Igenity® Beef

The Path of Confidence

NEOGEN® | Igenity® Beef

Welcome to Igenity®

Since its introduction in 2003, the revolutionary Igenity® DNA testing portfolio has powered confident decisions in cow-calf production. Igenity profiles provide a tool to rank cattle on traits that impact productivity, helping commercial producers select replacement heifers based on genetic merit. Igenity ranks cattle using simple one to ten scores for key traits.

Contents

Getting Started

Beef Genomics Empower Your Future

Select, manage, and market cattle with more confidence. Evaluate maternal, performance, and carcass traits in one step. Focus time, feed, and resources on young breeding stock of verified merit.

- Invest in heifers that improve stayability and reproduction.
- Raise cows tailored to your production and grazing goals.
- Confidently select for grids, value-added marketing programs, and retained ownership.

Leverage Crossbreeding Plus DNA Selection

Igenity® is designed for crossbred and straightbred cattle of eight key breeds. This unique design helps you use heterosis plus DNA scores to make faster progress on your goals.

The U.S. Meat Animal Research Center has shown that lifetime production in weaning weights increased about 36 percent due to heterosis in British-cross cows. Longevity increased 16 percent.

Add in Igenity and you can put targeted selection pressure on traits your heifers will pass on to their offspring. By combining Igenity and crossbreeding, you get the benefits of both.

Commercial Cattle Products

Igenity Beef Profile/Crossbred and Straightbred Heifers

Get 17 maternal, performance, and carcass traits plus parentage — ideal for maternal line improvement (and bulls without EPDs).

- Maternal: Birth weight, calving ease direct, calving ease maternal, stayability, heifer pregnancy, docility, and milk.
- Performance: Residual feed intake, average daily gain, weaning weight, yearling weight, and scrotal circumference.
- Carcass: Tenderness, marbling, ribeye area, fat thickness, and hot carcass weight.
- SeekSire™ parentage.

Maximize Potential, Generation After Generation

A study by the Red Angus Association profiled 91 Red Angus calves with Igenity and followed them through harvest. The top 25 head scored 2.4 Igenity points higher for average daily gain and marbling than the bottom 25 head. The top calves netted $50 per head more at harvest.

Improving a 250-head cow herd's Igenity weaning weight scores by one point would increase calf-crop production by 1,750 pounds annually.

Fertility traits are considered lowly heritable, but even modest gains make an impact on your bottom line. A one point increase in Igenity stayability scores would reduce your cow replacement rate by 48 heifers needed to maintain a 250-cow herd over six years.

Holding back a heifer is a risk of $2,000 per head in costs and lost opportunity. A reduction of 48 replacement heifers would save around $96,000. Plus, it may take years to see if you retained the best. With Igenity, you can more confidently select the heifers that will protect your investment and maximize potential in each generation.

Igenity® Beef Results Key

How to Interpret Your Igenity Beef Results

Igenity® profiles of replacement heifers and non-registered bulls help you evaluate their genetic potential for maternal, performance, and carcass traits. This makes it easy to review and focus on those making the biggest impact.

Igenity reports on 17 traits to help you select, manage, and market your cattle. Using Igenity profiles can help you know more about the genetic potential of young breeding stock before you have made significant investments in their development.

Maternal Traits Drive Production

Maternal
Birth weight, calving ease direct, calving ease maternal, stayability, heifer pregnancy, docility, and milk

Calving difficulties, cows that don't breed back, heifers with poor conception, cattle with poor dispositions, and cows that milk too much, or not enough, all hurt your bottom line. Evaluating maternal traits in your breeding stock helps you develop a cow-herd that will be more productive for years to come.

Performance Traits Drive Efficiency

Performance
Residual feed intake, average daily gain, weaning weight, yearling weight, and scrotal circumference

Heifers and cows that don't require extra feed to maintain body condition are more efficient cows. By selecting females with lower residual feed intake and higher average daily gain, you will improve efficiency of maintainence and gain in your herd. Selection pressure on these traits can help improve feed efficiency in future calf crops, too. For example, pens of feeder calves can be grouped with other animals of similar potential, and be fed or marketed based on that potential. This leads to more uniform and efficient gain in the finishing phase.

Carcass Traits Drive Value

Carcass
Tenderness, marbling, ribeye area, fat thickness, and hot carcass weight

Predicting carcass merit is important whether you are raising feeder calves for sale at weaning, retaining calves to finish, and/or selling on quality grids. Igenity allows you to select breeding stock that produce high-quality carcasses among their progeny. Plus, sorting high-quality cattle from lower-potential cattle helps you manage and market each group more appropriately.

How to Use Your Scores

Igenity Genetic Effects Table							
Maternal Traits							
Igenity Scores	Birth Weight	Calving Ease Direct	Calving Ease Maternal	Docility	Heifer Pregnancy Rate	Milk	Stayability
	(lbs.)	(%)	(%)	(%)	(%)	(lbs.)	(%)
10	9	17.8	16.1	16.8	12.3	42.8	53.6
9	8	15.8	14.3	15	10.9	38	47.6
8	7	13.9	12.5	13.1	9.5	33.3	41.7
7	6	11.9	10.7	11.2	8.2	28.5	35.7
6	5	9.9	9	9.4	6.8	23.8	29.8
5	4	7.9	7.2	7.5	5.4	19	23.8
4	3	5.9	5.4	5.6	4.1	14.3	17.9
3	2	4	3.6	3.7	2.7	9.5	11.9
2	1	2	1.8	1.9	1.4	4.8	6
1	0	0	0	0	0	0	0

Igenity Genetic Effects Table					
Performance Traits					
Igenity Scores	Average Daily Gain	Residual Feed Intake	Weaning Weight	Yearling Weight	Scrotal Circumference
	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(%)
10	0.26	0.69	50.7	87	1.59
9	0.24	0.61	45.1	77.3	1.41
8	0.21	0.54	39.4	67.7	1.23
7	0.18	0.46	33.8	58	1.06
6	0.15	0.38	28.2	48.3	0.88
5	0.12	0.31	22.5	38.7	0.71
4	0.09	0.23	16.9	29	0.53
3	0.06	0.15	11.3	19.3	0.35
2	0.03	0.08	5.6	9.7	0.18
1	0	0	0	0	0

Igenity Genetic Effects Table					
Carcass Traits					
Igenity Scores	Hot Carcass Weight	Fat Thickness	Ribeye Area	Tenderness	USDA Marbling Score
	(lbs.)	(in.)	(sq. in.)	(lbs. WBSF)	(marb. units)
10	102.5	0.25	1.7	-1.2	150
9	91.1	0.23	1.5	-1	133
8	79.7	0.2	1.3	-1	117
7	68.3	0.17	1.1	-0.8	100
6	56.9	0.14	0.9	-0.6	83
5	45.6	0.11	0.8	-0.6	67
4	34.2	0.08	0.6	-0.4	50
3	22.8	0.06	0.4	-0.2	33
2	11.4	0.03	0.2	-0.1	17
1	0	0	0	0	0

Understanding One to Ten Igenity® Scoring

This chart allows you to cross reference the one to ten Igenity® scores for traits with their corresponding molecular breeding values or expected effects. This molecular breeding value is the prediction of how future progeny of an animal are expected to perform compared to the progeny of other profiled animals. Higher scores are not necessarily better — they just mean the animal has more genetic potential for that trait.

Comparing Scores Between Profiled Animals

The examples below show you how to equate Igenity scores to variations in molecular breeding value effects from the genetic table.

Heifer Pregnancy Rate (HPR)	Igenity Score	Genetic Effect	Description
Animal A	8	9.5%	Animal A will produce daughters with a 6.8% higher probability of conceiving during a normal breeding season compared to daughters of Animal B.
Animal B	3	2.7%	
		6.8%	

Stayability (STAY)	Igenity Score	Genetic Effect	Description
Animal A	8	41.7%	Daughters of Animal A have a 29.8% greater probability of staying in the herd until six years of age than daughters of Animal B.
Animal B	3	11.9%	
		29.8%	

Average Daily Gain (ADG)	Igenity Score	Genetic Effect	Description
Animal A	8	0.21 lbs.	Animal A is expected to produce progeny that will gain 0.15 pounds more per day than progeny of Animal B, and therefore weigh 22.5 pounds more after 150 days on feed.
Animal B	3	0.06 lbs.	
		0.15 lbs. per day	

Residual Feed Intake (RFI)	Igenity Score	Genetic Effect	Description
Animal A	8	0.54 lbs.	Progeny of Animal B are predicted to consume 0.39 pounds less feed per day than progeny of Animal A to achieve the same daily gain.
Animal B	3	0.15 lbs.	
		0.39 lbs.	

Definitions of Traits Reported

Maternal Traits

Birth weight (BW): Variation in birth weight a heifer or bull will pass along to its offspring. A higher score indicates greater genetic potential for heavier birth weight.

Calving ease direct (CED): Percentage of unassisted births, indicating greater probability a calf will be born unassisted out of a first-calf heifer. Genetic factors such as birth weight and shape of the calf are included in calving ease direct. A higher value is greater calving ease.

Calving ease maternal (CEM): The probability a first-calf heifer will calve unassisted. Calving ease maternal includes all genetic factors that impact a heifer's ability to calve unassisted, such as pelvic area and her genetic contribution to birth weight. A higher value is greater calving ease.

Stayability (STAY): The chance a heifer will remain in the herd as a productive cow until at least six years of age. A higher value is desired.

Heifer pregnancy rate (HPR): A heifer's potential to conceive during breeding season, relative to other heifers. A higher value is desired.

Docility (DOC): The animal's genetic potential to be calm or have calm offspring. Higher scores indicate a higher probabiltiy of progeny with acceptable disposition.

Milk (M): Expressed as pounds of calf weaning weight affected by the milk production of a calf's dam. This is not a prediction of actual pounds of milk produced.

Performance Traits

Residual feed intake (RFI): This is an indicator of feed efficiency. It is the difference in animals' daily consumption of feed to achieve the same level of daily gain. Lower residual feed intake indicates greater feed efficiency.

Average daily gain (ADG): Based on pounds of gain per day. The Igenity® score for average daily gain identifies an animal's genetic potential for post-weaning growth.

Scrotal circumference (SC): Difference in scrotal size as an indication of fertility in replacement females. A higher score equates to higher scrotal size.

Weaning weight (WW): Pounds at age of 205 days.

Yearling weight (YW): Pounds at age of 365 days.

Carcass Traits

Tenderness (TEND): Animals' genetic potential for carcass tenderness as measured by the Warner-Bratzler Shear Force test. A higher score indicates greater tenderness.

USDA marbling (MARB): Marbling score indicates the degree of marbling in the rib eye at the twelfth rib expressed in USDA marbling units.

Ribeye area (REA): Estimates muscling in a beef carcass and is measured in square inches of the ribeye muscle at the twelfth rib.

Fat thickness (FAT): Scored as depth of fat in inches over the ribeye muscle at the twelfth rib. Higher fat thickness scores equate to lower lean yield.

Hot carcass weight (HCW): Hot carcass weight is the hot or unchilled weight of the carcass after slaughter and the removal of the head, hide, intestinal tract, and internal organs.

Other Reports

Sample rejected (SR): The quality of DNA testing starts with the quality of the sample. Common reasons for sample rejection are: lack of animal ID on the sample, improper or blank information on an order form, insufficient hair follicle samples, mold, dirt, foreign or fecal matter, evidence of tampering, or sending in decomposing animal tissue.

No result (NR): Some samples appear normal but don't produce acceptable results due to contaminants that are undetectable to the eye. To test the animal, a new sample will need to be submitted.

Results are not complete (X): At times, Neogen® will send out partial results, such as providing BVD PI results before Igenity profiling is completed. The traits scored as an X indicate the analysis for that test has not yet been completed.

Envigor™ Results Key

What is Envigor™

Envigor ™ reports an estimate of heterosis in crossbred cattle. Reported on a scale of one to ten, the results can be used as an indication of hybrid vigor. A higher score indicates increased heterosis.

Benefits of Hybrid Vigor

- Increased fertility.
- Lower cull rates.
- More pounds weaned per cow exposed.
- Greater feed efficiency.

Lowly vs. Highly Heritable Traits

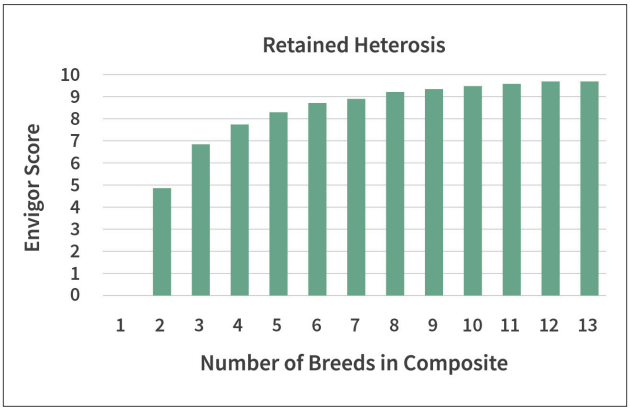
General Rule of Thumb: Some Traits are Strongly Influenced by Genetics While Others are More Impacted by Management and Environment			
	Structural/Carcass Traits	**Performance Traits**	**Maternal/Fertility Traits**
Heritability	High	Moderate	Low
Traits	Ribeye area, marbling, and fat thickness	Weaning weight, yearling weight, average daily gain, and residual feed intake	Birth weight, calving ease, stayability, heifer pregnancy, and milk
Igenity Beef	Strong influence	Moderate influence	Minimal influence
Envigor	Minimal advantage	Moderate advantage	Strong advantage

Impact on Fertility/Stayability

- A one score increase leads to a 4 percent increase in the probability of a heifer breeding as a yearling.
- A one score increase leads to a 4 percent increase in the probability of a cow staying in the herd for six years.
- A one score increase leads to a 2 percent decrease in the probability of an animal having a health event.

Law of Diminishing Returns

The advantage of increased heterosis diminishes as more breeds are added. Unlike Igenity® Beef Scores, Envigor results are not about achieving a ten.



How to Use the Scores

- Even producers with a well-managed crossbreeding scheme will have a wide variety of heterosis in a single calf crop.
- Envigor scores can be used to select replacements that are benefiting the most from a crossbreeding program.

Putting Your Results to Work

How to Use the Results

Using the reports can help in many ways. For example, you can use the scores to sort cattle and manage them for breeding or production, or the data can help you pinpoint strengths and weaknesses in your cow herd and identify traits you want to improve. Long term, you can use your Igenity® reports to track improvements across multiple traits, increase uniformity in your cattle, and measure your progress.

Contact your Neogen® representative to learn about the benefits of better, faster decision making through our Encompass data management platform. To bring you this online resource we've partnered with iYOTAH Solutions to host results management on their nTell website.

What is an Index and How Do I Use It?

Using Indexes

Indexes allow for selection pressure on multiple traits at the same time, depending on a producer's breeding objectives. Producers today are likely to believe more than a single trait is important. Furthermore, it is not difficult to believe selection for one trait would impact other traits as well. For example, selection for increased weaning weight is likely to result in increased yearling weight and average daily gain. While Igenity Profiles provide index values centered around total production, maternal, or terminal breeding programs, the Encompass online platform allows individuals to also design an index tailored to their needs.

Reading the Chart

Selection pressure: The amount of emphasis placed on the animal's breeding value for that trait.

Traits: Each molecular breeding value reported in an Igenity Beef Profile.

Impact on one to ten scores: This is the estimated change in Igenity scores following one generation of selection using this index. These impacts are graphically provided in the chart.

Igenity® Production Index

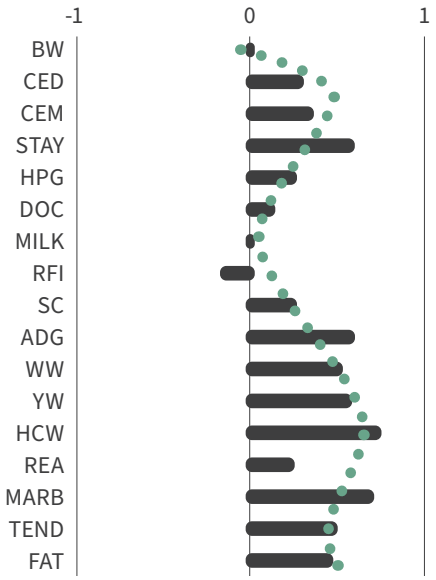
The Igenity® Production Index balances maternal traits with gain and carcass characteristics, placing a large emphasis on stayability, marbling, and hot carcass weight, with a negative emphasis on residual feed intake.

This index is designed for producers wanting to keep their own replacement females while either marketing calves with superior carcass potential or retaining ownership and harvesting on a grid.

Production Index Trends — How to Interpret

- Significant increases in marbling and hot carcass weight due to larger emphasis.
- Positive increases in maternal traits such as stayability and calving ease.

Igenity Production Index				
	Selection Pressure	Traits	Impact on 1–10 Scores	Custom Index Trends
Maternal		BW	0.00	
		CED	0.29	
	10%	CEM	0.35	
	25%	STAY	0.58	
		HPG	0.24	
		DOC	0.13	
		MILK	0.00	
Production	-10%	RFI	-0.16	
		SC	0.25	
		ADG	0.58	
		WW	0.51	
		YW	0.56	
Carcass	20%	HCW	0.72	
	10%	REA	0.23	
	20%	MARB	0.69	
	5%	TEND	0.48	
		FAT	0.45	



*Herd results may vary dependent on individual selection intensity.

Igenity® Maternal Index

The Igenity® Maternal Index laces emphasis on fertility, weaning weight, and calving ease, with a negative emphasis on residual feed intake.

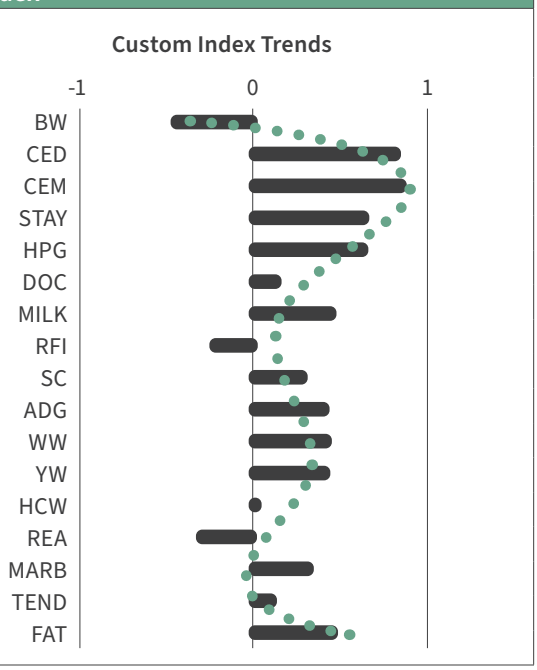
This index is designed for producers wanting to keep their own replacement females and market calves at weaning.

Maternal Index Trends — How to Interpret

- Improved staybility and cow maintenance trends.
- Favorable impacts on birth weight and calving ease.
- Modest increases in milk.

Igenity Maternal Index

	Selection Pressure	Traits	Impact on 1–10 Scores
Maternal		BW	-0.46
	10%	CED	0.83
	15%	CEM	0.86
	20%	STAY	0.64
	15%	HPG	0.63
		DOC	0.13
	10%	MILK	0.45
Production	-10%	RFI	-0.23
		SC	0.28
		ADG	0.40
	20%	WW	0.42
		YW	0.41
Carcass		HCW	0.02
		REA	-0.31
		MARB	0.33
		TEND	0.11
		FAT	0.46



*Herd results may vary dependent on individual selection intensity.

Igenity® Terminal Index

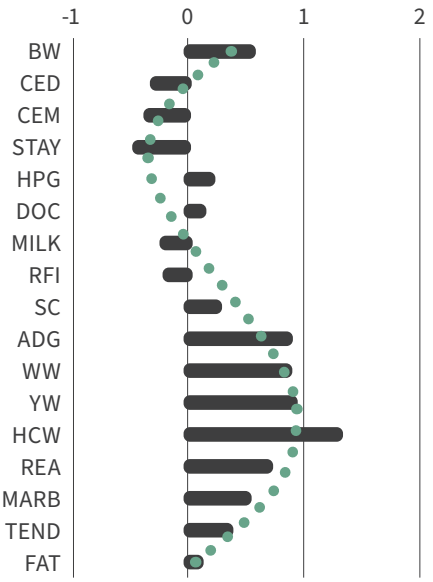
The Igenity® Terminal Index is specialized to identify animals with superior carcass performance. It places the highest emphasis on hot carcass weight, followed by marbling and ribeye area. There is, however, a negative emphasis placed on residual feed intake and fat thickness to control feed costs.

This index is designed for producers who retain ownership of progeny to identify calves who are likely more profitable as feeder calves compared to replacement heifers.

Terminal Index Trends – How to Interpret

- Substantial increases in terminal traits including average daily gain, weight traits, ribeye area, and marbling.
- Mild effects on birth weight and calving ease.

Igenity Terminal Index				
	Selection Pressure	Traits	Impact on 1–10 Scores	
Maternal		BW	0.54	
		CED	-0.30	
		CEM	-0.35	
		STAY	-0.45	
		HPG	0.20	
		DOC	0.12	
		MILK	-0.21	
Production	-15%	RFI	-0.21	
		SC	0.26	
		ADG	0.86	
		WW	0.86	
		YW	0.91	
Carcass	40%	HCW	1.31	
	10%	REA	0.70	
	20%	MARB	0.51	
	5%	TEND	0.35	
	-10%	FAT	0.10	



*Herd results may vary dependent on individual selection intensity.

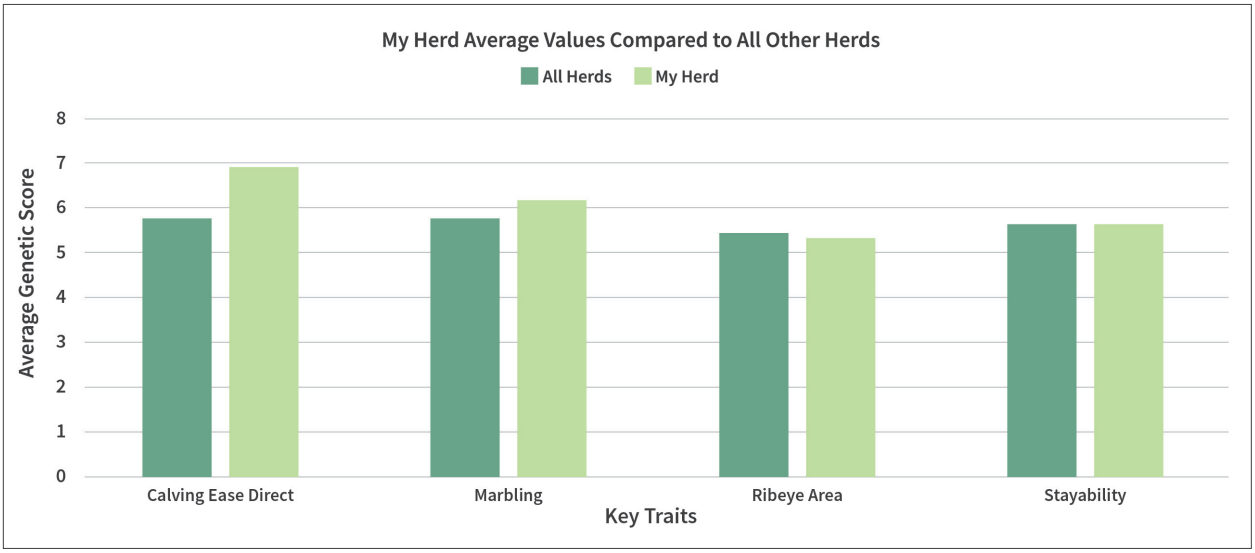
Detailed Report

All traits in the test order are scored from one to ten, including the selection indexes — ten is more of the trait and one is less of the trait. Traits are grouped by maternal, performance, and carcass categories. The report ranks cattle in the test order based on the Igenity Maternal Index or the Igenity® Total Cow Index if Envigor™ was ordered. The Igenity Total Cow Index combines maternal traits and an Envigor score into a weighted index.

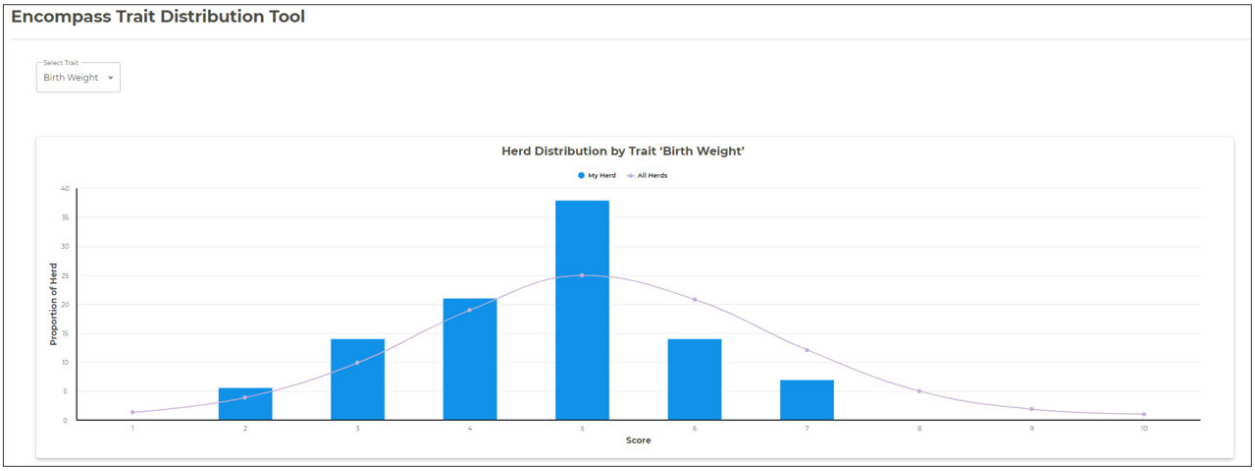
Animal Information				Decision Indexes			Maternal							Production					Carcass				
Animal ID Number	Sample Barcode Number	Gender (M/F)	Breed	Igenity Total Cow Index	Igenity Maternal Index	Igenity Production Index	BW	CED	CEM	HPR	MILK	STAY	DOC	WW	ADG	YW	RFI	SC	MARB	REA	FAT	TEND	HCW
7006	NE01038115			6.49	6.40	6.50	3	8	9	5	7	8	5	5	6	5	9	5	7	5	6	6	6
3035	NE01038104			6.23	6.45	6.05	5	7	6	7	4	8	5	7	5	6	7	6	6	5	6	7	5
3023	NE01038092			6.15	6.35	6.10	7	5	6	7	5	7	7	7	5	6	5	9	7	4	7	7	5
6023	NE01038112			6.13	6.50	6.05	2	10	8	4	7	8	6	4	4	4	5	6	6	2	7	9	4
3024	NE01038091			5.96	6.30	5.90	5	7	8	6	4	8	7	5	5	5	6	4	6	3	7	10	3
7014	NE01038116			5.96	6.30	6.50	5	7	8	6	5	7	6	5	5	5	5	5	7	5	8	5	6
817	NE01038106			5.87	6.55	6.55	5	8	9	6	4	7	6	5	3	4	4	6	6	6	8	8	5
6008	NE01038114			5.87	5.85	5.30	6	6	7	4	4	6	8	7	7	7	5	7	4	5	4	4	5
3027	NE01038095			5.81	6.30	5.90	4	7	9	7	7	5	6	5	6	5	6	8	7	4	6	5	6
64	NE01038109			5.76	6.25	5.85	5	7	8	5	5	6	7	7	6	7	6	8	6	5	6	7	5
8001	NE01038102			5.74	6.40	6.20	5	7	6	6	4	8	7	8	7	8	8	10	6	6	6	10	5
3001	NE01038108			5.74	6.40	5.40	6	5	6	10	7	5	6	7	6	7	7	7	6	5	8	5	6
7005	NE01038117			5.72	6.20	6.25	7	6	7	5	8	7	5	6	7	6	7	7	7	5	7	6	6
4007	NE01038099			5.68	6.50	5.60	3	9	9	9	4	4	5	5	5	5	4	5	7	4	8	4	5
4000	NE01038105			5.64	6.10	5.65	5	6	5	7	5	6	7	7	6	7	5	9	6	5	7	7	5
3063	NE01038113			5.57	5.85	5.20	7	5	5	8	4	5	6	7	5	6	5	6	5	5	7	7	5
501	NE01038100			5.45	5.70	6.15	5	4	6	4	7	6	4	6	7	6	4	5	7	4	7	7	6
7001	NE01038120			5.38	6.15	6.05	4	9	8	5	3	6	7	6	7	7	5	9	7	4	7	7	5

Encompass

This online platform allows you to quickly and easily make selection decisions to drive progress in your herd. Contact your Neogen® representative to schedule a demonstration of Encompass.



Encompass Online Platform



Logging into your Encompass account gives you access to DNA test results, details of DNA reports, and profiling tools, all created to enhance decision making.

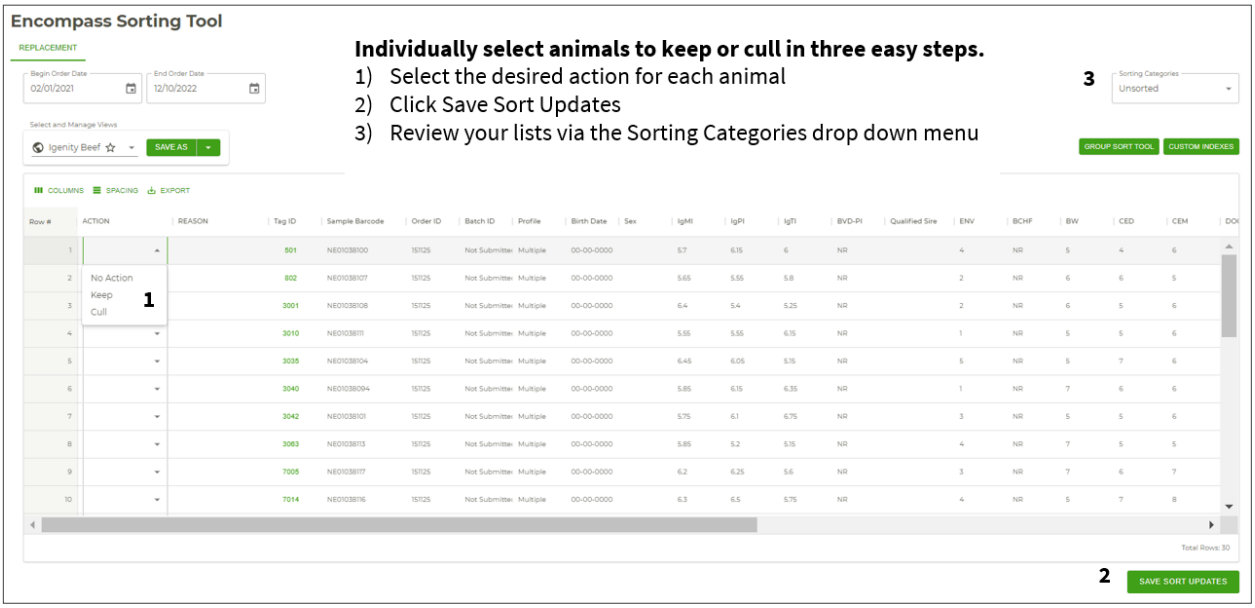
Use the Encompass Online Platform to Compare, Rank, and Select Cattle

Encompass will help you evaluate the DNA of your commercial breeding stock.

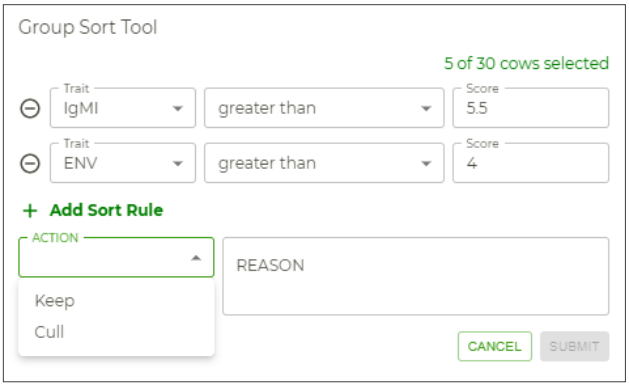
You can call up herd reports and assess their maternal, performance, and carcass traits. Use the site to sort cattle, compare them to herd mates, and benchmark against other herds in the database.

By using the site tools, you can easily see patterns, strengths, and areas needing improvement.

The Encompass sorting tool gives you the power make selection decisions on animals individually or by group criteria.

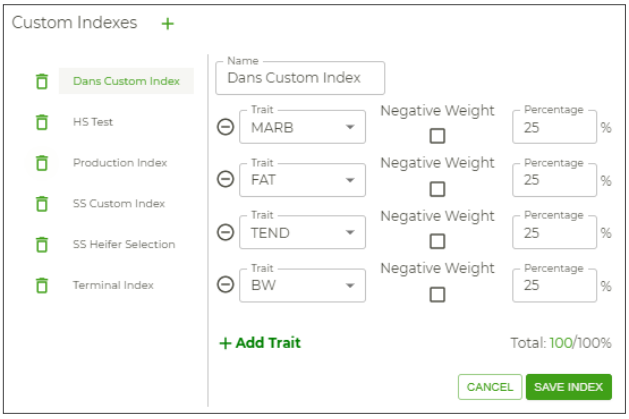


To make selection decisions on multiple animals using trait criteria, you can use the group sort tool.



Custom Indexing

We explain how the traits are used in the index, but not every ranch is the same. If you want a unique index for your management plan or region, you can create a new index in seconds and save it for your future use.



SeekSire™ Parentage

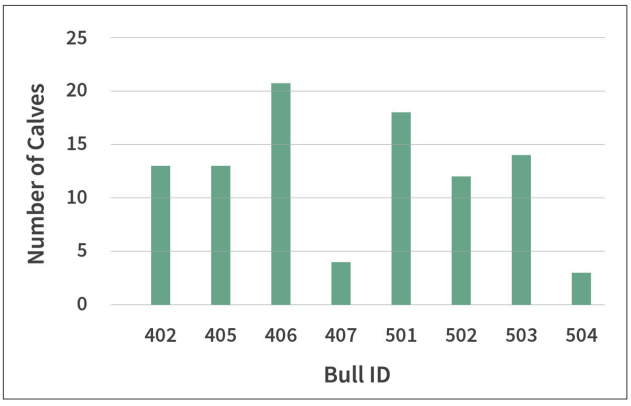
How Sire Parentage Information Complements Heifer Profiling

DNA profiles can help you select replacement heifers. You can also use DNA testing to determine sire parentage. Following both practices helps you pick your best heifers, find your best bulls, and make faster progress on genetic improvement in your herd.

Advantages of Parentage Verification

- Find the top and bottom bulls.
  - Identify bulls with most influence in your calf crop.
  - Confirm sires that caused calving problems.
  - Discover the sires of early born calves.
  - Identify the sires of any abnormal calves.
  - Retain ownership? Find the bulls siring the top and bottom carcasses.
- Know earlier which traits to emphasize when purchasing your next bulls.
- Match calves to their dams to track cow productivity.
- Best of all, compliments Igenity® Beef at the time of order. Discover the sires of your best replacement heifers and most productive cows.

Each of these advantages can have a major impact on the bottom line. If you do have a problem bull, it may take an extra year to identify him without verifying the parentage of the current year's calf crop.



Getting value: In this real example of yearling bulls, no. 407 and no. 504 are under-performing compared to the group.


53

To get on the path to value, call 877.Igenity or visit IgentyBeef.com