumed per head that must be charged against the Enhance progeny. Using a $335 per ton dry ration cost (Source: Cattle-Fax/AgStrata ration price for cattle closed out in January 2022), that calculates to an additional feed expense of $47.50 per head. This extra cost would reduce the financial advantage of the Enhance sire group from $218.91 to $171.41 per head ($218.91 - $47.50 = $171.41), which is still very impressive. The $Beef index difference between these two sires was $97 as of March 4, 2022 (Enhance at $195 – Focus at $98 = $97). Thus, the expected financial advantage for the Enhance sire group, based on $Beef, was directionally accurate, though considerably larger than the $Beef spread between the two sires ($171.41 versus $97).

Worth highlighting for sustainability advocates is the incremental feed-to-gain ratio when the 284 pounds of extra feed are compared against the 59-pound finish weight advantage held by the Enhance progeny. This comparison calculates to an incremental feed conversion rate of 4.81 pounds of dry feed per pound of live weight gain. For beef cattle, that is very good efficiency indeed and well worth the additional feed cost to get those additional pounds.

Using the available data, we estimate the Enhance progeny had a 2% advantage in feed efficiency across the entire feeding period when compared to the Focus-sired cattle (6.43 versus 6.57 pounds of dry feed per pound of live weight gain, respectively).

Qualifying for Top Dollar Angus. Another interesting result was that, based on their Ignity Beef scores, the Enhance-sired progeny qualified for Top Dollar Angus, while those by Focus did not. When DNA testing is used, Top Dollar Angus requires a 4-trait-average Ignity Beef score of 6.0 or higher program (1-10 scale, with higher scores signaling greater genetic merit) for qualification into its top 25% feeder calf marketing. The four traits utilized are average daily gain, carcass weight, marbling and ribeye area. Calf crops or groups of feeder cattle that reach or surpass a 6.0 average for these four post-weaning traits are genetically programmed for superior growth and carcass performance and are genetically better than at least 75% of all industry cattle.

Table 5.

Progeny Ignity Beef Scores (1-10 Scale)		
	Enhance	Focus of ER
Top Dollar Angus Sire	Yes	No
Progeny Evaluated (head)	18	13
Average Daily Gain	4.9	4.4
Carcass Weight	6.4	4.8
Marbling	7.6	6.0
Ribeye Area	6.1	4.8
4-Trait Average Score	6.3	5.0
Top Dollar Angus Qualified	Yes	No

As shown above in Table 5, the 4-trait average Ignity Beef score for Enhance progeny was 6.3, landing above the 6.0 threshold and high enough to qualify this sire group for Top Dollar Angus. Focus progeny fell short and would not have qualified for Top Dollar Angus, averaging 5.0 on the four traits of interest. Higher Ignity Beef scores are associated with improved growth and carcass performance, as demonstrated here and in other real-world research conducted by Neogen. That is why Top Dollar Angus regularly uses Ignity Beef scores in working with ranchers to help them understand the genetic merit of their calf crops, and to determine their qualification status. Replacement heifer candidates are typically tested as a representative sample of each producer's calf crop.

One more important observation is that dams of both the Enhance and Focus calves averaged 4.9 on their Ignity Beef 4-trait-average scores. See Table 6 below. None of the minor differences in the individual trait averages between the two dam groups were statistically significant. These heifers rank near the middle of the cattle population in genetic merit for the traits utilized in this project.

Table 6.

Average Igenity Beef Scores (1-10 Scale)	Dams of Enhance Calves	Dams of Focus Calves
Average Daily Gain	4.9	5.1
Carcass Weight	4.8	4.7
Marbling	5.4	5.5
Ribeye Area	4.7	4.5
4-Trait Average	4.9	4.9

The 4-trait average Igenity Beef score on Enhance-sired calves was higher than that of their dams by 1.4 units on Igenity's 1-10 scale (6.3 for the Enhance calves versus 4.9 for their dams). For the Focus calves, there was negligible genetic improvement, with a 5.0 versus 4.9 average 4-trait score for the calves and their dams, respectively. What we see here is an example of meaningful genetic improvement on the one hand, versus maintaining the status quo on the other.

Conclusion. The purpose of this project was to demonstrate the usefulness of EPDs and DNA testing to help create more valuable beef cattle. These tools were again proven to work extremely well in predicting the genetic merit of progeny produced, which directly impacts real-world phenotypic and financial performance. When the goal is to breed more valuable calf crops, EPDs, $Indexes and commercial DNA testing can be used with confidence.

Keep in mind that the substantial differences observed here were accomplished in one generation. A single sire selection decision generated a major divergence in gross carcass value and net return per head. Pick the right sire(s) and the size of your cattle check will increase. Greater top- and bottom-line results are what the superior genetic sire created in this field study, just as predicted.

Because elite sire genetics are readily available in the beef industry today, it is now possible to create highly valuable cattle in one generation (two at most), even when the initial cow base is mediocre. The F1 black-baldy dams of both sire groups were genetically similar and found via Igenity Beef to be near the middle of the bell curve for growth and carcass traits. Dams of the Enhance and Focus calves both averaged 4.9 on their Igenity Beef 4-traits average DNA scores (not terrible, but not great either). Even so, the superior genetic sire, in one mating, created high-value cattle that grew well, gained efficiently and graded 50% Prime. He put more dollars into the pockets of the owners of his progeny. Such an outcome is repeatable by anyone who chooses to follow the same EPDs-to-dollars path.

Effectiveness of the genetic tools seedstock breeders and commercial ranchers have at their fingertips was successfully illustrated in this field study for important production traits and in terms of financial

results. The takeaway is that the creation of high-value cattle, and elimination of cattle with poor genetics, is now easier and faster than ever before in the history of U.S. beef production.

Comments from Ben Eggers, Manager, Sydenstricker Genetics

"We all hear a fair amount of questioning about the accuracy of today's EPDs. Some people ask whether EPDs are getting too large, and whether or not breeders are actually making that much genetic progress. This being the case, when Top Dollar Angus contacted us with the idea for a project comparing two sires, head-to-head, to see how their EPDs and bio-economic indexes would perform in the real world, Sydenstricker Genetics was interested.

My thoughts quickly went toward possible sires to compare. It was obvious we might use this data to prove or disprove more than one issue related to EPDs. Why not compare two sires born 19 years apart, both highly proven, each with approximately 12,000 progeny records in the American Angus Association's database? Their EPDs are different enough there could be a good comparison, and we can see if we've made as much progress in the past two decades as the EPDs suggest.

Both Enhance and Focus are landmark sires in the Angus breed, and major influencers in their time. Going in, we believed the data would show that substantial progress has been made. Now that the project is finished, the evidence definitely supports the fact that sizable genetic advances have been made."

Acknowledgements

We end by again recognizing our four project partners. These champions demonstrate tireless commitment to improving the U.S. beef business and making producers in all industry segments more profitable. Thanks to you all, our valued colleagues and friends. We could not have completed this work without you.

Mike John, Huntsville, MO	**Sydenstricker Genetics, Mexico, MO**
Triangle H Feedlot, Garden City, KS	**Neogen Corporation, Lincoln, NE**

The SydGen Enhance-sired calf pictured above was part of this project. He weighed 61 pounds at birth on August 18, 2020, and went on to gain 4.13 pounds per day in the feedlot. His finish weight was 1,550 pounds and he reached Certified Angus Beef status easily with a marbling score of 671.

With the right genetics, creating high-value beef cattle has now become easy and fast.