

IGENITY[®] Results Key

for beef

v6a

Using the power of DNA, IGENITY helps you understand and manage the potential for animals to perform and transmit traits of economic importance. The comprehensive profile includes:

Carcass Composition

The IGENITY profile scores for Yield Grade, Ribeye Area, and Backfat Thickness are calculated using multiple DNA markers that reflect the animal's genetic potential for these traits. For example, animals with an IGENITY profile score of 10 for Ribeye Area will have a 2.56 in² larger ribeye than animals which score a one. Ribeye Area is scored in square inches, Backfat in inches, and Yield Grade in Yield Grade scores (1-5). These IGENITY results provide a more complete picture of the Carcass Composition potential for an animal.

Carcass Quality

The IGENITY profile scores for Quality Grade and Marbling reflect extremely powerful multiple marker analyses which are indicative of an animal's potential for intramuscular fat deposition and Choice or better Quality Grade carcasses. The IGENITY profile score for Marbling Scores translate to the 100 to 999 scale, where 400 represents low Choice. Marbling score is particularly useful in deciding between animals with similar marbling EPDs or ultrasound data. The IGENITY profile for Quality Grade reflects the percent Choice or higher – so 64.4% more animals with an IGENITY Quality Grade score of 10 will grade Choice or higher than animals with a score of 1.

The IGENITY profile score for Tenderness score represents animals' genetic potential for tenderness as measured by the Warner Bratzler shear force test, with 10 being the most tender and 1 the least tender.

Maternal and Reproductive Traits

Reproduction is arguably the most economically important trait for Cow/Calf producers.¹ Heifer Pregnancy Rate is a heifer's chance at becoming pregnant over a normal breeding season, relative to other heifers. Stayability is the chance a heifer will remain in the herd until at least six years old, relative to other animals. Maternal Calving Ease is measured as the percentage of unassisted births – a higher value is greater calving ease. These IGENITY profiles can be used to make replacement heifer decisions as well as be used to select future maternal sires.

Average Daily Gain

A key profitability measurement for any operation, Average Daily Gain (ADG) is measured in lbs of gain per day. The IGENITY profile results for ADG identifies an animal's genetic potential for rate of gain, for both calves and post-weaning growth. Animals which score a 10 will gain an additional .81 lbs per day over animals which score a 1 – which could mean a 166 lb difference over 205 days.



Using the 1 to 10

The values listed in the chart on the back reflect the relative difference expected in animals compared to contemporaries with an IGENITY profile score of 1. Higher scores are not necessarily better – it just means that the animal has the potential for more of that trait. For the most informed decisions use IGENITY profiles in conjunction with other selection and management tools like conformation and EPDs. Select the scores which are best for your animals and your operation.



Feed Efficiency

The IGENITY Feed Efficiency analysis predicts genetic potential for Residual Feed Intake (RFI). RFI describes an animal's feed intake above or below its predicted needs for maintenance and growth. An animal with a low RFI score will

- Eat less to achieve the same gains,
- Gain more on the same amount of feed,
- Require less feed to maintain body condition as a mature adult.

The results of Feed Efficiency combined with ADG give you a powerful look at an animal's ability to grow efficiently, maintain body condition as a mature animal and have efficient offspring.

Results are specific to *Bos indicus* or *Bos taurus*.

Docility

Calm cattle are not just about handler safety – calm cattle eat more², have better response to vaccinations and pre-conditioning³, and are more tender.⁴ The IGENITY profile for docility is the animal's genetic potential to be extremely calm, or to have calm offspring. Higher scores from IGENITY for this trait indicate a higher percentage of calves that possess acceptable behavior.

Coat Color

The IGENITY Coat Color analysis looks at the genes that determine red or black coat color. Results are reported as:

Y Homozygous Black

N Not Homozygous black

The black (ED) gene is dominant over red (e). Black animals may carry one or two copies of the black gene. Only homozygous black animals will have 100% black offspring.

Wild Type (E+) is neutral to red and black, and generally allows the expression of the other gene. The following results are available online:

E^{ED}E^D Homozygous Black

E^{ED}E⁺ Black Carrier, Wild Type

E^De Red Carrier

E⁺e Red Carrier, Wild Type

E⁺E⁺ Wild Type, Any Color

ee Red

Horned/Polled

The IGENITY Horned/Polled analysis uses multiple markers to identify horned and polled animals. The polled allele is dominant over the horned allele, so animals can appear polled despite carrying a horned gene. This analysis is breed specific for purebred animals and each breed has a different set of markers involved. The results do not reveal the presence or absence of scurs.

HH Homozygous Horned

PP Homozygous Polled

HP Heterozygous Horned/Polled

I Indeterminate

IH One Horned allele, one indeterminate allele

Myostatin

Myostatin, as part of the IGENITY Profile, analyzes for nine different variants of the myostatin gene, even though some may not be found in all breeds.

Six variants are classified as "disruptive;" these cause muscle hypertrophy (double-muscling), larger birth weights, increased dystocia and enhanced tenderness.

Three myostatin variants are referred to as "missense," and will increase muscularity and reduce external and intramuscular fat, with no change in birth weight.

For all myostatin variants one copy is intermediate.

Disruptive variants are:

C313Y **nt419**

E226X **nt821**

E291X **Q204x**

Missense variants are:

D182N

F94L

S105C

Myostatin results are reported as:

0 None of the nine possible variants are present

1, Variant One copy of the listed variant is present

2, Variant two copies of the listed variant are present

Bovine Viral Diarrhea - Persistently Infected (BVD PI)

This is a test for the presence of the BVD virus. Negative animals are free of the BVD virus. Positive animals have the virus present. If there is a positive test result, first contact your veterinarian. To make sure that the calf is not transiently infected with BVD, wait 30 days and re-submit a new sample on the same animal. If that sample is also positive, it is likely that the calf is persistently infected with BVD.

SR (Sample Rejected)

Samples may be rejected for many reasons including insufficient follicles, fecal contamination, excessive dirt, evidence of tampering, mold or other foreign matter.

NR (No Result)

Some samples may look normal, but still are unable to produce acceptable results. This often occurs due to contaminants that are undetectable to the naked eye, dirt, mold or other foreign matter.

For both SR and NR results, a sample from the same animal can be resubmitted at no charge.

X

Results are not complete.

Genetic Abnormalities

Full Name	Abbreviation	Result	Description
Arthrogyposis multiplex	AM	AMF AMC AMA	AM free AM carrier AM affected
Chondrodysplasia	CHO	CHOF CHOC CHOA	CHO free CHO carrier CHO affected
Coat Color Diluter	DL	DLF DLC DLH	DL free DL carrier DL homozygous
Dun	DN	DNF DNC DNH	DN free DN carrier DN homozygous
Idiopathic epilepsy	IE	IEF IEC IEA	IE free IE carrier IE affected
Neuropathic hydrocephalus	NH	NHF NHC NHA	NH free NH carrier NH affected
Osteopetrosis	OS	OSF OSC OSA	OS free OS carrier OS affected
Pulmonary hypoplasia with anasarca	PHA	PF PC PA PNR	PHA free PHA carrier PHA affected NR for PHA
Pulmonary hypoplasia with anasarca for Dexter	PHAD	PFD PCD PAD PNRD	PHA free for allele specific to Dexter PHA carrier for allele specific to Dexter PHA affected for allele specific to Dexter NR for allele specific to Dexter
Tibial hemimelia	TH	THF THC THA THFO THCO THAO	TH free TH carrier TH affected TH free for Outcast TH carrier for Outcast TH affected for Outcast

Validation Process

Analyses in the comprehensive IGENITY® profile begins with the discovery of DNA markers (most often single nucleotide polymorphisms or SNPs). All the markers behind the IGENITY profile were discovered by independent scientists at research institutions, including universities, research organizations, and government entities such as USDA.

Markers are then analyzed at IGENITY in validation populations. High quality validation is dependent on good quality resource populations. IGENITY uses multiple resource populations that represent various production environments and biological types, often working with industry partners from the seedstock, cow-calf, feedlot and/or packing segments of the beef industry to collect phenotypes that are not commonly available. To date, IGENITY has captured data from tens of thousands of animals with hundreds of phenotypes under many different types of environmental conditions for use in its validation efforts.

Once the phenotypic data is captured, geneticists at IGENITY carefully analyze marker associations, using analytical methods that are well documented in the scientific literature and reviewed with academic and government scientists to ensure their validity and acceptance. Markers are analyzed individually and in groups of markers to determine the most powerful combination for any given trait. Thousands of animal phenotypes are used to conduct these analyses, resulting in confidence that any significant associations discovered will have a high probability of truly occurring in various biological types and environments. Only after new markers pass this rigorous validation process does IGENITY make new markers available to the beef industry.

Visit www.IGENITY.com for additional information, to order additional kits and view your results online.

IGENITY profile results and associated effects *

IGENITY Result	Residual Feed Intake (Indicus)**	Residual Feed Intake (Taurus)**	Average Daily Gain***	Tenderness in lbs. of WBSF	USDA Marbling Score	% Choice & higher	Yield Grade	Back Fat Thickness (in)	Ribeye Area (in ²)	Heifer Pregnancy Rate (%)	Stavability (%)	Maternal Calving Ease (%)	Docility (%)
10	5.5	4.2	0.81	-2.3	161.4	64.4	1.35	.37	2.56	18.8	16.7	9.5	45.4
9	5.0	3.6	0.72	-2.0	141.3	57.2	1.21	.32	2.22	16.2	14.7	8.4	39.6
8	4.2	3.1	0.64	-1.9	123.6	50.1	1.07	.28	1.93	14.2	12.9	7.3	34.7
7	3.6	2.7	0.54	-1.5	106.4	42.9	0.92	.24	1.64	12.1	11.2	6.2	30.0
6	3.0	2.2	0.44	-1.2	88.4	35.8	0.76	.21	1.35	10.0	9.5	5.1	25.3
5	2.4	1.8	0.34	-1.1	70.6	28.6	0.61	.17	1.07	8.1	7.6	4.1	20.5
4	1.9	1.3	0.24	-0.8	53.3	21.5	0.46	.13	0.80	6.0	5.8	3.1	15.7
3	1.2	0.9	0.14	-0.4	35.5	14.3	0.31	.09	0.53	4.0	3.9	2.0	10.7
2	0.6	0.4	0.05	-0.2	17.7	7.2	0.15	.06	0.24	1.9	2.5	1.0	5.8
1	0	0	0	0	0	0	0	0	0	0	0	0	0
P-value	5.7E-13	8.04E-08	2.4E-19	1.9E-08	3.8E-18	1.0E-20	1.6E-16	3.9E-20	1.8E-14	2.6E-30	1.1E-34	4.2E-32	3.1E-19

*Data on file at Merial. Results expressed represent differences expected in animals compared to contemporaries with IGENITY Profile scores of 1.

**Lbs of feed per day.

*** Lbs of gain per day.

WBSF = Warner-Bratzler shear force

