New Opportunities for Maternal Trait Selection in Angus Cattle

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American Angus Association

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AGI

AHIR
ANGUS HERD
IMPROVEMENT RECORDS

NEW

MATERNAL TOOLS

ANNUAL UPDATES

EPDs, $VALUES AND ECONOMIC ASSUMPTIONS

MAY 23, 2025

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Functional Longevity

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Functional Longevity

Cows that stay in the herd and produce a calf every year

Definition: on average, number of calves a sires daughters are predicted to produce by 6 years of age compared to other sires daughters

Data: calving and culling records

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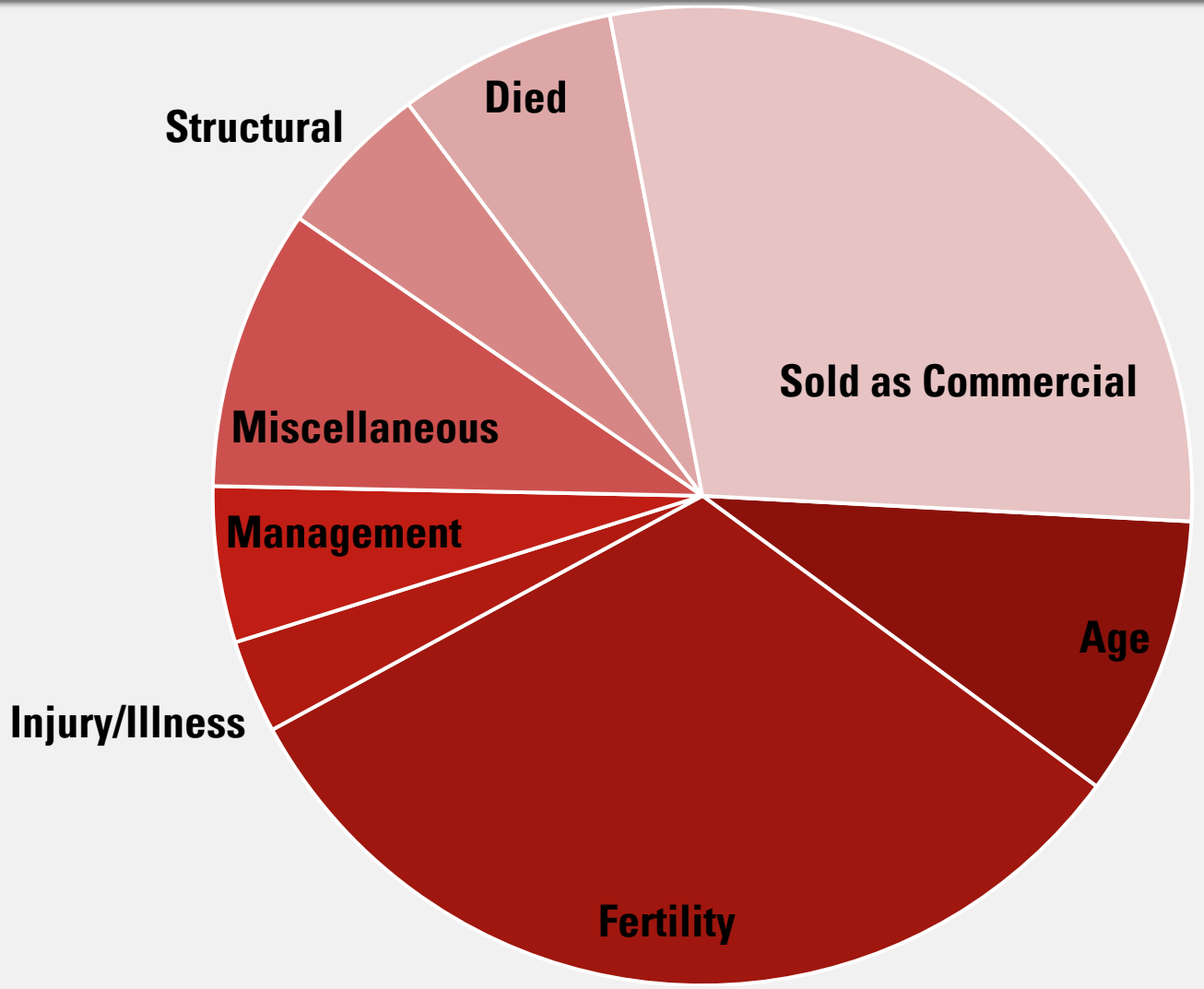
Why do females leave the herd?



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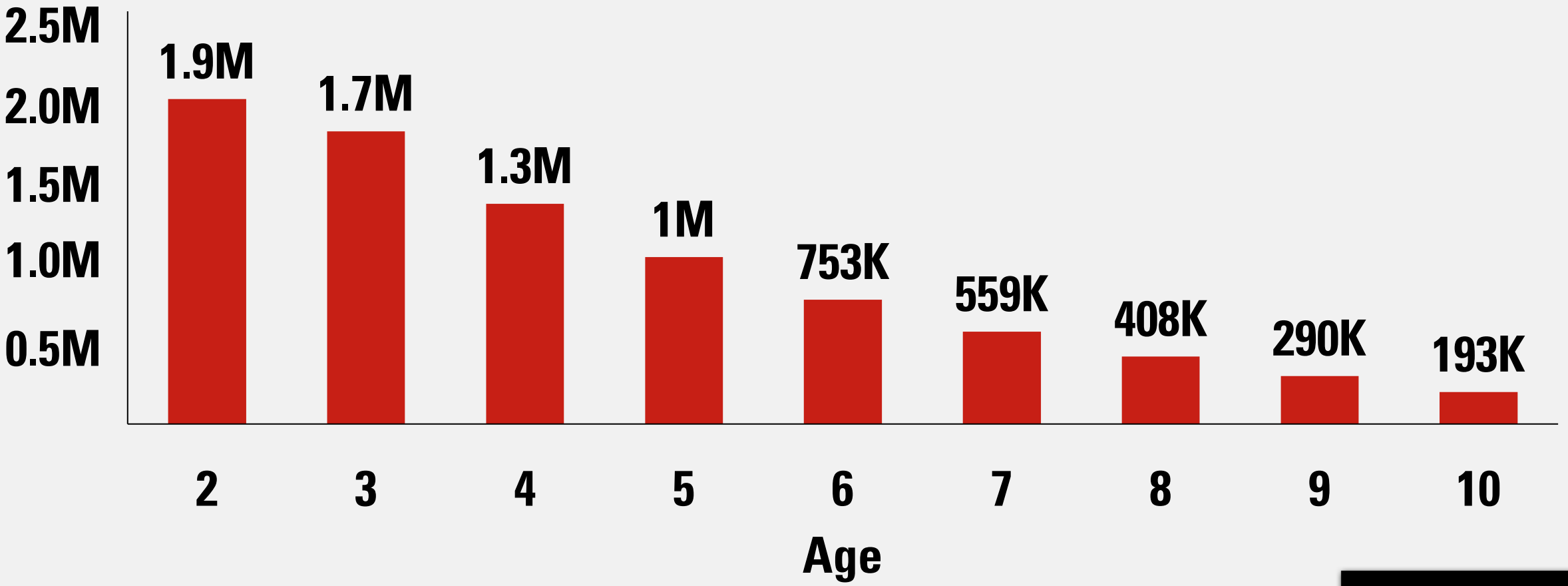
Scope of the Functional Longevity Evaluation

- FL data includes American Angus Association and Canadian Angus Association data

- 2.09M cows with records
  - 8.89M records total
- 1.87M genotyped animals
- 4.56M animals in the pedigree

As of 9/27/2025

Distribution of cows with records by age



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What records are used?

- Inventory Reporting data (since 2012)
  - ~15% of records
- Calving and culling records since 1990
- Must calves as a two-year-old female
- Ages 2-10 (9 possible calving events)

- Phenotype is number of calves

- Model
  - Random regression model

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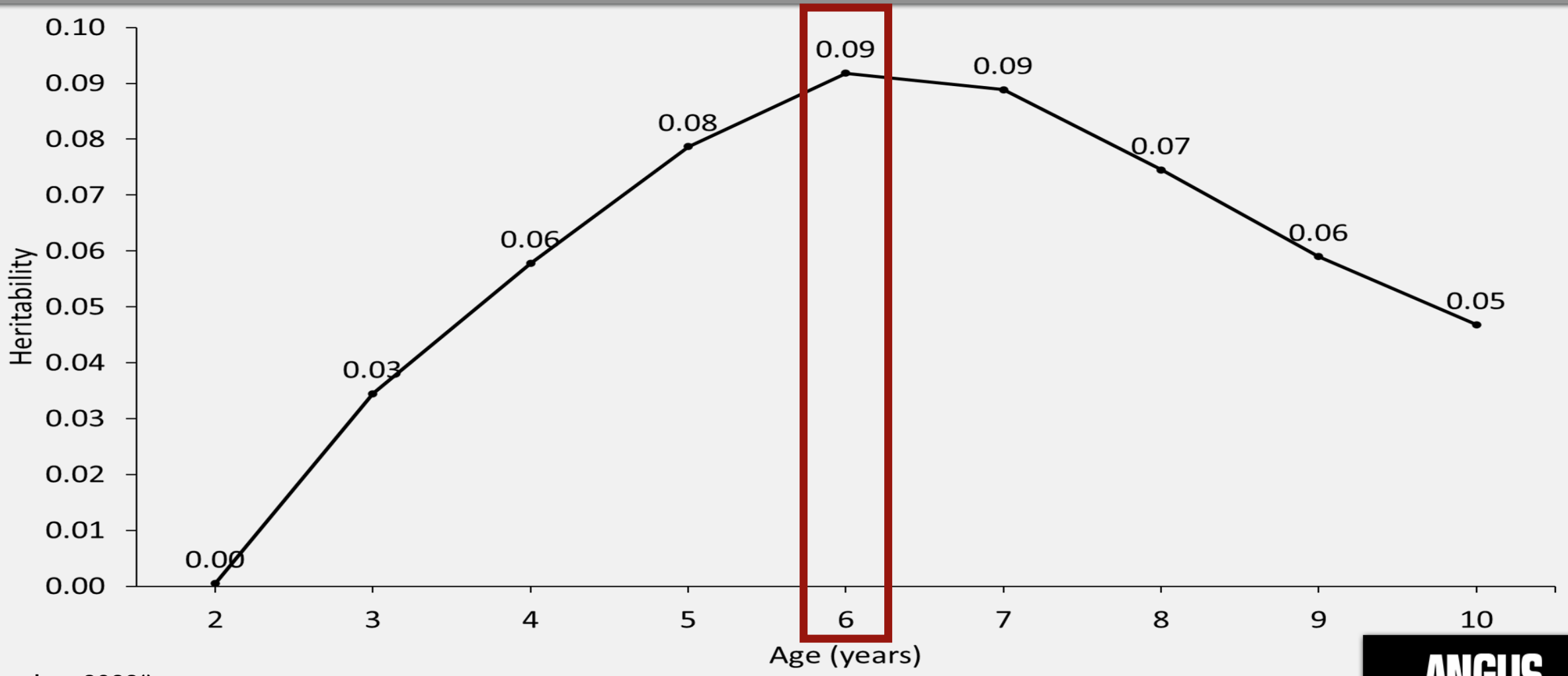
Functional Longevity heritability is 0.10



October 2023*

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EPD are highly correlated after age 6

Age	3	4	5	6	7	8	9	10
3	**0.03**	0.99	0.97	0.94	0.90	0.84	0.79	0.73
4		**0.06**	0.99	0.97	0.94	0.91	0.86	0.81
5			**0.08**	0.99	0.98	0.95	0.91	0.87
6				**0.09**	0.99	0.98	0.95	0.92
7					**0.09**	0.99	0.98	0.96
8		*symmetric*				**0.07**	≥0.99	0.98
9							**0.06**	≥0.99
10								**0.05**

October 2023*

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Predicting the EPD at 6 years of Age

Beef Industry Considerations

- Recommended by Beef Improvement Federation (BIF) as predicted.
  - Continuity for national cattle evaluation
- Accepted industry age for when females "pay off" themselves in the herd

Breed Specific Considerations

- Heritability is maximized at Age 6 (0.10)
- Genetic correlations are high >0.90 for ages 6-10
  - Minimal re-ranking of sires
  - Data still included from 7-10 years to add accuracy and information

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FL Units: number of calves by 6 years of age

Sire	FL EPD
A	1.5
B	0.5
Difference	**1.0**

- **On average**, sire A's daughters are expected to produce 1 more calf by age 6 compared to sire B's daughters

- If the breeding goal is to increase the number of calves produced, a sire with a higher FL EPD is more desirable compared to a sire with a lower FL EPD

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Practical anecdotes about the trait have been realized

- Select a **larger**, more positive **EPD**.
- Like with any NEW trait **spread** in the EPD is **limited**.
- **Low** to moderate **correlations** to EPDs **present**.
  - True multi-trait genetic correlations are being worked through
- **Heritability** is **low**.
  - Slow rate of genetic change, but can still use for selection
  - Management and environment play a large role

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It is not about the individual cow.

- **Genetic improvement for this trait isn't about the individual female.**
  - It is about the aggregate information provided by a sire's daughters.

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Teat Size & Udder Suspension

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Teat and Udder Conformation

- Quality influences profitability
- A leading cause of culling, lower cow longevity and lifetime productivity
- Extremes of udder and teat scores can become detrimental at some point
  - Calf is unable to suckle and consume colostrum
  - Suspension held too close to body cavity

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Data Collection

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TEAT & UDDER SCORING

Teat and udder conformation are traits essential to a productive cow. Poor teat or udder
provides an opportunity to cull females, and increases difficulty for a newborn calf to su
Association accepts udder scores from members through a simple two category systen
teat size and udder suspension are scored on the same quarter but are scored independ

For **SUBMISSION OF SCORES**, they must be collected with 24 hours of calving. Teat and
collecting calf birth weight and calving ease data. Submit information through AAA Logi

GUIDELINES:

- Collect within 24 hours of calving
- Use weakest quarter to score both teat size and udder s
- Score both teat size and udder suspension on 1-9 scale,
- Calving ease and birth weight data can also be collecte
- Submit data with calving book information
- Best if one person scores all females in each manageme

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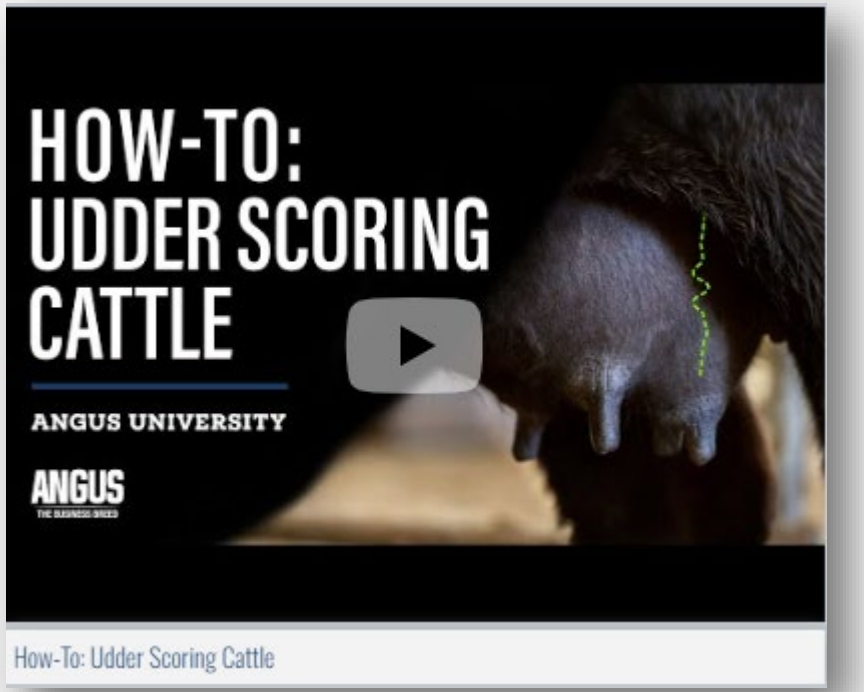
TEAT & UDDER SCORECARD FOR CATTLE

Teat Size		Udder Suspension	
Very large & misshapen	1	Very pendulous	1
Large	3	Pendulous	3
Intermediate	5	Intermediate	5
Small	7	Tight	7
Very small	9	Very tight	9



How-To: Udder Scoring Cattle

angus.org/university

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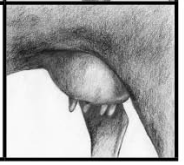
Guidelines – Follow BIF Recommendations

- Taken within 24 hours of calving
- Use weakest quarter to score both teat size and udder suspension
- Score both teat size and udder suspension on (1-9) scale, independently
- Can use intermediate scores (2, 4, 6, 8)
- Score without consideration for age
- One person scoring per group

	UDDER SUSPENSION		TEAT SIZE	
1	Very Pendulous		Very Large & Misshapen	
3	Pendulous		Large	
5	Intermediate		Intermediate	
7	Tight		Small	
9	Very Tight		Very small	

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Scope of Teat and UDDR Evaluation

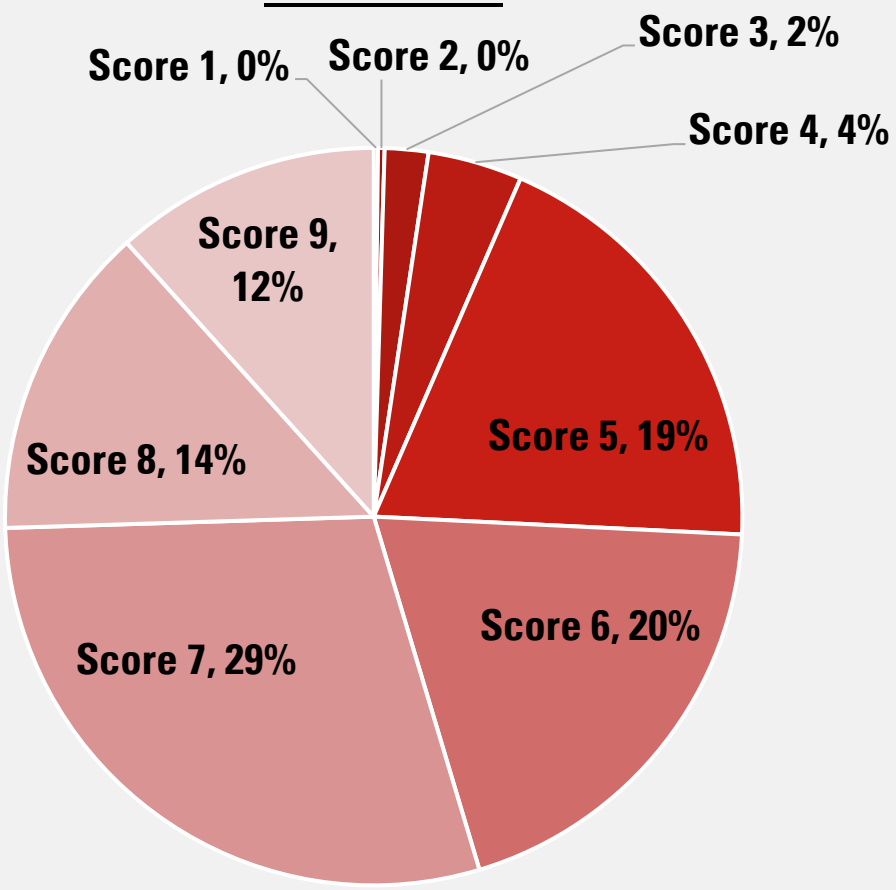
- Includes American Angus Association and Canadian Angus Association data

- 125,000+ females
- 433,000+ combined scores
- 1.87M genotyped animals
- 2.8M animals in the pedigree

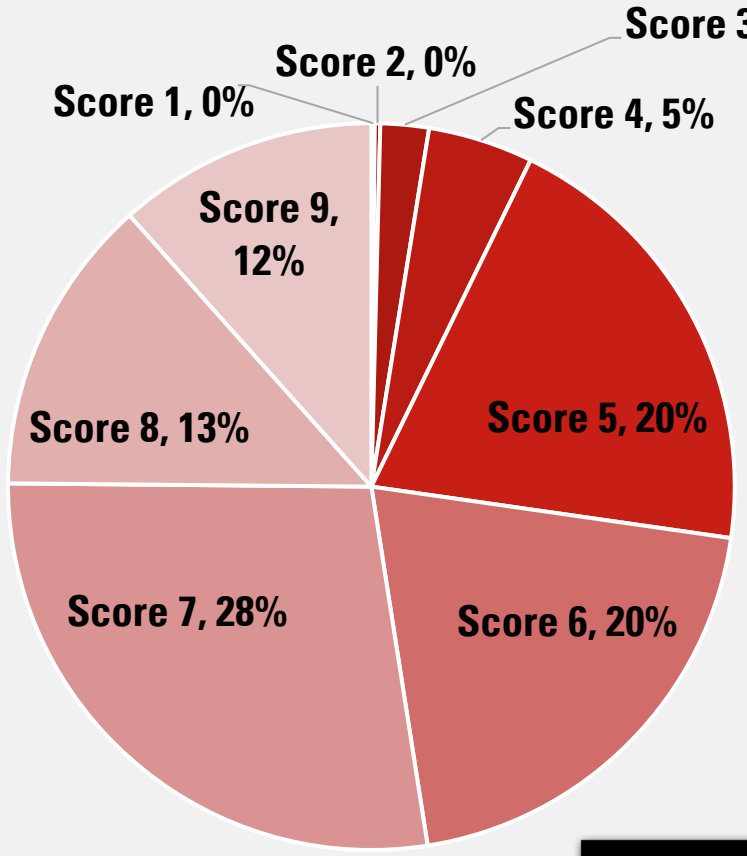
As of 9/27/2025

Distribution of scores – Average score ~6.5

Teat Size



Udder Suspension



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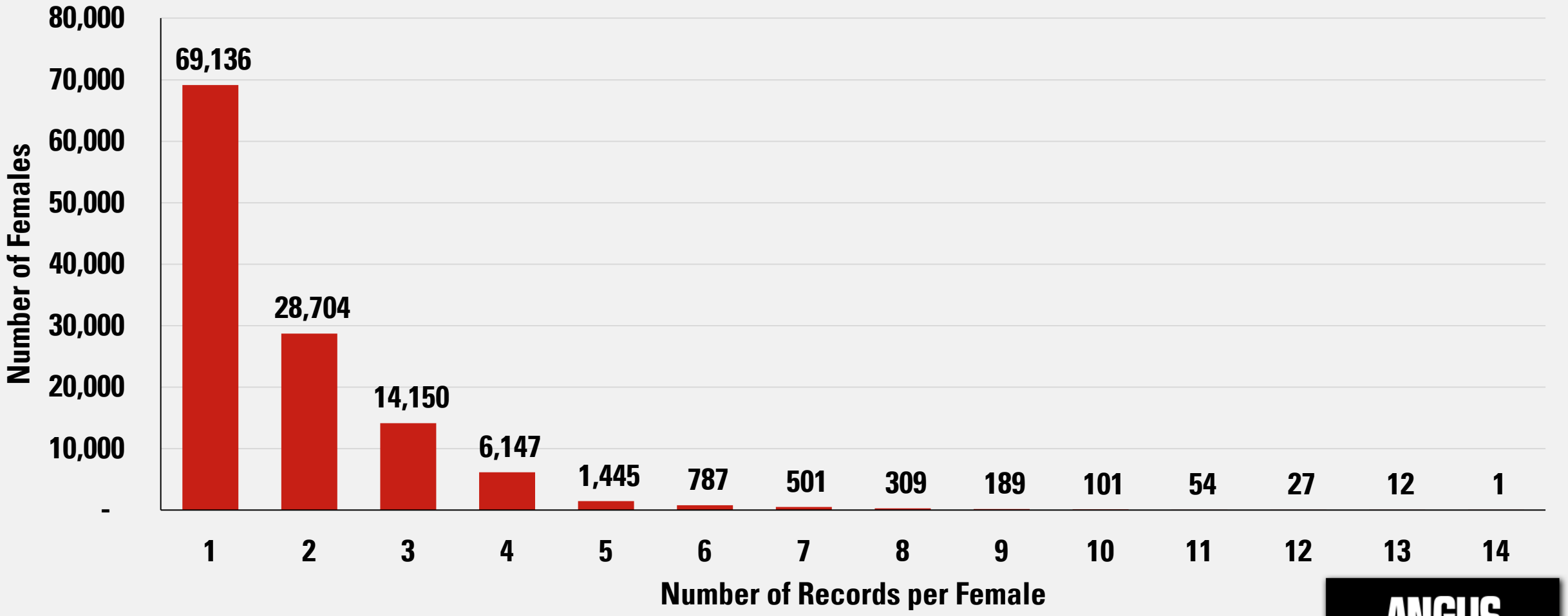
Distribution of Repeated Records – Teat Size



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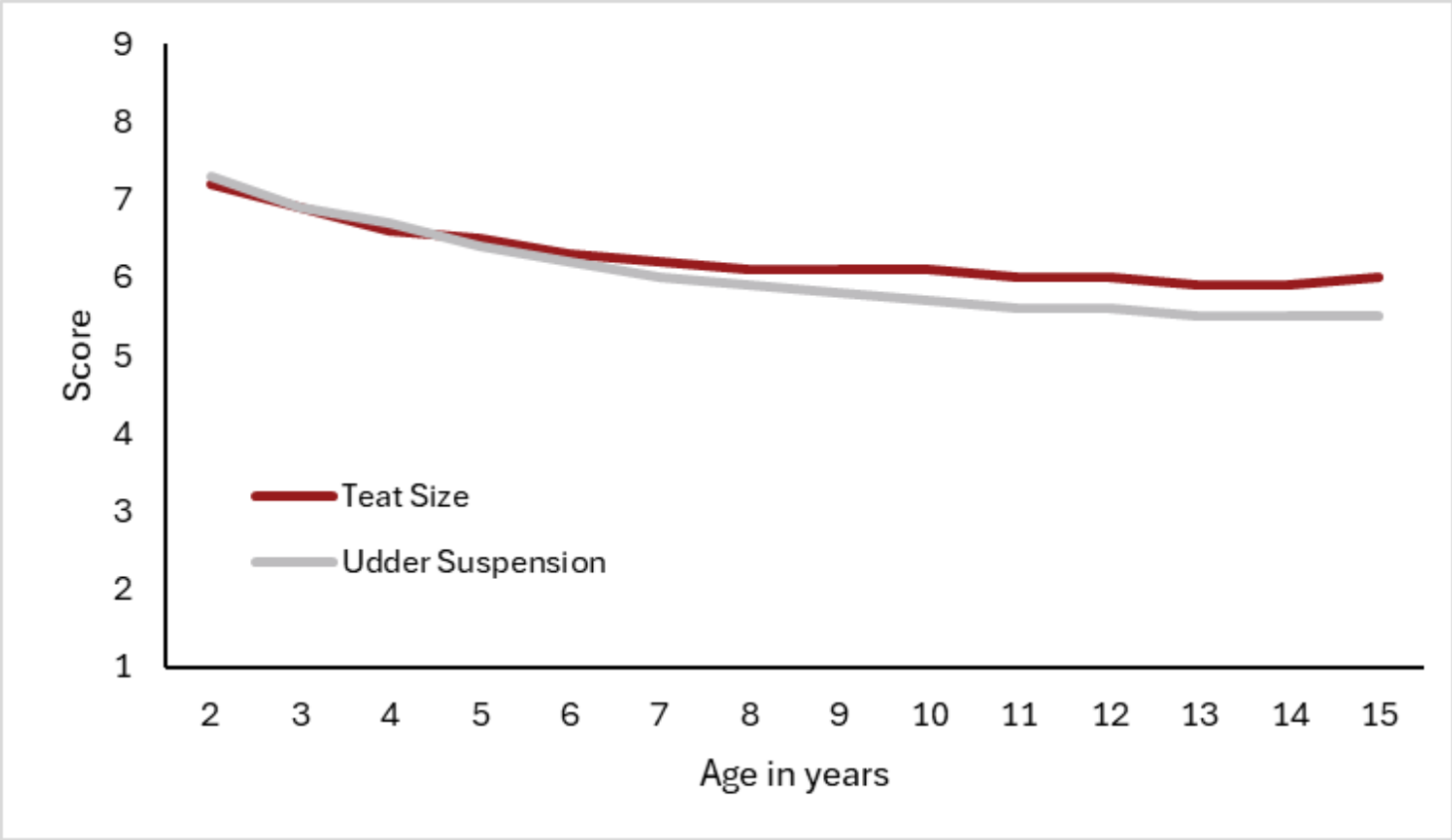
We know udders breakdown with age



- Udder conformation = structural trait
- Breakdown with age
- Score without consideration if female is a first calf heifer or 14 years old

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Teat and UDDR EPDs

Teat Size (Teat)

- Expressed in units of teat size score, with a **higher EPD** indicating a sire will produce daughters with **smaller teat size** compared to that of other sires' daughters

A higher EPD moves closer to a smaller teat (score of 9)

Udder Suspension (UDDR)

- Expressed in units of udder suspension score, with a **higher EPD** indicating a sire will produce daughters with **tighter udder suspension** compared to that of other sires' daughters

A higher EPD moves closer to a closer suspended udder (score of 9)

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EPD and ACC distribution

	Number of animals	Average	Min	Max	SD
		Teat Size			
EPD	2.7M	0.52	-0.66	1.53	0.17
ACC	2.7M	0.27	0.05	0.91	0.09
		Udder Suspension			
EPD	2.7M	0.52	-0.58	1.24	0.14
ACC	2.7M	0.26	0.05	0.91	0.08

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Heritability and Correlation

	Teat Size	Udder Suspension
Teat Size	**0.32**	0.77
Udder Suspension		**0.28**

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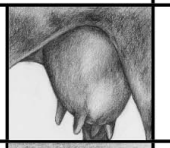
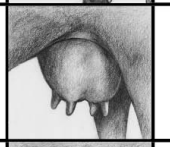
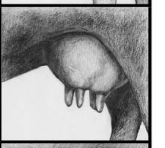
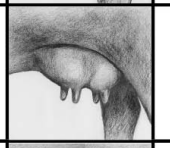
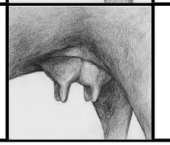
What about correlations with other traits?

- Extremes in either direction (closer to either a score of 9 or 1) may cause undesirable results
- Negative correlations do exist
  - Selecting higher EPD (more towards a score of 9), may decrease WW and Milk

Teat Size	
Weaning weight direct (WW)	-0.14
Weaning weight maternal (Milk)	-0.17
Udder Suspension	
Weaning weight direct (WW)	-0.11
Weaning weight maternal (Milk)	-0.24

	UDDER SUSPENSION		TEAT SIZE	
1	Very Pendulous		Very Large & Misshapen	
3	Pendulous		Large	
5	Intermediate		Intermediate	
7	Tight		Small	
9	Very Tight		Very small	

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Three New Maternal Selection Tools

PRODUCTION												MATERNAL					
CED ACC % PROG	BW ACC % PROG	WW ACC % PROG	YW ACC % PROG	RADG ACC % PROG	DMI ACC % PROG	YH ACC % PROG	SC ACC % PROG	HP ACC % DAUS	CEM ACC % DAUS	MILK ACC %	MKH MKD	TEAT ACC % PROG	UDDR ACC % PROG	FL ACC % DAUS	MW ACC % PROG	MH ACC % PROG	SEN %
+13	+1.6	+84	+147	+.27	+1.88	+.4	+1.23	+11.2	+17	+21	1	+.61	+.53	+1.00	+87	+.5	-26
.87	.96	.94	.91	.53	.53	.91	.90	.42	.45	.36	4	.50	.48	.40	.47	.46	
10%	60%	10%	15%	40%	95%	60%	30%	50%	1%	80%		35%	50%	75%	25%	40%	75%
1248	4121	3227	1618	15	15	697	759	56	20			17	17	24			

Click here to show/hide Management EPD Section

MANAGEMENT				
DOC ACC % PROG	CLAW ACC % PROG	ANGLE ACC % PROG	PAP ACC % PROG	HS ACC % PROG
+18	+.42	+.47	-.51	+.43
.85	.81	.80	.40	.76
55%	25%	45%	20%	35%
332	410	410	58	138

Click here to show/hide Angus-on-Dairy $Values Section

CARCASS						ANGUS-ON-DAIRY $VALUES		$VALUES					
CW ACC %	MARB ACC %	RE ACC %	FAT ACC %	CARC GRP PROG	USND GRP PROG	$AXH %	$AXJ %	$M %	$W %	$F %	$G %	$B %	$C %
+64	+1.07	+1.03	+.013	3	393	+202	+182	+70	+74	+104	+78	+182	+306
.57	.53	.53	.48	5	1151								
25%	15%	15%	45%			10%	10%	35%	30%	35%	15%	20%	15%

Phenotypic traits: **CE, BW, WW, YW, Doc, Claw, Angle, UScanWT, UIMF, URE, URibFat, URumpFat**

Bold Phenotypes are included in the National Cattle Evaluation. More Info

- Teat, UDDR, and FL are in the Maternal suite of EPDs
- All three were incorporated in the Maternal Weaned Calf Value ($M) in May

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Updated Maternal Weaned Calf Value ($M)

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Maternal Weaned Calf Value ($M)

- Expressed in dollars per head, **predicts profitability differences from conception to weaning** with the underlying breeding objective assuming that individuals **retain** their own **replacement females** within herd and **sell the rest of the cull female and all male progeny as feeder calves**.
- The model assumes commercial producers will have a 20% herd level replacement rate.

12 Traits included in $M	
CED	FL
WW	MW
CEM	DOC
Milk	HP
Teat	Claw
UDDR	Angle

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What does that ideal commercial Angus female look like?

- Refinement of economic values taking place to accurately model the commercial herd
- Feedback from the industry:
  - Survey ranked cow survival/longevity at the top of the list.
  - All profitability starts with fertility and longevity.
  - Combined value is heavily weighted towards terminal.

Trait	Median
Cow survival	4.5
Docility	5.2
Foot score	5.5
Heifer pregnancy	5.6
Weaning weight	6.6
Calving ease	6.6
Body condition score	7.5
Marbling grade	7.7
Feedlot efficiency	7.8
Milk	7.9
Feedlot gain	9.1
Cow mature weight	9.8
Cow frame score	10.6
Yield grade	10.7

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General assumptions currently being applied to Teat Size and Udder Suspension

- The probability that a cow is culled for teat size or udder conformation is greatest at 4 years of age.
  - The ability for a cow to survives from 4 to 5 years of age.

- Chances of cows being culled:
  - 75% chance that cows in the 1/2/3 categories will be culled
  - 15% chance they will be culled 4/5 categories
  - 0% chance they will be culled 6/7 and 8/9

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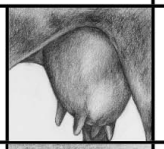
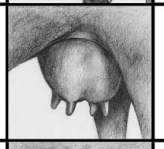
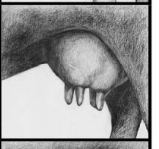
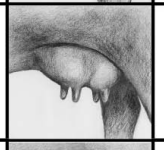
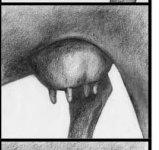
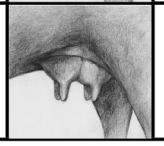
1	Very Pendulous		Very Large & Misshapen	
3	Pendulous		Large	
5	Intermediate		Intermediate	
7	Tight		Small	
9	Very Tight		Very small	

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Functional Longevity | Cost and revenues associated with FL

- **Cull cow sales**: Generate revenue from cull carcass value
- **Calf sales**: Calf value positively correlated with calf weight
- **Average genetic merit of the herd**: Older cows = lower genetic merit
- **Replacement Heifer Cost**
- **Feed costs**: Retaining a higher proportion of older cows through FL allows for higher proportion of feed cost going to maintenance instead of growth
- **Calving Assistance:** Calving ease tends to be better for older cows than younger cows.

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$M correlations were >0.90

	N	$M	$B	$C
All	445,000	0.91	0.999	0.98
Current S&D	330,000	0.90	0.999	0.98
Non-Parents	116,000	0.91	0.999	0.98
Main & Supps	4,000	0.91	0.999	0.98
Top 200	200	0.95	0.999	0.99

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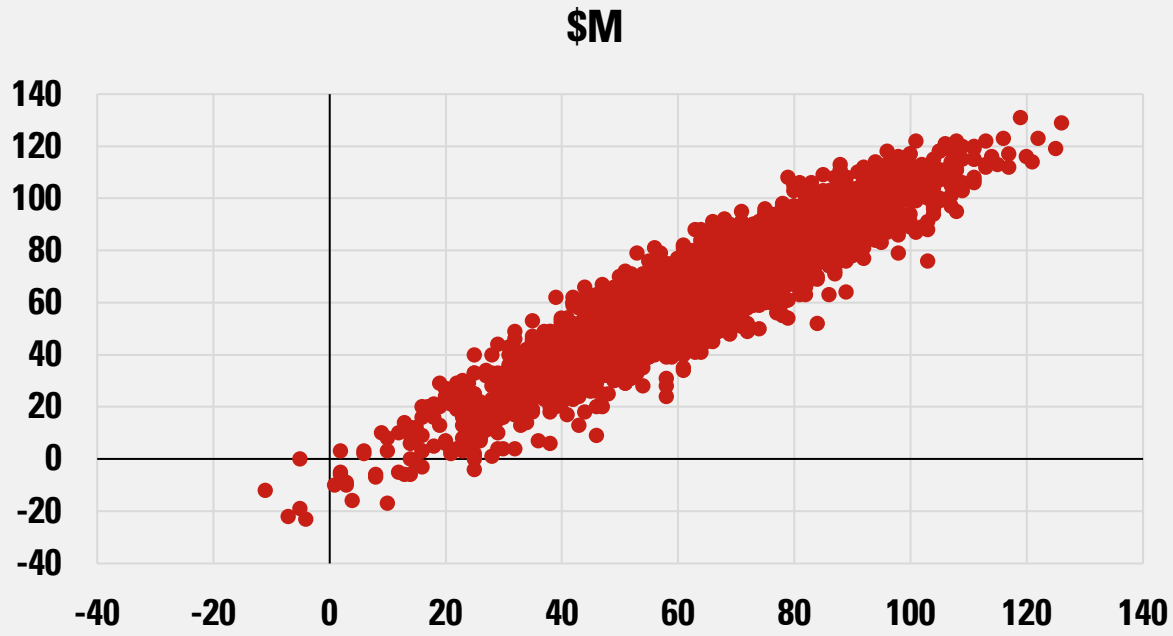

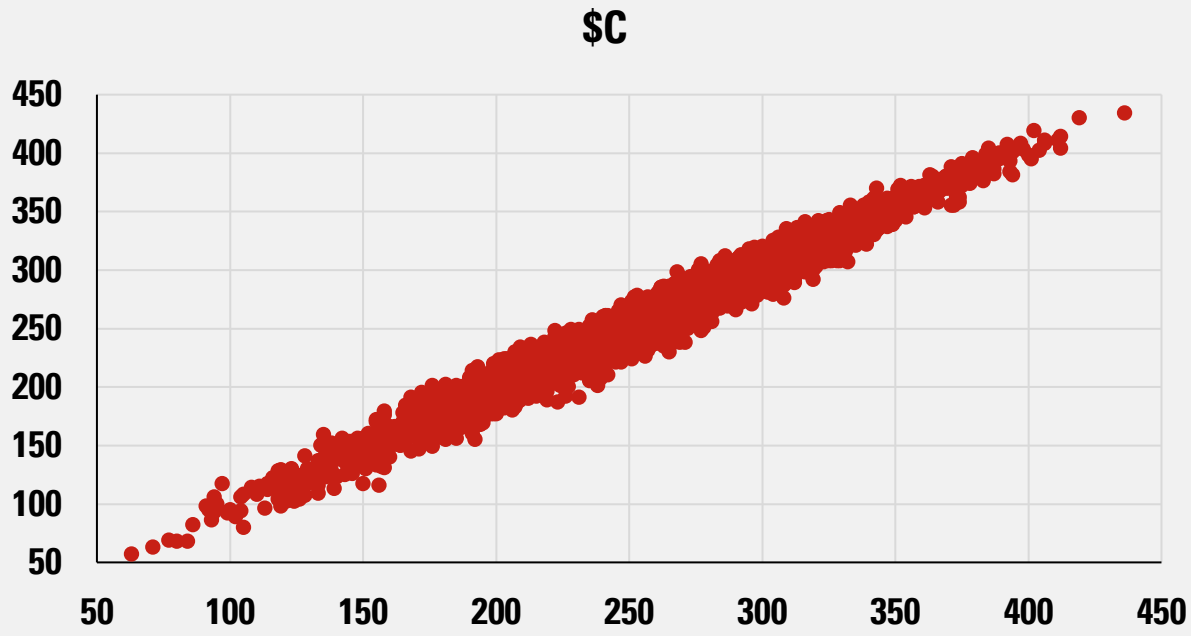

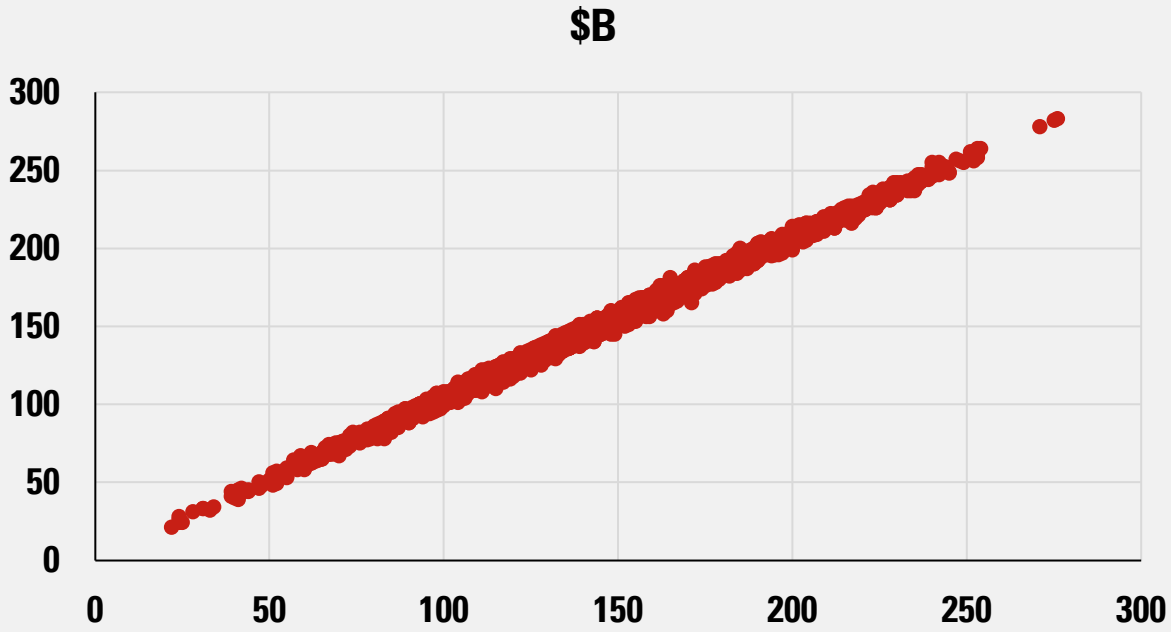

Main and Supplemental Sires

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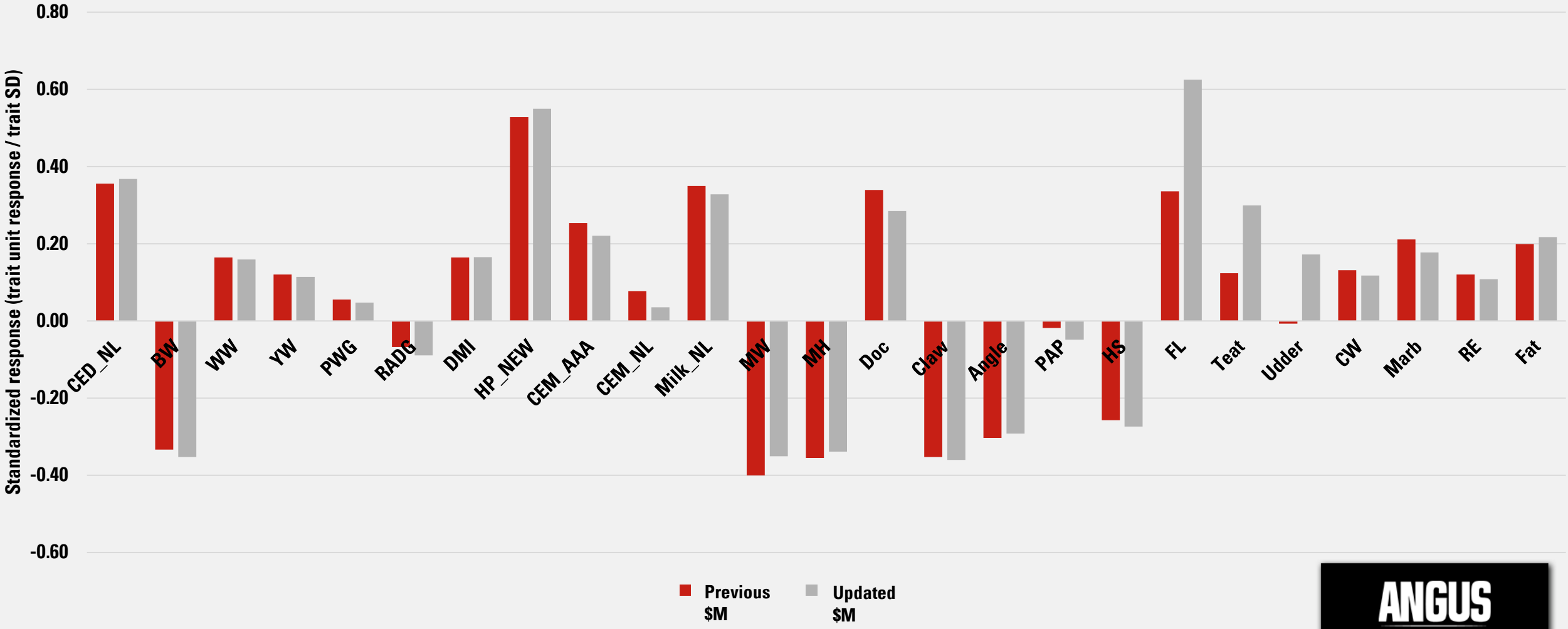
Compare Response to Selection for Previous and Updated $M



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.87	.96	.94	.91	.53	.53	.91	.90	.42	.45	.36	4	.50	.48	.40	.47	.46	
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QUESTIONS/CONTACT

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