NEOGEN®

WHITE PAPER

IGENITY® FEEDER

For Stocker and Feedlot Cattle

Igenity Feeder

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- Igenity Feeder by Neogen enters the industry as a first-of-its-kind genomic profile designed specifically for terminal cattle destined for the backgrounding and feedlot phases of production.
- Designed to identify animals with increased carcass potential, especially when sold on a grid
- Cattle ranked in the top 25% for the Igenity Terminal Index had larger ribeye area, hot carcass weights, and marbling scores compared to animals in the bottom 25%[1]
- If sold on the same grid, that would have resulted in a 5%, or $76.54 increased revenue per animal
- Igenity Days on Feed (DOF) Index is designed to identify and rank animals who gain, mature, and fatten at a faster rate, resulting in fewer projected DOF
- When combined with enrollment weights, cattle can be grouped into pens according to their predicted days to feed for optimum profitability
- For a given feedlot entry weight, a one-score increase in DOF Index values is equal to approximately 20 less DOF

Igenity Feeder Product Development and Features

Fueled by the largest multi-breed genetic evaluation globally, Igenity Feeder benefits from the accumulation of over 15 million phenotypes and 300,000 genotypes within the International Genetic Solutions (IGS) database. Seedstock breeders' commitment to collecting this data unlocks the ability to predict genetic merit — using only a sample of DNA.

While the resources powering the genomic predictions are the same as those used in our replacement heifer profile, Igenity Beef index weightings and calculations are the product of years of research utilizing information collected from thousands of feedlot cattle located across the US. Based on previously published data outlining how cattle grow in terms of weight and body composition[5] as well as knowledge of how cattle are fed and profit is made, the scientists at Neogen have developed Igenity Feeder as a tool to help producers and feedlot operators maximize their investment in terminal cattle. First, the Igenity Terminal Index is designed to rank cattle according to their genetic potential for terminal traits, while the Days on Feed (DOF) Index is designed to rank cattle based on their potential for gain and fattening. Together, these indexes will assist in the marketing and management of cattle at all stages in the beef supply chain.

As a commercial straight-bred and crossbred tool, the target population for testing is limited by the breeds of cattle used to develop the predictions. For Igenity Feeder, these include animals of any combination Angus, Charolais, Gelbvieh, Hereford, Limousin, Maine Anjou, Red Angus, Shorthorn, or Simmental, or animals of these breeds with up to 50% Bos indicus content. Cattle with majority breed composition outside of those nine breeds are not recommended for testing on Igenity Feeder. Igenity Feeder does not include parentage verification; however, it does qualify for the Neogen Igenity Branded Program.

Indexes for Optimized Grouping

In the seedstock industry, predictions of genetic merit are expressed as Expected Progeny Differences (EPDs) and are a composition of pedigree, phenotype, and genomic information (when available), for a single trait at a time.

Our Igenity Profiles for commercial cattle leverage that information, in partnership with the Institute for Genomic Sciences (IGS), to estimate Molecular Breeding Values (MBV) using only genomic information.

While knowledge of an animal's underlying value for specific traits of interest is useful for selecting and breeding decisions, it can sometimes be a lot of information to balance at once. This is especially true from a stocker or feedlot perspective when producers group like-cattle together. Selection indexes provide an opportunity to rank animals based on a summation of their genetic merit across a multitude of traits. These traits can also be weighted according to their importance and economic impact. For simplification, Igenity Feeder reports two index values that provide insight into an animal's potential economic return. These index measures rank animals from 1 (low) to 10 (high) based on their genetic predisposition for desired trends, be it carcass revenue or DOF.

Igenity Terminal Index

The Igenity Terminal Index is designed to rank animals according to their genetic potential for terminal traits of interest. It places the most emphasis on hot carcass weight, followed by marbling and ribeye area, with negative emphasis placed on residual feed intake and fat thickness. Higher Igenity Terminal Index values indicate animals with increased carcass potential, especially when sold on a grid.

Days on Feed (DOF) Index

The Days on Feed (DOF) Index is designed to rank cattle according to their genetic potential for gain and fattening. Based on prior knowledge of how cattle grow and deposit weight as they mature, this index includes traits such as hot carcass weight, fat thickness, marbling, and even average daily gain (ADG). Higher DOF Index values indicate animals who mature and fatten at a faster rate, resulting in fewer estimated DOF.

The Value of Both Indexes?

While these indexes seem similar and include some overlapping information, what they are estimating is quite different. The Igenity Terminal Index is a prediction of potential carcass merit, while the DOF index is an estimate of how quickly an animal will mature and put on weight. Both pieces of information provide key insights into the profitability of an animal.

During validation, the correlation between these two indexes was no different than zero, proving that the Igenity Terminal Index and DOF Index do provide independent insights. Furthermore, cattle with both increased Igenity Terminal and DOF Indexes gained 0.5 lbs/day more and were on feed for 29 days less than those with decreased Igenity Terminal and DOF Indexes (**Table 1**).

Table 1. Comparison of DOF and gain in cattle grouped according to their DOF and Igenity Terminal Indexes.

		DOF Index1					
		High			Low		
		DOF, d	Gain, lbs	ADG, lbs	DOF, d	Gain, lbs	ADG, lbs
Igenity Terminal Index[1A]	High	187	747	4.2	212	788	3.9
	Low	191	728	4.0	216	765	3.7

[1A] High index values are those greater than or equal to 5.5; Low index values are less than 5.5.

Utilizing Results

Igenity Feeder results are designed to assist producers in the marketing, management, and sorting of feeder cattle, providing insight into the genetic footprint previously unknown or treated as an average.

For the stocker and backgrounder, the initial benefit of Igenity Feeder comes in terms of the Igenity Terminal Index and its ability to rank cattle according to their carcass and growth potential. While cattle of unknown genetics have potentially already been purchased, understanding their genetic predisposition to marble and grow provides an advantage for sorting and marketing.

To illustrate the power of the Igenity Terminal Index, Table 2 has been included to show how differently cattle performed in a feedlot based on their index values. While these cattle were fed to approximately the same backfat thickness before slaughter ($P = 0.38$), cattle ranked in the top 25% for the Igenity Terminal Index had larger ribeye areas, hot carcass weights, and marbling scores as compared to animals in the bottom 25% ($P < 0.01$) (Neogen data on file, March 2025). If sold on the same grid, that would have resulted in a 5%, or $76.54 increased revenue per animal.

Table 2. Summary statistics and difference in revenue between the top and bottom 25% of cattle based on the Igenity Terminal Index.

	Top 25%	Bottom 25%	*P* Value[1]
		N=1549	N=1524
Average Terminal Index	6.50	4.25	P < 0.01
Enrollment Weight, lbs	766.76	749.65	P < 0.01
Ribeye Area, in[2A]	15.49	15.02	P < 0.01
Marbling Score[2B]	487.70	473.29	P < 0.01
12th – rib fat thickness, in	0.62	0.63	P < 0.38
HCW, lbs	921.86	873.86	P < 0.01
USDA Quality Grade[2C]	2.94	2.89	P < 0.01
USDA Yield Grade	2.73	2.72	P < 0.71
Revenue[2D], $	1600.11	1523.57	P < 0.01
Difference per animal	76.54		

[2A] Calculated using a two-sided t-test, P < 0.05 considered significantly different.
[2B] Marbling score: < 300 = Trace, 300 = Slight, 400 = Small, 500 = Modest, 600 = Moderate, >700 = Slightly Abundant
[2C] Grades: 1 = USDA Standard; 2 = USDA Select; 3 = USDA Choice; 4 = USDA Prime.
[2D] Revenue calculated using the grid provided in Table S.1.

Not only can load lots of cattle be grouped and sold as more uniform lots, but Igenity Branded also provides producers with a marketing avenue to obtain premiums for low-risk animals.

Initially launched in partnership with Superior Livestock Auction, Igenity Branded is a marketing channel available to innovative producers who have invested in profiling their cattle. When tested on Igenity Feeder, animals receive their Igenity Branded Tier along with their Igenity Terminal Index

value. Based on this value, animals are placed into one of four groups:

Elite — Best of the best. Cattle rank genetically superior to 75% of Igenity tested cattle.

Premier — The next level. Cattle rank in the top 50% of Igenity tested cattle.

Choice — A cut above the entry level tier. These calves rank in the 3rd quartile.

Tested — Entry level tier. Calves have received a verified Igenity genomic profile.

Groups of cattle can then be sorted and delineated within sale books, web, and television to ensure buyers are notified when Igenity Branded cattle are available.

While the Igenity Terminal Index and Igenity Branded tier are generally more useful for marketing calves either into or out of the backgrounding phase, Igenity Feeder also provides useful insight for the feedlot operator.

For the feedlot operator, knowing an animal's genetic merit for a multitude of traits can then be used to understand better how cattle will mature and deposit muscle and fat. At birth, all cattle have a mature weight or a weight at which they transition from using excess energy intake to deposit

protein and begin depositing fat[3]. They also have a specific maturation rate or a speed at which that mature weight is obtained. This knowledge of cattle growth and maturation combined with DNA has allowed the scientists at Neogen to create a prediction of how cattle will grow and mature within the feedlot based on their genetic makeup. Then, assumptions of feed costs, yardage fees, animal purchase costs **(Table S.2)**, and grid prices **(Table S.1)** can be combined to predict a profit curve. The profit curve determines the optimal target weight and the corresponding number of

DOF required to attain the target weight. In an independent validation population, the predicted target weights avoid steep hot carcass weight discounts (> 1000 pounds) in 100% of individuals, while yield grade and quality grade discounts are avoided in 84% and 89% of animals, respectively. This is the underlying principle that drives the DOF Index. In other words, cattle that have a lower mature weight will transition from depositing muscle to fat at a lower body weight than animals with a higher mature weight, even though they may have the same average daily gain. In this case, the animal with the lower mature weight will be maturing more quickly despite a similar gain as the high mature weight animal. This faster-maturing animal will require fewer estimated DOF to attain quality grade premiums and be managed to avoid yield grade discounts. Therefore, the animal will receive a higher DOF Index value.

While the DOF Index ranks cattle from 1 (more DOF) to 10 (less DOF) at a given feedlot entry weight, there is likely to be variation within each of those categories. The DOF Index can be combined with each animal's weight at feedlot entry to effectively group cattle into pens according to their optimal days on feed. This can be accomplished using **Table 3**. Find the approximate feedlot entry weight (rows) and DOF

index (columns) for an individual animal. Then, locate their intersection for the estimated optimal DOF based on the individual's genetic potential and market and production cost assumptions provided in the supplemental tables

S.1 and S.2. For example, a steer with an entry weight of approximately 650 lbs and Igenity DOF Index of 7 would reach peak profitability and weight at around 193 days on feed. The DOF Index assumes that the best management practices are applied to both animal health and nutrition. In the trials, animals were appropriately managed with vaccination, deworming, nutrition, and implemented implant strategies.

Table 3. DOF for maximum profitability based on individual animal DOF Index and feedlot entry weight.

Enrollment Weight, lbs	DOF Index: Optimal Days on Feed									
	1	2	3	4	5	6	7	8	9	10
500	395	367	338	309	280	251	223	194	165	136
550	375	348	321	294	267	240	213	186	159	132
600	354	329	304	278	253	228	203	178	152	127
650	333	310	286	263	240	216	193	169	146	123
700	312	291	269	248	226	204	183	161	140	118
750	292	272	252	232	213	193	173	153	133	113
800	271	253	235	217	199	181	163	145	127	109
850	250	234	218	202	185	169	153	137	121	104
900	229	215	201	186	172	157	143	129	114	100
950	209	196	184	171	158	146	133	120	108	95
1000	188	177	166	156	145	134	123	112	102	91

While the model used has proven robust to changes in the cost and marketing assumptions, feedlot operators who believe their rations or purchase costs are vastly different from those provided here have two options:

Group cattle according to table 3, using their enrollment weights and DOF index values. Then, refer to supplemental tables S.3 and S.4, as they provide target weights as a secondary guide for each animal's optimum profitability.

Contact your Neogen Representative about current optimal DOF estimations.

Additional Testing Available

Not only does Igenity Feeder include indexes to assist with the marketing and management of feeder cattle, but additional testing is also available.

BreedSeek™

BreedSeek is an add-on to the Igenity Beef genomic tests that delivers primary and secondary majority breeds and percentages

for the following breeds: Akaushi, Angus, Ayrshire, Brahman, Brown Swiss, Charolais, Gelbvieh, Guernsey, Hereford, Gyr, Holstein, Jersey, Limousin, Nelore, Piedmontese, Red Angus, Shorthorn, Simmental, South Devon, and Wagyu.

Benefits of BreedSeek

1. Manage breeding groups within the herd to maintain a desired level of breed representation
2. Market purebred beef from a certain breed directly to consumers and highlight benefits of the breed
3. Crossbreeding results in increased heterosis or hybrid vigor, leading to increased performance and genetic potential

Envigor™

Envigor reports an estimate of heterosis in crossbred cattle. Reported on a scale of 1 (low) to 10 (high), results can be used as an indication of hybrid vigor. A higher score indicates increased heterosis. Research has shown that hybrid vigor impacts

many economically relevant traits within the cattle industry, including decreased disease susceptibility[4]. Specifically, our preliminary data analysis equates a one score increase in Envigor score to a 2% decrease in the probability of having a health event within the feedlot.

Table S.1. Grid premiums and discounts used for both revenue calculation and optimum profitability[1]

USDA Quality Grade	USDA Yield Grade				
	1	2	3	4	5
Prime	15.36	13.25	11.57	-0.79	-6.36
Ave & High Choice	8.42	6.31	4.63	-7.73	-13.30
Low Choice	3.79	1.68	Base[2]	-12.36	-17.93
Select	-11.13	-13.24	-14.92	-27.28	-32.85
Standard	-23.68	-25.79	-27.47	-39.83	-45.40
Base Price/CWT: $179.12					
400–500 lb	-30.71	900–1000 lb			-1.00
500–550 lb	-23.47	1000–1050 lb			-7.67
550–600 lb	-11.80	Over 1050 lb			-16.00

S.1.A Prices summarized from USDA National Weekly Direct Slaughter Cattle Report September 14, 2020
S.1.B Premiums and discounts given $/CWT of hot carcass weight.

Table S.2. Average industry cost assumptions used for profit curve estimation

Daily Yardage Fee	.45	
Cost Per Ton of Dry Matter	**200.00**	
Maintenance: 2.2 Mcal/kg NE		
Gain: 1.4 Mcal/kg NE		
Animal Purchase Cost/CWT	**Heifer**	**Steer**
< 600 lb	144.00	161.00
600–700 lb	133.00	138.00
700–800 lb	111.00	125.00
800–900 lb	101.00	115.00
> 900 lb	99.00	113.00

Table S.3. Steer target live weight (lbs) for maximum profitability when combining ITI and DOF Index information.

Terminal Index	DOF Index: Optimal DOF									
	1	2	3	4	5	6	7	8	9	10
1	1500	1500	1500	1500	1506	1448	1389	1331	1272	1214
2	1500	1500	1500	1500	1546	1487	1429	1371	1312	1254
3	1500	1500	1500	1500	1550	1527	1469	1410	1352	1293
4	1500	1500	1500	1500	1550	1550	1508	1450	1391	1333
5	1500	1500	1500	1500	1550	1550	1548	1489	1431	1372
6	1500	1500	1500	1500	1550	1550	1550	1529	1470	1412
7	1500	1500	1500	1500	1550	1550	1550	1550	1510	1451
8	1500	1500	1500	1500	1550	1550	1550	1550	1550	1491
9	1500	1500	1500	1500	1550	1550	1550	1550	1550	1531
10	1500	1500	1500	1500	1550	1550	1550	1550	1550	1550

Table S.4. Heifer target live weight (lbs) for maximum profitability when combining Igenity Terminal Index and DOF Index information.

Terminal Index	DOF Index: Optimal DOF									
	1	2	3	4	5	6	7	8	9	10
1	1550	1520	1461	1403	1345	1286	1228	1169	1111	1052
2	1550	1550	1501	1443	1384	1326	1267	1209	1150	1092
3	1550	1550	1541	1482	1424	1365	1307	1248	1190	1131
4	1550	1550	1550	1522	1463	1405	1346	1288	1229	1171
5	1550	1550	1550	1550	1503	1444	1386	1327	1269	1210
6	1550	1550	1550	1550	1542	1484	1325	1367	1309	1250
7	1550	1550	1550	1550	1550	1524	1465	1407	1348	1290
8	1550	1550	1550	1550	1550	1550	1505	1446	1388	1329
9	1500	1550	1550	1550	1550	1550	1544	1486	1427	1369
10	1500	1500	1500	1500	1500	1550	1550	1525	1467	1408

The unique attribute characterizations of the Igenity Terminal Index and DOF Index are highlighted in tables S.3 and S.4, where low Igenity Terminal Index values correspond with high DOF Indexes. In this case, the animals have low revenue generation potential (low Igenity Terminal Index) but at the same time gain and mature quickly with an early transition from muscle to fat deposition (high DOF Index), indicating the risk of steep yield grade discounts occurring at lightweights.

Note: While the DOF recommendation tables will more appropriately group animals based on when they will reach their optimum target weight, tables S.3 and S.4 provide an additional tool to adjust the slaughter date for each pen if necessary due to variation in growth conditions (weather, nutrition, etc.). Using tables S.3 and S.4, if the average weight of the pen appears to be approaching its average target weight sooner or later than expected, the shipping date should be adjusted accordingly.

References

[1]Neogen data on file, March 2025

[2]BCHF_Factsheet_03.23.2020.pdf

[3]Owens, F. N., Gill, D. R., Secrist, D. S., & Coleman, S. W. (1995). Review of some aspects of growth and development of feedlot cattle. Journal of animal science, 73(10), 3152-3172.

[4]Snowder, G. D., Van Vleck, L. D., Cundiff, L. V., & Bennett, G. L. (2005). Influence of breed, heterozygosity, and disease incidence on estimates of variance components of respiratory disease in preweaned beef calves. Journal of animal science, 83(6), 1247-1261.

[5]Tedeschi, L. O. (2015). Integrating genomics with nutrition models to improve the prediction of cattle performance and carcass composition under feedlot conditions. PloS one, 10(11), e0143483.

[6]All statements and analyses contained herein are a product of research and development conducted by Neogen Corporation. Any equations, product development, and validation are considered proprietary intellectual property. Data on file. 2020. Reference Nums: 445525, 445527, 445528, 481939, 485449, 485450, 491309, 491310. Neogen Corporation.

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