

DNA Technology Made Simple

Goldrush Genetics has asked Rick Pfortmiller, our IGENITY Representative, to provide some insight into DNA testing and how you can incorporate this additional information into your selection methods.

IGENITY – Comprehensive, Practical and Powerful

Genetic testing has been available to the beef industry for several years. Beginning with markers for coat color and parentage and expanding into carcass traits, these DNA tools are just the tip of the iceberg of what the future will hold. With advances in technology, new markers for these and other traits of economic importance continue to be uncovered. IGENITY, a division of Merial Limited, a global animal health company, is at the forefront of DNA testing in beef cattle.

The IGENITY Profile

A unique feature of IGENITY is the profile concept that evaluates and reports results from a single DNA sample derived from tail hair follicles, an ear tag tissue punch, or a semen or blood sample. Currently, this genetic analysis includes the carcass composition traits of Quality Grade, Yield Grade, Tenderness, Marbling, Ribeye Area, Hot Carcass weight and Fat Thickness. In addition, the IGENITY Profile also includes genotyping for parentage confirmation in multi-sire matings and breeding record reconciliation. Coat color determination is also included in the IGENITY Profile and is valuable for the breeds (Goldrush Gelbvieh) and composites (Goldrush Balancers) selecting or monitoring black or red coat color.

Profile Score Advantages

Several tests currently on the market have reported the genotypes in the results and breeders and their customers have based their selections upon them. As the industry identifies new and more informative markers for a wider range of traits, the management and interpretation of the results becomes complicated and time consuming without expensive analysis tools. To assist beef cattle breeders and commercial ranchers in understanding the value of the DNA information, IGENITY incorporated a scoring system for each trait using a scale of 1 to 10. Higher values are not necessarily better – it indicates the animal has the potential for more of that trait.

The values listed in the chart below reflect the relative difference expected in animals compared to contemporaries with an IGENITY profile score of 1. A brief explanation of each trait follows the table.

IGENITY Result	Yield Grade	%Choice Based on Quality Grade	Ribeye Area in Square Inches	Hot Carcass Weight lbs.	Back Fat Thickness in Inches	USDA Marbling Score	Tenderness in lbs. of WBSF
10	0.44	44.5	0.95	45.5	0.100	85.3	-2.27
9	0.39	38.9	0.85	39.8	0.085	76.6	-1.95
8	0.33	34.3	0.74	34.1	0.070	67.4	-1.85
7	0.28	30.3	0.68	28.7	0.060	57.9	-1.54
6	0.23	25.2	0.51	23.3	0.050	48.4	-1.22
5	0.19	19.9	0.41	21.8	0.040	39.0	-1.13
4	0.15	14.9	0.27	16.6	0.033	29.6	-0.79
3	0.11	10.2	0.21	11.4	0.025	20.1	-0.42
2	0.05	5.6	0.11	5.7	0.013	10.1	-0.21
1	0	0	0	0	0	0	0

Yield Grade:

Higher IGENITY Yield Grade scores equal a genetic potential for a higher USDA Yield Grade. Since higher Yield Grade values equate to more fat and or less muscle, animals with higher IGENITY profile scores are expected to be fatter and or lighter muscled. A group of animals with an IGENITY profile score of “10” for Yield Grade can be expected to receive a Yield grade score that is 0.44 units of a grade higher than an animal that receives a score of “1”. A USDA Yield Grade 1 (Y1) relates to the lower IGENITY profile scores, while a USDA Yield Grade 5 (Y5) reflects higher IGENITY profile scores.

Quality Grade (% USDA Choice):

Higher IGENITY scores for Quality Grade equal greater genetic potential to grade Choice or higher. In a group of animals with an IGENITY Profile score of “10” for Quality Grade, you would expect 44.5% more animals to grade USDA Choice (or higher) than a group of animals that score “1”.

Ribeye Area:

In a group of animals with an IGENITY profile score of “10” for Ribeye Area, the average ribeye area is expected to be 0.95 square inches greater than in a group of animals that score “1”. Higher scores reflecting larger ribeye areas; lower IGENITY profile scores reflect smaller ribeye areas.

Hot Carcass Weight:

Higher IGENITY Profile Hot Carcass Weight scores equal heavier carcass weights. In a group of animals with an IGENITY Profile score of “10” for Hot Carcass Weight, the average carcass weight is expected to be 45.5 lbs. greater than a group of animals that score “1”. Carcass weight profile scores are related to expected differences in carcass weights assuming the cattle are harvested at approximately the same fat thickness. The targeted fat thickness for fed cattle is approximately 0.5 inches. Higher carcass weight scores should reach 0.5 inches of fat at heavier weights.

Fat Thickness:

In a group of animals with an IGENITY profile score of “10” for Fat Thickness, the average fat thickness is expected to be 0.10 inches greater than in a group of animals that score “1”. Lower IGENITY profile scores indicate less external fat, while higher scores reflect more external fat.

Marbling Score:

Higher IGENITY scores for marbling equal greater genetic potential for marbling. In a group of animals with an IGENITY profile score of “10” for marbling, the average marbling can be expected to be 85.3 points greater than animals with a score of “1”. Beef Quality for Marbling uses a 1 to 999 point scale in the USDA Beef Grading system. Marbling points reflect how much intramuscular fat is present in the carcasses, and thus the potential to grade USDA Choice. The minimum marbling requirement for USDA Choice carcasses is 400 units of marbling. Each marbling score has 100 units. Therefore the 85 unit range from IGENITY Profile scores 1 to 10 equals almost one full marbling score.

Tenderness:

The IGENITY profile score for Tenderness represents an animal’s genetic potential for tenderness as measured by Warner-Bratzler shear force (WBSF) with “10” the most tender and “1” the least tender. Lower shear force means more tender beef. In a group of animals with an IGENITY Profile Tenderness score of “10”, 2.27 lbs. less shear force is required than an animal with an IGENITY profile of “1”. This means higher IGENITY profile scores represent animals that are more tender than those with lower scores.

How to use the IGENITY Profile

IGENITY Scores are easy to incorporate into your selection criteria. If you are a commercial cattleman, you may want to focus on just the Quality Grade, Yield Grade and tenderness scores and identify those animals that best represent the future direction of your operation. If you are a seed stock producer, with the individual traits of Ribeye area, Carcass Weight and Fat Thickness being available, the opportunity to micro-manage and meet your optimum goals is possible.

In a future issue, we will discuss how the IGENITY Profile can assist in bull management, heifer selection and marker-assisted management in the feedlot.

If you would like additional information on IGENITY, go to www.igenity.com or give me a call at (785) 230-9507 or drop me an e-mail at rick.pfortmiller@merial.com.

Converting from Bovigen to IGENITY

Goldrush repeat customers may recall that a majority of the DNA testing in the past was done through Bovigen, LLC, which customarily utilizes a star designation indicating the presence or absence of an allele for a marker. For example, if a bull was homozygous for both alleles on the Calpain 316 marker, it was designated as a 2 star animal.

For the 2006 Goldrush sale offering, results were reported for a total of five markers – three in the Tenderness category and two in the Quality Grade category. While this reporting method has been widely recognized, caution must be exercised when interpreting the results. A common misconception is that two animals with identical numbers of stars are identical from a gene marker standpoint. As illustrated below in Table 1, each of these bulls has equal number of 7 stars but different genetic values due to the different marker combinations.

Table 1. Bovigen Solutions GeneSTAR Results:

Animal ID	Quality Grade		Tenderness		
	TG5	M2	CAST	Calp316	Calp4751
S32	0	*	**	**	**
R89	**	*	**	*	*

These two bulls were also DNA tested using IGENITY in the spring of 2007. The Profile scores are reported in Table 2 below. Note that additional traits are included in addition to the Quality Grade and Tenderness markers. We see differences between each of these bulls relative to their individual traits. Depending on the traits that you are selecting for you might choose one bull over the other. If you place more emphasis on carcass cutability, the R89 bull would indicate more favorable scores for muscling and leanness where the S32 has a slight advantage in tenderness.

Table 2. IGENITY Results:

Animal ID	Tenderness	Fat Thickness	Yield Grade	Ribeye Area	Carcass Weight	Quality Grade	Marbling Score
S32	10	6	6	6	5	4	5
R89	7	3	3	8	8	4	5

Because IGENITY and Bovigen, LLC utilize different proprietary markers and report the results differently, it can appear challenging. As a Goldrush customer accustomed to the stars system of reporting, you are now analyzing IGENITY Profile scores in your selection criteria. While there is no direct conversion between the two companies, if you have used the previous technology to emphasize particular traits, you can continue this same selection pressure by selecting animals with the favorable IGENITY scores on those same traits.