Heifer Management Blueprints

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Understanding Your Genomic Results

Introduction

After submitting DNA samples for genomic testing, there comes the daunting task of understanding and utilizing the results. Genomic results are typically organized and sent out in an electronic file. Results are reported 1 - 2 months after the sample is submitted. The spreadsheet will summarize all traits which are reported as Genomic Predicted Transmitting Abilities (**GPTA**). The report may also include separate sheets for net merit, core traits, type traits, composite indexes, reliability for all values, parentage information, definitions, and animals that were not reported.

Traits Included

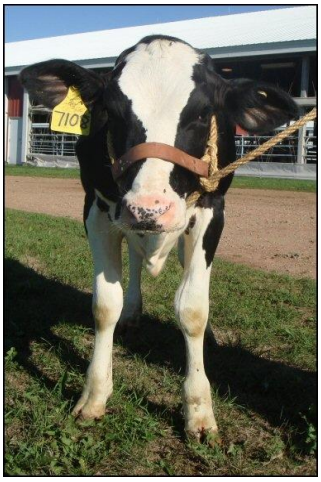
The most recognizable traits reported via genomic testing are genomic PTA values for the common production traits. Common production traits include milk yield, fat yield, protein yield, fat percent and protein percent. These traits are often combined into indexes such as Cheese Merit or Fluid Merit which are also reported.

Another common index used to evaluate dairy cattle, Net Merit, is also provided. Net Merit (**NM$**) predicts the lifetime profit of the calf or heifer and provides a useful way to rank results. NM$ includes GPTA's for yield, health, longevity and reproduction to predict the income that will be generated. The NM$ sheet will include the net merit GPTA for each calf or heifer alongside the net merit percentile rank for the breed.

The other composite indexes include Breed Performance Index, Calving Ability, Final Score Type, Udder Composite, Body Size Composite, and Feet and Legs Composite. Included in the report are up to 16 yield and health GPTA's as well as up to 18 linear type traits, which correspond to international type evaluations. Inbreeding coefficients and haplotype status for each animal are also included.

An Example

7099



7108

Two Holstein heifers, #7099 and #7108 (Pictured Above) were chosen from the UW Integrated Dairy Herd at the Marshfield Agricultural Research Station to demonstrate differences in genetic potential within a herd. Shown below is an example of the GPTA results for the heifers. Table 1 contains actual GPTA results for #7099 and #7108 from samples taken when the heifers were five months old. There are marked differences in their GPTA's for yield and type traits. Based on NM$, #7099 is expected to make $816 more (($474 - $66) x 2= $816) than #7108 over her lifetime. The table includes all traits and composites included in a genomics report alongside descriptions for each. The reliabilities and parentage information are not listed.

Table 1. Actual genomic report for heifers #7099 and #7108.

On-farm ID (Herd Management #)	7099	7108	
Official ID (Registration #, USDA AIN, Calfhood Vaccination #)	982000174866161	982000174866170	
Birth Date	1/10/2012	1/22/2012	
Sex	F	F	
Breed	HO	HO	Genomic testing is currently available for pure bred Holstein, Brown Swiss, and Jersey.
Platform 6K/50K	6K	6K	Genomic tests come in different sizes depending on the number of markers they examine. The 6K chip, which includes 6,909 markers, is considered the "low density" chip and is used most commonly for dairy females due to affordability.
Job #	US514173	US514173	Each group of submissions will be assigned a unique job number.

Trait/Composite	Results		Definition[1]
	#7099	#7108	
NM$	474	66	**Net Merit** index, expressed in dollars, represents the expected profit, compared to the breed average, over the lifetime of the animal. Traits pertaining to yield, health, longevity, and fertility are factored into the estimate.
CM$	520	73	**Cheese Merit** index, expressed in dollars, is a composite index that places more weight on protein and fat.
FM$	435	55	**Fluid Merit** index, expressed in dollars, is a composite index that places more weight on volume.
BPI	1905	1328	**Breed Performance Index**, expressed in index points, compares the animals with others in the breed based on the animal's predicted overall performance (combination production, health, and conformation).
Milk	1214	76	**Milk Yield**, expressed in pounds, demonstrates the differences in milk produced over a single lactation.
Fat	48	21	**Fat**, expressed in pounds, demonstrates the differences in fat produced over a 305-day lactation.
Prot	44	3	**Protein**, expressed in pounds, demonstrates the differences in protein produced over a 305-day lactation.
Fat %	0.02	0.07	**Fat** as a percent in milk.
Prot %	0.03	0	**Protein** as a percent in milk.
SCS	2.90	2.89	**Somatic Cell Score**, expressed as Log10, predicts susceptibility to mastitis compared to the breed base. A lesser value is more desirable.

DPR	-0.2	-0.5	**Daughter Pregnancy Rate**, expressed as a percent difference that a cow will become pregnant in a 21-day cycle compared with the breed average. Example: A DPR of 0 will have an approximate 4 more days open than a DPR of 1.
HCR	2	1.3	**Heifer Conception Rate**, expressed as a percent, predicts the likelihood of daughters becoming pregnant as a heifer. Example: HCR of 2 means daughters are 2% more likely to conceive as a heifer than an HCR of 0.
CCR	1	-0.2	**Cow Conception Rate**, expressed as a percent, predicts the likelihood of daughters becoming pregnant as lactating cows. Example: CCR of 1 means daughters are 1% more likely to conceive as a lactating cow than a CCR of 0.
PL	3.2	0.7	**Productive Life**, expressed in months, predicts the difference of months in milk compared to the breed average.
SCE	6	9	**Sire Calving Ease**, expressed as a percent, predicts the calving difficulty for first-calf heifers. Lower numbers correspond to easier calving.
DCE	7	8	**Daughter Calving Ease**, expressed as a percent, predicts the calving difficulty for first-calf heifers. Lower numbers correspond to easier calving
SSB	7.4	8.1	**Sire Still Birth**, expressed as a percent, predicts the percent of calves from a sire to be stillborn or die within 48 hours.
DSB	6.6	7.8	**Daughter Still Birth**, expressed as a percent, predicts the percent of calves from a cow to be stillborn or die within 48 hours.
CA$	24.6	-2.8	**Calving Ability**, expressed in dollars, is a composite of traits relating to calving ease and still birth rates.
Type-FS	1.28	-0.29	**Final Score Type**, expressed in points, composite of physical traits.
UDC	0.54	-0.69	**Udder Composite**, expressed in points, index to measure overall udder composition. Positively correlated to productive life.
FLC	1.26	-0.06	**Feet and Legs Composite**, expressed in points, incorporates several feet and leg traits. Positively correlated to productive life.
BDC	0.7	0.14	**Body Size Composite**, expressed in points, incorporates several traits concerning size and strength. Positively correlated to weight.
ST	1.11	0.47	**Stature**, expressed in values based on short to tall, a greater value indicates a taller animal.
SG	0.03	-0.2	**Strength**, expressed in units based on frail to strong, a greater value indicates a stronger animal through the chest.
BD	0.31	-0.24	**Body Depth**, expressed in values reflecting shallow to deep, a greater value indicates a greater depth of rib.
DF	1.56	0.2	**Dairy Form** is expressed in values reflecting tight to open.
RA	0.4	1.41	**Rump Angle** is expressed in high pins to sloped. The values indicate the differences in the slope from hips to pins with

			values near zero being desirable.
RW	0.92	-0.06	**Rump-Thurl Width** is expressed in values that range from narrow to wide width between the pins. The greater the value, the wider width.
LS	-0.85	-0.17	**Rear Legs Side View** is expressed in values to indicate posty to sickle. A value near zero is desirable.
LR	1.25	-0.2	**Rear Legs Rear View** values indicate the difference in width of stance from hock-in to straight. The greater the value, the straighter the animal tracks on its rear legs.
FA	1.09	-0.08	**Foot Angle**, values range from low to steep. The greater the value, the greater the hoof angle.
FLS	1.41	-0.1	**Feet/Legs Score** is a composite score of feet and leg traits. A higher value is more desirable.
FU	-0.13	-0.48	**Fore Udder Attachment**, expressed in units to indicate loose to strong. The greater the value, the greater strength of the fore udder attachment.
UH	1.67	-0.58	**Rear Udder Height**, values indicate low to high. The greater the value, the higher the rear udder.
UW	1.54	-0.53	**Rear Udder Width**, values indicate narrow to wide with greater values indicating a wider rear udder.
UC	1.49	-1.14	**Udder Cleft**, rates the depth of the cleft between the rear quarters from weak to strong. The greater the value, the stronger the cleft.
UD	-0.09	-0.16	**Udder Depth**, rates the distance between lowest point of the udder floor and the point of the hock. A higher value is desirable.
FT	0.2	-1.72	**Front Teat Placement**, rates the distance between the base of the front teats. The greater the value, the closer the teats.
RT	1.04	-2.1	**Rear Teat Placement**, rates the distance between the rear teats. The greater the value, the closer the teats.
TL	0.13	1.16	**Teat Length** indicates the predicted length of the longest teat. A value close to zero is desirable.
Ind Inbrd	3.7	2	**Genomic Individual Inbreeding**, expressed as a percent, measures the homozygosity (same genes inherited from both parents) of the animal. A value close to zero is more desirable.
Fut Inbrd	7.7	6	**Genomic Future Inbreeding**, expressed as a percent, indicates the amount of homozygosity the progeny of this animal will contribute if mated at random. A lower number is more desirable.
HH1	F	F	**Holstein Haplotype 1, 2, and 3**, expressed as "C" for Carrier or "F" for Free. Breeding a carrier female to a carrier bull may result in a 25% embryonic death.
HH2	F	F	
HH3	F	F	

[1] Definitions were derived from information provided by Pfizer Animal Health at: https://animalhealth.pfizer.com/sites/pahweb/US/EN/Products/PublishingImages/Genetics%20Images/CLARIFIDE%20Understanding%20Results.pdf