

BY THE NUMBERS

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Apples to Apples

How to make across-breed EPD comparison.

Genetic change has been rapid in the Angus breed, in part due to member dedication to data collection. From birth and weaning weights to carcass ultrasound collection and even to foot conformation and temperament, Angus members are working to better describe their genetics every single day.

These performance records, in combination with pedigree information and genotypes, work simultaneously to provide the best genetic selection tools for Angus breeders and their customers to make breeding decisions.

The Angus database is robust and powerful to describe the genetics of registered Angus cattle. Annually, the Association registers more than 300,000 head in the Herd Book, records more than 400,000 birth weights, and submits more than 180,000 genomic tests. The database contains millions upon millions of individual weight records, and hundreds of thousands of observations for foot conformation, fertility and environmental adaptability (i.e., hair shedding, pulmonary arterial pressure).

Over the decades, cumulative records have resulted in improved genetic selection tools and genetic change for Angus cattle.

Why can't we directly compare?

Expected progeny differences (EPDs) have been a genetic selection tool in beef cattle since the 1970s. The American Angus Association first published EPDs in 1974. Since that time, numerous traits have been described and selection tools created to help producers work towards meeting specific breeding objectives for their herds.

EPDs are designed to predict the average performance of future progeny from one individual compared to another individual. They are also only to be used to compare cattle within a single breed. The Association's EPDs are not directly comparable to EPDs from other breed associations.

The EPDs from the Association for registered Angus cattle are based on the database of performance weights and measures that have been generated over decades by members enrolled in Angus Herd Improvement Records (AHIR®) members. Other breeds' EPDs are linked back to their own within-breed databases, which have a different base population to create EPDs from.

At face value, directly comparing EPDs across breeds is like comparing apples and oranges.

How we can directly compare

For this reason, since 1993, the U.S. Meat Animal Research Center (USMARC) has provided a table of adjustment factors to be able to do across-breed EPD comparisons. These third-party adjustment factors are derived from the USMARC Germplasm Evaluation Project.

This project uses a herd of commercial cows bred to several prominent sires of each of the most popular breeds used in the U.S. beef industry. From there, USMARC determines breed differences among progeny that have been given the same opportunity to perform under the same management and access to the same resources. The 2022 adjustment factors include 18 different breeds. After the across-breed adjustments are applied, a commercial producer can directly compare the resulting across-breed EPDs (AB-EPDs) amongst the different breeds.

They then adjust the differences expressed in these progeny by the differences of the sire EPDs sampled in the project. The across-breed adjustment factors use simple math to adjust a Charolais bull to an Angus base, for example. The AB-EPDs are the most useful to commercial

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cattlemen who may purchase more than one breed of bull. It allows for direct comparison between bulls that do not have EPDs from the same Association.

The adjustment factors in Table 1 can be added to the respective within-breed EPD to adjust to an Angus base.

When comparing breed-of-sire averages, Angus continues to have some of the lightest birth weights, heaviest yearling and carcass weights, and best marbling scores compared to other breeds in the beef industry.

Comparison in practice

Let's say a commercial cattleman is evaluating two bulls to purchase — one bull is an Angus and the other bull is a Simmental. In Table 1, Angus are the base, meaning their EPDs have no adjustment factors. Table 2 lists the across-breed adjustment factors, within-breed EPDs, and the AB-EPDs. For our example in Table 2, the adjustment factors of 0 are listed for the Angus bull, his EPDs for growth, and the AB-EPDs (which are the same as before because Angus is the base).

As we look at the Simmental bull, we see the across-breed adjustment factors listed for each trait, his within-breed EPDs, and the AB-EPDs that are directly comparable to the Angus bull. If we look at the math, the Simmental sire has an adjustment factor of +1.9 for BW and his own within-breed EPD of +1.2. So, AB-EPD for BW = 1.9 + 1.2, which is +3.1. The Angus bull and the Simmental bull now have a comparable EPD for BW. We would

Table 1: January 2022 adjustment factors to add to EPD value of respective breed to estimate across-breed EPDs.

Breed	BW, lb.	WW, lb.	YW, lb.	Milk, lb.	Marb ¹	REA, sq. in.	Fat, in.	CW, lb.
Angus	0.0	0.0	0.0	0.0	0.00	0.00	0.000	0.0
Hereford	1.0	-14.4	-41.8	-11.3	-0.34	0.04	-0.076	-70.8
Charolais	6.4	5.5	-23.9	-1.8	-0.32	0.79	-0.197	4.1
Red Angus	2.3	-19.2	-28.5	1.4	-0.09	0.27	-0.038	-10.0
Simmental	1.9	-13.0	-25.7	-2.3	-0.15	0.50	-0.066	-5.3
Gelbvieh	3.3	-8.5	-18.0	5.1	-0.55	0.82	-0.119	-14.8

¹Marbling score units: 4.00 = S1⁰⁰; 5.00 = S^m0⁰

Across-breed adjustments are current as of 06/30/2022. Visit www.beefimprovement.org for entire table and updates.

SOURCE: U.S. Meat Animal Research Center.

Table 2: Example of using across-breed adjustments factors to convert noncomparable within-breed EPDs to comparable across-breed EPDs.

Breed	Tag		BW	WW	YW	Milk
Angus	0001	AB Adj. Factors ¹	0	0	0	0
		EPD ² (within-breed)	2.1	58	103	20
		AB-EPD ³	2.1	58	103	20
Simmental	0002	AB Adj. Factors ¹	1.9	-13.0	-25.7	-2.3
		EPD ² (within-breed)	1.2	65	115	22
		AB-EPD ³	3.1	52.0	89.3	19.7

¹AB adjustment factors are the across breed adjustments from Table 1.

²EPDs are the within-breed EPD values from the breed's genetic evaluation for the bull of interest.

³Across-breed EPDs after adjustment factors are applied to within-breed EPDs.

expect, on average, for the Simmental bull's progeny to weigh one pound (lb.) more at birth than the Angus bull's progeny.

Looking at YW, the Simmental sire has an adjustment factor of -25.7 and his own within-breed EPD of 115. Following the math, 115 - 25.7 = 89.3 for the AB-EPD. Now that the EPDs are comparable across breeds, we see, on average, the Angus bull's progeny are expected to weigh approximately 14 more lb. at yearling than the Simmental bull's progeny.

Across-breed EPD adjustment factors can equip your customers to make better selection decisions if looking at more breeds than Angus. At face value, EPDs for animals from different breeds may look appealing, but remember without adjustments, they are not an apples-to-apples

comparison. A non-Angus bull may appear to have a better birth weight EPD, but after the across-breed adjustments, that may or may not hold true. More informed comparisons can be made using the across-breed adjustment factors to help your customers make better genetic selections to meet their breeding objectives. **AJ**

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Editor's note: For a full list of the across-breed adjustment factors published by USMARC, visit www.angus.org/Nce/AcrossBreedEpdAdjFactors.