

April 2025: Genetic Base Change Resources

Table 1. Difference in predicted transmitting abilities (PTAs) of cows born in 2020 compared to those born in 2015.¹

Trait	Units	Breed					
		AY Ayrshire	BS Brown Swiss	GU Guernsey	HO Holstein	JE Jersey	MS M. Shorthorn
Milk	Pounds	142	381	68	752	355	6
Fat	Pounds	3	9	0	44	16	-7
Protein	Pounds	5	14	2	29	14	-3
Productive life	Months	0.08	0.9	0.72	2.31	1.61	0.37
Somatic cell score (SCS)	Log base 2 units	0.02	-0.04	0	-0.1	0.02	0.02
Daughter pregnancy rate	%	-0.99	-0.61	-0.45	-0.21	-0.39	-0.53
Heifer conception rate	%	-0.69	0.14	-0.32	0.94	1.41	-0.52
Cow conception rate	%	-1.15	-0.48	-0.85	0.45	0.05	-0.37
Cow livability	%	-0.86	0.47	-0.03	0.41	0.61	-0.04
Gestation length ²	Days	0.15	-0.08	0.16	-0.65	0.28	—
Residual Feed Intake	Pounds	—	0	—	-42.34	—	—
Milk fever / Hypocalcemia	%	—	0	—	0.07	0.1	—
Displaced abomasum	%	—	0	—	0.35	0.21	—
Ketosis	%	—	0	—	1.04	-0.06	—
Mastitis	%	—	-0.01	—	0.7	-1.05	—
Metritis	%	—	0	—	1.02	-0.02	—
Retained Placenta	%	—	0	—	0.01	-0.11	—
Early first calving	Days	-0.25	0.66	0.23	2.37	1.93	-1.72
Heifer Livability	%	—	—	—	0.46	0.18	—
Final Score	Points	0.2	0.2	0.3	*	0.5	0.2
Stature	Points	0.5	0.4	-0.1	*	0.5	0.2
Strength	Points	0	0.1	0.1	*	0.1	0
Dairy form	Points	0.2	0	-0.1	*	0.4	0.2
Front Teat Attachment	Points	0.3	0.2	0.2	*	0.2	0.1
Rear Legs – Side View	Points	-0.1	0	-0.2	*	0	-0.1
Body depth	Points	0.1	0	0	*	0	0.1
Rump angle	Points	0	0.2	-0.5	*	-0.3	0
Rump width	Points	0.2	0.1	0.2	*	0.3	0.2
Fore udder attachment	Points	0.5	-0.5	-0.7	*	0.9	0.2
Rear udder height	Points	0.4	-0.4	-0.5	*	0.5	0.2
Rear udder width	Points	0.2	0.2	0.2	*	0.1	0.1
Udder depth	Points	0.6	0.4	0.6	*	0.7	0.2
Udder cleft	Points	0.3	0.1	0.1	*	0.2	0.1
Front teat placement	Points	0.3	0.3	0.2	*	0.4	0.2
Teat Length	Points	-0.2	-0.4	-0.2	*	0.1	-0.1
Rear Legs – Rear View	Points	—	0.1	0.2	*	0	0.1
Mobility	Points	—	0.1	—	—	0	0.1
Milking Speed	Points	—	0	—	—	0	0
Rear teat placement – rear view	Points	—	0.1	—	—	0.3	—
Rear teat placement – side view	Points	—	—	—	—	-0.1	—
Lifetime Net Merit	Dollars	71	130	-15	404	179	-12
Lifetime Cheese Merit	Dollars	65	117	-17	375	166	-4
Lifetime Fluid Merit	Dollars	73	135	-13	417	184	-15
Lifetime Grazing Merit	Dollars	47	104	-39	386	151	-30

— Trait not calculated and published for breed

* Trait calculated by Holstein Association USA.

1. The noted differences in PTAs included in this table do not yet account for inbreeding and heterosis adjustments. These adjustments will impact published PTAs.

Table 2. Differences in actual (phenotypic) performance between cows born in 2020 and those born in 2015 attributed to genetic (BV=breeding value') and environmental changes.

Trait	Partitioned Change	Breed					
		AY Ayrshire	BS Brown Swiss	GU Guernsey	HO Holstein	JE Jersey	MS M. Shorthorn
Milk (pounds)	Phenotypic	200	914	-207	793	-161	80
	Genetic (BV)	284	762	136	1504	710	12
	Environmental	-84	152	-343	-711	-871	68
Fat (pounds)	Phenotypic	13	49	-5	1.9	8	12
	Genetic (BV)	6	18	0	88	32	-14
	Environmental	7	31	-5	21	-24	26
Protein (pounds)	Phenotypic	9	36	-3	55	5	3
	Genetic (BV)	10	28	4	58	28	-6
	Environmental	-1	8	-7	-3	-23	9
Productive life (months)	Phenotypic	-1.39	0.07	-0.63	1.39	-0.33	-0.42
	Genetic (BV)	0.16	1.8	1.44	4.62	3.22	0.74
	Environmental	-1.55	-1.73	-2.07	-3.23	-3.55	-1.16
SCS (Log base 2 units)	Phenotypic	-0.04	-0.14	-0.15	-0.16	-0.22	-0.09
	Genetic (BV)	0.04	-0.08	0.0	-0.2	0.04	0.04
	Environmental	-0.08	-0.06	-0.15	0.04	-0.26	-0.13
Daughter pregnancy rate	Phenotypic	-1.72	-0.29	-0.43	0.72	0.33	-0.39
	Genetic (BV)	-1.98	-1.22	-0.9	-0.42	-0.78	-1.06
	Environmental	0.2	0.93	0.47	1.14	1.11	0.67
Heifer conception rate %	Phenotypic	-0.21	-1.14	-2.35	0.75	2.67	-1.79
	Genetic (BV)	-1.38	0.28	-0.64	1.88	2.82	-1.04
	Environmental	1.17	-1.42	-1.71	-1.13	-0.15	-0.75
Cow conception rate %	Phenotypic	-3.79	1.34	-1.35	3.2	3.88	4.23
	Genetic (BV)	-2.3	-0.96	-1.7	0.9	0.1	-0.74
	Environmental	-1.49	2.3	0.35	2.3	3.78	4.97
Cow livability %	Phenotypic	0.02	0.0	0.02	0	-0.0	0.0
	Genetic (BV)	-1.72	0.94	-0.06	0.82	1.22	-0.08
	Environmental	1.74	-0.94	0.08	-0.82	-1.22	0.08
Gestation length (days)	Phenotypic	-0.48	-0.26	0.05	-0.0	0.01	—
	Genetic (BV)	0.3	-0.16	0.38	-1.3	0.56	—
	Environmental	-0.78	-0.1	-0.33	1.3	-0.55	—
Residual Feed Intake	Phenotypic	—	—	—	0.46	—	—
	Genetic (BV)	—	—	—	-84.68	—	—
	Environmental	—	—	—	85.14	—	—
Milk Fever / Hypocalcemia %	Phenotypic	—	0.99	—	-0.0	-0.0	—
	Genetic (BV)	—	-0.3	—	0.14	0.2	—
	Environmental	—	1.29	—	-0.14	-0.2	—
Displaced Abomasum %	Phenotypic	—	—	—	0.0	-0.0	—
	Genetic (BV)	—	—	—	0.7	0.42	—
	Environmental	—	—	—	-0.7	-0.42	—
Ketosis %	Phenotypic	—	—	—	0.01	0.0	—
	Genetic (BV)	—	—	—	2.08	-0.12	—
	Environmental	—	—	—	-2.07	0.12	—
Mastitis %	Phenotypic	—	-0.05	—	0.01	0.02	—
	Genetic (BV)	—	-0.02	—	1.4	-2.1	—
	Environmental	—	-0.03	—	-1.39	2.12	—
Metritis %	Phenotypic	—	0.89	—	0.01	-0.01	—
	Genetic (BV)	—	-1.92	—	2.04	-0.04	—
	Environmental	—	2.81	—	-2.03	0.03	—
Retained Placenta %	Phenotypic	—	0.0	—	0.0	-0.0	—
	Genetic (BV)	—	0.1	—	0.02	-0.22	—
	Environmental	—	-0.1	—	-0.02	0.22	—
Early first calving (days)	Phenotypic	4.81	-4.2	-2.8	2.74	-10.6	-8.73
	Genetic (BV)	-0.5	1.32	0.46	4.74	3.86	-3.44
	Environmental	5.31	-5.52	-3.26	-2.0	-14.46	-5.29
Heifer Livability %	Phenotypic	—	—	—	-1.83	-2.89	—
	Genetic (BV)	—	—	—	0.92	0.36	—
	Environmental	—	—	—	-2.75	-3.25	—
Lifetime net merit (\$\$)	Genetic (BV)	142	260	-30	808	358	-24
Lifetime cheese merit (\$\$)	Genetic (BV)	130	234	-34	750	332	-8
Lifetime fluid merit (\$\$)	Genetic (BV)	145	270	-26	834	368	-30
Lifetime grazing merit (\$\$)	Genetic (BV)	94	208	-78	772	302	-60

Table 3. Ratio of trait SD for base cows born in 2020 vs. those in 2015. The PTAs will be expanded (or contracted) by these ratios.

	Breed					
Traits	Ayrshire	Brown Swiss	Guernsey	Holstein	Jersey	Milking Shorthorn
Milk	1.032	1.055	1.002	1.006	0.912	1.048
Fat	1.020	1.026	0.974	1.042	0.907	0.997
Protein	1.018	1.060	0.987	0.998	0.895	0.998
SCS	0.989	0.998	1.028	1.018	1.008	1.011

Table 4. Ratio of trait SD for base cows born in 2020 compared to Holsteins. The PTAs will be expanded (or contracted) by these ratios.

	Breed					
Trait	Ayrshire	Brown Swiss	Guernsey	Holstein	Jersey	Milking Shorthorn
Milk	0.94	0.86	0.86	1	0.78	0.76
Fat	0.90	0.88	0.89	1	0.85	0.75
Protein	0.99	0.98	0.92	1	0.88	0.76
SCS	1.03	0.99	1.13	1	0.87	1.15