



IMPROVE GENETIC SELECTION

BY UNDERSTANDING TRAITS AND INDEXES

There is a lot of data to consider when it comes to selecting genetics. Traits, indexes, milk proteins, fertility - **what do they all mean and how do you use them within your dairy?** Use this as a resource to help you better understand what each trait, index, or other selection factors describe. Then, use it to understand the meaning of the values given on a bull proof as seen on ABS Bull Search or a female genomic evaluation result.

Today's U.S. dairy genetic evaluations are computed in April, August, and December by the Council on Dairy Cattle Breeding (CDCB), Holstein Association USA, and American Jersey Cattle Association. For Holstein and Jersey sires, evaluations are genomically enhanced and represent a blending of genomic data, pedigree information, and results from progeny.

INDUSTRY TRAITS

	TRAIT	TRAIT NAME	DESCRIPTION	EFFECT OF POSITIVE/ HIGHER VALUE
PRODUCTION	MILK	Milk LBS	Expected second-lactation milk production in pounds compared to breed average.	Increased Milk LBS
	FAT	Fat LBS	Expected second-lactation fat production in pounds compared to breed average.	Increased Fat LBS
	PRO	Protein LBS	Expected second-lactation protein production in pounds compared to breed average.	Increased Protein LBS
HEALTH AND FERTILITY	PL	Productive Life	Expressed as additional months of life in the milking string.	Increase lifetime days in milk
	LIV	Livability	Represents the additional percentage of cows that avoid dying on the farm, permitting producers to recoup disposal income.	Decrease mortality rate
	DPR	Daughter Pregnancy Rate	Percentage of non-pregnant cows that become pregnant during each 21-day period compared to breed average. Trait using a 50-day voluntary wait period. A DPR of 1 implies daughters from the bull will average 4 fewer days open in their lactation.	Decrease days open
	SCS	Somatic Cell Score	Uses somatic cell score data from the first five lactations as an indicator of mastitis resistance.	Increase Somatic Cell Count (SCC)
	HCR	Heifer Conception Rate	Percentage of inseminated heifers that become pregnant at each service, shown as a deviation in percentage.	Increase Conception Rate
	CCR	Cow Conception Rate	Percentage of inseminated cows that become pregnant at each service, shown as a deviation in percentage. For example, a bull with a CCR value of 1 implies that the conception rate for his daughters will likely be 1% higher during the lactation than daughters of a bull with an evaluation of 0.	Increase Conception Rate
	FS	Feed Saved	The expected pounds of feed saved per lactation based on body weight composite (BWC) and residual feed intake (RFI) evaluations. Larger, positive values are more favorable. This composite trait favors animals with lower BWC.	Increase feed efficiency
	RFI	Residual Feed Intake	The difference between the actual and expected feed intake expressed in pounds of dry matter consumed per lactation. Lower values are considered desirable.	Increase feed consumed
	MSPD	Milking Speed	Represents average pounds of milk per minute based on US Holstein parlor data. Average = 7.	Increase pounds per minute of milking time
	CDN MT	Canadian Milking Temperament	The temperament of first lactation cows at milking time. Average = 100, standard deviation = 5.	Increase of cows that are "calm" or "very calm" while being milked
	AHI	ABS Health Index	A composite index that includes mastitis, metritis, ketosis, displaced abomasum, hypocalcemia, retained placenta, twinning rate, and heifer survival. Average = 100, standard deviation = 5.	Decrease health issues

INDUSTRY TRAITS (CONTINUED)

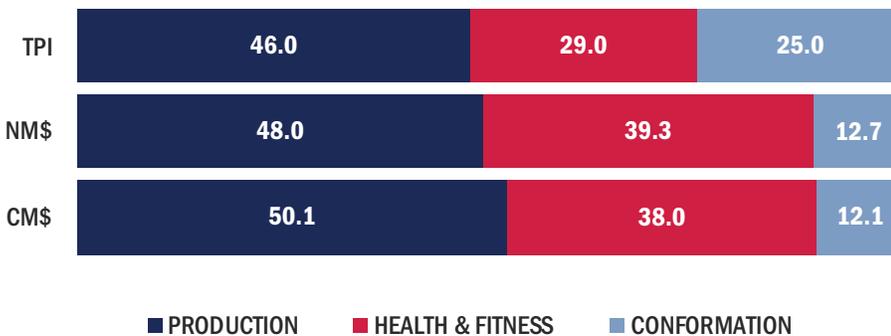
	TRAIT	TRAIT NAME	DESCRIPTION	EFFECT OF POSITIVE/ HIGHER VALUE
CALVING TRAITS	SCE	Sire Calving Ease	Percentage of difficult births expected in first calf heifers.	Direct estimate of difficult calvings
	DCE	Daughter Calving Ease	Percentage of difficult births expected for daughters sired by the bull.	Increase difficult calvings
	SSB	Sire Stillbirth	Percentage of stillborn calves expected for a sire.	Increase stillbirths
	DSB	Daughter Stillbirth	Percentage of stillborn calves expected for a sire's daughters.	Increase stillbirths
CONFORMATION	PTAT	Type	The difference in final score classification points compared to the base population.	Improve classification score
	UDC	Udder Composite	A composite index that incorporates fore and rear attachments, udder depth, cleft, teat placement, and stature.	Improve udder conformation
	FLC	Feet and Leg Composite	A composite index based on rear legs including rear view, foot angle, feet and legs score, and stature.	Improve leg conformation
	BWC	Body Weight Composite	A composite index that incorporates strength, body depth, rump width, dairy form, and positive stature.	Increase weight
	STA	Stature	Height at the hips.	Increase height
	STR	Strength	Evaluation of strength and substance including width of chest.	Increase strength
	BD	Body Depth	Evaluation of depth of barrel.	Increase body depth
	DF	Dairy Form	Evaluation of openness and angularity.	Reduce body condition
	RA	Rump Angle	The slope from the hips to the pins, measured in inches.	Reduce pin height
	TW	Rump Width/ Thurl Width	Distance between the pins, measured in inches.	Widen thurl
	RLS	Rear Legs: Side View	The angle of the set to the hock.	Increase leg set
	RLR	Rear Legs: Rear View	Evaluation of the rear legs ability to stand straight, wide apart with feet squarely placed.	Straighten leg
	FA	Foot Angle	The angle the front of the toes makes with the ground.	Increase steepness
	FLS	Feet & Legs Score	Classification score based on the cumulative evaluation of feet and leg traits including evidence of mobility.	Increase leg classification score
	FUA	Fore Udder Attachment	Evaluation of the strength, length, and capacity of the fore udder attachment.	Strengthen fore udder
	RUH	Rear Udder Height	Distance between the bottom of the vulva and the top of the milk secreting tissue, measured in inches.	Reduce distance between udder and vulva
	R UW	Rear Udder Width	The width of the rear udder where the udder attaches to the body, measured in inches.	Widen udder
	UC	Udder Cleft	Depth of cleft between the rear quarters, measured in inches; the trait has an intermediate optimum of 0, cleft stronger or weaker will be penalized.	Strengthen cleft
	UD	Udder Depth	The distance between the lowest point of the udder floor and the point of the hock, measured in inches.	Raise udder floor
	FTP	Front Teat Placement	The distance between the front teats, measured in inches.	Reduce distance between front teats
RTP	Rear Teat Placement	Distance between the rear teats; the trait has intermediate optimum of -1 (equal to 1.8 inches), teats closer or wider will be penalized.	Reduce distance between front teats	
TL	Teat Length	The length of the longest teat, measured in inches. For Holsteins, 0 represents the average teat length of 2.4 inches. -3 represents the teat length of 2.2 inches, and +3 represents the teat of length 2.6 inches.	Lengthen teats	

INDUSTRY INDEXES

While understanding industry indexes is important, ABS recommends using a **Custom Index to maximize genetic progress**. It gives you the power to include the traits and weightings that matter to you. Customize and prioritize trait selection based on your milk market, facilities, and business style by building a Custom Index.

INDEX	INDEX NAME	DESCRIPTION
TPI®	Total Performance Index	An industry index created by Holstein Association USA with the goal to offer a balanced approach to selection for production, health, and conformation.
NM\$	Net Merit Dollars	An industry index created by USDA that combines 39 individual traits for the NM\$ Holstein Index. Describes expected lifetime profit per cow as compared to the base population born in 2020. *Please note that Holstein and Jersey values are calculated slightly different.
CM\$	Cheese Merit Dollars	An industry index created by USDA that combines 39 individual traits more focused on components than NM\$. Describes expected lifetime profit per cow as compared to the base population born in 2020. *Please note that Holstein and Jersey values are calculated slightly different.
JPI™	Jersey Performance Index	An industry index created by the American Jersey Cattle Association with the goal to offer a balanced approach to selection for production, health, and conformation.
JUI™	Jersey Udder Index	An industry index created by American Jersey Cattle Association with the goal to identify high-performing, long-lived cows with durable udders.

RELATIVE EMPHASIS (%) OF TPI, NM\$, AND CM\$ FOR HOLSTEINS



TPI AND NM\$ INDEX WEIGHTINGS FOR HOLSTEINS

	PRO	FAT	MILK	Feed Efficiency	TYPE	UDC	FLC	BWC	RFI	LIV	PL	SCS	Health Index	DPR	CCR	HCR	EFC	HLIV	Calving Traits
TPI	19.0	19.0		8.0	8.0	11.0	6.0			3.0	5.0	-4.0	2.0	5.2	5.2	1.3	1.3		2.0
NM\$	13.0	31.8	3.2			1.3	0.4	-11.0	-6.8	5.9	13.0	-2.6	1.5	2.1	1.8	0.5	1.0	0.8	3.3
CM\$	17.4	30.0	-2.7			1.3	0.4	-10.4	-6.4	5.6	12.3	-3.2	1.4	2.0	1.7	0.5	1.0	0.7	3.2

MILK PROTEIN

MILK PROTEIN GENOTYPE	PROTEIN TYPE	DESCRIPTION
A1/A1 A1/A2 A2/A2	Beta Casein	One of the caseins in milk protein.
AA, AB, AE, BE, BB or EE	Kappa Casein	One of the caseins in milk protein. This is beneficial in cheese making since cows with the BB genotype for Kappa Casein have a slightly higher Kappa Casein content in their milk.

REAL WORLD DATA® (RWD®) TRAITS

TRAIT	DESCRIPTION	MEANING OF STARS
RWD® Bull Fertility	Use to provide ABS customers with an easy-to-use ranking of fertility for conventional for ABS sires.	Increase in conception rate.
TransitionRight®	Used to strategically choose ABS sires to enhance the transition health of your herd by making cows more genetically resistant to disorders including mastitis, metritis, and ketosis.	Reduce incidences of transition-related challenges.

POLLED VERSUS HORNED

GENOTYPE	RESULTING PHENOTYPE	DESCRIPTION
PP	Homozygous Polled	Animals will have no horns and all offspring will be born without horns.
Pp	Heterozygous Polled	Animals will not have horns, but offspring may or may not have horns depending on the sire they are mated to.
pp	Recessive Horned	Animals will be born with horns.



Profit from Genetic Progress

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