EPD Averages, Tools and Trends

BOLT Evaluation January 1, 2020

CANADIAN HEREFORD ASSOCIATION Calgary, Alberta, Canada

Introduction

The following information is for use in analysing the Expected Progeny Differences (EPDs) from the Spring BOLT Evaluation. The EPDs are calculated by the Agricultural Business Research Institute (ABRI) in Australia, and use the combined datasets of the Canadian and American Hereford Associations. The resulting EPD values are directly comparable across the Hereford breed within North America but are not directly comparable between different breeds of cattle.

The evaluation was conducted using BOLT (Bio-Metric Open Language Tools) software and represents a significant advancement in the way that EPD are calculated. Major changes to the evaluation are outlined in the Changes and Updates section of this document. EPD produced from the BOLT software are "single step" EPD that directly include pedigree, performance and DNA information in the model. Previous evaluations used a blending technique that calculated EPD in a traditional manner and then used DNA results to tweak the EPD either up or down. BOLT uses the DNA information directly in the evaluation producing a much more robust evaluation that can extract more information from the DNA data that is available, resulting in more reliable genetic evaluation.

DNA information from member SNP testing serves to improve the accuracy of the evaluation for tested animals and their direct descendents by providing direct measurement of the DNA that the animal possesses and passes on to their progeny. As animals add progeny records, the relative influence of the DNA test is reduced in the calculation of the EPD. While EPD on individual animals may be affected, inclusion of genomic testing results does not change the overall averages of the EPD in the population. The additional genomic data enhances the accuracy values associated with the EPD. The DNA SNP test information provides significant levels of new information in less proven animals.

The CHA and AHA have moved to weekly evaluations, however the average EPD will change very slowly over time and this document reflects breed average EPD from the January 13, 2020 BOLT evaluation.

Breed Average EPD

	CED	BW	WW	YW	MM	M&G	CEM	SC	MCW	SCF	UDDR	TEAT	MPI	FMI	RFI	PWG	Carc Wt	FAT	REA	MARB
Sires	2.6	2.9	52	84	24	50	1.9	0.9	88	14.7	1.2	1.2	124.5	116.7	99.4	32.4	65	0.013	0.38	0.08
Dams	1.5	3.2	49	79	22	46	1.5	0.8	85	14.3	1.2	1.2	117.4	106.6	100.0	30.9	61	0.006	0.31	0.06
Calves	2.4	2.9	52	84	24	50	1.9	0.9	88	15.0	1.2	1.2	123.1	111.6	100.7	31.8	64	0.012	0.37	0.08

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Highlights

The BOLT evaluation represents the most current science in the way that genetic evaluation is conducted in the Hereford population. This includes single step evaluation, the addition of new traits and changes to the way the dataset is compiled. Additionally, members will notice increased frequency of genetic evaluations.

Single Step Evaluation

Previously genomically enhanced EPD were computed using traditional methods of calculating EPD and then adjusting the EPD afterwards based on the results of a DNA marker test. The single step method calculates EPD using pedigree, performance and DNA information directly in the model. This allows the evaluation to use the full power of the DNA sample in the EPD calculation and prevents issues such as double counting of DNA results through the blending process.

Data Cutoff

Data that is included in the evaluation is cut off in 2001 for performance data and restricted to a 3 generation pedigree for those animals. This means that data in the evaluation has been collected through complete herd reporting structures for both AHA and CHA. Restricting the data used has not had a major affect on animal rankings, and animals currently being used are fully represented in the dataset.

Genetic Parameters

The genetic parameters that are used in the evaluation have changed significantly as they were re-estimated with the move to the BOLT evaluation. Additionally, with increased computing horsepower several models such as Calving Ease and Sustained Cow Fertility have been changed to reflect evaluation methods that do a better job of trait evaluation, but were previously limited by computer power.

New/Revised Traits

Calving Ease

The new calving ease evaluation uses a linear approach rather than categorical to calving ease. This allows the inclusion of more records, including those calving ease records from mature cows in the evaluation of calving ease. Expression of the traits is the same as previously reported.

Sustained Cow Fertility

The genetic evaluation for longevity is described as sustained cow fertility. Previously, Stayability was defined as the probability that a cow will reach a threshold age in the cowherd. SCF is better described as a linear type of trait where cows that live longer in the herd are given more credit than cows that exit at an earlier age.

Udder Suspension and Teat Size

Udder suspension and teat size are new traits that are calculated using udder and teat scores collected shortly after calving. These scores represent a convenience trait with regards to udder quality.

Carcass Weight

As part of the BOLT evaluation a carcass weight EPD is now calculated and represents relative differences in the expected carcass weight of slaughter progeny in pounds.

Traits

Trait	Abbreviation	Units
Expected Progeny Difference	EPD	
Accuracy	ACC	
Calving Ease	CE	% Unassisted Calving
Birth Weight	BW	Pounds
Weaning Weight	WW	Pounds
Yearling Weight	YW	Pounds
Milk	Milk	Pounds
Total Maternal	TM	Pounds
Maternal Calving Ease	MCE	% Unassisted Calving
Scrotal Circumference	SC	Centimeters
Mature Cow Weight	MCW	Pounds
Sustained Cow Fertility	SCF	% Probability
Udder Suspension	US	Udder Score
Teat Size	TS	Teat Score
Maternal Productivity Index	MPI	Standard Units
Feedlot Merit Index	FMI	Standard Units
Residual Feed Intake	RFI	RFI Score
Post Weaning Gain	PWG	Pounds
Carcass Weight	Carc Wt	Pounds
Fat	FAT	Inches
Rib-Eye Area	REA	Square Inches
Marbling	MARB	USDA Marbling Score Units

Accuracy

Accuracy in the BOLT evaluation is calculated directly, rather than being estimated as in previous evaluations. This is because of the model and new computing horsepower that can be employed. EPDs change because we are continually collecting more information on Hereford cattle. As well, researchers continue to find ways to better describe genetic relationships; this results from model improvements, such as the multi-trait analysis performed by ABRI.

Accuracy is based on the amount and quality of performance/pedigree and DNA information available on the animal and its' close relatives – particularly the number of progeny analysed. Accuracy is also based on the heritability of the trait and the genetic correlations with other recorded traits. Hence accuracy indicates the "confidence level" of the EPD. The higher the accuracy value the lower the likelihood of change in the animal's EPD as more information is analyzed for that animal and its' relatives. Even though an EPD with a low accuracy may change in the future, it is still the best estimate of an animal's genetic merit for that trait. As more information becomes available, an EPD is just as likely to increase in value as it is to decrease.

While an EPD is still a better measure of an animal's genetic merit than a rank or an index, it is important to be aware of the potential risks associated with using low accuracy sires. As EPDs are used for improving accuracy of selection, it is important to consider the accuracy value associated with the EPD value.

Accuracy values range from .00 to .99. The following table is given for interpreting accuracy.

Accuracy	**Interpretation**
< 0.10 - PE	Very low accuracy. EPDs should be considered a preliminary estimate. They could change substantially as more performance information becomes available.
0.10 to 0.25	Low accuracy, usually based on the animal's own records and pedigree. Useful for screening "best bet" animals. Still subject to substantial changes with more information, particularly when the performance of progeny are analysed.
0.25 to 0.40	Medium accuracy and includes some progeny information. Becoming a more reliable indicator of the animal's value as a parent.
0.40 to 0.70	High accuracy. Some progeny information included. Unlikely that the EPD will change very much with the addition of more progeny data.
> 0.70	Very high accuracy estimate of the animal's true breeding value.

When two animals have similar EPDs the one with the higher accuracy could be the safer choice, assuming other factors are equal.

Average and Percentiles

Current Calves (Averages and Percentiles)

	CED	BW	WW	YW	MM	M&G	CEM	SC	MCW	SCF	UDDR	TEAT	MPI	FMI	RFI	PWG	CW	FAT	REA	MARB
Mean	**2.4**	**2.9**	**52**	**84**	**24**	**50**	**1.9**	**0.9**	**88**	**15.0**	**1.2**	**1.2**	**123.1**	**111.6**	**100.7**	**31.8**	**64**	**0.012**	**0.37**	**0.08**
Min	-18.3	-7.7	-12	-26	-2	-4	-16.0	-1.3	-24	-10.8	0.5	0.5	31.3	6.7	83.0	3.7	-7	-0.109	-0.73	-0.41
Max	22.8	12.8	88	147	50	86	15.3	2.8	180	29.9	1.9	2.0	203.2	276.6	115.0	61.8	121	0.151	1.35	1.23
1%	13.6	-2.8	71	115	37	67	8.9	1.7	30	23.3	1.5	1.6	174.4	180.4	112.0	47.0	87	-0.039	0.78	0.47
2%	12.4	-1.3	69	111	35	65	8.1	1.6	46	22.5	1.5	1.5	169.6	169.8	111.0	45.0	84	-0.029	0.73	0.40
3%	11.6	-0.8	67	109	34	64	7.6	1.6	52	22.0	1.5	1.5	165.9	163.3	110.0	43.7	82	-0.029	0.69	0.36
4%	10.9	-0.4	66	107	33	63	7.1	1.5	55	21.6	1.4	1.5	163.3	158.9	110.0	42.9	81	-0.029	0.67	0.33
5%	10.4	-0.1	65	105	33	62	6.8	1.5	58	21.2	1.4	1.4	160.9	155.4	109.2	42.1	80	-0.029	0.65	0.30
10%	8.4	0.7	62	100	31	60	5.7	1.3	65	20.0	1.4	1.4	152.8	144.1	106.0	39.9	76	-0.019	0.58	0.23
15%	7.2	1.2	60	97	30	58	5.0	1.3	71	19.2	1.3	1.4	147.4	137.2	105.0	38.3	74	-0.009	0.54	0.20
20%	6.2	1.5	59	95	28	57	4.4	1.2	74	18.5	1.3	1.3	143.0	132.0	104.0	37.1	72	-0.009	0.51	0.17
25%	5.4	1.8	58	93	28	55	3.9	1.1	77	17.9	1.3	1.3	138.9	127.6	103.0	36.0	71	-0.009	0.48	0.15
30%	4.7	2.1	57	91	27	54	3.5	1.1	80	17.3	1.3	1.3	135.3	123.6	103.0	35.2	69	0.001	0.46	0.13
35%	4.1	2.3	55	89	26	53	3.1	1.0	83	16.8	1.2	1.3	132.2	120.1	102.0	34.3	68	0.001	0.44	0.11
40%	3.5	2.6	54	87	25	52	2.7	1.0	85	16.3	1.2	1.2	129.2	116.9	101.0	33.5	67	0.001	0.42	0.10
45%	2.9	2.8	53	86	25	52	2.3	1.0	87	15.7	1.2	1.2	126.2	113.9	101.0	32.6	66	0.011	0.40	0.08
50%	2.3	3.0	53	84	24	51	1.9	0.9	89	15.2	1.2	1.2	123.3	110.9	101.0	31.9	65	0.011	0.38	0.07
55%	1.8	3.2	52	83	23	50	1.6	0.9	91	14.7	1.2	1.2	120.3	107.9	100.0	31.0	64	0.011	0.35	0.06
60%	1.2	3.4	51	81	23	49	1.2	0.8	93	14.1	1.2	1.2	117.5	104.9	100.0	30.2	63	0.021	0.33	0.04
65%	0.6	3.6	49	80	22	48	0.8	0.8	96	13.5	1.1	1.1	114.2	101.7	99.0	29.4	62	0.021	0.31	0.03
70%	0.0	3.8	48	78	21	46	0.4	0.8	98	12.9	1.1	1.1	111.0	98.4	98.0	28.5	60	0.021	0.29	0.02
75%	-0.6	4.1	47	76	20	45	0.0	0.7	100	12.2	1.1	1.1	107.6	94.5	98.0	27.5	59	0.031	0.26	0.00
80%	-1.4	4.4	46	74	19	44	-0.5	0.7	103	11.5	1.1	1.1	103.4	90.2	97.0	26.4	57	0.031	0.23	-0.01
85%	-2.2	4.7	44	71	18	42	-1.1	0.6	106	10.7	1.1	1.1	99.0	85.3	96.0	25.1	56	0.031	0.20	-0.03
90%	-3.4	5.2	42	67	17	40	-1.9	0.5	110	9.7	1.0	1.0	93.2	79.2	95.0	23.6	53	0.041	0.15	-0.05
95%	-5.1	5.9	38	62	14	35	-3.0	0.4	116	8.2	1.0	1.0	84.4	70.2	94.0	21.2	49	0.051	0.09	-0.08
100%	-18.3	12.8	-13	-26	-2	-4	-16.0	-1.3	180	-10.8	0.5	0.5	31.3	6.7	83.0	3.7	-7	0.151	-0.73	-0.41
Num	196388	196388	196388	196388	196388	196388	196388	196388	196388	196388	196388	196388	29702	29702	936	29702	196388	196388	196388	196388

Current Calves are all calves born in the last 2 years (2018 – 2019)

Current Sires (Averages and Percentiles)

	CED	BW	WW	YW	MM	M&G	CEM	SC	MCW	SCF	UDDR	TEAT	MPI	FMI	RFI	PWG	CW	FAT	REA	MARB
Mean	**2.6**	**2.9**	**52**	**84**	**24**	**50**	**1.9**	**0.9**	**88**	**14.7**	**1.2**	**1.2**	**124.5**	**116.7**	**99.4**	**32.4**	**65**	**0.013**	**0.38**	**0.08**
Min	-15.6	-7.6	-12	-29	-8	-4	-15.9	-1.1	-25	-14.5	0.4	0.4	16.8	5.8	66.0	8.0	3	-0.099	-0.58	-0.50
Max	23.0	10.1	87	143	64	93	15.9	2.8	173	35.5	2.0	2.1	225.7	299.0	119.0	61.7	122	0.161	1.36	1.19
1%	14.8	-3.5	75	121	40	70	10.6	2.0	20	25.3	1.6	1.7	194.3	228.2	114.0	52.8	93	-0.059	0.92	0.55
2%	13.6	-2.3	72	117	39	68	9.3	1.8	33	24.1	1.5	1.6	183.4	206.4	110.4	50.0	90	-0.049	0.84	0.45
3%	12.7	-1.4	71	114	37	67	8.6	1.8	39	23.4	1.5	1.5	179.4	192.4	109.1	48.5	88	-0.039	0.79	0.40
4%	12.1	-1.0	69	112	36	65	8.2	1.7	43	22.8	1.5	1.5	176.6	185.8	108.8	47.0	86	-0.039	0.77	0.37
5%	11.4	-0.7	68	111	36	64	7.7	1.7	46	22.4	1.5	1.5	173.9	180.6	108.0	46.1	85	-0.039	0.74	0.34
10%	9.5	0.2	65	105	33	62	6.4	1.5	58	21.1	1.4	1.4	162.6	165.2	106.0	43.2	80	-0.029	0.65	0.26
15%	8.1	0.8	63	101	31	60	5.6	1.4	64	20.1	1.4	1.4	155.0	153.1	104.0	41.0	77	-0.019	0.60	0.22
20%	7.0	1.2	61	98	30	58	4.9	1.3	69	19.3	1.3	1.4	149.7	146.3	103.0	39.5	75	-0.009	0.55	0.19
25%	6.1	1.6	59	95	29	57	4.3	1.2	74	18.6	1.3	1.3	145.5	140.0	103.0	38.2	73	-0.009	0.52	0.16
30%	5.3	1.9	58	93	28	55	3.8	1.2	77	17.9	1.3	1.3	141.1	134.4	102.0	36.9	71	-0.009	0.49	0.14
35%	4.6	2.2	57	91	27	54	3.3	1.1	81	17.1	1.3	1.3	136.4	129.3	102.0	35.8	70	0.001	0.46	0.12
40%	3.8	2.5	55	89	26	53	2.8	1.0	84	16.4	1.2	1.2	132.0	124.2	101.0	34.6	68	0.001	0.43	0.10
45%	3.1	2.7	54	87	25	52	2.4	1.0	87	15.7	1.2	1.2	128.0	119.9	100.0	33.5	67	0.011	0.41	0.08
50%	2.5	3.0	53	85	24	51	1.9	0.9	90	15.0	1.2	1.2	124.8	114.7	100.0	32.4	65	0.011	0.38	0.07
55%	1.8	3.2	52	83	23	50	1.5	0.9	93	14.3	1.2	1.2	121.4	110.4	99.0	31.2	64	0.011	0.36	0.05
60%	1.1	3.4	51	81	22	49	1.0	0.8	95	13.6	1.2	1.2	118.1	105.6	99.0	30.2	63	0.021	0.33	0.04
65%	0.4	3.7	49	79	21	47	0.6	0.8	98	12.9	1.1	1.1	113.9	101.1	98.0	29.1	61	0.021	0.30	0.02
70%	-0.3	4.0	48	77	20	46	0.0	0.7	101	12.0	1.1	1.1	109.7	96.8	98.0	28.0	60	0.031	0.27	0.00
75%	-1.0	4.2	46	75	19	45	-0.5	0.7	105	11.2	1.1	1.1	105.2	90.5	97.0	26.7	58	0.031	0.23	-0.02
80%	-1.9	4.6	45	72	18	43	-1.1	0.6	108	10.4	1.1	1.1	99.5	85.2	96.0	25.2	56	0.041	0.20	-0.04
85%	-2.8	4.9	43	69	17	41	-1.9	0.5	113	9.5	1.0	1.0	93.7	78.8	95.0	23.7	54	0.041	0.15	-0.06
90%	-4.1	5.4	40	65	15	38	-2.8	0.4	118	8.1	1.0	1.0	86.0	70.8	93.0	21.6	50	0.051	0.10	-0.09
95%	-6.2	6.2	35	57	12	33	-4.2	0.3	127	6.1	1.0	0.9	72.6	58.2	90.0	18.4	45	0.071	0.01	-0.13
100%	-15.6	10.1	-12	-29	-8	-4	-15.9	-1.1	173	-14.5	0.4	0.4	16.8	5.8	66.0	8.0	3	0.161	-0.58	-0.50
Num	7274	7274	7274	7274	7274	7274	7274	7274	7274	7274	7274	7274	1885	1885	428	1885	7274	7274	7274	7274

Current Sires are all sires that have had a calf reported in the last 2 years (2018 – 2019)

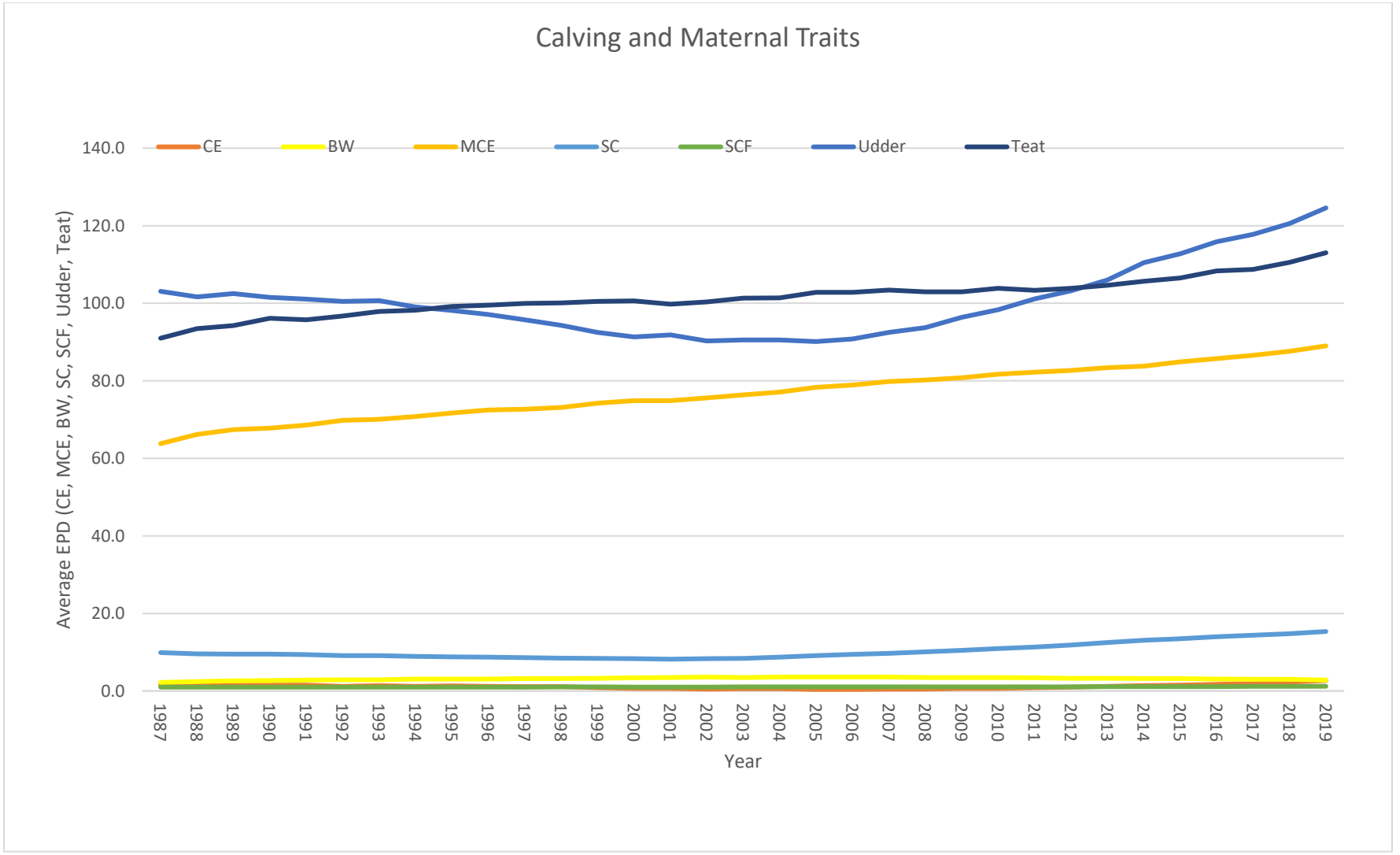
Current Dams (Averages and Percentiles)

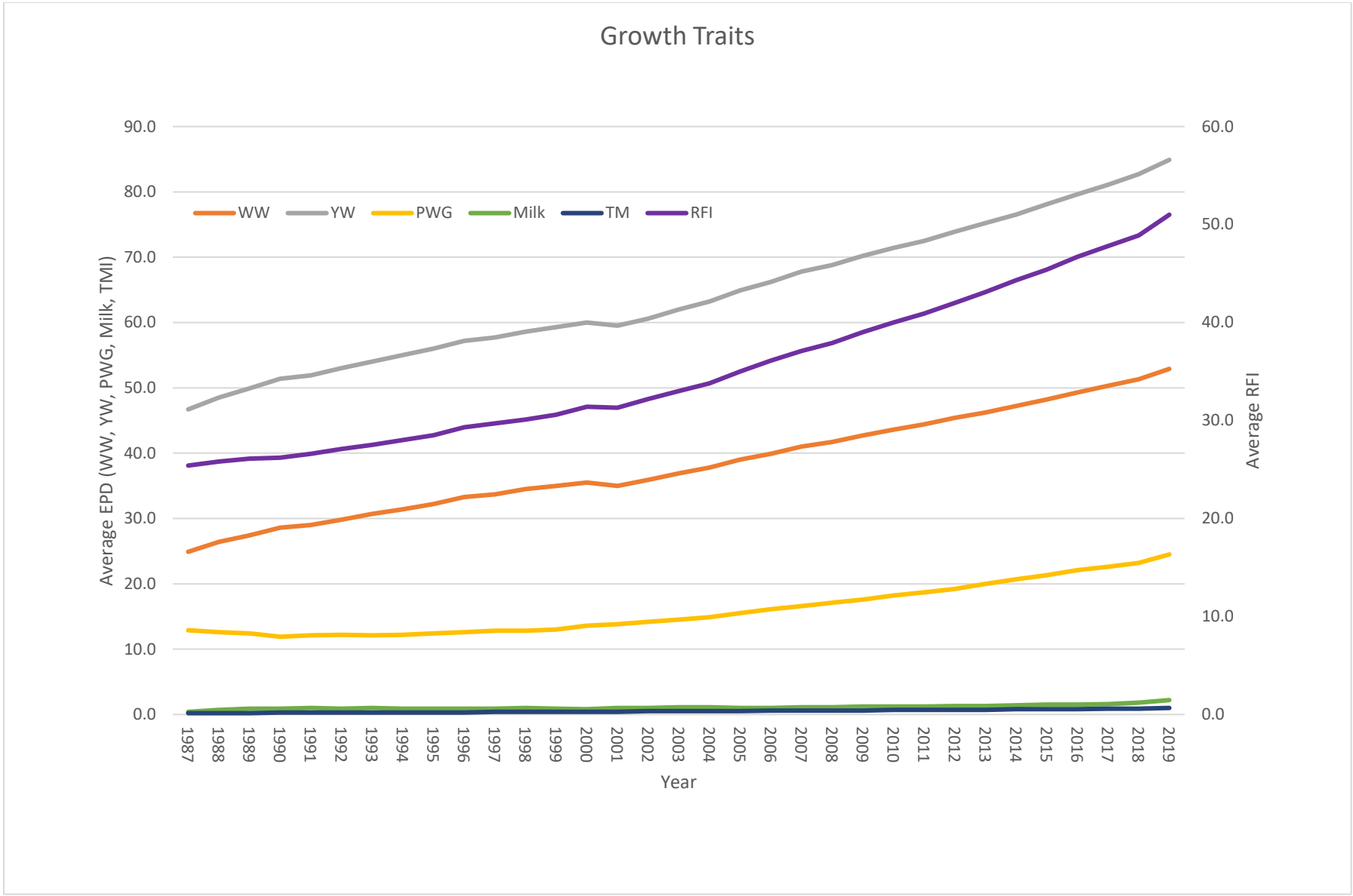
	CED	BW	WW	YW	MM	M&G	CEM	SC	MCW	SCF	UDDR	TEAT	MPI	FMI	RFI	PWG	CW	FAT	REA	MARB
Mean	**1.5**	**3.2**	**49**	**79**	**22**	**46**	**1.5**	**0.8**	**85**	**14.3**	**1.2**	**1.2**	**117.4**	**106.6**	**100.0**	**30.9**	**61**	**0.006**	**0.31**	**0.06**
Min	-17.4	-7.8	-10	-19	-8	-4	-22.4	-1.1	-27	-13.5	0.0	-0.1	20.3	-3.6	87.0	-0.1	-3	-0.109	-0.80	-0.49
Max	20.9	12.1	84	147	53	86	17.8	2.9	203	31.9	2.0	2.2	205.1	241.0	117.0	69.8	121	0.181	1.40	0.96
1%	13.3	-3.3	68	111	38	66	9.4	1.7	18	24.6	1.5	1.6	174.1	178.1	110.2	47.2	85	-0.049	0.76	0.42
2%	12.0	-1.2	66	107	36	64	8.4	1.6	36	23.5	1.5	1.5	168.0	166.3	108.0	44.9	81	-0.039	0.70	0.35
3%	11.1	-0.5	64	105	34	63	7.7	1.5	44	22.8	1.5	1.5	164.4	159.8	107.0	43.6	79	-0.039	0.66	0.31
4%	10.4	-0.2	63	103	33	61	7.3	1.4	48	22.3	1.4	1.5	161.2	155.2	107.0	42.6	78	-0.039	0.64	0.28
5%	9.7	0.1	63	101	33	60	6.9	1.4	51	21.9	1.4	1.4	158.7	151.6	106.0	41.8	77	-0.029	0.62	0.26
10%	7.7	1.0	60	96	30	58	5.7	1.3	60	20.3	1.4	1.4	149.9	139.8	105.0	39.3	73	-0.019	0.54	0.20
15%	6.4	1.5	58	93	29	56	4.9	1.2	66	19.2	1.3	1.3	143.7	132.4	104.0	37.7	71	-0.019	0.50	0.17
20%	5.4	1.8	56	90	27	54	4.2	1.1	70	18.3	1.3	1.3	138.9	127.2	103.0	36.4	69	-0.009	0.46	0.14
25%	4.6	2.1	55	88	26	53	3.7	1.0	73	17.6	1.3	1.3	134.7	122.7	102.0	35.3	68	-0.009	0.43	0.12
30%	3.9	2.4	53	86	25	51	3.3	1.0	76	16.9	1.2	1.2	131.0	118.7	102.0	34.3	66	-0.009	0.40	0.10
35%	3.2	2.6	52	84	24	50	2.8	0.9	79	16.2	1.2	1.2	127.6	115.1	101.0	33.4	65	-0.009	0.38	0.09
40%	2.6	2.9	51	83	23	49	2.4	0.9	82	15.6	1.2	1.2	124.2	111.8	101.0	32.5	64	0.001	0.35	0.07
45%	2.0	3.1	50	81	23	48	2.0	0.8	84	14.9	1.2	1.2	121.0	108.8	100.0	31.7	62	0.001	0.33	0.06
50%	1.4	3.3	49	79	22	47	1.6	0.8	86	14.3	1.1	1.1	117.7	105.7	100.0	30.9	61	0.001	0.31	0.05
55%	0.9	3.5	48	78	21	46	1.2	0.8	89	13.6	1.1	1.1	114.6	102.7	99.0	30.1	60	0.001	0.29	0.04
60%	0.3	3.7	47	76	20	44	0.8	0.7	91	13.0	1.1	1.1	111.6	99.5	99.0	29.2	59	0.011	0.26	0.02
65%	-0.3	3.9	46	74	19	43	0.4	0.7	93	12.3	1.1	1.1	108.4	96.3	99.0	28.4	58	0.011	0.24	0.01
70%	-0.9	4.2	45	72	19	42	0.0	0.6	96	11.6	1.1	1.1	104.9	92.8	98.0	27.4	56	0.021	0.22	0.00
75%	-1.6	4.4	43	70	18	41	-0.5	0.6	98	11.0	1.1	1.0	100.9	89.1	98.0	26.5	55	0.021	0.19	-0.02
80%	-2.4	4.7	42	68	17	39	-1.1	0.5	102	10.3	1.0	1.0	96.3	85.0	97.0	25.4	53	0.021	0.16	-0.03
85%	-3.3	5.0	40	65	15	37	-1.8	0.5	105	9.4	1.0	1.0	91.3	80.4	96.0	24.0	51	0.031	0.13	-0.05
90%	-4.4	5.5	38	61	13	35	-2.6	0.4	110	8.4	1.0	1.0	84.6	74.4	96.0	22.2	49	0.041	0.09	-0.07
95%	-6.1	6.2	34	56	11	30	-4.0	0.3	117	6.7	0.9	0.9	74.5	65.1	94.0	19.7	45	0.051	0.02	-0.11
100%	-17.4	12.1	-10	-19	-8	-4	-22.4	-1.1	203	-13.5	0.0	-0.1	20.3	-3.6	87.0	-0.1	-3	0.181	-0.80	-0.49
Num	136474	136474	136474	136474	136474	136474	136474	136474	136474	136474	136474	136474	20333	20333	1880	20333	136474	136474	136474	136474

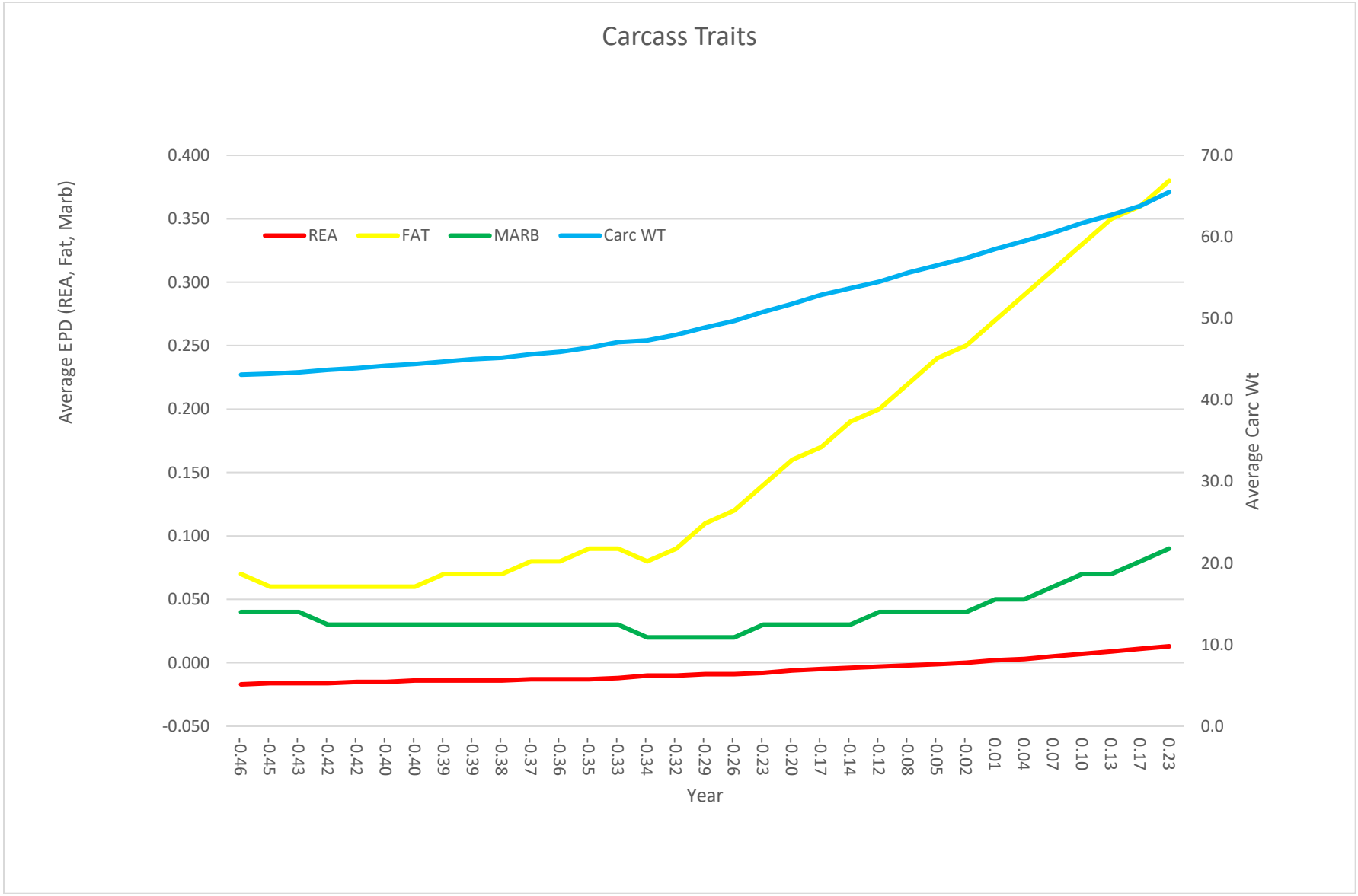
Current Dams are all dams that have had a calf reported in the last 2 years (2018 – 2019)

Genetic Trends

Year	CED	BW	WW	YW	MM	M&G	CEM	SC	MCW	SCF	UDDR	TEAT	MPI	FMI	RFI	PWG	Carc Wt	FAT	REA	MARB
2019	2.7	2.8	52.9	84.9	24.5	51.0	2.2	1.0	89.0	15.3	1.2	1.2	124.6	113.0		32.0	65.5	0.013	0.38	0.09
2018	2.3	3.0	51.3	82.7	23.2	48.9	1.8	0.9	87.6	14.8	1.2	1.2	120.6	110.6	100.1	31.7	63.8	0.011	0.36	0.08
2017	1.9	3.0	50.3	81.1	22.6	47.8	1.6	0.9	86.6	14.4	1.2	1.2	117.8	108.8	99.3	31.2	62.7	0.009	0.35	0.07
2016	1.7	3.1	49.3	79.6	22.1	46.7	1.5	0.8	85.7	14.0	1.2	1.2	115.9	108.3	100.4	30.8	61.7	0.007	0.33	0.07
2015	1.5	3.2	48.2	78.1	21.3	45.4	1.5	0.8	84.9	13.5	1.2	1.1	112.8	106.5	99.6	30.4	60.5	0.005	0.31	0.06
2014	1.4	3.2	47.2	76.5	20.7	44.3	1.4	0.8	83.8	13.1	1.1	1.1	110.5	105.7	99.7	30.2	59.5	0.003	0.29	0.05
2013	1.2	3.3	46.2	75.2	20.0	43.1	1.3	0.7	83.4	12.5	1.1	1.1	106.0	104.7	99.6	30.0	58.5	0.002	0.27	0.05
2012	1.0	3.3	45.4	73.9	19.2	42.0	1.3	0.7	82.7	11.9	1.1	1.1	103.2	103.9	99.6	29.7	57.4	0.000	0.25	0.04
2011	0.9	3.4	44.4	72.5	18.7	40.9	1.2	0.7	82.2	11.3	1.1	1.1	101.2	103.3	99.8	29.4	56.5	-0.001	0.24	0.04
2010	0.7	3.5	43.6	71.4	18.2	40.0	1.2	0.7	81.7	10.9	1.1	1.1	98.4	103.9	99.8	29.2	55.6	-0.002	0.22	0.04
2009	0.7	3.5	42.7	70.2	17.6	39.0	1.2	0.6	80.8	10.5	1.1	1.1	96.4	103.0	99.4	29.0	54.5	-0.003	0.20	0.04
2008	0.5	3.5	41.7	68.8	17.1	37.9	1.1	0.6	80.2	10.1	1.1	1.1	93.7	102.9	99.6	28.9	53.7	-0.004	0.19	0.03
2007	0.5	3.6	41.0	67.8	16.6	37.1	1.1	0.6	79.8	9.7	1.1	1.1	92.5	103.4	100.0	28.5	52.9	-0.005	0.17	0.03
2006	0.4	3.6	39.9	66.2	16.1	36.1	1.0	0.6	78.9	9.4	1.1	1.1	90.8	102.8	99.5	28.2	51.8	-0.006	0.16	0.03
2005	0.4	3.6	39.0	64.9	15.5	35.0	1.0	0.5	78.3	9.2	1.1	1.1	90.1	102.8	99.6	27.7	50.8	-0.008	0.14	0.03
2004	0.6	3.6	37.8	63.2	14.9	33.8	1.1	0.5	77.1	8.8	1.1	1.0	90.5	101.4	99.2	26.8	49.7	-0.009	0.12	0.02
2003	0.6	3.5	36.9	62.0	14.5	33.0	1.1	0.5	76.4	8.4	1.1	1.0	90.5	101.3	99.5	26.5	48.9	-0.009	0.11	0.02
2002	0.5	3.6	35.9	60.6	14.2	32.2	1.0	0.5	75.6	8.3	1.1	1.0	90.3	100.3	99.5	26.1	48.0	-0.010	0.09	0.02
2001	0.7	3.5	35.0	59.5	13.8	31.3	1.0	0.4	74.9	8.2	1.1	1.0	91.8	99.8	99.4	25.6	47.3	-0.010	0.08	0.02
2000	0.7	3.4	35.5	60.0	13.6	31.4	0.8	0.4	74.9	8.4	1.1	1.0	91.3	100.6	99.6	25.9	47.1	-0.012	0.09	0.03
1999	0.9	3.3	35.0	59.3	13.0	30.6	0.9	0.4	74.2	8.4	1.1	1.0	92.5	100.5	99.5	25.4	46.4	-0.013	0.09	0.03
1998	1.1	3.2	34.5	58.6	12.8	30.1	1.0	0.4	73.1	8.5	1.1	1.0	94.3	100.1	99.1	25.3	45.9	-0.013	0.08	0.03
1997	1.1	3.2	33.7	57.7	12.8	29.7	0.9	0.4	72.7	8.6	1.1	1.0	95.7	100.0	99.6	25.2	45.6	-0.013	0.08	0.03
1996	1.2	3.1	33.3	57.2	12.6	29.3	0.9	0.3	72.5	8.8	1.1	1.0	97.1	99.5	99.3	24.7	45.2	-0.014	0.07	0.03
1995	1.3	3.1	32.2	56.0	12.4	28.5	0.9	0.3	71.7	8.8	1.0	1.0	98.2	99.2	99.8	24.4	45.0	-0.014	0.07	0.03
1994	1.2	3.1	31.4	55.0	12.2	28.0	0.9	0.3	70.8	8.9	1.0	1.0	99.1	98.2	99.3	23.8	44.7	-0.014	0.07	0.03
1993	1.4	2.9	30.7	54.0	12.1	27.5	1.0	0.3	70.1	9.1	1.0	1.0	100.7	97.9	100.0	23.6	44.4	-0.014	0.06	0.03
1992	1.2	2.9	29.8	53.0	12.2	27.1	0.9	0.3	69.8	9.2	1.0	1.0	100.5	96.7	99.6	23.3	44.2	-0.015	0.06	0.03
1991	1.5	2.8	29.0	51.9	12.1	26.6	1.0	0.3	68.6	9.4	1.0	1.0	101.1	95.7	99.3	22.9	43.9	-0.015	0.06	0.03
1990	1.5	2.7	28.6	51.4	11.9	26.2	0.9	0.3	67.8	9.5	1.0	1.0	101.5	96.1	98.6	22.8	43.7	-0.016	0.06	0.03
1989	1.5	2.6	27.4	49.9	12.4	26.1	0.9	0.2	67.4	9.5	1.0	1.0	102.5	94.2	99.7	22.3	43.4	-0.016	0.06	0.04
1988	1.7	2.4	26.4	48.5	12.6	25.8	0.7	0.2	66.2	9.6	1.0	1.0	101.7	93.4	99.3	22.0	43.2	-0.016	0.06	0.04
1987	1.6	2.2	24.9	46.7	12.9	25.4	0.4	0.2	63.8	9.9	1.0	1.0	103.1	91.0	99.2	21.4	43.1	-0.017	0.07	0.04
1986	1.7	2.1	23.9	45.2	13.2	25.1	0.3	0.2	62.0	10.1	1.1	1.0	104.4	89.3	99.4	21.1	43.0	-0.018	0.07	0.04
1985	1.6	1.9	22.8	43.9	13.4	24.9	0.2	0.2	60.5	10.0	1.0	1.0	102.5	86.9	99.8	20.7	42.7	-0.019	0.08	0.04


Calving and Maternal Traits
CE
BW
MCE
SC
SCF
Udder
Teat
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Average EPD (CE, MCE, BW, SC, SCF, Udder, Teat)
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year


Growth Traits
WW
YW
PWG
Milk
TM
RFI
Average EPD (WW, YW, PWG, Milk, TMI)
Average RFI
Year
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Carcass Traits
Average EPD (REA, Fat, Marb)
Average Carc Wt
REA
FAT
MARB
Carc WT
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
-0.050
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-0.46
-0.45
-0.43
-0.42
-0.42
-0.40
-0.40
-0.39
-0.39
-0.38
-0.37
-0.36
-0.35
-0.33
-0.34
-0.32
-0.29
-0.26
-0.23
-0.20
-0.17
-0.14
-0.12
-0.08
-0.05
-0.02
0.01
0.04
0.07
0.10
0.13
0.17
0.23
Year

How to Use the EPD

How to Read the EPD Tables

MR HEREFORD 123E

As of Jan 01/2019 EPDs																				
	Calving Ease	Birth Weight	Weaning Weight	Yearling Weight	Milk	Total Maternal	Maternal Calving Ease	Scrotal Circ.	Cow Weight	Sustained Cow Fertility	Udder Suspension	Teat Size	MPI	FMI	RFI	PWG	Carc WT	Fat	REA	MARB
EPD	4.6	+1.9	**+62.0**	**+109.0**	+20.0	+51.0	+2.9	+1.4	+78.0	+14.7	+1.0	+1.0	-125.0	136.0-	+104	**+47**	75	+0.014	+0.50	+0.26
Acc	.66	.89	.85	.84	.65	-	.33	.31	.74	.79	.64	.63	-	-	.15	.84	.45	.44	.41	.40
Breed Avg. EPDs for 2016 Born Calves Click for Percentiles																				
EPD	+2.1	+3.0	+53.0	+85.0	+24.0	+51.0	+1.9	+0.9	+90.0	+14.3	+1.2	+1.2	120.6	114.2	+101	+32.1		+0.011	+0.40	+0.11

Traits Observed: AHA GE-EPD

Statistics: Number of Herds: **40**, Progeny with WW Analysed: **96**, Daughters in Production: **486**

Calving Ease EPD and Accuracy

Calving Ease EPDs are calculated using birth weight and calving ease score information. Calving ease EPDs represent the ease with which progeny of an animal are born to first calf heifers. The EPD is expressed as a percent probability, with a higher value representing calves with a higher probability of being born unassisted. In the above example, MR HEREFORD 123E has a CE EPD of 4.6 with an accuracy of 0.66. The breed ***average and percentile breakdown*** table for active sires, indicates that this sire is 15.0% above the breed average for calving ease, or his calves from first calf heifers can be expected to require 2.0% fewer assists than those from a sire with a CE EPD of 2.6.

Birth Weight EPD and Accuracy

Birth weight is an indicator of calving ease. Higher birth weight EPDs usually indicates more calving difficulty. In the example above, MR HEREFORD has a BW EPD of 1.9 with an accuracy of 0.89. Referring to the breed ***average and percentile breakdown*** table for ***active sires*** this bull is 1.0 lbs. below the breed average for the BW EPD for active sires and/or his progeny can be expected to weigh on average 1.0 lbs. less at birth than progeny sired by a bull with an EPD of 2.9 (1.9 minus 2.9 = -1.0 lbs.). More specifically, this bull is in the top 35 percent of the breed in North America for low progeny birth weights. This sire's BW EPD has a high accuracy.

Weaning Weight EPD and Accuracy

The weaning EPD reflects progeny growth differences up to 205-days. In the example above MR HEREFORD has a WW EPD of 62.0 and an accuracy of 0.85. Referring to the breed ***average and percentile breakdown*** table for ***active sires*** this bull is 10.0 lbs. above the breed average for the WW EPD for active sires and/or his progeny can be expected to weigh on average 10.0 lbs. more at 205-days than progeny sired by a bull with an EPD of 52.0 (62.0 minus 52.0 = 10.0 lbs.). More specifically, this bull is in the top 20 percent of all active sires in North America for progeny weaning weights. This sire's WW EPD has a high accuracy.

Yearling Weight EPD and Accuracy

The yearling EPD reflects progeny growth differences through to 365-days. In the example above MR HEREFORD has a YW EPD of 109.0 and an accuracy of 0.84. Referring to the breed ***average and percentile breakdown*** table for ***active sires*** this bull is 25.0 lbs. above the breed average for the YW EPD for active sires and/or his progeny can be expected to weigh on average 25.0 lb more at 365-days than progeny sired by a bull with an EPD of 84.0 (109.0 minus 84.0 = 25.0 lb.). More specifically, this bull is in the top 10 percent of all the breed in North America for progeny yearling weights. This sire's YW EPD has a high accuracy.

Milk EPD and Accuracy

The milk EPD indicates the ability of a sire's daughters to provide their calves with an environment that encourages growth from birth to weaning, through mothering ability and milk production. This EPD is expressed in the expected difference in pounds of calf at weaning. In the example above MR HEREFORD has a Milk EPD of 20.0 and an accuracy of 0.65. Referring to the breed ***average and percentile breakdown*** table for ***active sires,*** this bull is 4.0 lb. below the breed average for the Milk EPD for active sires and/or the progeny of his daughters can be expected to weigh on average 4.0 lb. less at 205-days than progeny sired by a bull with an EPD of 24 (20.0 minus 24 = -4.0 lb.). More specifically, this bull is in the top 70 percent of the breed in North America for progeny milk or stated another way, the bottom 30%.

Total Maternal EPD

Also known as Milk + Growth, this EPD combines the milk EPD plus ½ the weaning weight EPD. It is expressed in pounds of calf weaned at 205-days and combines the genetics for pre-weaning growth and the influence of the maternal environment on the weaning weight of the daughter's progeny. In the example MR HEREFORD has a TM EPD of 51.0. Referring to the breed ***average and percentile breakdown*** table for ***active sires*** this bull is 1.0 lbs. above the breed average for the TM EPD for active sires and/or the progeny of his daughters can be expected to weigh on average 1.0 lbs. more at 205-days than progeny sired by a bull with an EPD of 50 (51.0 minus 50.0 = 1.0 lb.). More specifically, this bull is in the top 50 percent of all active sires in North America for progeny total maternal weights.

Maternal Calving Ease EPD and Accuracy

Maternal Calving Ease EPD represents the ease with which a sire's daughters will calve as first calf heifers, when compared to daughters of other sires. The EPD is expressed as a percent probability, with a higher value representing daughters with a higher probability of unassisted calving. MR HEREFORD has an

MCE EPD of 2.9 with an accuracy of 0.33. We expect the daughters of MR HEREFORD to calve with 1.0% fewer assists as first calf heifers than daughters of a bull with a MCE EPD of 1.9 (2.9 – 1.9 = 1.0). MR HEREFORD is in the top 40% of active sires in the Hereford breed for maternal calving ease.

Scrotal Circumference EPD and Accuracy

The Scrotal Circumference EPD reflects differences in scrotal measurements, taken in centimetres and adjusted to 365 days of age. The SC EPD is positively associated with age at puberty of progeny. In this case MR HEREFORD has a SC EPD of 1.4 with an accuracy of 0.31. We would expect the average yearling scrotal size of MR HEREFORD's progeny to be 0.5 cm more than those of a sire with an SC EPD of 0.9 (1.4 – 0.9 = 0.5) when bred to the same cows. In addition, we would expect the progeny of MR HEREFORD to be slightly older at puberty. MR HEREFORD is in the 15th percentile of the breed. It is highly recommended that all sires used, meet the minimum recommended scrotal requirements and pass a semen test prior to breeding.

Cow WT EPD and Accuracy

The Cow WT EPD reflects differences in the mature weight of a sire's daughters. This is important as it is related to maintenance energy requirements. In the example, MR HEREFORD has a Cow WT EPD of 78.0 and an accuracy of 0.74. We would expect the daughters of MR HEREFORD to be 10.0 pounds lighter when fully grown than daughters of a bull with a Cow WT EPD of 88, when used on the same group of cows (78.0 minus 88.0 = -10.0 pounds). MR HEREFORD is in the 35th percentile for Cow WT, meaning his daughters are predicted to be very slightly lighter than breed average.

Sustained Cow Fertility EPD and Accuracy

The Sustained Cow Fertility EPD reflects differences in the probability that a sire's daughters will remain in production continue calving through age 12, given that they calved as a two year old. In the example MR HEREFORD has an SCF EPD of 14.7 with an accuracy of 0.79. This means that daughters from MR HEREFORD have average likelihood of remaining in the herd (14.7% minus -14.7% = 0.0%). MR HEREFORD is in the top 55% of active sires for Stayability.

Udder Suspension EPD and Accuracy

The Udder Suspension EPD indicates differences in udder suspension of cows. A higher number indicates a tighter udder suspension. MR HEREFORD has an Udder EPD of 1.0 which indicates that daughters will have a slightly looser udder attachment than daughters from an average Hereford bull with an Udder EPD of 1.2 (1.0 – 1.2 = -0.2). MR HEREFORD is in the top 85% of the breed for Udder Suspension.

Teat Size EPD and Accuracy

The Teat Size EPD indicates differences in teat size of cows. A high number indicates smaller teat size. MR HERFORD has a Teat Size EPD of 1.0. This means that daughters from MR HEREFORD are expected to have slightly larger teats than daughters from an average Hereford bull with a Teat Size EPD of 1.2. (1.0 – 1.2 = -0.2). MR HEREFORD is in the top 85% of the breed for Teat Size.

Maternal Productivity Index and Accuracy

MR HERFORD has a Maternal Productivity Index (MPI) of 125.0. This indicates that MR HEREFORD combines traits that will result in his daughters being more productive cows than an average Hereford sire with an MPI of 124.5. MR HEREFORD is in the top 50% of the breed for MPI.

Feedlot Merit Index and Accuracy

MR HEREFORD has a Feedlot Merit Index (FMI) of 136. This indicates that MR HEREFORD is significantly better at producing terminal progeny than an average Hereford bull with an FMI of 116.7. MR HEREFORD is in the top 30% of the breed for FMI.

Residual Feed Intake EPD and Accuracy

The RFI EPD shows differences between expected feed intake and actual feed intake. A higher index value indicates lower than expected feed intake by progeny, with each point representing 10 pounds of feed. MR HEREFORD has an RFI EPD of 104 with an accuracy of 0.15. Referring to the breed ***average and percentile breakdown*** table for ***active sires*** this bull is 4.6 lbs. above the breed average for the RFI EPD for active sires and/or his progeny can be expected to eat 46 pounds less per year than calves from a sire with a 99.4 RFI EPD (104.0 minus 99.4 = 4.6 x10 = 46lb.).The accuracy of the trait is quite low at 0.15, however there is not a lot of RFI data available as of yet. MR HEREFORD is in the top 15% of the breed for residual feed intake.

Post Weaning Gain EPD and Accuracy

The PWG EPD reflects differences in the rate of gain of a sire's calves post-weaning. A higher value, represents a more rapid rate of gain. MR HEREFORD has a PWG EPD of 47.0 with an accuracy of 0.84. Referring to the breed ***average and percentile breakdown*** table for ***active sires***, this bull is 14.6 lbs. above the breed average for the PWG EPD for active sires and/or his progeny can be expected to gain on average 14.6 lb more between 205 and 365-days than progeny sired by a bull with an EPD of 32.4 (47.0 minus 32.4 = 14.6 lb.). More specifically, this bull is in the top 4 percent of all the breed in North America for post weaning gain. This sire's PWG EPD has a high accuracy.

Carcass Weight EPD and Accuracy

The Carcass Weight EPD shows differences in expected carcass weight of feeder progeny in pounds. A higher value indicates heavier carcasses. MR HEREFORD has a Carcass Weight EPD of 75.0 with an accuracy of 0.45. We would expect feeder calves from MR HEREFORD to have 10 pound heavier carcass weights than calves from an average Hereford bull (75.0 – 65.0 = 10.0 lb). MR HEREFORD ranks in the top 20% of the breed for carcass weight.

Fat EPD and Accuracy

The Fat EPD reflects differences in carcass backfat measures in feeder progeny. In the above example MR HEREFORD has a Fat EPD of 0.014 and an accuracy of 0.44. We would expect the average backfat of MR HEREFORD's progeny to be 0.001 inches more than progeny of a bull with a Fat EPD of 0.013 when used across the same group of cows. MR HEREFORD ranks in the top 60% of the breed for fat thickness.

REA EPD and Accuracy

The REA EPD reflects differences in rib-eye area carcass measures in feeder progeny. In the above example MR HEREFORD has a REA EPD of 0.48 and an accuracy of 0.41. We would expect the average REA of MR HEREFORD's progeny to be 0.10 in^2 larger than progeny of a bull with an REA EPD of 0.38, when used across the same group of cows. MR HEREFORD ranks in the top 35% of the breed.

Marbling Fat EPD and Accuracy

The MARB EPD reflects differences in carcass measures of marbling in feeder progeny, using USDA marbling scores. In the above example, MR HEREFORD has a MARB EPD of 0.26 and an accuracy of 0.62. We would expect the average intramuscular fat of MR HEREFORD's progeny to have 0.20 more units of intramuscular fat than progeny of a bull with an MARB EPD of 0.08 when used across the same group of cows. Using the table of *possible change values by accuracy level* we can see that MR HEREFORD's MARB EPD should not change by more than plus or minus 0.12 (0.34 to 0.58 units). The MARB EPD is highlighted in RED since the accuracy of the trait is greater than 0.60 and the EPD ranks in the top 10% of the breed. The table below demonstrates the relationship between USDA marbling scores and Canadian Quality Grades.

Marbling Description	USDA Score	Cdn Quality Grade
Abundant	10-10.9	Prime
Moderately Abundant	9-9.9	Prime
Slightly Abundant	8-8.9	Prime
Moderate	7-7.9	AAA
Modest	6-6.9	AAA
Small	5-5.9	AAA
Slight	4-4.9	AA
Traces	3-3.9	A
Practically Devoid	2-2.9	B1

Traits Observed, Number of Herds, Progeny and Daughters

This indicates whether the animal has Genomic (DNA) information included in their genetic evaluation. As well it provides information on the number of herds providing weaning data on the sire's progeny and the total number of weaning records used in the analysis from those herds. Both herds and progeny may include performance information from the Canadian and American Associations. In this example the sire was used in 40 herds and had 96 progeny included in the weaning weight evaluation. As well, there are 486 daughters of the bull, with progeny included in the evaluation.

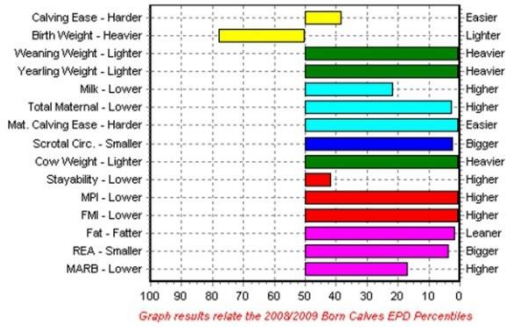
EPD Graphs on the CHA Website

The screen below appears when you select an animal on the CHA website under the EPD or Animal searches. What you may not be aware of is that there is a pictorial representation available of every animal's EPD **ranking** within the population.

Canadian Hereford EPD Graph for

Home Animal Inquiry EPD Inquiry Mating Predictor Member Inquiry Sale Catalogs Semen Catalogs

EPD Percentiles for



Graph results relate the 2008/2009 Born Calves EPD Percentiles

Fall 2010 EPDs

	Calving Ease	Birth Weight	Weaning Weight	Yearling Weight	Milk	Total Maternal	Maternal Calving Ease	Scrotal Circ.	Cow Weight	Stayability	MPI	FMI	Fat	REA	MARB
EPD	+0.9	+5.0	**+64.6**	**+111.5**	**+21.4**	**+53.7**	**+8.9**	**+1.4**	+92.0	+0.1	**+167.9**	**+200.8**	-0.034	**+0.53**	**+0.12**
Acc	.76	.94	.91	.91	.88	-	.74	.75	.94	.90	.90	.82	.77	.80	.74
Breed Avg. EPDs for 2008 Born Calves Click for Percentiles															
EPD	+0.1	+3.7	+42.3	+69.6	+15.8	+37.0	+0.6	+0.7	+34.7	-0.2	+138.5	+122.7	+0.001	+0.20	+0.03

Traits Observed: BWT,WWT,YWT,SC

Statistics: Number of Herds: **404**, Progeny with WW Analysed: **1767**, Daughters in Production: **1033**

Once you click on the graphic or the [View] link, this graph appears. It gives you a quick snapshot view of the animal's **ranking** within the population for each EPD. The graph is based upon the calf percentile table, so if you trying to compare older animals (i.e. animals with progeny), it is better to use the Active Sires and Active Dams percentile tables presented earlier in this document to determine rankings. If you are looking for yearling, 2 year old bulls, or replacement females, the graph on website is accurate. **Always keep in mind that EPDs do not represent actual values and EPDs must be used as a comparison between two or more animals.**