



By the Numbers

► by American Angus Association staff

Making a good bull even better

No bull has greater genetic impact on the U.S. beef industry than the registered Angus bull. Whether the products are steers destined for the feedlot or heifers sorted into the replacement pen, Angus sires have gained more genetic influence than bulls of all other major breeds combined.

Making the best better

Hundreds of thousands of Angus bulls are turned out annually with the nation's commercial cows, passing on traits proven to make cattle producers from ranch to feedlot more productive and profitable. Real-world economics are the foundation of Angus popularity — and it's the Angus bull that "brings the goods" to the industry year after year.

So, can the Angus bull, good as he is, be made even better? Is there any remaining opportunity for improvement? Angus breeders believe further improvements are both necessary and possible, and they continue to fine-tune the genetic package represented by the average Angus bull.

Expected progeny differences (EPDs) have proven very useful in this quest for ever-better genetics. During the past 20 years, for example, birth weights on purebred Angus bull calves remained stable [81-83 pounds (lb.)], while the adjusted weaning and yearling weights on these bulls increased by 60-70 lb.

Genotypes beget phenotypes. So, increasing weaning and yearling weights this much without seeing a corresponding rise in birth weights could only have been accomplished through thoughtful breeding decisions based on EPDs published by the American Angus Association. These tools enabled breeders to select faster-growing cattle that uniquely held birth weights in check. For the Angus breed in total, the average birth weight EPD has increased by only about 1 lb. since the mid-1980s, while average weaning weight (WW) and yearling weight (YW) EPDs increased approximately 30 lb. and 50 lb., respectively.

Most Angus breeders are well aware of these trends. The breed has measurably changed its birth-to-growth spread during the past two decades, creating more pay weight for its commercial bull customers

without increased calving difficulty. Feedlot operators have also benefited. Today's Angus-sired steers offer better daily gain and feed conversion rates, along with favorable carcass characteristics.

Making more linebackers

Perhaps less noticed is that while Angus breeders added growth, they held frame size completely in check. The average yearling height EPD for the entire breed is currently +0.4 inches (in.), only one-tenth of an inch more than 20 years ago. Angus bulls born in 2004 as yearlings averaged 50.5 in. tall at the hip — equivalent to a 5.75 frame score — and a level of stature that has remained unchanged since the late 1980s.

Angus bulls have indeed become heavier at a year of age, but not taller (see Fig. 1). This is an impressive trend when you consider the genetic correlation between yearling height and yearling weight is strongly positive, at 0.54. These two traits normally move in the same direction. But through informed selection using EPDs,

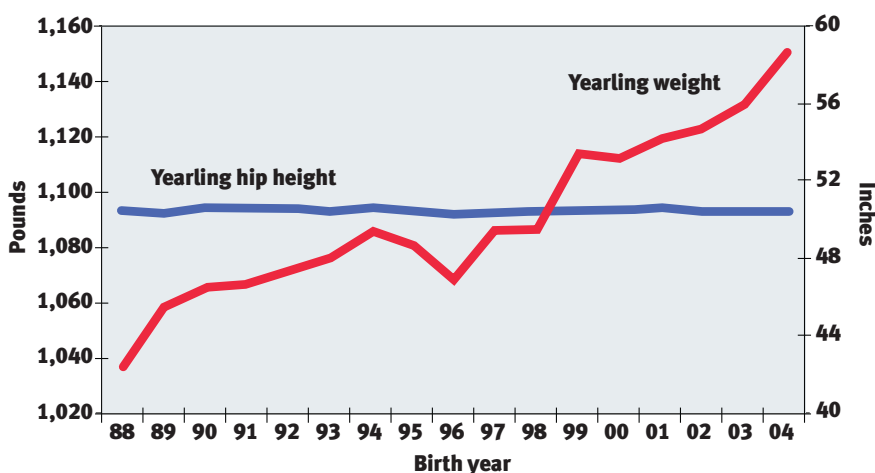
breeders have been able to hold frame size constant while adding significant yearling weight.

And just where do those extra pounds reside? Weight, also called mass, is the product of volume multiplied by density. The added weight today's Angus bulls are packing must therefore be the result of greater body length, increased base width and greater body depth (the animal's linear dimensions other than height). Phenotypic shape is being altered, and a more linebacker-like body type is gradually emerging.

"Angus breeders as a whole believe their cattle are already right-sized for frame. There is no directional change occurring in yearling hip height within the Angus breed overall," says Sally Northcutt, Association director of genetic research. "But, breeders have added more body dimension in every direction other than height. Over time, they've made the cattle longer, thicker and deeper-bodied, which adds up to more total volume."

Muscularity has also been on the rise in the Angus breed, and muscle is a relatively dense tissue. It has a higher weight per unit of volume than most other types of tissue, which is another partial explanation as to why Angus bulls are getting heavier without becoming taller. The genetic trend for both ribeye (RE) EPD and ultrasound ribeye

Fig. 1: Genetic trends for growth rate and frame size among Angus bulls*



*Breed average.

▣ BY THE NUMBERS

(URE) EPD has been increasing steadily, especially during the past 10 years.

Among 2004-born bulls, average URE is +0.17. Their average yearling ribeye size was 12.5 square in. (sq. in.), as measured by ultrasound. Forty-four percent of these bulls exhibited a URE greater than +0.25 (top 40% for all non-parent bulls), and this subgroup came in with an average ribeye area of 13.1 sq. in. at 1 year of age.

Going even further up the muscularity spectrum (top 20% of non-parent bulls), 23% of recorded 2004-born Angus bulls are +0.40 or above for URE, and their ultrasound ribeye measurements averaged 13.4 sq. in. at 1 year of age. These differences suggest that the

breed has enough genetic variation to keep progressively adding muscle, as long as breeders apply positive selection pressure on the trait. Note that the above comparisons were adjusted to remove the effects of different yearling weights to accurately depict how genotypic differences give rise to significant differences in phenotype.

The genetic trek continues

Most breeders would agree the observed height and weight trends have been positive for Angus genetics during the past two decades. It has helped the breed reach an amazing level of popularity with commercial producers. Yet, more work remains. A good

bull can be made even better, which motivates stewards of Angus genetics to continue their quest for multi-trait improvement.

If the past is any indication (and we've discussed only a few traits in this article), impressive progress will be made in the years ahead — and you can be certain the Angus bull of the future will offer up an even more impressive genetic package to the commercial beef industry.



Editor's Note: "By the Numbers" is a column authored by Association performance programs staff to share insights with Angus members about data collection and interpretation, the National Cattle Evaluation, 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.