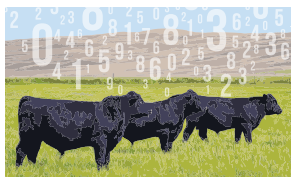


# BY THE NUMBERS



by Stephen Miller, director of genetic research

## The power of the database

*The 11th World Congress on the Genetics Applied to Livestock Production (WCGALP) was hosted in early February in Auckland, New Zealand. Taking place every four years, the 11th meeting saw 1,276 delegates from all over the world assemble, with 188 of those from the United States. With a focus on just genetic improvement of livestock (all species), this meeting is considered the Olympics of animal breeding.*

The meeting provides an opportunity to catch a snapshot of the latest in developments in the field. For American Angus there were two main take-home messages from the meeting:

1. The move to single step represented a state-of-the-art development and confirms Angus's leadership in the area; and
2. American Angus is an international leader, and Angus's future success will continue to depend on the database of phenotypes and genotypes amassed through member investment.

The developments in genetic evaluation at the American Angus Association were well-represented at the WCGALP. Daniela Lourenco shared the University of Georgia's paper *Single-step genomic BLUP for national beef evaluation in US: From initial developments to final implementation*. Lourenco's paper was chosen for a special presentation as a "pioneering talk," where she delivered the major accomplishment of Angus Genetics Inc. (AGI) moving

the Association to single-step analyses for all traits.

The conference had a field-trip component, and AGI sponsored, in part, an Angus field day where I presented the paper *Developments in the genetic evaluation of American Angus cattle* that outlined the history of accomplishments in the genetic evaluation of Angus cattle in the United States, emphasizing the membership's dedication to recording and their adoption of genomic testing as significant contributors to success in the breed.

### Confirmation

It was clear after Lourenco's talk that the move to single step in July 2017 was the right decision and that, given the size of the Angus database, this represented a significant milestone in the field of genetic evaluation of beef cattle.

It is only natural to take for granted that with which you work day to day. It is when you attend such a conference and interact with others in the same field that you are reminded of the significant advantage that American Angus

breeders have developed for themselves. This advantage has been built by the membership through an emphasis on and dedication to recording and performance programs, the rapid adoption of genomic testing and the in-house genetic evaluation capabilities at AGI, allowing more rapid adoption of the latest in technologies, like single step.

When interacting with others involved in the genetic evaluation of Angus cattle around the world, they all indicated the demand for U.S. genetics. Angus genetics from the United States are the gold standard other countries want to be benchmarked against.

This is a market opportunity for Angus breeders in the United States as the world demand for U.S. genetics is strong. When interacting with a European genetics company representative, he indicated that his fastest-growing semen market in Europe was for Angus.

### Data dependent

The American Angus Association is the world's largest beef cattle

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breed association. Does size matter? Registering the most cattle is not nearly as important as the collection of a lot of data. Genetic improvement is driven off the accuracy of the expected progeny differences (EPDs) and the breadth of those EPDs to represent the range of traits influencing profitability in the commercial sector. This accuracy is dependent on the amount of data recorded.

When it comes to the size of the database, within a single beef breed, where the genetic improvement takes place that influences the commercial sector, the U.S. Angus database dwarfs all others.

The summary statistics in Table 1 will be familiar to Angus breeders, as it has been shown repeatedly through AGI presentations. Over time it grows to become more and more impressive.

Compared to other breeds, the number of 461,617 genotypes is simply astounding. Of course, having a lot of genotypes alone is not important. The combination of genotypes and performance information recorded is what is really important to develop accurate EPDs. Sustained genetic improvement requires engagement in recording by breeders.

**Table 1: Summary of data<sup>1</sup> used in Angus genetic evaluation**

Trait	Animals with records	Total animals <sup>2</sup>
Genotypes <sup>3</sup>	461,617	
Growth <sup>4</sup>	9,066,443	10,582,742
Calving ease	1,556,214	9,649,963
Ultrasound <sup>5</sup>	1,933,288	3,307,571
Carcass <sup>6</sup>	117,310	4,354,366
Scrotal circumference	917,232	2,366,744
Mature weight	209,495	1,210,450
Dry-matter intake	21,507	1,021,219
Heifer pregnancy	66,841	919,343

<sup>1</sup> Represents weekly evaluation March 2, 2018.  
<sup>2</sup> Includes extended pedigree and parents without records or genotypes.  
<sup>3</sup> Genotypes used in the genetic evaluation of each of the traits.  
<sup>4</sup> Animal with either a birth, weaning or yearling weight or genotype.  
<sup>5</sup> Counts are for ultrasound intramuscular fat.  
<sup>6</sup> Counts are for carcass weight.

Figs. 1 and 2 document the adoption of recording by birth year. The number of animals recorded can exceed the number of registered animals born that year as non-registered cattle are recorded and included in the evaluation through the Beef Improvement Record (BIR) Service.

The adoption of ultrasound recording is an excellent example of breeder engagement. As EPDs are developed, breeders have responded with increased recording. Even dry-matter intake (DMI), a difficult and expensive trait to measure, now has more than 20,000 animals recorded.

Since some traits, like mature weight, are recorded at advanced ages, we would expect fewer records in recent birth years as the graph illustrates. Docility is another trait that has demonstrated excellent uptake by breeders since its inception.

The trends also highlight

traits that will require continued emphasis for the membership to maintain their leadership advantage. Traits like carcass and mature weight require continued efforts to maintain recording. The implementation of the structured sire evaluation program by the Association, with records now starting to influence the weekly EPD

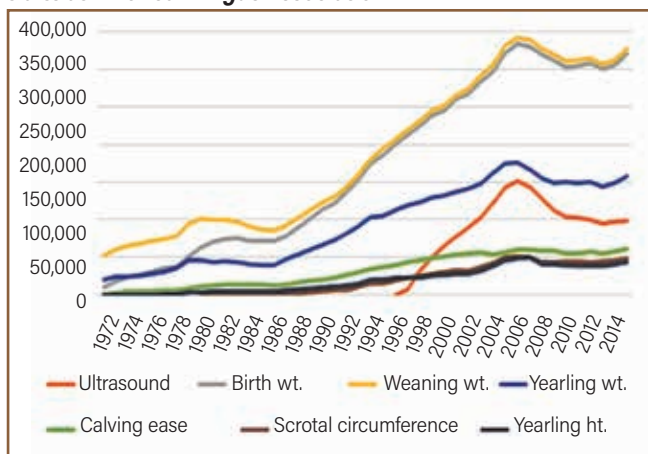
for carcass traits, is an important step toward maintaining that advantage.

## Summary

American Angus breeders have developed a leadership position for themselves, with worldwide demand for their genetics and genetic improvement infrastructure, including the weekly cattle evaluation through AGI, which is state-of-the-art and will underpin breeders' future success.

Maintaining this leadership position will require continued work as the competition for beef genetics worldwide will continue to evolve. The strategy for future success will be similar to that which has placed Angus breeders in the lead to date, recording, genotyping and the ability to implement the latest in genetic evaluation technology in a timely manner. **AJ**

**Fig. 1: Frequency of recording by birth year for established traits at American Angus Association**



**Fig. 2: Frequency of recording by birth year for emerging and more difficult traits at American Angus Association**

