SOUTH CENTRAL HIGHLAND CATTLE ASSOCIATION · 2026 ANNUAL GATHERING



BREEDING WITH PURPOSE

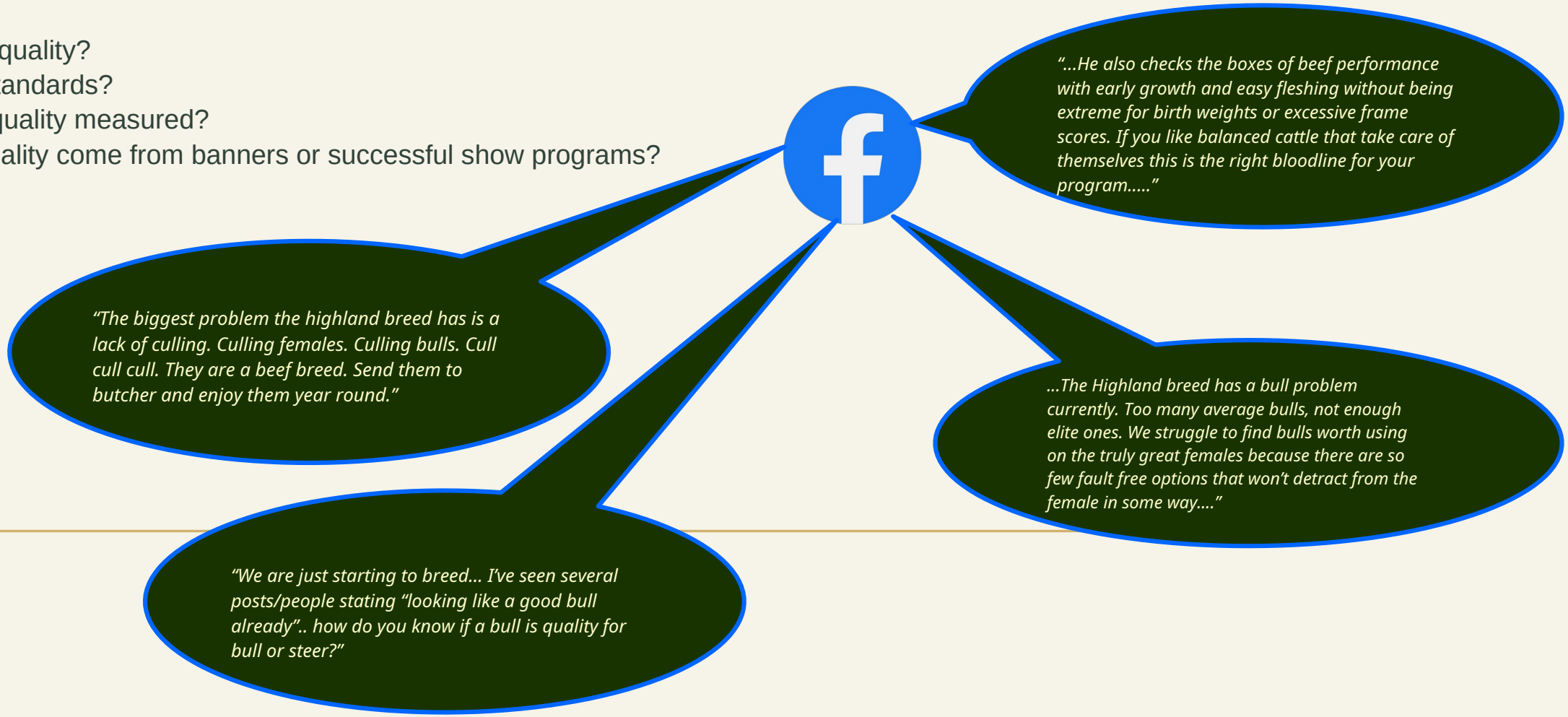
Data Driven Breeding Strategies

GOALS / TRAITS / MEASUREMENT / DECISIONS

J BAR T
Highland Cattle Co.

The Challenge from the Presenter's Perspective

- What is quality?
- Breed standards?
- How is quality measured?
- Does quality come from banners or successful show programs?



PRESENTATION ROADMAP

- Start with a plan
- Testing Methods & Trait Definitions – Maternal / Production / Terminal
- Data
- Tools / Analytics
- A Way Forward
- Final Thoughts

From a clear purpose to informed selection — using evidence.

Combining traditional stockmanship with measurable genetic and performance data.

What’s the plan?

SHOW STOCK

· Structure · Breed Character · Growth Rates

BREEDING STOCK

· Maternal Ability · Fertility

BEEF PRODUCTION

· Carcass quality and yield · Eating experience

BREED PRESERVATION

· Soundness · Heritage · Diversity

The 'plan' will influence the traits / trait groups of interest

TESTING TYPES

Two methods for evaluating cattle

PREDICTS GENETIC POTENTIAL

IGENITY BEEF PROFILE

DNA-BASED GENOMIC TEST

- Uses DNA markers to estimate inherited genetic potential
- Reports trait scores on a 1–10 scale and selection indexes
- Supports selection before an animal has progeny or carcass records

****Note: Highland samples are compared to the commercial herd. There is not a Highland only herd archive at this point.*

MEASURES EXPRESSED TRAITS

ULTRASOUND

LIVE-ANIMAL MEASUREMENT

- Uses ultrasound scans to assess body composition
- Estimates ribeye area (REA), intramuscular fat (%IMF) and backfat (BF)
- Results reflect genetics, age, nutrition and management
- Live weight and scrotal circumference are also recorded
- Ultrasound measurements conducted on Highland bulls at NWSS

Same breeding objective, different evidence. Scores and measurements are not interchangeable.

IGENITY BEEF PROFILE
https://www.neogen.com/en/usac/brands/igenity-beef/

DNA sample collection methods

TAIL HAIR

PULLED HAIR + ROOTS

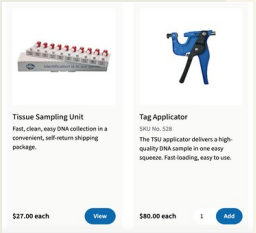
- Pull clean hair from the tail switch; do not cut.
- Include visible roots: about 30, or 50–60 for fine hair.
- Secure on a labeled hair card.

STANDARD: HAIR SAMPLE

TISSUE

EAR NOTCH / TSU

- Collect a small ear tissue sample with a TSU applicator.
- Keep the sealed, barcoded collection tube identified.
- Submit according to kit instructions.



STANDARD: TISSUE SAMPLE

SEMEN

BREEDING BULLS

- Intact, unused semen straws may be accepted.
- Never send a cut or previously used straw.
- Confirm acceptance for Igenity Beef before submitting.

CHECK WITH NEOGEN FIRST

Also accepted: blood samples. Match every sample barcode to the animal ID; follow Neogen kit instructions.



What does Igenity tell us?

DNA-based Prediction

Uses genetic markers to estimate inherited potential for measurable traits.

1–10 Indexed Scores

Scores express predicted genetic potential, not pounds, inches, or percentages.

Direction Matters

More of a trait is not necessarily better for every breeding objective.

Selection Indexes

Maternal, Production and Terminal combine several traits for different goals.

KEY POINT: Genetic potential is not a guaranteed outcome or a physical measurement.

Maternal and performance traits

MATERNAL / FERTILITY

BW	**Birth Weight**	Potential for calf birth weight; higher = heavier.
CED	**Calving Ease Direct**	Potential for unassisted births.
CEM	**Calving Ease Maternal**	Potential for daughters to calve unassisted.
STAY	**Stayability**	Likelihood a female remains productive to age six.
HPR	**Heifer Pregnancy**	Potential to conceive during the breeding season.
DOC	**Docility**	Inherited tendency toward calm disposition.
MILK	**Milk**	Maternal effect on calf weaning weight, not milk volume.

PERFORMANCE

ADG · Daily gain WW / YW · Weaning / yearling weight RFI · Residual feed intake SC · Scrotal circumference

Carcass traits and selection indexes

CARCASS TRAITS

TEND	**Tenderness**	Potential for tender beef (related to shear force).
MARB	**Marbling**	Potential for intramuscular fat deposition.
REA	**Ribeye Area**	Potential for ribeye muscle area.
FAT	**Fat Thickness**	Potential for external fat thickness.
HCW	**Hot Carcass Weight**	Potential for unchilled carcass weight.

COMPOSITE SELECTION INDEXES

Maternal	**Replacement females**	Emphasizes maternal and reproductive performance.
Production	**Broad production**	Combines multiple production-related traits.
Terminal	**Market offspring**	Emphasizes feedlot and carcass performance.

How to Interpret Igenity Scores in Highlands

Igenity gives a commercial-beef genomic score; it is not a Highland-only breed ranking.

1 Commercial-beef framework

Igenity Beef was developed as a genomic selection tool for commercial cow-calf producers.

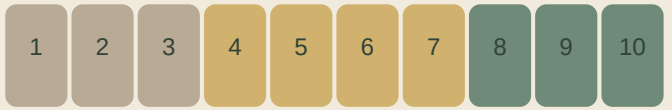
The result tells us predicted genetic merit in that broader commercial-beef framework — not where the animal ranks among Highlands.

Important: the exact reference composition and scaling can change as Neogen updates the product.

→

2 Igenity 1–10 score

10 = more of the trait • 1 = less of the trait



Lower More of trait

A score of 5 does NOT mean "average Highland."

It is an Igenity score interpreted in the product's commercial-beef reference system.

→

3 Highland interpretation

For a within-breed question, compare tested Highlands to other tested Highlands.

That reveals whether an animal is high, average, or low relative to the Highland sample — an apples-to-apples comparison.

Our Highland database provides this second view.

Source: Neogen Igenity® Beef product materials — 1–10 trait scores; designed for commercial cow-calf producers.

Igenity answers: "How does this animal compare in the commercial framework?" • Our database answers: "How does it compare with other Highlands?"

Why Re-index Highland Results?

A second, Highland-only comparison helps separate breed context from the commercial Igenity score.

1 Collect Highland results

Use tested Highlands with the same trait definitions and score direction.

→

2 Define the Highland reference

Calculate the distribution of the tested Highland sample for each trait.

→

3 Standardize within the sample

Express each animal's position relative to the Highland sample mean and spread.

→

4 Interpret both views

Keep the original Igenity score and the Highland-only relative result side by side.

Original Igenity view

Commercial-beef genomic score • preserves Neogen's original 1–10 result

Highland-only view

Within-sample relative standing • compares Highlands with other tested Highlands

Caution: a Highland-only index describes the tested Highland sample. It is not a breed-wide EPD, percentile, or official breed evaluation.

Use both views. Re-indexing adds Highland context — it does not replace the original Igenity result.

Observed measurements and abbreviations

REA	**Ribeye Area**	Estimated muscle area in square inches (in²).
%IMF	**Intramuscular Fat**	Estimated fat percentage within ribeye; marbling indicator.
BF / FAT	**Backfat**	Estimated external fat thickness in inches.
REA/100	**REA per 100 lb**	REA ÷ live weight × 100; a size-adjusted comparison.
ADG	**Average Daily Gain**	Weight gained ÷ days; pounds per day.
WT	**Live Weight**	Measured live body weight in pounds.
SC	**Scrotal Circumference**	Physical circumference in centimeters.
WDA	**Weight per Day of Age**	Live weight ÷ age in days; pounds per day.

Interpret in context: age, nutrition, management and scanning conditions matter.

Igenity and ultrasound: different evidence

TRAIT	IGENITY	ULTRASOUND / RECORD
Marbling	Predicted genetic potential	Estimated %IMF
Ribeye area	Predicted genetic potential	Measured REA (in²)
Fat thickness	Predicted genetic potential	Measured BF (inches)
Growth	Predicted ADG merit	Observed ADG (lb/day)
Tenderness	Predicted tenderness merit	Not assessed by routine ultrasound

An Igenity REA score of 8 is NOT an 8-square-inch ribeye.

Carcass Trait Distribution Charts
Igenity Carcass results compared with Red Angus and Simmental

Igenity Breed Comparison

Reference data source: ABS Global (American Breeders Service) — Igenity Beef Genomic Scores, ABS website. Report snapshot: July 23, 2026; obtained October 4, 2026.

Choose breeds to compare reported score distributions. Highland database animals follow the population, sex and search filters above. Use Expand chart for a larger view, zoom and PNG download.

Breeds

☑ Highland database (75) ☐ Angus (87) ☑ Red Angus (17) ☑ Simmental (22) ☐ Hereford (13)

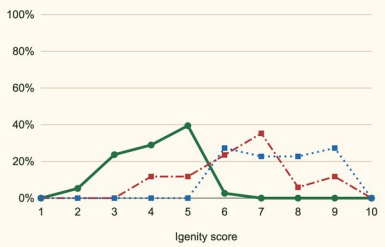
Trait group

○ Maternal ○ Growth / Performance ◉ Carcass

Vertical axis: percent of animals with a valid score for that trait. Horizontal axis: Igenity score 1–10. Missing scores are excluded; each chart reports its own sample count. Higher scores are not always preferable, including fat thickness and residual feed intake.

Exploratory comparison: genomic predictions, not measured performance or breed-wide averages. ABS animals are selected sires; Highland test version and cross-breed calibration have not been confirmed. Your Highland selection can include unregistered animals or crosses; use AHCA above for the registered population.

Hot Carcass Weight



Highland database: n=38
Red Angus: n=17
Simmental: n=22

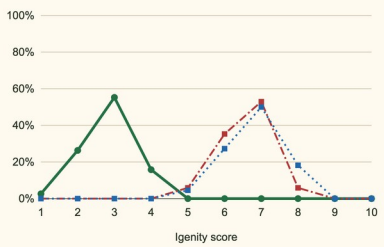
Highland selection: AHCA Igenity Animals; All animals in selected list.

Reference scores: ABS Global (American Breeders Service), ABS - Igenity Beef Scores, July 23, 2026.

Source: www.absglobal.com/igenity-beef-scores/ | Chart: J Bar T Highland Cattle Company.

Exploratory genomic score comparison; cross-breed calibration is unconfirmed. Selected samples, not breed-wide averages. Higher is not always better.

Marbling



Highland database: n=38
Red Angus: n=17
Simmental: n=22

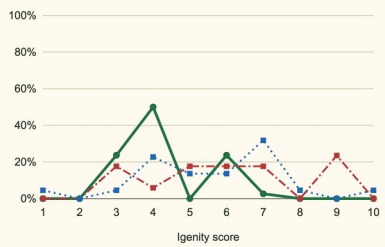
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Exploratory genomic score comparison; cross-breed calibration is unconfirmed. Selected samples, not breed-wide averages. Higher is not always better.

Tenderness



Highland database: n=38
Red Angus: n=17
Simmental: n=22

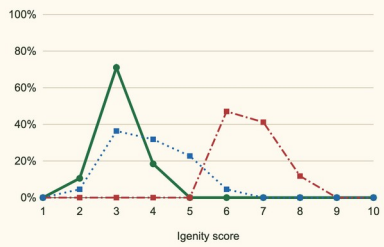
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Reference scores: ABS Global (American Breeders Service), ABS - Igenity Beef Scores, July 23, 2026.

Source: www.absglobal.com/igenity-beef-scores/ | Chart: J Bar T Highland Cattle Company.

Exploratory genomic score comparison; cross-breed calibration is unconfirmed. Selected samples, not breed-wide averages. Higher is not always better.

Fat Thickness



Highland database: n=38
Red Angus: n=17
Simmental: n=22

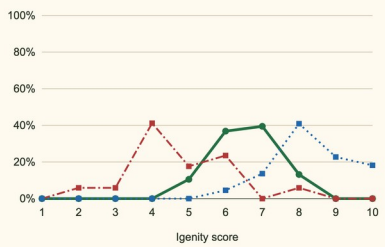
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Reference scores: ABS Global (American Breeders Service), ABS - Igenity Beef Scores, July 23, 2026.

Source: www.absglobal.com/igenity-beef-scores/ | Chart: J Bar T Highland Cattle Company.

Exploratory genomic score comparison; cross-breed calibration is unconfirmed. Selected samples, not breed-wide averages. Higher is not always better.

Ribeye Area



Highland database: n=38
Red Angus: n=17
Simmental: n=22

Highland selection: AHCA Igenity Animals; All animals in selected list.

Reference scores: ABS Global (American Breeders Service), ABS - Igenity Beef Scores, July 23, 2026.

Source: www.absglobal.com/igenity-beef-scores/ | Chart: J Bar T Highland Cattle Company.

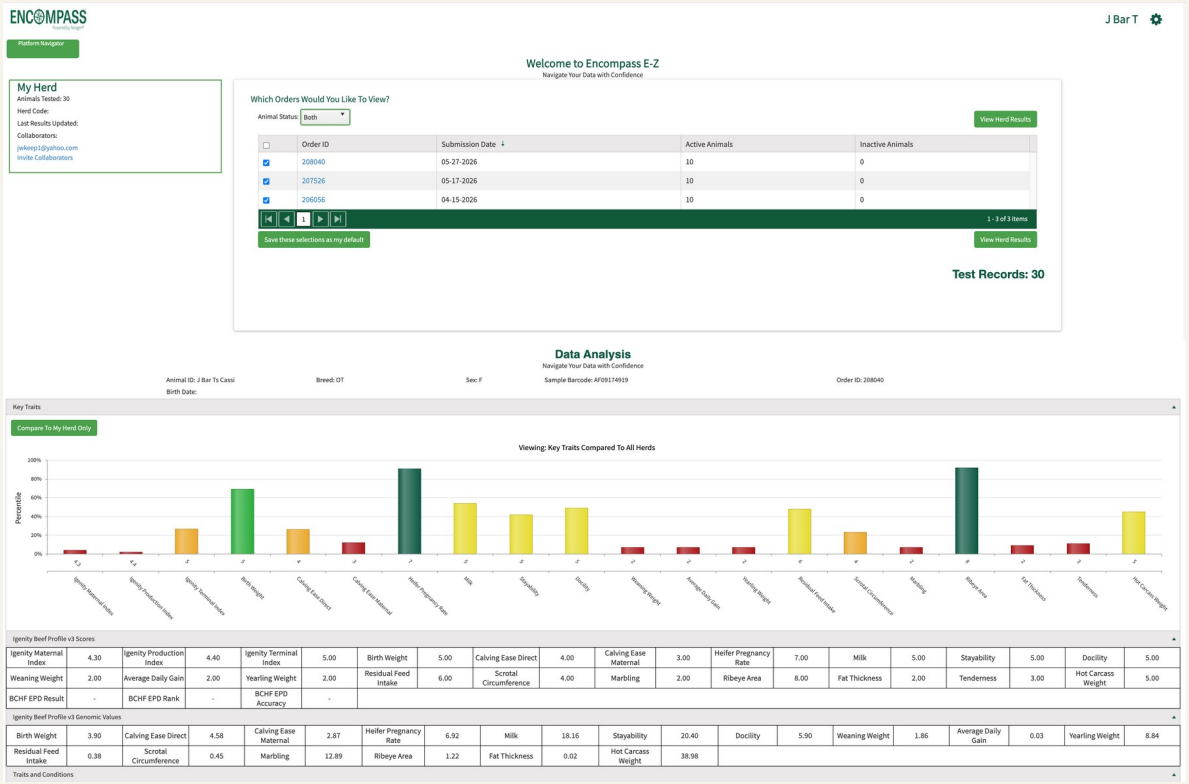
Exploratory genomic score comparison; cross-breed calibration is unconfirmed. Selected samples, not breed-wide averages. Higher is not always better.

Y = % at Score
X = Score

Where's the Data?

Igenity

- Personal decision to complete testing
- Private data
- Seems to be a reluctance to share data in our community



NWSS

All bulls weighed, scrotal measured and ultrasound
All females weighed

Female Data

- DOB → Age in Days
- Weight
- Estimated/Calculated:
  - ADG
- Estimated 205-Day Weight

Bull Data

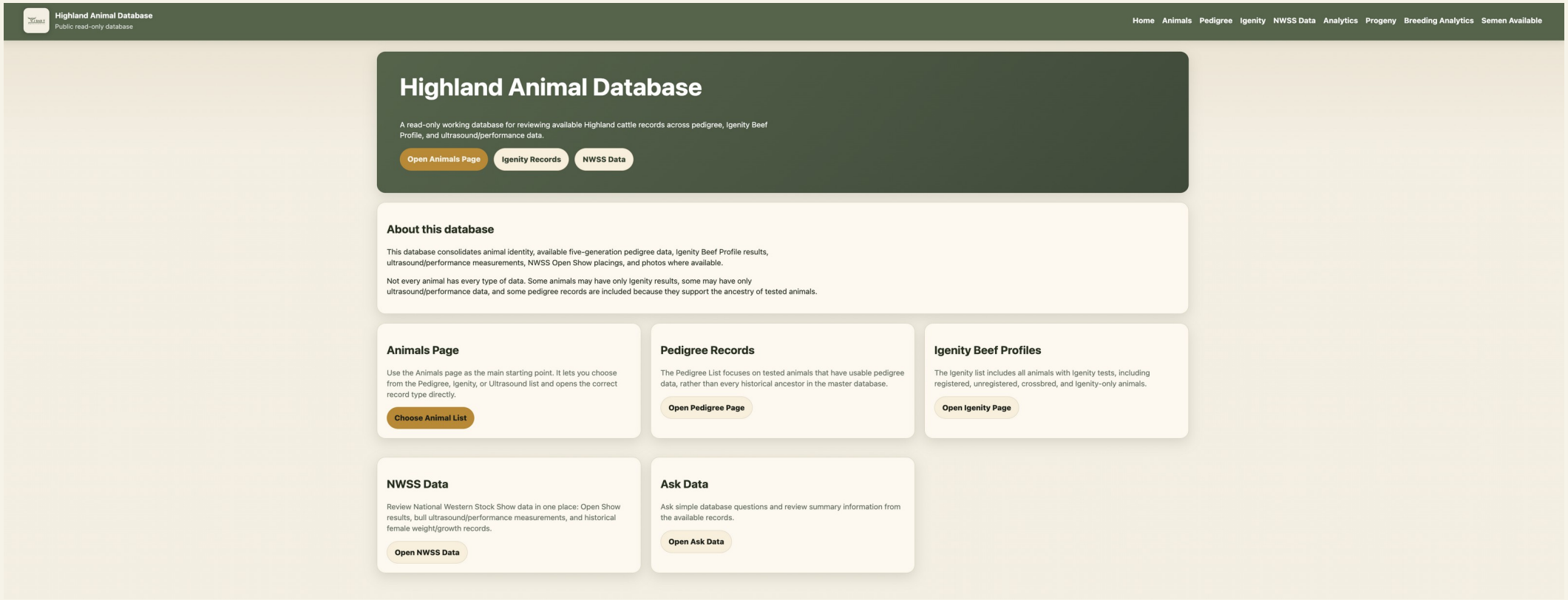
- DOB → Age in Days
- Weight
- Estimated/Calculated:
  - ADG
- Estimated 205-Day Weight
- Scrotal size – cm
- Ultrasound
- REA, %IMF / Marbling, Backfat

AHCA NATIONAL SHOW

Entry	Reg. No.	Name	DOB	Sex	Weight	REA	Backfat	%IMF	Scrotal
4773	68592	MES Classy Cassy (ET,PV,D)	2/4/2024	Cow	scratch				
4774	67793	Lori Stori at Bluestone Ranch	2/2/2024	Cow	866				
4775	68587	MES Firestar (AI,PV,D)	1/22/2024	Cow	scratch				
4776	67729	HG Sagrada (ET,PV,D)	1/9/2024	Cow	964				
4777	67424	Mid-Lakes She's Got A Way (AI,D)	1/4/2024	Cow	1129				
4778	70233	STR Ophelia (ET,PV,D)	1/2/2024	Cow	1131				
4779	70232	STR Evangeline (ET,PV,D)	1/1/2024	Cow	1173				
4780	67596	BTTR Snow (ET,PV,D)	10/31/2023	Cow	1010				
4781	68017	Skye High Ma Belle (D)	10/13/2023	Cow	1354				
4782	67302	Howling Springs Forrest	9/29/2023	Cow	1243				
4783	67450	Apple Hill Coral	9/12/2023	Cow	785				
4784	67448	Apple Hill Sapphira	9/2/2023	Cow	760				
4785	67512	RLC Waukena	8/24/2023	Cow	1328				
4786	67582	RCC's Ruby	6/27/2023	Cow	scratch				
4787	68016	Skye High Mair (PV,D)	6/22/2023	Cow	1341				
4788	68221	Silva's Pepper Jack	6/22/2023	Cow	1310				
4789	67009	JLH Melody (PV,D)	6/3/2023	Cow	1347				
4790	69126	STR Adrenaline Rush (AI,PV,D)	5/25/2023	Cow	scratch				
4791	67637	Circle V Empress (AI,D)	5/10/2023	Cow	scratch				
4792	67359	Howling Springs Donatella V (ET,PV,D)	4/25/2023	Cow	1298				
4793	67433	CSF Calypso (PV,D)	4/23/2023	Cow	1353				
4794	66176	Kesabe's Mountain Momma (PV,D)	4/22/2023	Cow	scratch				
4795	67581	Little 77 Mint	4/14/2023	Cow	scratch				
4796	66211	Stuarton Oaks Farm Ila	4/13/2023	Cow	scratch				
4797	67530	SFF Rising Moon	4/12/2023	Cow	scratch				
4798	67431	CSF Mendota (D)	4/8/2023	Cow	1231				
4799	66212	Windermere Muse (AI,PV,D)	4/3/2023	Cow	1173				
4800	66379	FSH Daphne (ET,PV,D)	3/29/2023	Cow	scratch				
4801	67203	Skye High Moon	3/26/2023	Cow	1184				
4802	68962	Circle V Ruthless Rebel (AI,PV,D)	3/24/2023	Cow	1239				
4803	66202	Hettie of Hager Hollow (AI,D)	3/23/2023	Cow	924				
4804	67057	STR Betula's Keepsake (ET,PV,D)	2/5/2023	Cow	1432				
4805	65488	Trinity's Aphrodite	1/22/2023	Cow	scratch				
4806	65479	Trinity's Tali's Twilight	1/14/2023	Cow	1457				
4807	65681	BDR Lillie Jean (AI,D)	7/26/2022	Cow	1034				
4808	64345	HS Lovestruck (PV,D)	5/6/2022	Cow	1277				
4809	64152	Lavender of Highland Spice (D)	4/26/2022	Cow	scratch				
4810	62094	Trafalgar Kate 21	5/18/2021	Cow	1391				
4811	61608	STR Mind Games (ET,PV,D)	1/8/2020	Cow	1402				
4812	59943	Ledyards Clara (D)	1/2/2020	Cow	scratch				
4813	59209	Ledyards Tiffany Talia (D)	4/19/2019	Cow	1518				
4814	57623	ARY Ruffian	3/17/2018	Cow	1355				
4815	57510	CRR Dream By Design	11/4/2017	Cow	1284				
4893	S170	WYH Olipop	5/3/2025	Cow	499				
4894	S184	Wakarusa's So Glamorous	2/5/2025	Cow	455				
4895	S164	TN Turkey Creek Brown Sugar	5/15/2024	Cow	990				
	72763	LiTerra Redwood (D)	9/14/2025	Bull	287				
4816	71791	Mid-Lakes Take Down (AI,PV,D)	7/27/2025	Bull	520	9.21	0.14	1.66	31
4817	72348	STR Lachlan (AI,PV,D)	7/11/2025	Bull	351	6.60	0.10	1.48	23
4818	71608	GR2BlueberryHill Thrill Seeker (D)	7/5/2025	Bull	276	4.88	0.13	1.25	22
4819	72605	Brassy Acres When In Rome (PV,D)	7/1/2025	Bull	364	7.59	0.11	1.67	21
4820	72347	STR Arran (AI,PV,D)	6/13/2025	Bull	464	7.74	0.12	1.97	24
4821	71305	HVC's War Horse (AI,PV,D)	5/7/2025	Bull	720	12.85	0.21	1.33	35
4822	72610	BFL Herbert (PV,D)	4/26/2025	Bull	543	6.64	0.13	1.34	29
4823	72293	HC Rock & Roll (ET,PV,D)	4/22/2025	Bull	scratch				
4824	71062	FSH Rayden (ET,PV,D)	4/17/2025	Bull	scratch				
4825	71964	Holy Cross Roman (PV,D)	4/3/2025	Bull	638	9.24	0.19	2.60	29
4826	71061	FSH Gatlin (ET,PV,D)	4/2/2025	Bull	scratch				
4827	71772	Beyond Hope Royel (AI,D)	3/28/2025	Bull	scratch				
4828	72189	Highland Spice Pearl's Beast (PV,D)	3/27/2025	Bull	scratch				
4829	71763	WL Ring of Fire (AI,PV,D)	3/25/2025	Bull	737	10.56	0.12	0.80	33
4830	71125	Kesabe's Nacho Average Joe (PV,D)	3/23/2025	Bull	487	7.60	0.13	1.18	28
4831	71488	OG Try Your Luck (PV,D)	3/17/2025	Bull	606	7.73	0.13	0.88	26
4832	72455	Kesabe's Riot Act (ET,PV,D)	3/17/2025	Bull	501	7.25	0.25	1.60	27
4833	72217	MXB Metallic Finley (D)	2/7/2025	Bull	854	11.95	0.20	1.82	35
4834	71310	Howling Springs Oldham (PV,D)	2/5/2025	Bull	834	13.46	0.15	2.53	32
4835	72297	STR Endurance (ET,PV,D)	1/31/2025	Bull	692	11.44	0.17	0.54	34
4836	70330	STR Iain Mor (PV,D)	1/21/2025	Bull	741	12.05	0.17	2.23	28
4837	71431	MES Otto (AI,PV,D)	1/13/2025	Bull	872	13.50	0.19	1.26	35
4838	71382	Howling Springs Oakley (D)	1/12/2025	Bull	901	10.23	0.19	3.37	37

Results are found on the AHCA website: https://highlandcattleusa.org/national-show-sale-results/

Prototype – A Common Data Archive for Highland Cattle Data



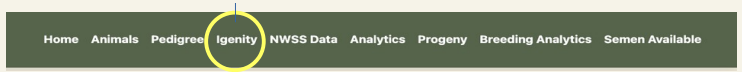
Highland Animal Database

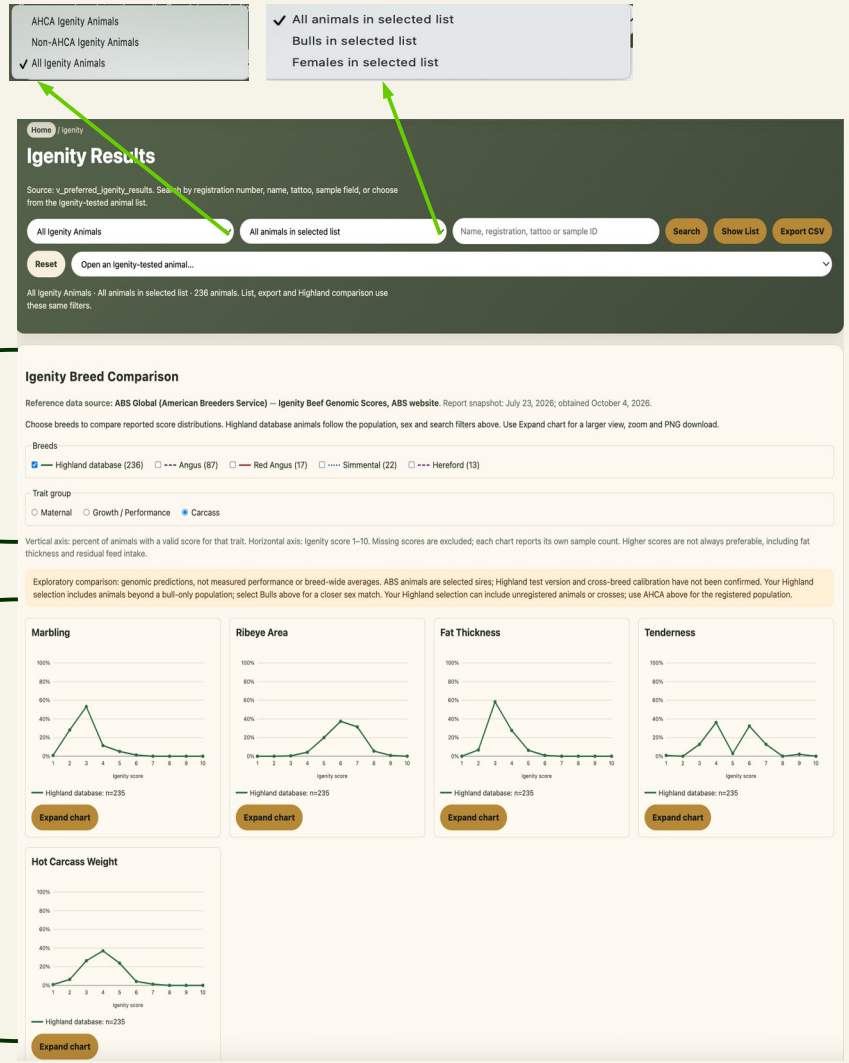
https://highlanderheaven.com/highland_database_public/

Prototype – Igenity Data

Highland Animal Database

https://highlanderheaven.com/highland_database_public/





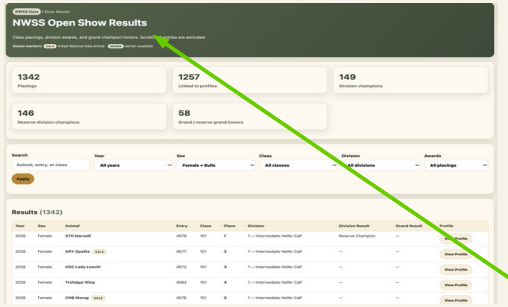
Breed Comparison Option

Distribution Charts for the Selected Group

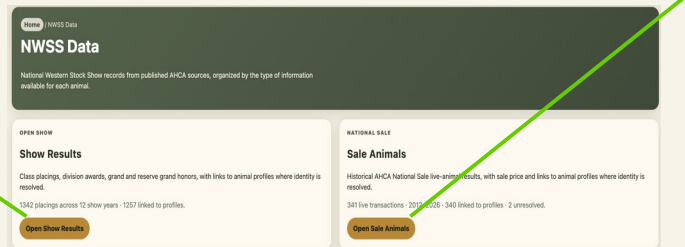
Prototype – NWSS Data

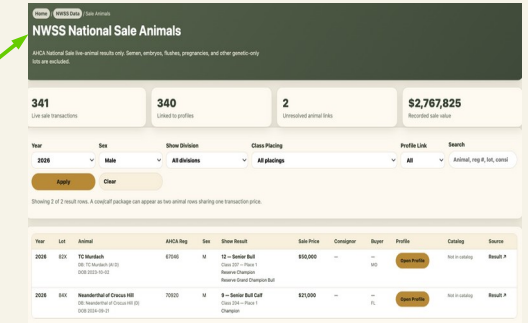
Highland Animal Database

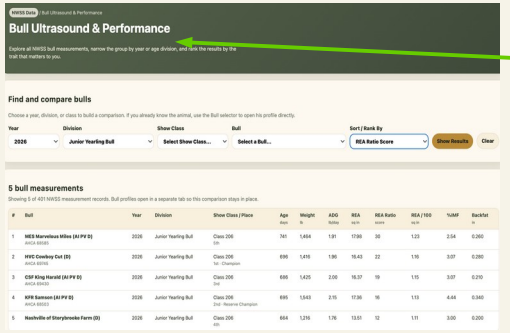
https://highlanderheaven.com/highland_database_public/

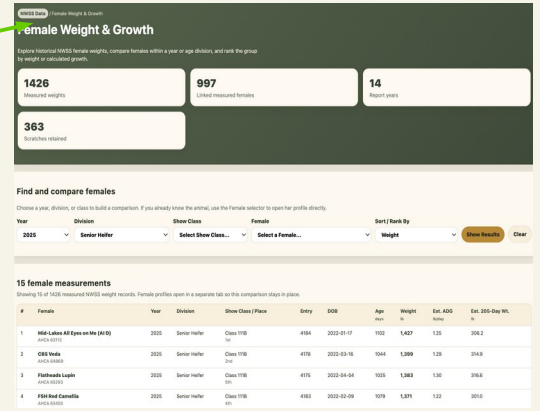










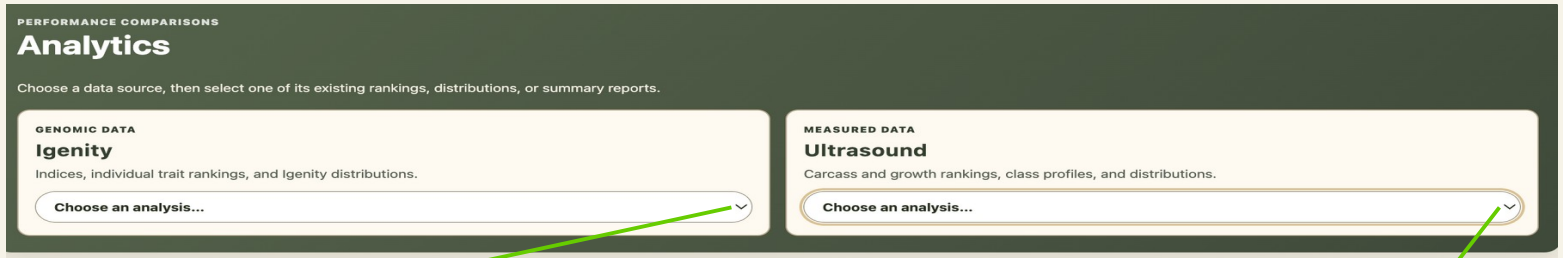


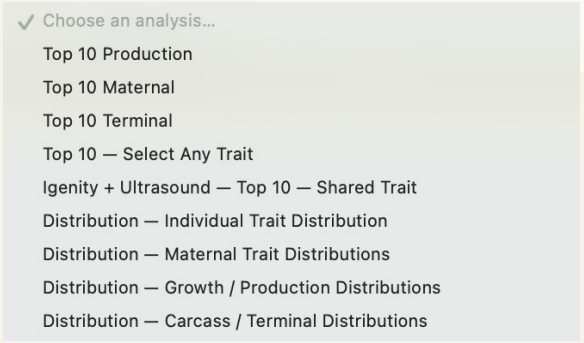
Prototype – Analytics

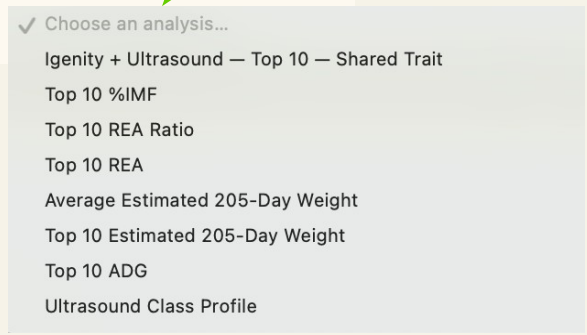
Highland Animal Database

https://highlanderheaven.com/highland_database_public/









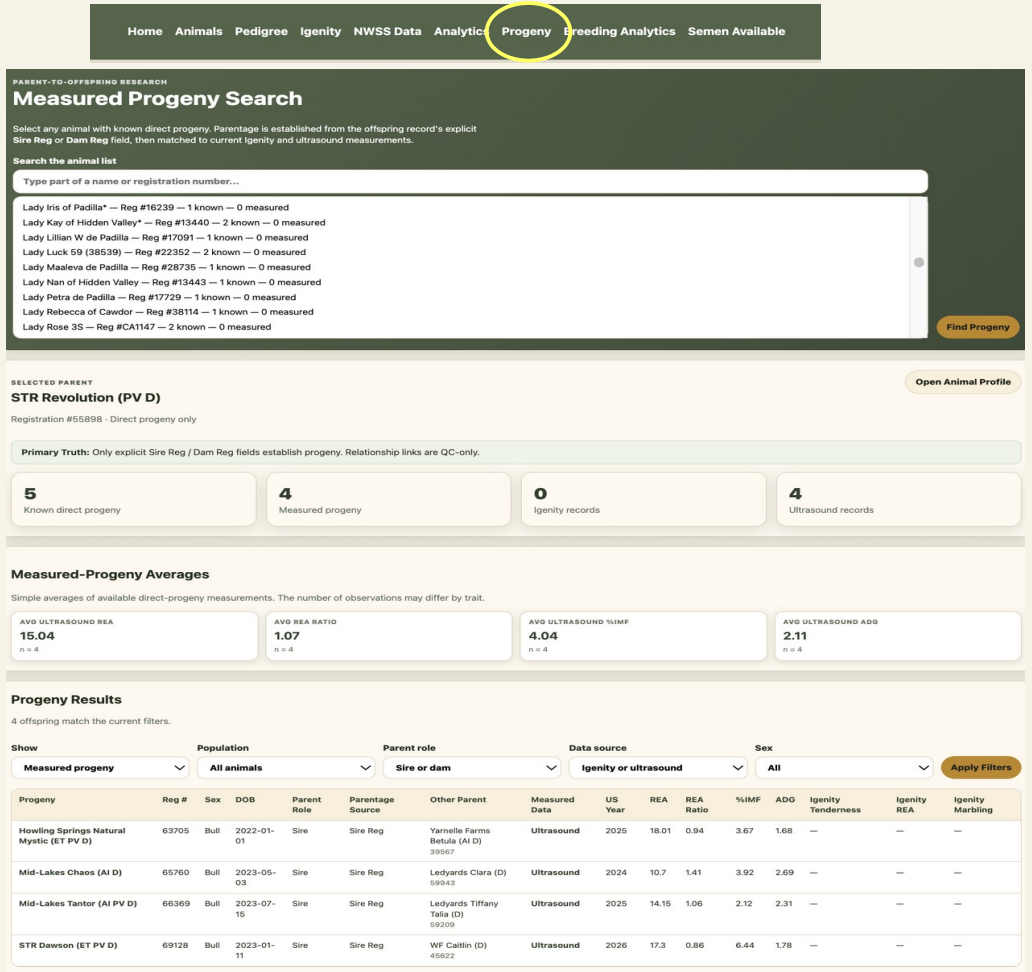
Prototype – Progeny

Highland Animal Database

https://highlanderheaven.com/highland_database_public/

Progeny Search

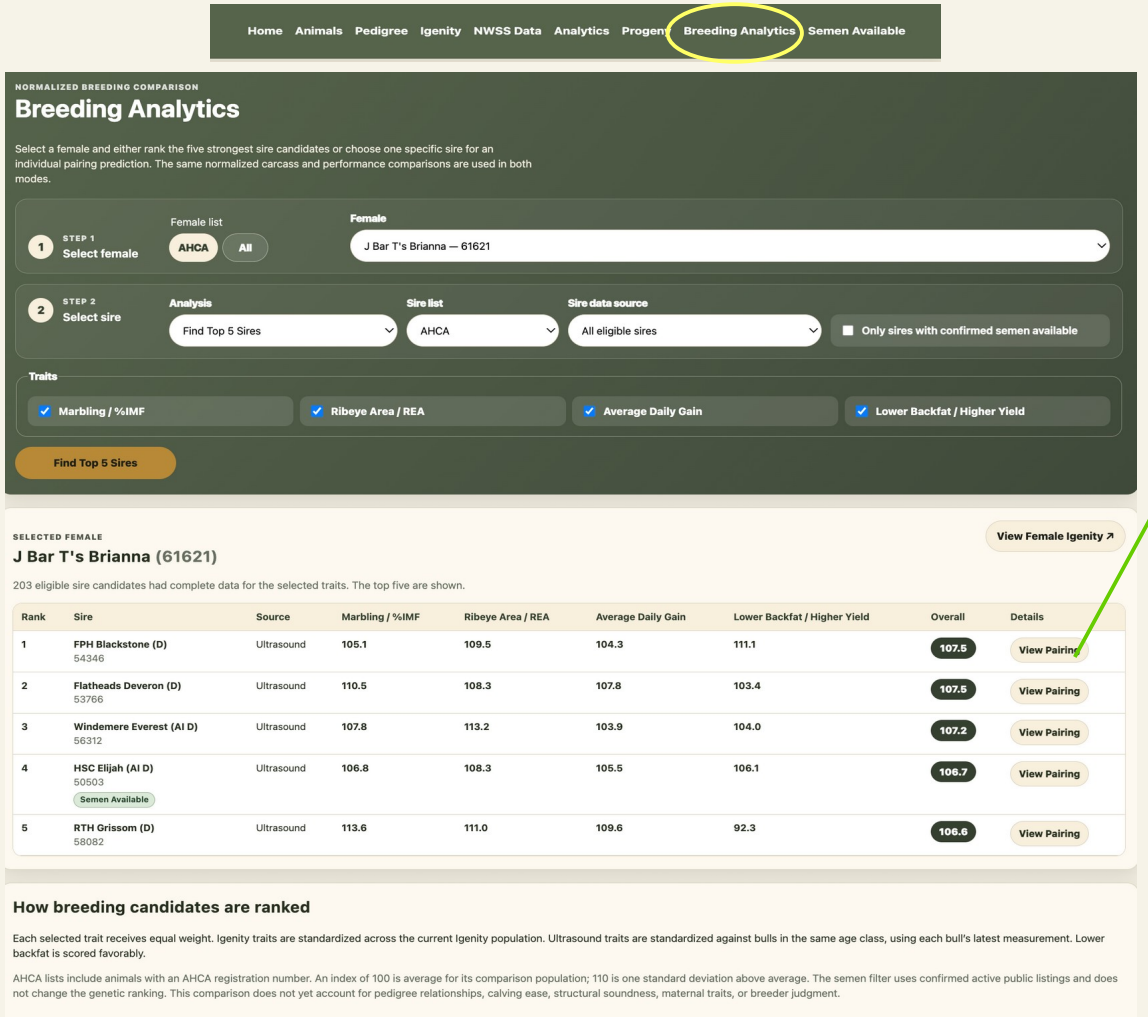
- Animal in the database with progeny in the database
- Can be Igenity or NWSS data
- Also includes ancestry with measured progeny



Prototype – Breeding Analytics

Highland Animal Database

https://highlanderheaven.com/highland_database_public/



Breeding Analytics

- Designed to help suggest breeding candidates based on selected traits
- Both must be in the database to calculate trait contributions



Example

- Brianna
- Top 5 Sires
- AHCA
- All Eligible
- All Traits

Pairing Detail

- Estimates relative pairing potential
- Links to available data on parentage

Comparison/Analytics possible because of indexing the Igenity data within the Highland group
Provides a comparative estimate to help identify breeding combinations for further evaluation

Prototype – Semen

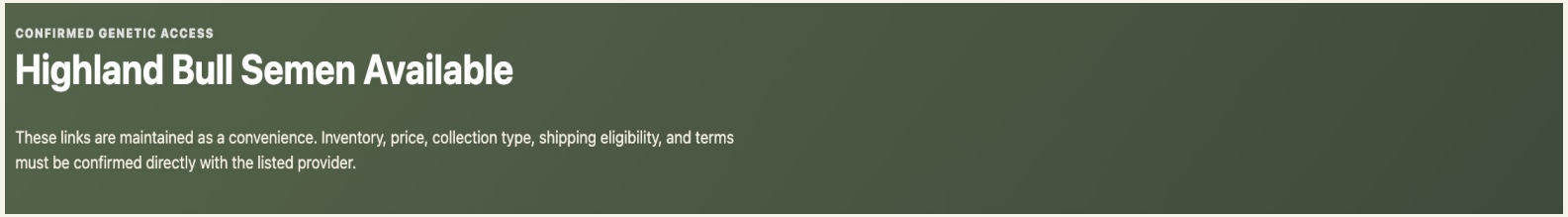
Highland Animal Database

https://highlanderheaven.com/highland_database_public/



Semen Search

- Pages where Highland semen is marketed
- Semen links are also presented in the profiles of the bulls that have semen
- Links are presented in the Analytic sections when searching for breeding options



A Unified Approach to Data-Driven Breeding

- Improving individual folds should generally have a positive impact on the breed

- A unified effort focused on data driven breeding programs could help everyone
  - Common productized database for archiving and analyzing records
  - Shared interest among data-driven breeders
  - Genetic Testing programs
  - Data sharing for improvements
  - Building a baseline to measure improvement

- A Certified Highland Beef Registry ?
  - Archive of tested/documented purebred and crossbred cattle

Farm Goals

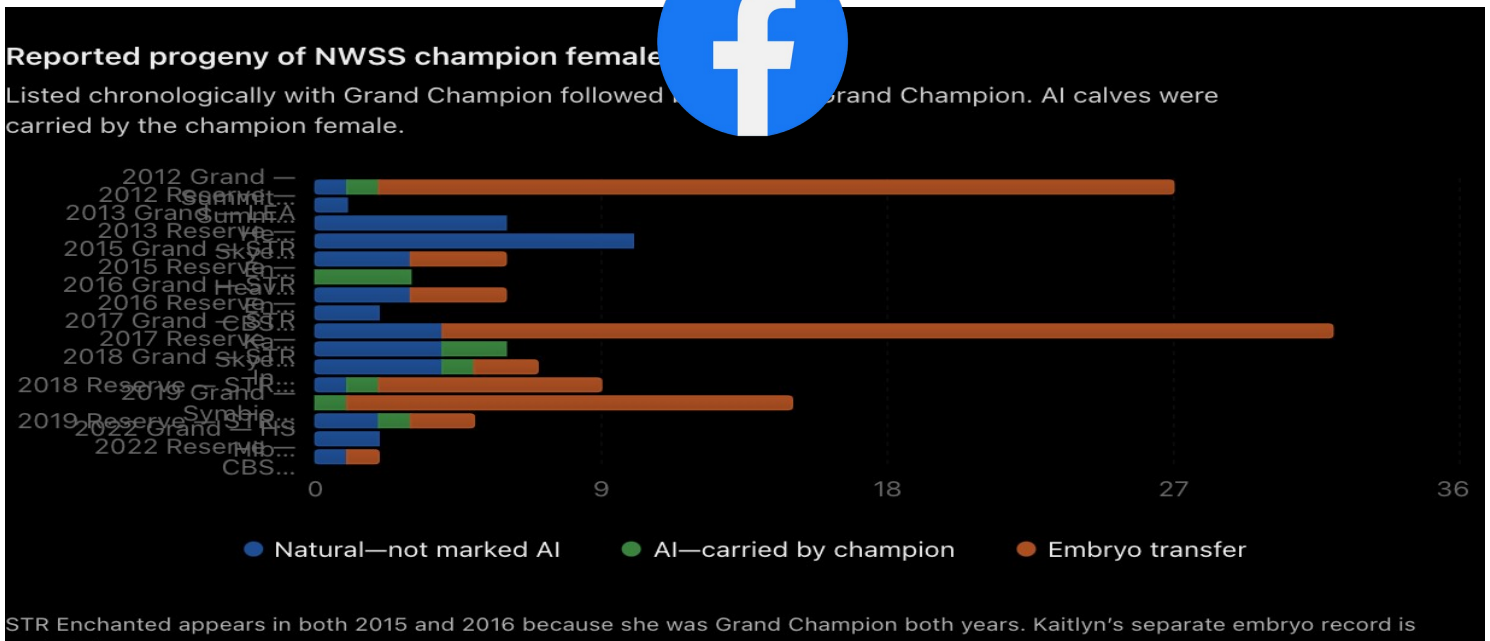
- Have a Plan
- Execute
- Evaluate
- Improved Plan

Breed Goals

- Improved folds will improve the breed overall
- Is there a need for an organized effort focused on data-driven breeding programs?
  - Common productized database for archiving and analyzing records
  - Shared interest among data-driven breeders
  - Testing programs

From a clear purpose to informed selection — using evidence.

Combining traditional stockmanship with measurable genetic and performance data.


Reported progeny of NWSS champion female
Listed chronologically with Grand Champion followed
rand Champion. AI calves were
carried by the champion female.
2012 Grand —
2012 Reserve —
2013 Grand —
2013 Reserve —
2015 Grand —
2015 Reserve —
2016 Grand —
2016 Reserve —
2017 Grand —
2017 Reserve —
2018 Grand —
2018 Reserve —
2019 Grand —
2019 Reserve —
2022 Grand —
2022 Reserve —
0
9
18
27
36
Natural—not marked AI
AI—carried by champion
Embryo transfer
STR Enchanted appears in both 2015 and 2016 because she was Grand Champion both years. Kaitlyn's separate embryo record is