Department of Animal Science

THE DIFFERENCE IN ACCURACY (ACC), PERCENTILE RANKING (%) AND GENOMIC SCORES OF EPDs

April 2020
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Expected Progeny Differences (EPDs) provide a means of estimating an animal's genetic value as a parent for a particular trait. The EPD is used in selection programs by predicting differences in progeny performance of a particular trait between prospective parents. Included in the calculation of an individual's EPD are its own performance record for a particular trait along with records on ancestors in the individual's pedigree. Also included in the calculation are records on collateral relatives (full siblings, half siblings, cousins, etc.), as well as progeny records. Progeny performance of an individual is more valuable in the calculation of the individual's EPD than the performance of its ancestors. EPDs are calculated for a number of different traits and are reported in the same unit of measurement as the trait. An EPD value can be either positive or negative depending on the calculated genetic value of the individual in relationship to its breed. Table 1 is an example how EPDs of an individual might be reported in a pedigree.

Table 1.

					Production	
CED Acc % Prog	BW Acc % Prog	WW Acc % Prog	YW Acc % Prog	RADG Acc % Prog	DMI Acc % Prog	YH Acc % Prog
+5	+1.0	+72	+143	+.39	+.96	+1.
.87	.96	.95	.91	.53	.53	.91
60%	45%	10%	2%	1%	70%	2%
1192	5075	3970	1657	15	15	629

From Table 1, the Calving Ease Direct EPD is +5 with an Accuracy of .87. The CED EPD is in the 60th percentile for the breed. There were 1,192 progeny records involved in the calculation of that EPD.

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Along with the calculated EPD is an accuracy (ACC) value. The ACC is a measure of the reliability and how true the calculated EPD is to the animal's actual genetic value. Unlike the EPD values, accuracy values range from 0 to 1.0, with 1.0 never being attained. The accuracy value is based on the type and amount of data used to calculate the EPD. Most yearling bulls have accuracy values that range from .05 to .35 for growth traits since the calculation of his EPD is based on his own performance record and pedigree information. Older bulls with progeny information used in the calculation of their EPDs will have higher accuracy values. Accuracy is primarily a function of the amount of information available on an individual. Animals with higher accuracies have EPDs that more closely reflect their true genetic value. Now with genomic testing, EPDs that were traditionally calculated using performance records and pedigree information can be improved by incorporating genomic information to increase the accuracy of EPDs for younger animals with no progeny. These Genomic-Enhanced EPDs (GE-EPD) are valuable as they improve the reliability of the EPDs for younger animals.

Percentile ranking compares EPDs for specific traits among animals within a breed. Average EPDs for most traits are not zero and will differ between breeds. Percentile tables are used to determine where an individual's EPD for different particular traits ranks within the breed. Most all breeds have a percentile table that allows one to determine where that specific EPD value ranks within their breed. Percentile ranking values range from 1 to 99. It is important to understand that the lower the numeric percentile value reflects superiority for that trait. For example, an individual that is in the 75 percentile for a trait means the animal is only superior to 25 percent of the animals in the breed for that trait. An animal that is in the 5 percentile for a trait means that it is superior to 95 percent of the breed for that trait. In Table 2 is an example of a breed percentile table. To determine how a Hybrid Simmental individual that has a birth weight EPD (BW) of 0.40 ranks within the breed, the following needs to be done. Search the BW column for 0.40 and determine where that number corresponds with the % column. From Table 2, the 0.40 BW aligns with the 45 percentile of the breed. This indicates that individual is superior to 55 percent of the breed for BW EPD.

Table 2.

Hybrid Simmental Percentiles Table

	%	API	TI	CE	BW	WW	PWG	YW	MCE	MLK	MWW	STY	DOC	CWT	YG	MRB	BF	REA	SF
Possible Change	1	164.21	86.95	19.60	-4.40	87.40	0.32	136.60	11.70	32.20	70.50	21.80	18.00	53.40	-0.52	0.77	-0.13	1.09	-0.52
	2	159.04	84.85	18.50	-3.70	84.30	0.31	131.80	11.00	30.80	68.20	21.00	17.00	50.20	-0.49	0.70	-0.12	1.04	-0.50
Simbrah	3	155.66	83.63	17.90	-3.30	82.60	0.30	128.80	10.60	30.00	66.90	20.60	16.40	48.20	-0.47	0.66	-0.11	1.00	-0.48
	4	153.38	82.70	17.50	-2.90	81.30	0.29	126.80	10.20	29.40	65.80	20.30	16.00	46.70	-0.45	0.64	-0.10	0.97	-0.47
Full Blood	5	151.52	81.93	17.10	-2.70	80.20	0.29	125.00	10.00	28.90	65.00	20.00	15.70	45.50	-0.43	0.62	-0.10	0.94	-0.46
	10	145.34	79.22	15.80	-1.80	76.80	0.27	119.10	9.10	27.30	62.50	19.10	14.60	41.70	-0.39	0.54	-0.09	0.86	-0.43
Purebred	15	141.08	77.43	14.90	-1.30	74.50	0.26	115.20	8.60	26.20	60.90	18.50	14.00	39.20	-0.36	0.49	-0.08	0.82	-0.41
	20	137.83	75.94	14.20	-0.90	72.60	0.25	112.20	8.10	25.40	59.60	18.00	13.40	37.30	-0.34	0.45	-0.07	0.78	-0.39
Top 50 Sires	25	135.13	74.68	13.70	-0.50	71.10	0.24	109.60	7.80	24.60	58.60	17.50	13.00	35.60	-0.32	0.42	-0.07	0.75	-0.38
	30	132.64	73.50	13.30	-0.30	69.70	0.24	107.30	7.40	24.00	57.70	17.10	12.60	34.20	-0.30	0.39	-0.06	0.72	-0.37
	35	130.38	72.41	12.90	0.00	68.30	0.23	105.00	7.10	23.40	56.80	16.60	12.20	32.90	-0.28	0.36	-0.06	0.69	-0.35
	40	128.11	71.35	12.50	0.20	67.00	0.22	102.90	6.90	22.80	56.00	16.20	11.90	31.80	-0.26	0.33	-0.05	0.67	-0.34
	45	126.00	70.28	12.10	0.40	65.80	0.22	100.70	6.60	22.30	55.20	15.80	11.60	30.60	-0.25	0.30	-0.05	0.64	-0.33
	50	123.83	69.24	11.70	0.60	64.50	0.21	98.50	6.30	21.70	54.40	15.40	11.20	29.50	-0.23	0.28	-0.04	0.62	-0.32
	55	121.63	68.16	11.40	0.80	63.30	0.20	96.30	6.00	21.20	53.50	14.90	10.90	28.40	-0.21	0.26	-0.04	0.60	-0.31
	60	119.37	67.10	11.00	1.00	62.10	0.20	94.00	5.80	20.70	52.60	14.50	10.60	27.20	-0.20	0.23	-0.04	0.57	-0.31
	65	117.05	65.97	10.60	1.20	60.80	0.19	91.60	5.50	20.10	51.70	14.00	10.20	26.10	-0.18	0.21	-0.03	0.55	-0.30
	70	114.63	64.80	10.20	1.40	59.40	0.18	89.10	5.20	19.60	50.60	13.40	9.80	24.80	-0.17	0.18	-0.03	0.52	-0.29
	75	112.05	63.55	9.70	1.60	57.90	0.17	86.30	4.80	19.00	49.40	12.70	9.40	23.40	-0.15	0.15	-0.03	0.49	-0.28
	80	109.14	62.16	9.20	1.90	56.20	0.16	83.20	4.40	18.30	48.10	12.00	8.90	21.90	-0.13	0.12	-0.02	0.46	-0.26

Table 3 is an example of genomic percentile ranking or scores for different traits. These numeric genomic scores are sometimes reported in sale catalogs at the bottom of the pedigree with the scores in boxes for the various traits. These numbers explain where that individual's genomic value for a trait ranks with only genomic-tested animals in the breed. Since these scores are only updated annually, they do not include any of the weekly up-to-date DNA test results or performance data. These values range from 1 to 100 and are only updated once a year.

Table 3.

CED	BEPD	WEPD	YEPD	MILK	MARB	RE	$W	$B
+2	+3.7	+92	+176	+21	+.36	+1.00	+70	+215

BW	ADJ 205	ADJ 365	DOC	FRAME	ADJ SC	DAM WEANING
90	770	1498	+28	7.0	40.59	4-107

CED	BW	WW	YW	DMI	YH	SC	DOC	HP	CEM	MILK	MW	MH	CW	Marb	RE	Fat	TEND
20	26	5	1	59	8	10	2	52	11	70	7	5	1	70	21	65	56

In some cases, the genomic percentile or score may rank differently than the weekly updated Genomic Enhanced EPD (GE-EPD). The latest genomic test results and performance information is included in the calculation of the weekly updated GE-EPD. When the GE-EPD and genomic percentile for a particular trait differ, the latest GE-EPDs are the most accurate and up-to-date estimate of the animal's genetic merit.

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