

Expected Progeny Differences Trait Definitions and Utilizing Percentile Tables

Sean Bessin and Darrh Bullock, Animal and Food Sciences

Expected progeny differences (EPDs) are useful tools in providing the best estimate of the genetic value of a particular animal as a parent. Differences in EPDs between parents of the same breed predict the performance differences of their future offspring if environmental factors are the same. EPD values should not be compared between breeds; for example, you should not compare an Angus bull's weaning weight EPD with a Simmental bull's weaning weight EPD. Most established breeds have EPDs for calving ease, growth, maternal, and carcass traits. When used properly, producers can make genetic improvements to their herd through parental selection. This publication is intended to help producers better understand EPDs and how one might use them in selection of replacement animals. This fact sheet is a supplement to *Using Expected Progeny Differences* (ASC-141) and *Beef Sire Selection* (ASC-165).

Expected Progeny Difference

Expected progeny difference (EPD) is the prediction of how future progeny of each animal are expected to perform relative to the progeny of other animals listed in the database. EPDs are expressed in units of measure for the trait and can be expressed as positive or negative. They are the best available tool for making selection decisions on the traits that are computed. Combining this information with a Breeding Soundness Exam and visual appraisal of the bull are the best means of finding the right bull for your operation.

Accuracy (ACC) is the reliability that can be placed on the EPD; ACC ranges from .00 to 1.00. An accuracy close to 1.0 indicates higher reliability. In many breeds, accuracies that are listed as letters (i.e. "PE," "I") are given to young bulls with very little available information.

Accuracy is impacted by the number of progeny and ancestral records included in the analysis. EPDs with low accuracy values are still the single best tool for selecting for the trait of interest.

EPD Percentile Tables

Every breed that computes EPDs generates a table that breaks down the EPDs into percentile rankings (Table 1). By using this table producers can determine how a bull (or female) ranks within their respective breed for each trait. This information can be extremely valuable to producers, particularly if they are not familiar with the EPDs of that breed. See example for further explanation.

Trait Definitions (common acronyms)

Calving Ease Direct (CED) (CE) (CE DIR) is expressed as a difference in percentage of unassisted births in first-calf heifers, with a higher value indicating greater calving ease. Heifers bred to bulls with higher values should have fewer assisted births.

Birth Weight EPD (BW), expressed in pounds, is a predictor of a sire's ability to transmit birth weight to his progeny compared to that of other sires. BW can be used as an indicator of calving ease if a calving ease EPD is not available, but it is recommended to use the calving ease EPD if available.

Weaning Weight EPD (WW) (WWT), expressed in pounds, is a predictor of a sire's ability to transmit weaning growth to his progeny compared to that of other sires.

Yearling Weight EPD (YW) (YWT), expressed in pounds, is a predictor of a sire's ability to transmit yearling growth to his progeny compared to that of other sires.

Docility (DOC) is expressed as a difference in yearling cattle temperament, with a

higher value indicating more favorable docility. DOC is not an indicator of the bull's behavior, which must be evaluated independently, but rather is an indicator of the potential behavior of his calves. It is still important to handle cattle properly to insure good disposition.

Heifer Pregnancy (HP) (HPG) is a selection tool to increase the probability or chance of a sire's daughters becoming pregnant as first-calf heifers during a normal breeding season. A higher EPD is the more favorable direction, and the EPD is reported in percentage units. This EPD only has use if one is planning on retaining heifers.

Maternal Milk EPD (Milk) (MK) (MLK) (MAT) is a predictor of a sire's genetic merit for milk and mothering ability as expressed in his daughters' calves' weaning weight compared to daughters of other sires. In other words, maternal milk is that part of a calf's weaning weight attributed to milk and mothering ability. This EPD only has use if one is planning on retaining heifers.

Mature Weight EPD (MW), expressed in pounds, is a predictor of the difference in mature weight of daughters of a sire compared to the daughters of other sires. This EPD only has use if one is planning on retaining heifers.

Calving Ease Maternal (CEM) (MCE) (CED-Gelbvieh) is similar to calving ease direct EPD; however, CEM predicts the probability of a bull's daughters calving without assistance. This trait is expressed in terms of percentages, with the higher values indicating heifers with greater calving ease. Caution: bulls with high values for this EPD are not necessarily calving-ease bulls; this trait is determined by the calving ease direct EPD. This EPD only has use if one is planning on retaining heifers.

Stayability (STY) (ST) is an indicator of longevity of a bull's daughters in the cow herd. This EPD predicts the probability (in percent) that a bull's daughters will remain in the herd through six years of age. The higher the EPD value, the higher the probability that the bull's daughters will remain in the herd through that period of time. Only of use if producer is retaining heifers.

Total Maternal (TM) (TOTMAT) is often used as a trait to evaluate females and reflects their genetic contribution to the weaning weight of their calves. Expressed in pounds of calf weaning weight, it is calculated by taking half of the weaning weight EPD and adding the entire milk EPD.

Table 1. Angus Current Spring Percentile Breakdown Active Sires

Top Pct (%)	Production					Maternal			
	CED	BW	WW	YW	Doc	HP	CEM	Milk	MW
1	15	-2.9	71	124	32	12.5	15	37	93
2	14	-2.2	68	119	29	12	14	35	84
3	14	-1.9	66	116	27	11.8	14	34	79
4	13	-1.6	65	114	26	11.4	13	34	74
5	13	-1.3	64	112	25	11.2	13	33	71
10	11	-0.6	60	106	22	10.4	12	31	62
20	10	0.3	55	99	17	9.5	11	28	52
30	8	0.9	52	94	15	8.8	10	27	44
40	7	1.3	49	89	12	8.4	9	25	37
50	6	1.8	47	85	10	8	8	24	32
60	5	2.2	44	81	8	7.7	7	22	26
70	3	2.7	41	76	5	7.1	6	20	19
80	2	3.2	38	70	2	6.5	5	18	10
90	0	4	32	61	-2	5.3	4	15	-2
Avg	6	1.8	46	84	9	7.9	8	23	31

Source: Chart provided by American Angus Association.

Example

A producer is considering purchasing a bull to use in his commercial operation. He has Angus-Gelbvieh rotational cross-breeding system and is looking to buy an Angus bull. He will use the bull on 25 mature cows and 5 heifers; replacement heifers will be saved from the mating. The producer sells his calves at weaning after a short preconditioning period (10-14 days), and he has good nutrition and health management. The producer is considering purchasing one of two bulls: UK Danny Y92 or UK Regis Y6. It is important to see how the bulls compare to each other by looking at the differences in their EPDs of importance, but it is also important to see how they compare to the breed in general. By looking at the EPD Percentile Table (Table 1) we see that Y92 is in the top 40 percent of the breed for calving ease direct (CED) and Y6 is in the top 10 percent; this gives Y6 the advantage since we are going to breed a limited number of heifers. We are also concerned with weaning growth and milk since

we are selling the calves at weaning and retaining replacement heifers. For weaning growth Y92 has an EPD of 48 lb, which is in the top 50 percent of the breed, and Y6 has a WW EPD of 52 lb, which is in the top 30 percent of the breed. This gives Y6 a weaning growth advantage. Milking ability of the replacement females also favors Y6, who is in the top 20 percent for milk while Y92 is in the top 90 percent. The last trait of importance in this example is calving ease maternal; Y92 has an EPD of 4 percent (top 90%), and Y6 has a value of 11 percent (top 20%). The advantage goes to Y6. Therefore, it is obvious in this example that Y6 is the clear choice between the two bulls, but by comparing the bulls to the breed as a whole using the EPD Percentile Table, we know that Y6 is a good-performing bull within the breed for all of the traits in which we are interested. For more information on EPDs see ASC-141, and for more information on targeted selection, see ASC-165.

UK Danny Y92 Reg: AAA 17461497 Bull

Birth Date: 10/18/2011 Tattoo: Y92
Breeder: 303275 - University of Kentucky, Versailles, KY
Owner(s): 303275 - University of Kentucky, Versailles, KY

Production				Maternal	
CED	BW	WW	YW	CEM	Milk
Acc	Acc	Acc	Acc	Acc	Acc
+7	-.2	+48	+81	+4	+16
.35	.40	.35	.35	.20	.25

Actual Birth Weight: 82 lb
Actual Weaning Weight: 650 lb
Actual Yearling Weight: 1025 lbs

UK Regis Y6 Reg: AAA 17408899 Bull

Birth Date: 08/28/2011 Tattoo: Y6
Breeder: 303275 - University of Kentucky, Versailles, KY
Owner(s): 303275 - University of Kentucky, Versailles, KY

Production				Maternal	
CED	BW	WW	YW	CEM	Milk
Acc	Acc	Acc	Acc	Acc	Acc
+11	-.2	+52	+91	+11	+29
.30	.35	.35	.35	.15	.30

Actual Birth Weight: 89 lb
Actual Weaning Weight: 645 lb
Actual Yearling Weight: 1050 lbs

Note: Even though actual weights are provided, they should not be used in the decision-making process. EPDs provide the best tool to make selection decisions and are best when used alone; however, it is still important to visually appraise the bulls and have a Breeding Soundness Exam. We also ignore the BW EPD when a CED EPD is available.

Current EPD Percentile Chart Links

Angus	http://www.angus.org/Nce/PercentBreakdown.aspx
Beefmaster	http://www.beefmasters.org/siresummary_current.php
Brangus	http://gobrangus.com/member/genetics.php
Charolais	http://www.charolaisusa.com/epdstats.html
Chianina	http://www.chicattle.org/epd.html
Gelbvieh	http://www.gelbvieh.org/education/epds/epdinformation.html
Hereford	http://www.hereford.org/node/1498
Limousin	http://www.nalf.org/siresummary.php
Maine-Anjou	http://www.maine-anjou.org/
Red Angus	http://redangus.org/genetics/epd-percentiles
Murray Grey	http://www.murraygreybeefcattle.com/
Salers	http://salersusa.org/index.php/sire-summary
Senepol	http://senepolcattle.com/
Simmental	https://herdbook.org/simmapp/action/pages.PagesAction?eventSubmit_displayPage=T&pageId=9
Tarentaise	http://www.americantarentaise.org/page12.asp

About the Authors

Sean Bessin, Extension Educator
Darrh Bullock, Extension Professor
Department of Animal and Food Sciences