



By the Numbers

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Defying the antagonisms

Many discussions today revolve around various opinions regarding the design of an efficient beef production system and the genetics necessary to meet those goals. Angus breeders have used performance data to practice multi-trait selection that has improved the seedstock available to the beef industry. By simultaneously selecting to enhance traits that are considered biologically antagonistic, we see tremendous genetic improvement in areas once considered a dream.

Examples

Let's look at a couple of examples. Birth weight (BW) is moderately correlated with other measures of growth — weaning weight (WW), yearling weight (YW), mature weight (MW), etc.

What does that mean? A correlation is a

measure of how two traits vary together. A correlation closer to 1.00 simply means that as one trait increases, the other trait also increases. Correlations close to 0 would imply that by selecting for one trait, the other trait is not influenced. So, by selecting

for higher performing animals at yearling time, we will normally tend to also increase birth weight as a correlated response to the selection for yearling weight.

The published genetic correlations for birth and yearling weight range from 0.40 to 0.70, with an average of about 0.55. That is a strong correlation, but it does leave some opportunity to identify genetics where improvement can be made for both traits.

Making improvements

By utilizing available genetic selection tools, Angus breeders have made remarkable strides in breeding and identifying seedstock to improve these traits. A review of the Angus genetic trend for BW and YW expected progeny differences (EPDs) by birth year (see Table 1) demonstrates the progress made in improving these traits. Note that during the past 20 years (1985 to 2005) the average BW EPD has gone from +1.2 to +2.3 pounds (lb.). During that same time, the average YW EPD has moved from +19 to +73 lb., an increase of 54 lb.

We field the occasional question implying that the EPDs have increased drastically, but the increases in the individual performance data over time have not kept pace. Table 2 shows the Angus Herd Improvement Records (AHIRSM) adjusted weights by birth year for bull calves over the last several years. Note that during the same 20-year period (1985 to 2005), adjusted birth weight has increased by only 1 lb., while the average yearling weight submitted to AHIR increased by 187 lb.

Genetic selection tools have enabled breeders to maintain birth weight while

Fig. 1: Angus genetic trend for BW, YW and MW EPD

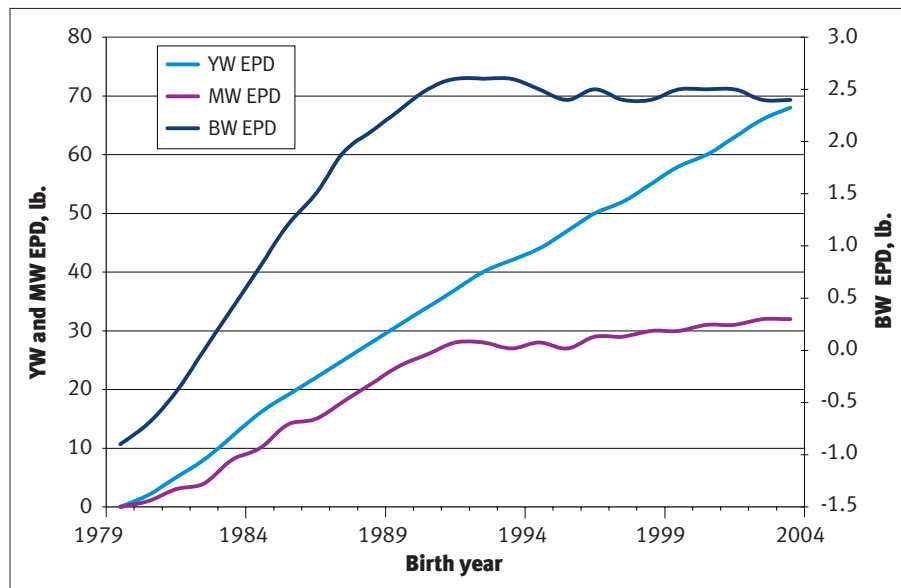


Table 1: Angus genetic trend, EPD by birth year

Year	BW EPD	YW EPD
1975	-1.7	-8
1980	-0.7	2
1985	1.2	19
1990	2.5	34
1995	2.4	47
2000	2.5	60
2005	2.3	73

Adapted from www.angus.org/sireeval/genetic.html.

Table 2: AHIR average adjusted weights, lb., for bulls by year

Year	Birth wt.	Yearling wt.
1975	69	866
1980	74	922
1985	80	978
1990	83	1,066
1995	82	1,081
2000	81	1,112
2005	81	1,165

Adapted from www.angus.org/sireeval/ahir_ave.html.

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concurrently improving growth genetics in the breed. The economics of the industry continue to emphasize the importance of calf performance, whether on the cow or in the feedlot, to make a profit.

Balancing act

Another example of correlated traits that may not always provide a desirable effect in beef production is the correlation between yearling weight and mature size. Historically, as we selected for increased weaning weights and postweaning gain, we also pulled along extended growth curves and much larger mature weights. Producers today have attempted to keep these strongly correlated traits in balance by selecting for superior growth and performance while also applying downward pressure on mature size.

Some of the extreme environments and management schemes we raise cows in demand females that will maintain and reproduce on limited resources. This summer's widespread drought in many areas of the country further drives that point home. The enhancement of the mature weight and mature height (MH) EPDs

through the expansion of the mature cow weight database has accelerated the ability to identify Angus sires that can make impressive improvement in both these traits.

So, when we talk about the balancing act a breeder must perform in designing cattle that can achieve high expectations for a number of traits, we see how complex this can become. Can we really find animals with moderate birth weights and phenomenal performance in a package that will produce moderate-sized mature females to fit in a production environment? The answer is yes. Consider Fig. 1 (page 169), which combines the genetic trend for BW EPD, YW EPD and MW EPD.

The trend lines for all three traits were on similar paths until about 1990. At that time, growth continued to be a highly sought commodity, but as the accurate tools became available, we also began applying pressure for moderating birth weight and reasonable mature cow size. The results are impressive and exciting for the Angus breed. The trend for YW EPD remains in an upward slope, while both BW and mature size EPDs have leveled off over that time frame.

Continuing to improve

We must continually enhance the selection tools available that allow us to

characterize Angus genetics. The previous examples demonstrate the importance of collecting information such as cow weights and body condition scores at weaning time to further refine our current tools. More information on mature size EPDs and collecting the data can be found at www.angus.org/performance/mature_size.html.

As Angus breeders we need the means to continually make improvement in our genetics. More importantly, our customer, the commercial cow-calf producer, is going to demand it. The continued selection for genetics with a focus on the improvement of economically relevant traits to the beef industry will continue to be top of mind for the progressive seedstock producer.



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Editor's Note: "By the Numbers" is a column by Association performance programs staff to share insights with Angus members about data collection and interpretation, the National Cattle Evaluation (NCE), genetic selection, and relevant technology and industry issues. If you have questions or would like to suggest a topic for a future column, contact Sally Northcutt, director of genetic research, or Bill Bowman, director of performance programs, at (816) 383-5100.