The abundance of data presented to producers to use in genetic selection decisions has become almost excessive. The majority of bull sale catalogs contain actual and/or adjusted weights and ultrasound measurements, ratios for every trait, and Expected Progeny Differences (EPDs). The Red Angus Association of America (RAAA) has long been an advocate of simplifying selection decisions by placing sole selection emphasis on EPDs. When asked why, the response given is that “the research community has proven that EPDs are superior to actual or adjusted weights in estimating an animal’s genetic merit.” However, no real proof based on Red Angus data is presented to the producer to validate that claim.

RAAA believes in the science behind our genetic selection tools and can validate their reliability with multiple examples demonstrating the effectiveness of EPDs.

What are EPDs?
Quite simply, EPDs predict performance differences we expect to see in an animal’s progeny due to the inherited genetic merit received from that particular parent versus other parent animals with different EPDs. The classic example:
Bull A has a BW EPD of +1 and Bull B has a BW EPD of -5, so we would expect the average progeny of Bull B to weigh 6 lbs. less (-5 - 1 = -6) than the average progeny of Bull A.

EPDs are calculated using complex statistical models that consider the animal’s pedigree, his or her own performance, and the performance of related individuals. Two advantages of EPDs are:
1) Their ability to separate performance due to genetics-versus-environmental factors, and
2) EPDs account for the genetics of both parents in the mating.

Due to the combination of these advantages, the resulting EPDs are more complex and more accurate than actual or adjusted weights or ratios, which do not account for environmental influences or the genetics of both sire and dam.

EPDs are obviously more complex, but does complexity equal reliability? Let’s examine the data.
Calving ease is a well-known strength of Red Angus cattle, and one could easily argue that it is the trait that primarily drove Red Angus’ success in the early years. Although Red Angus is known as a calving-ease breed, the majority of producers who are selecting bulls to breed heifers place significant selection pressure on calving-ease traits, and understandably so.

Besides the question, “Should I use EPDs when selecting for calving ease?” many have sought a better understanding of which calving-ease EPD to use: Calving Ease Direct EPD (the probability of calves born unassisted out of 2-year-old heifers); or BW EPD (the pound difference in progeny birth weights).

To evaluate these questions, calving data on 2-year-old heifers was queried from the RAAA database on three heavily used sires divergent for CED and BW:  
- Sire A (599 observations);  
- Sire B (698 observations); and  
- Sire C (1,558 observations).

Resulting data is presented in Table 1.

**The question:**  
Do the CED and BW EPDs of these bulls agree with the results in the field (average birth weight of progeny and percent unassisted births)?
Observations:
• The data for both % Unassisted Births and Avg BW of Progeny clearly validate the published CED and BW EPDs of all three bulls.

• Specifically, the two bulls with the lowest BW EPDs (Sire B and Sire C) posted a lower Avg BW of Progeny as compared to Sire A, who has a higher BW EPD.

• Evaluation of % Unassisted Births finds definite alignment with the three bulls’ CED EPDs. While the difference in % Unassisted Births between the three bulls isn’t quite as great as the CED EPD suggests, the progeny data certainly ranks as expected given each bulls’ CED EPD.

• Producers selecting for calving ease can have confidence in Red Angus’ BW and CED EPDs, and are encouraged to place most of their selection emphasis on the CED EPD.

Bottom line:
EPDs predict calving ease.
Exhibit II: Carcass Data Results

One of the valuable breed-improvement programs offered by RAAA is the Carcass Progeny Test (CPT). This program is designed to validate the carcass genetics of young, unproven bulls. Bulls being tested, along with a high-accuracy reference sire, are randomly mated via artificial insemination to a single cowherd and performance data is collected on the resulting calves through harvest.

The 2012 CPT stands out as a great example to learn from, as 100 percent of the steer calves were harvested on the same day. Given that EPDs are advocated as being able to predict differences in average progeny performance, the 2012 CPT dataset provides for a ‘real-world’ evaluation of the reliability of carcass EPDs on young, unproven bulls. To conduct this study, each of the sires’ Marbling and Ribeye Area EPDs at the time of breeding (Spring 2012) were compared to the average Marbling and Ribeye Area data of their resulting steer progeny, which is presented in Table 2 and 3.

Sires participating in the 2012 CPT –
Bieber Rollin Deep Y118 (#1436844),
Brown 3K Stakeholder X7870 (#1379607),
LSF Saga 1040Y (#1445368) and
Messmer Packer S008 (#1109534) – served as the reference sire.
Marbling Observations:
- In reviewing the Spring 2012 EPDs of these bulls, the bulls break into two groups: Higher Marbling EPDs – Packer and Stakeholder; and Lower Marbling EPDs – Saga and Rollin Deep.

- While there’s a modest re-ranking within the two Marbling EPD groups, the average progeny of the two higher Marbling EPD bulls absolutely post higher average marbling scores as compared to the two lower Marbling EPD bulls.

Ribeye Area Observations:
- In evaluating the four sires’ genetic merit for Ribeye Area based on their Spring 2012 EPDs, the sires sort into three groups: High – Packer; Average – Stakeholder and Rollin Deep; and Low – Saga.

- The EPD groups of the bulls at breeding (High, Average and Low) accurately predict the Ribeye Area performance of their resulting CPT offspring.

- Due to minor differences, there’s modest re-ranking within the Average group. However, the progeny group with the highest average progeny Ribeye Area were sired by the High Ribeye EPD sire, Packer, and the progeny group with the lowest average progeny Ribeye Area were sired by the Low Ribeye EPD sire, Saga.

Keep in mind that the Spring 2012 EPDs on the test sires used in this evaluation (Stakeholder, Rollin Deep and Saga) were non-parent EPDs. The data included in their EPD calculations were limited to their pedigree and own ultrasound information. The carcass EPDs of these bulls were low accuracy, yet the progeny data supports the validity and use of carcass EPDs when making selection decisions for important carcass traits such as marbling and muscling.

**Bottom line:**
**EPDs work well to predict actual carcass results.**
Exhibit III: Growth Data Results

Included in the original release of EPDs, Weaning Weight (WW) EPD has been a significant component of commercial bull-buying decisions for several decades.

Assuming the majority of producers were placing selection pressure on growth using WW EPDs, we would expect a gradual increase in the population-wide average weaning weights reported to RAAA. However, some producers have observed that while the average WW EPD across the entire Red Angus breed continues to increase, phenotypic average weaning weights have not changed in their operation.

The question thus becomes, “Has the positive selection pressure producers have placed on WW EPDs resulted in an increase in the average weaning weight reported to the RAAA?”

To answer this question, we can simply calculate the average adjusted weaning weight (adjusted to 205 days of age) for each birth year and compare those averages against the average WW EPDs published by RAAA, which is presented in Table 4.
Observations:
- The average 205-day adjusted weaning weight reported by members has definitely increased over the last few decades, as has the average WW EPD of registered animals.
- The degree of agreement between the increases in average adjusted weaning weight and weaning weight EPD is quite remarkable.
- Recall that RAAA operates under Total Herd Reporting, which requires members to report the weaning performance of the entire herd and not just the animals with enough performance to justify the costs of a registration certificate. Thus, the average weaning weights included in Table 4 truly reflect the entire registered Red Angus population.

Bottom line: Positive selection pressure has increased weaning weights.
Exhibit IV: Genetic Trend Data

The previous evaluation validated that increases in WW EPD resulted in related increases in average adjusted weaning weights for registered Red Angus animals, thus, supporting the value and use of EPDs as measures of genetic merit.

Knowing that EPDs were not available in the early years of RAAA’s history, one has to wonder how much genetic change was made in WW genetic merit when the selection tools were limited to actual or adjusted weaning weights? The genetic trend (average EPD per birth year) for RAAA growth traits is displayed on Table 5, along with the dates in which new selection tools were released to RAAA members and stakeholders.

Observations:
• Between 1954 and 1974, breeders were limited to using actual or adjusted weaning weights as a means of making genetic improvement. Table 5 indicates that the genetic change made during this period was actually an unfavorable change.
• In 1974, RAAA released within-herd Estimated Breeding Values (EBVs), which were similar to EPDs but, due to their calculation, they were limited to within-herd comparisons. As breeders began to use the within-herd EBVs, limited positive changes to weaning and yearling weight were observed.
• Following the release of EPDs in 1979, a tremendous increase in WW and YW genetic merit has been documented.
• Table 5 shows EPD-based selection decisions are the most effective in making genetic change as compared to basic tools such as adjusted weights or ratios.

Simple, Reliable Genetic Selection Tools

Since their release in 1979, EPDs have provided Red Angus breeders with a simple, yet effective genetic-selection tool, which is validated by the real-world information provided.

In an era of abundant information used to promote and describe animals – actual weights, adjusted weights, ratios, EPDs, etc. – producers can have confidence that EPDs remain the gold standard in reliably predicting an animal’s genetic merit.