

2019 ACROSS-BREED EPD TABLE AND IMPROVEMENTS

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Across-Breed EPD (ABEPD) Adjustment Factors: National Cattle Evaluation (NCE), and the resulting Expected Progeny Differences (EPDs), have resulted in substantial genetic change since their inception in the 1970s. However, because breed associations often use different national evaluation programs, EPDs are generally only comparable within breed because of differences in the genetic base. Since 1993, the U.S. Meat Animal Research Center (USMARC) has produced a table of factors to adjust the EPDs of cattle so that the merit of individuals can be compared across breeds. Adjustment factors for carcass traits have been calculated since 2009 and carcass weight was added in 2015; to be included, breeds must have carcass data in the U.S. Meat Animal Research Center (USMARC) database and report their carcass EPDs on an actual carcass basis using an age-adjusted endpoint.

Bulls of different breeds can be compared on the same EPD scale by adding the appropriate adjustment factor to the EPDs produced in the most recent genetic evaluations for each of the eighteen breeds. Normally, the EPDs of animals from different breeds cannot be compared because most breed associations compute their EPDs in separate analyses and each breed has a different base point. The across-breed adjustment factors allow producers to compare the EPDs for animals from different breeds for these traits; these factors reflect both the current breed difference (for animals born in 2017) and differences in the breed base point. The AB-EPDs are most useful to commercial producers purchasing bulls of more than one breed to use in cross-breeding programs. For example, in terminal cross-breeding systems, AB-EPDs can identify bulls in different breeds with high growth potential or favorable carcass characteristics.

The ABEPD factors were traditionally derived and released during the annual Beef Improvement Federation conference each year. However, starting last year, we are updating the factors early in the year to make the factors more accurate during spring bull buying season. The factors are derived by estimating breed differences from the USMARC germplasm evaluation program and adjusting these differences for the EPDs of the sires that were sampled in the system. The traits for which factors are estimated are birth weight, weaning weight, yearling weight, maternal weaning weight (milk), marbling score, ribeye area, backfat depth, and carcass weight (Table 1). These factors adjust the EPDs to an Angus base (chosen arbitrarily).

As an example, suppose a Gelbvieh bull has a weaning weight EPD of + 50.0 lb and a Hereford bull has a weaning weight EPD of + 55.0 lb. The across-breed adjustment factors for weaning weight (see Table 1) are -11.6 lb for Gelbvieh and -16.1 lb for Hereford. The AB-EPD is $50.0 \text{ lb} - 11.6 \text{ lb} = 38.4 \text{ lb}$ for the Gelbvieh bull and $55.0 \text{ lb} - 16.1 = 38.9 \text{ lb}$ for the Hereford bull. The expected weaning weight difference of offspring when both are mated to cows of another breed (e.g., Angus) would be $38.4 \text{ lb} - 38.9 \text{ lb} = -0.5 \text{ lb}$.

It is important to note that the table factors (Table 1) do not represent a direct comparison among the different breeds because of base differences between the breeds. They should only be used to compare the EPDs (AB-EPDs) of animals in different breeds. To reduce confusion, breed of sire means (i.e., one half of full breed effect; breed of sire means predict differences when bulls from two different breeds are mated to cows of a third, unrelated breed) for animals born in 2016 under conditions similar to USMARC are presented in Table 2.

The adjustment factors in Table 1 were updated using EPDs from the most recent national cattle evaluations conducted by each of the eighteen breed associations (current as of December 2019). The breed differences used to calculate the factors are based on comparisons of progeny of sires from each of these breeds in the Germplasm Evaluation Program at USMARC in Clay Center, Nebraska. These analyses were conducted by USMARC geneticists Larry Kuehn (email: Larry.Kuehn@ars.usda.gov; ph: 402-762-4352) and Mark Thallman (email: Mark.Thallman@ars.usda.gov; ph: 402-762-4261).

Future Release of ABEPD Factors: The traditional time scale of ABEPD factor release during the late spring/early summer Beef Improvement Federation meeting is not ideal for commercial producers buying bulls in the spring or fall season. A BIF working group recommended a plan to begin releasing the ABEPD factors near the beginning of each year to facilitate the use of these tools during spring bull buying. Additional updates may be released throughout the year, particularly if breeds are aware of significant changes to their evaluations, such as base adjustments. As of now, changes to the factors will be reported on the BIF website (www.beefimprovement.org); for instance, we are working to update information for the marbling adjustment factor in Brahman.

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**TABLE 1: ADJUSTMENT FACTORS TO ADD TO EPDs OF EIGHTEEN
DIFFERENT BREEDS TO ESTIMATE ACROSS BREED EPDs**

Breed	Birth Wt. (lb)	Weaning Wt. (lb)	Yearling Wt. (lb)	Maternal Milk (lb)	Marbling Score ^a	Ribeye Area (in ²)	Fat Thickness (in)	Carcass Wt.(lb)
Angus	0.0	0.0	0.0	0.0	0.00	0.00	0.000	0.0
Hereford	1.0	-16.1	-44.0	-10.4	-0.32	0.06	-0.075	-67.3
Red Angus	2.5	-19.5	-29.8	2.7	-0.13	0.24	-0.049	-14.4
Shorthorn	4.2	-32.5	-44.0	2.9	-0.05	0.55	-0.025	7.2
South Devon	2.3	-27.0	-68.1	4.4	-0.38	0.40	-0.181	-72.5
Beefmaster	4.0	21.3	-3.8	9.5				
Brahman	9.7	49.8	10.8	18.8		0.01	-0.164	-36.6
Brangus	2.7	14.2	0.5	15.8				
Santa Gertrudis	4.9	37.5	34.9	20.8	-0.46	0.14	-0.091	-10.8
Braunvieh	1.9	-19.4	-42.4	4.8	-0.65	1.05	-0.107	-51.7
Charolais	6.2	29.6	24.7	8.7	-0.31	0.82	-0.200	8.8
Chiangus	2.5	-21.0	-36.0	4.2	-0.47	0.57	-0.140	-17.8
Gelbvieh	3.3	-11.6	-19.6	12.4	-0.52	0.92	-0.102	-5.3
Limousin	2.2	-17.2	-48.6	-2.1	0.01	0.65	-0.021	-3.1
Maine-Anjou	1.6	-30.0	-63.1	-4.3	-0.46	1.02	-0.184	-32.9
Salers	0.6	-9.9	-41.8	7.1	0.09	1.16	-0.179	-43.0
Simmental	2.5	-13.0	-18.7	1.7	-0.08	0.48	-0.049	-5.4
Tarentaise	2.5	19.1	-15.8	22.4				

^aMarbling score units: 4.00 = S1⁰⁰; 5.00 = S5⁰⁰

**TABLE 2: BREED OF SIRE MEANS FOR 2017 BORN ANIMALS
UNDER CONDITIONS SIMILAR TO USMARC**

Breed	Birth Wt. (lb)	Weaning Wt. (lb)	Yearling Wt. (lb)	Maternal Milk (lb)	Marbling Score ^a	Ribeye Area (in ²)	Fat Thickness (in)	Carcass Wt.(lb)
Angus	85.3	558.9	1049.8	544.8	5.78	13.73	0.683	938.5
Hereford	88.0	539.0	990.8	532.1	5.00	13.58	0.606	894.6
Red Angus	85.2	541.8	1013.3	544.5	5.54	13.48	0.648	905.9
Shorthorn	90.0	523.4	985.8	542.7	5.14	13.79	0.547	894.7
South Devon	88.2	523.1	969.8	549.9	5.25	13.80	0.501	855.2
Beefmaster	88.5	549.0	991.2	538.5				
Brahman	95.5	572.4	993.6	545.1		13.46	0.516	881.2
Brangus	87.6	545.4	1003.8	544.8				
Santa Gertrudis	89.2	548.2	997.8	541.4	4.77	13.39	0.584	893.7
Braunvieh	89.0	532.9	986.3	557.5	5.17	14.67	0.485	876.0
Charolais	90.6	564.1	1032.5	537.8	5.02	14.67	0.479	926.5
Chiangus	88.3	531.0	987.8	539.1	5.02	14.06	0.503	892.7
Gelbvieh	87.3	554.3	1024.2	552.2	5.03	14.58	0.540	915.2
Limousin	87.3	549.7	1000.2	539.7	5.02	14.74	0.541	913.4
Maine-Anjou	87.6	519.2	947.6	534.4	4.80	14.48	0.451	872.1
Salers	85.8	538.5	995.1	546.5	5.53	14.38	0.503	878.9
Simmental	88.4	560.4	1036.1	544.4	5.17	14.48	0.513	921.7
Tarentaise	87.0	539.6	966.0	542.9				

^aMarbling score units: 4.00 = S1⁰⁰; 5.00 = S5⁰⁰