UNDERSTANDING U.S. SIRE PROOFS

GENETIC CODES
BD Bulldog*
BL Bovine Leukocyte Adhesion Deficiency (BLAD)*
TL Tested free of BLAD
BY Brachyspina*
TY Tested free of Brachyspina
CD Cholesterol Deficiency*
TC Tested free of Cholesterol Deficiency
CV Complex Veterbral Malformation (CVM)*
TV Tested free of CVM
DP Deficiency of Uridine Monophosphate Synthase (DUMPS)*
TD Tested free of DUMPS
MF Mulefoot*
TM Tested free of Mulefoot
PO Observed Polled**
PC Tested Heterozygous Polled**
PP Tested Homozygous Polled**
TP Tested free of the Polled Condition (horned)
RC Carrier for red hair color
B/R Black/Red hair colour*
TR Tested free to red hair colour
DR1 Tested Heterozygous for Dominant Red*
DR2 Tested Homozygous for Dominant Red*
* Recessive Gene Carrier
** Dominant Gene Carrier

Net Merit (NM)
Additional net profit the offspring will provide over her lifetime.
Expressed in $US.

Predicted Transmitting Ability - Type (PTAT)
Average: 0
Higher is better.

Total Performance Index (TPI)
Combines genetic proofs for production, type, longevity and fertility into a single value.
Higher is better.
GTPI = Genomic TPI value

Daughters and Herds
with production data
Reliability accuracy (increases with more daughters)

HAPLOTYPES AFFECTING FERTILITY
Researchers have identified 5 haplotypes (HH1-HH5) that affect cattle fertility mainly through early embryo losses. If an animal inherits a copy of this haplotype from each parent, that embryo will not survive to become a calf, so fertility is affected.

HAPLOTYPE FOR CHOLESTEROL DEFICIENCY (HCD)
A haplotype has been identified that causes calves to have no cholesterol in the homozygous state. Calves who produce no cholesterol will die at several months of age. The economic impact of this haplotype is quite large, due to the costs of raising the calf for months before it dies.

GTPI 2698

EX-90-CAN TR TL TY TV — HH1F HH2F HH3F HH4F HH5F HH6F HCDF

Reg. #: HO840M3130920421	aAa: 342156	DMS: 345,135
Born: 08/02/2015	Kappa Casein: BE	Beta Casein: A1A2

PRODUCTION — 53 Herds 169 Dtrs 94% Rel — MACE-G / 12-19

Milk lbs	Fat lbs	Fat %	Protein lbs	Protein %
278	**106**	**+0.35**	**28**	**+0.07**
NM$ **878**	CM$ **915**	FM$ **801**	GM$ **843**	DWP$ **1021**

Daughter Average (ME) Milk **28,167 lbs** Fat **1,166 lbs** Protein **910 lbs**

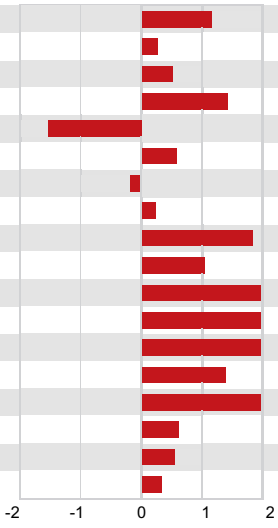
HEALTH & REPRODUCTION

Productive Life	**5.9**	Sire Calving Ease	**7.5%**	99% Rel
Somatic Cell Score	**2.75**	Daughter Calving Ease	**5.2%**	73% Rel
Daughter Pregnancy Rate	**2.4**	Sire Stillbirth	**7.2%**	
Livability	**3.0**	Daughter Stillbirth	**5.3%**	
Fertility Index	**2.5**	Feed Efficiency	**186**	

CONFORMATION — 32 Herds 70 Dtrs 91% Rel — MACE / 12-19

PTAT	**2.24**	Body Composite	**-0.06**
Udder Composite	**2.89**	Dairy Composite	**1.21**
Feet & Legs Composite	**0.79**		

Stature	Tall	**+1.16**
Strength	Strong	**+0.27**
Body Depth	Deep	**+0.52**
Dairy Form	Open Rib	**+1.42**
Rump Angle *	High	**-1.53**
Rump Width	Wide	**+0.60**
Rear Legs Side View *	Posty	**-0.17**
Rear Legs Rear View	Straight	**+0.23**
Foot Angle	Steep	**+1.88**
F & L Score	High	**+1.03**
Fore Attachment	Strong	**+3.02**
Rear Udder Height	High	**+4.12**
Rear Udder Width	Wide	**+3.79**
Udder Cleft	Strong	**+1.40**
Udder Depth	Shallow	**+2.27**
Fore Teat Placement *	Close	**+0.63**
Rear Teat Placement *	Close	**+0.56**
Fore Teat Length *	Long	**+0.34**



Origin of Production proof
CDCB = Domestic proof;
HA = Domestic Proof
MACE = Interbull MACE Proof
The letter "G" indicates the inclusion of genomic information

format: proof month/year

Productive Life (PL)
Measurement of longevity, including yield information.
Higher is better.

Somatic Cell Score (SCS)
An indicator trait for mastitis resistance based on the direct measure of somatic cells in milk samples. Lower is better.

Daughter Pregnancy Rate (DPR)
The percentage of non-pregnant cows that become pregnant during each 21-day period. A bull with a DPR of 1 indicates that his daughters have 1% higher pregnancy rate than a bull with a DPR of 0.
Higher is better.

Based on daughter classification.
Average: 0
Higher is better.

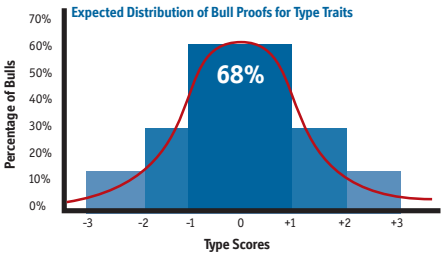
*For these traits, 0 is ideal.
These traits include **Rump Angle, Rear Legs Side View, Fore Teat Placement, Rear Teat Placement and Fore Teat Length.**

ANIMAL MODEL – The animal model represents proven methodology for calculating Predicted Transmitting Abilities (PTAs). Evaluations are based on the animal and its relationship to other animals being evaluated. Information from the animal itself, its ancestors, and its progeny are incorporated, with all known relationships among the animals considered.

PRODUCTION TRAITS – Production traits are expressed in predicted transmitting ability, which is an estimate of the genetic superiority or inferiority that an animal will transmit to the offspring.

TYPE TRAITS – Type Traits are expressed as Standardized Transmitting Abilities (STAs). This allows you to easily compare different traits of the same bull and see which traits have the most extreme values. The graph below illustrates normal distribution of bull proofs for conformation traits.

STANDARD DEVIATIONS – Simply put, the standard deviation tells us how far a bull is from the mean (average) value of all the bulls in the breed. The graph below shows the normal distribution of bull proofs for type traits with 68% of bulls ranging from -1 to +1, 95% from -2 to +2, 99% from -3 to +3, etc.).
For most bulls their scores will be close to the average of all the bulls, while fewer bulls will score at the high end or at the low end. Very few bulls reach scores as high as 3.2 as compared with over 99% of bulls that fall in the range of +3 to -3.



For more information on the American Proving System visit:
Council of Dairy Cattle Breeding (CDCB) at https://www.uscdcb.com