Investing in the Genetic Potential of Your Herd

Northwest Florida Beef Cattle Conference

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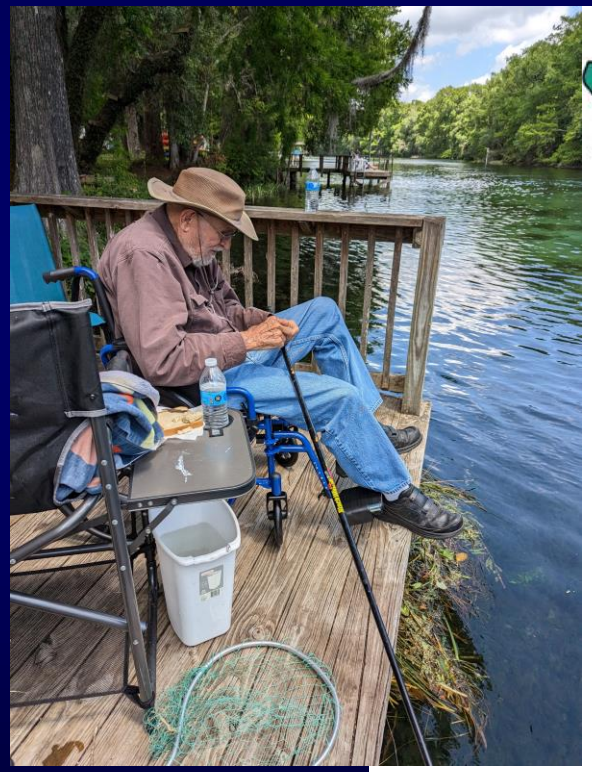
University of Kentucky

February 14, 2024



5th Generation Floridian

Economics 101

Income ≠ Profit

Profit = Income - Costs

Basic Genetics

- Breeding Management
  - Crossbreeding (Heterosis)
    - Individual
    - Maternal
  - Selection (Heritability)
    - Bull purchase
    - Cow culling
    - Replacements

Impact of Genetics

Trait	Heritability	Heterosis
Carcass Traits, Frame and Mature Wt	High	Low
Growth and Milk	Medium	Medium
Maternal Ability, Reproduction, Health, Cow Longevity and Overall Productivity	Low	High

Why Crossbreed?

- Heterosis (Hybrid Vigor) – The advantage a crossbred has over the average of the breeds represented in the cross
- Breed Complementarity

Heterosis

- Individual - Attributes that are observed in the calf
  - Weaning Weight
  - Survival to Weaning
- Maternal - Attributes observed in the female
  - Pregnancy Rate
  - Live Calving Percent
  - Lifetime Productivity

Heterosis

- Cumulative impact of all traits
- >20% increase in productivity
- Simplest crossbreeding system >10%
- Heavier and more calves to sell

Breed Selection

- This is not your father's breed!
- Breed characteristics from the 70s and 80s are no longer relevant
- Remember, color only impacts one trait in cattle
  - –COLOR
  - –Market

TABLE 2: BREED OF SIRE MEANS FOR 2020 BORN ANIMALS UNDER CONDITIONS SIMILAR TO USMARC

Breed	Birth Wt. (lb)	Weaning Wt. (lb)	Yearling Wt. (lb)	Maternal Milk (lb)	Marbling Score[a]	Ribeye Area (in^2)	Fat (in)	Carcass Wt.(lb)
Angus	84.7	539.2	978.6	521.1	6.19	13.71	0.663	920.8
Hereford	87.2	517.2	914.7	508.9	5.31	13.50	0.590	868.7
Red Angus	83.9	518.6	937.5	521.6	5.87	13.47	0.631	885.5
Shorthorn	89.0	500.9	901.9	514.2	5.45	13.71	0.529	867.5
South Devon	88.2	506.0	893.5	518.1	5.29	13.90	0.493	850.6
Beefmaster	87.4	528.2	920.1	507.8				
Brahman	94.4	557.4	928.7	513.5	4.86	13.49	0.509	859.3
Brangus	87.1	520.8	929.7	519.0				
Santa Gertrudis	88.4	528.2	920.7	512.3	5.11	13.32	0.579	873.2
Braunvieh	88.2	511.7	902.7	528.8	5.49	14.47	0.487	853.4
Charolais	89.5	540.8	950.2	515.8	5.34	14.57	0.463	898.1
Chiangus	87.9	507.0	907.0	512.6	5.46	14.01	0.524	872.9
Gelbvieh	86.5	537.8	955.6	520.2	5.30	14.42	0.522	890.0
Limousin	85.5	530.1	926.2	512.3	5.39	14.52	0.531	892.8
Maine-Anjou	86.3	496.8	876.9	503.8	5.17	14.40	0.454	855.4
Salers	85.9	517.9	916.8	518.7	5.17	14.39	0.475	861.1
Simmental	87.1	542.0	959.1	516.1	5.50	14.45	0.501	897.5
Tarentaise	86.2	523.1	892.1	505.7				

[a]Marbling score units: 4.00 = Sl^{00}; 5.00 = Sm^{00}

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Table 1. Relative Breed Differences for US Beef Breeds

Breed*	Birth Wt. (lb)[1]	Weaning Wt. (lb)[1]	Yearling Wt. (lb)[1]	Mature Wt. (lb)[1,2]	Maternal Milk (lb)[1]	Marbling Score[3]	Ribeye Area (in^2)[4]	Fat (in)[5]	Carcass Wt.(lb)[1]	Lean to-fat[6]	BCS[7]	FE Index Steer[8]
Angus	★★	★★★★	★★★★★	★★★★	★★★★	★★★★★	★★	★★★★★	★★★★★	★	★★★★	★★
Beefmaster	★★★	★★★	★★★	★★	★★						★★★	★★★★★
Brahman	★★★★★	★★★★★	★★★	★★★★	★★★	★	★★	★★★	★★	★★★	★★★★	★★★
Brangus	★★★	★★★	★★★	★★★	★★★★						★★★	★★
Braunvieh	★★★	★★	★★	★	★★★★★	★★★	★★★★	★★	★★	★★★★	★	★★★
Charolais	★★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★★	★★	★★★★	★★★★	★★★★	★★★
Chiangus	★★★	★★	★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★★
Gelbvieh	★★★	★★★★	★★★★	★★	★★★★	★★★	★★★★	★★★	★★★★	★★★	★★	★★★
Hereford	★★★	★★★	★★★	★★★	★★	★★★	★★	★★★★	★★★	★★	★★★★	★★★
Limousin	★★	★★★	★★★	★★	★★★	★★★	★★★★	★★★	★★★★	★★★	★★	★★★★★
Maine-Anjou	★★★	★	★	★★★	★	★★	★★★★	★★	★★	★★★★	★★★	★★★★
Red Angus	★	★★★	★★★★	★★★	★★★★	★★★★★	★★	★★★★★	★★★★	★	★★★★	★★
Salers	★★	★★★	★★★	★★★★	★★★★	★★	★★★★	★★	★★	★★★★	★★★	★★★
Santa Gertrudis	★★★	★★★	★★★	★★★	★★★	★★	★	★★★★	★★★	★★	★★	★★★★
Shorthorn	★★★★	★★	★★	★★★	★★★	★★★	★★	★★★	★★★	★★★	★★	★★★
Simmental	★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★★	★★★	★★★★	★★★	★★★	★★
South Devon	★★★	★★	★★		★★★	★★★	★★★	★★	★★	★★★		★
Tarentaise	★★	★★★	★★		★★							★★★

Selecting a Herd Bull

- Reproductive Soundness
- Structural Soundness
- Visual Appraisal
- Performance

Expected Progeny Differences

EPD

- Best tool for selecting bulls for the traits that EPD are computed
- Use to compare bulls or determine their rank in the breed for that trait
- Uses all information: actual measurement of bull, relatives, genomics and management/environment
- Risk management tool

Weaning Weight Direct EPD

+70
20%

+57
65%

Expect the average difference in average weaning wt of calves to be 13 pounds

Milk EPD

+34

10%

+25

60%

Expect the average difference in calves raised by these sires' daughters to be 9 lbs

Matching Genetics to Management/Environment

- What are your resources?
  - Labor Availability
  - Nutrition Quality and Quantity

Milk EPD

+34
10%

+25
60%

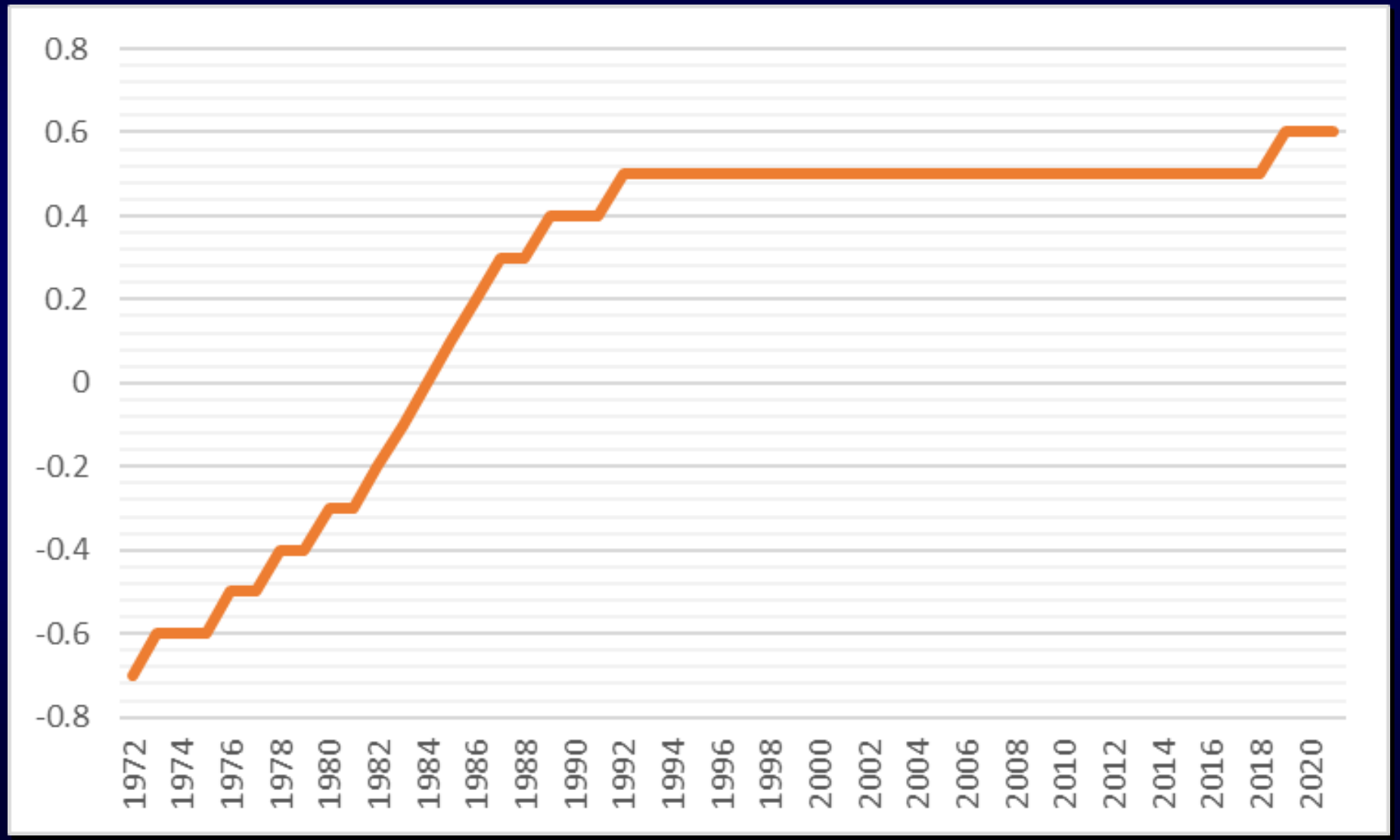
Expect the average difference in calves raised by these sires' daughters to be 9 lbs

Which bull is better?

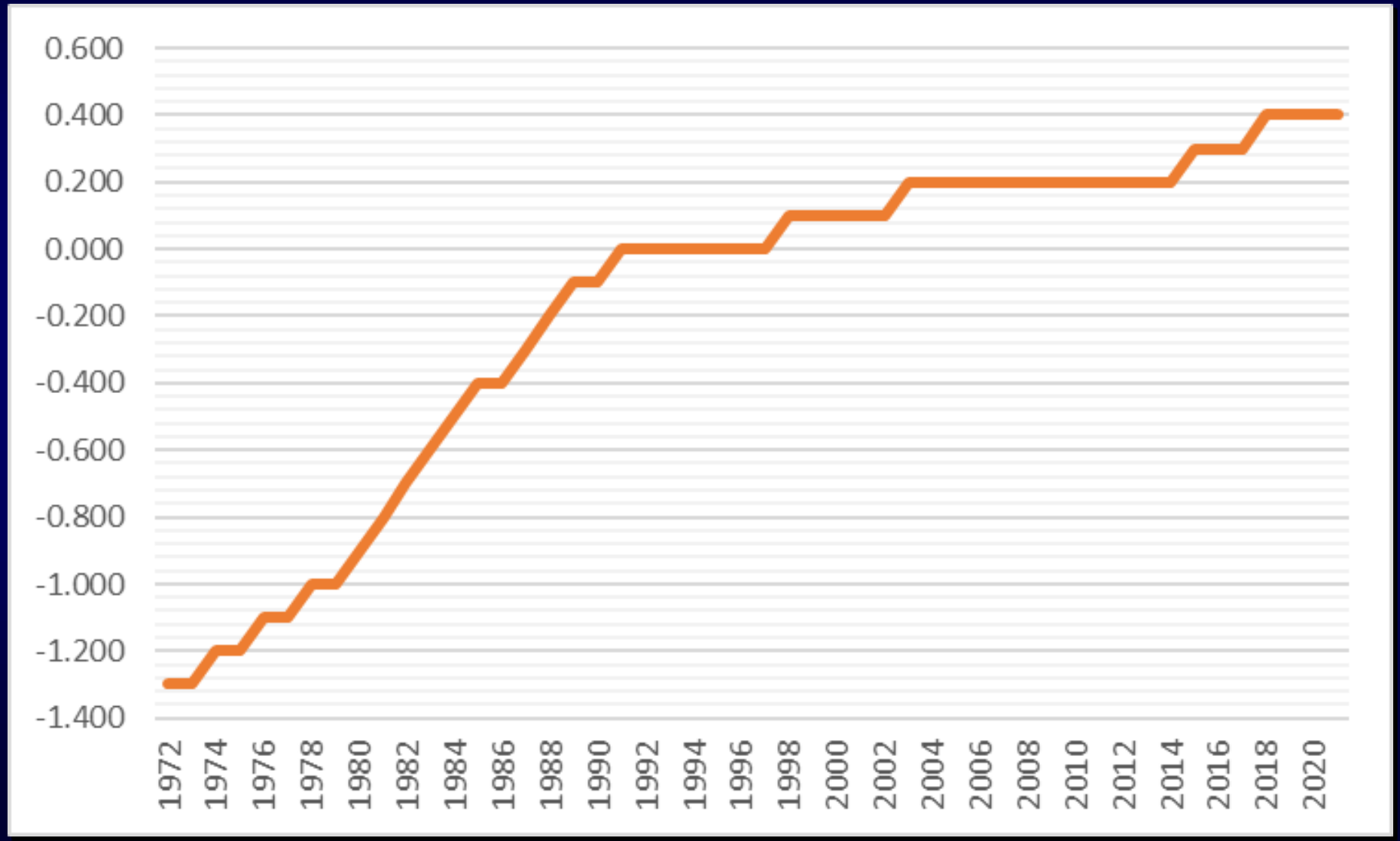
My Latest Pet Peeve

- What is Mature Size?
  - Scientist = Mature Weight
  - Beef Producer = Frame Size
- Who is right?
  - For the purposes of determining feeding requirements the appropriate trait is Mature Weight
  - Frame size is used to estimate what a cow's mature weight should be, but this is based on outdated information

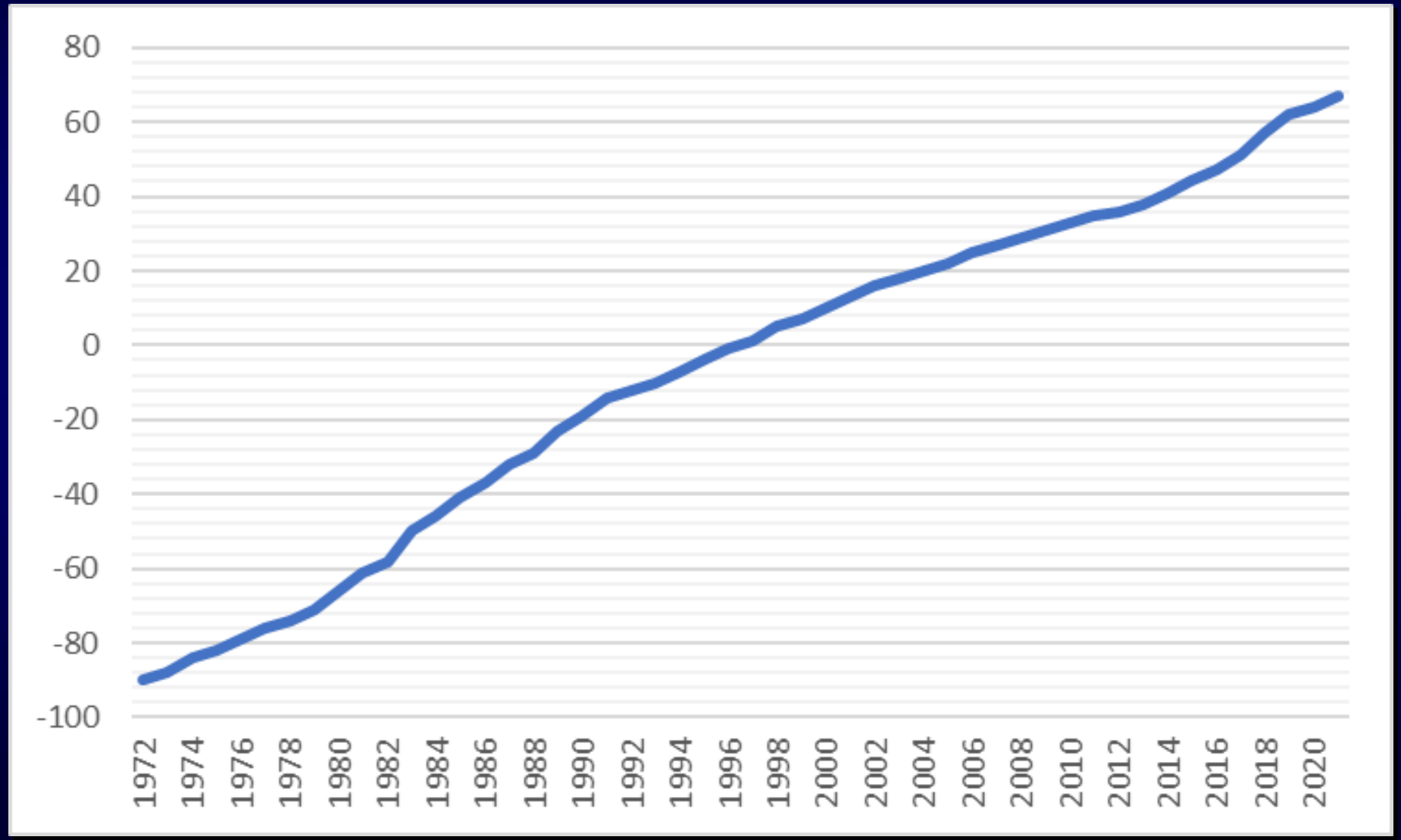
Yearling Height



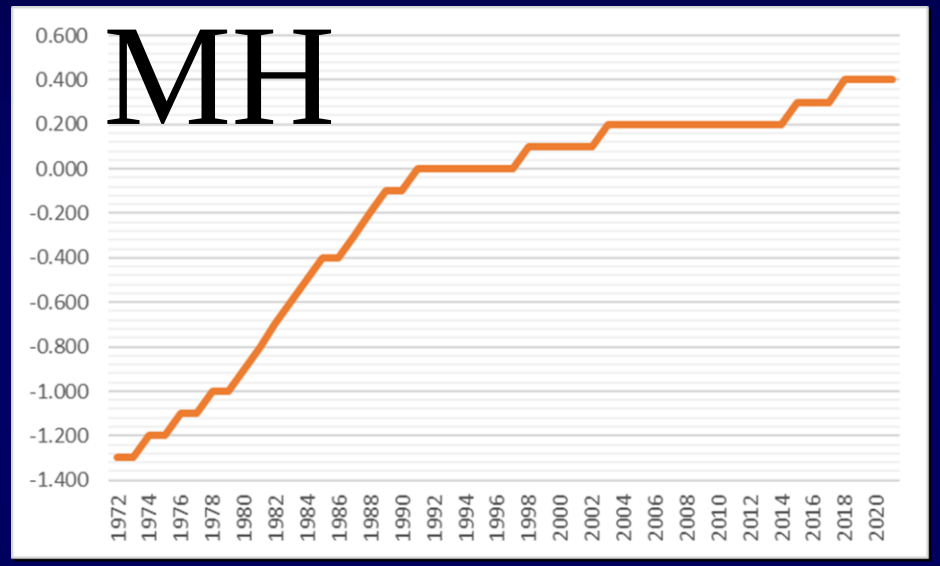
Mature Height

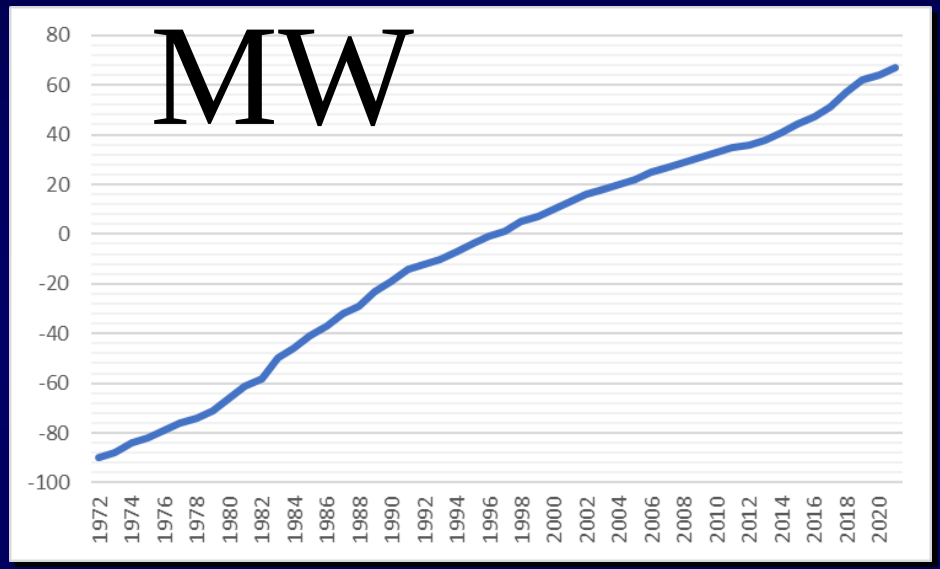


Mature Weight



Important to Remember!





What we look at!

What we feed!

This Impacts Costs!

High Growth = Heavy Calf Weight

High Milk = Heavy Calf Weight

High Growth = Heavy Mature Weight

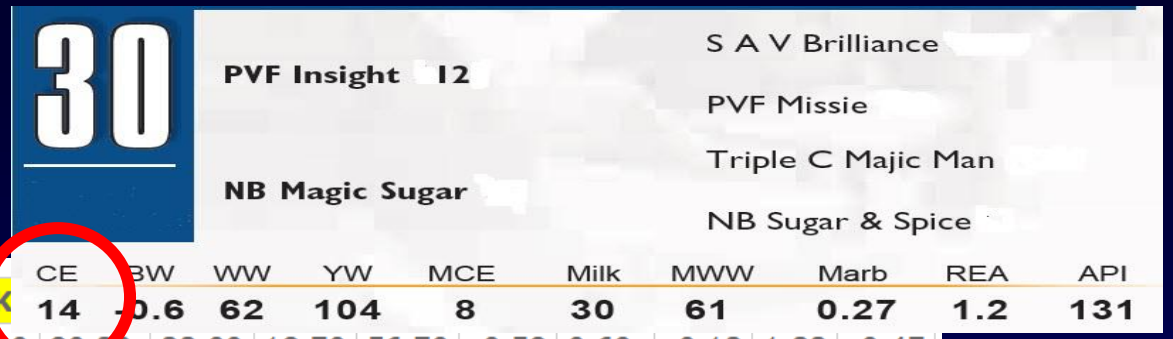
High Milk = Increased Maintenance Energy

High Mature Weight = Increased Maintenance Energy

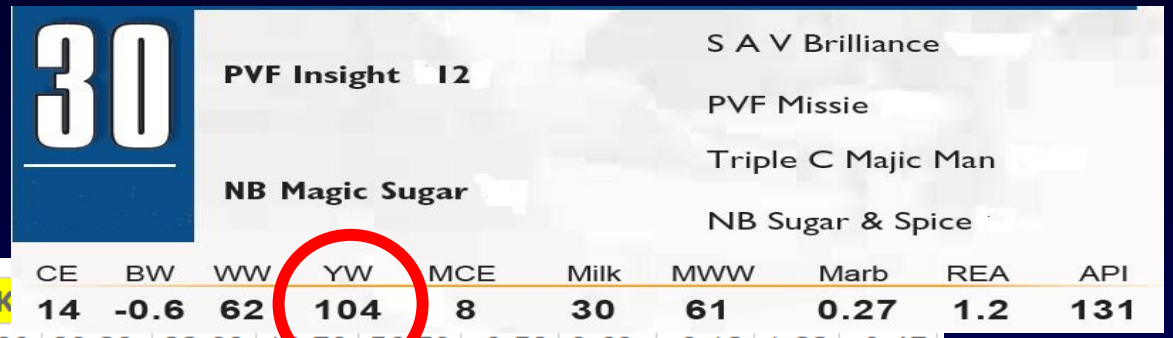
High Milk + High MW - Increased Maintenance Energy = Lower Body Condition

Lower Body Condition = Low Reproduction

Low Reproduction = Low Income/Profit



%	API	TI	CE	BW	WW	ADG	YW	MCE	MILK									
1	183.86	102.86	18.40	-3.80	103.40	0.38	161.10	10.90	34.50	80.70	23.00	18.70	56.70	-0.58	0.69	-0.13	1.33	-0.47
2	177.49	99.92	17.50	-3.00	100.10	0.36	155.30	10.30	33.20	78.20	22.10	17.70	53.00	-0.56	0.62	-0.12	1.27	-0.45
3	173.48	98.05	16.80	-2.60	98.00	0.35	152.00	9.90	32.40	77.00	21.60	17.20	50.50	-0.55	0.57	-0.12	1.23	-0.44
4	170.33	96.78	16.40	-2.30	96.50	0.34	149.40	9.60	31.70	76.10	21.20	16.70	48.70	-0.54	0.54	-0.11	1.21	-0.44
5	168.03	95.66	16.00	-2.00	95.30	0.33	147.20	9.40	31.10	75.30	20.90	16.30	47.20	-0.53	0.51	-0.11	1.18	-0.43
10	159.72	91.75	14.80	-1.20	91.30	0.31	140.00	8.50	29.30	72.30	19.90	15.20	42.60	-0.50	0.42	-0.11	1.10	-0.41
15	154.11	89.01	14.00	-0.60	88.70	0.30	135.10	7.90	28.10	70.50	19.20	14.50	39.50	-0.48	0.36	-0.10	1.05	-0.40
20	149.50	87.03	13.40	-0.20	86.60	0.28	131.40	7.50	27.20	69.00	18.60	14.00	37.20	-0.47	0.31	-0.10	1.02	-0.39
25	145.48	85.27	12.90	0.20	84.70	0.28	128.20	7.10	26.40	67.70	18.10	13.50	35.30	-0.46	0.27	-0.10	0.98	-0.38
30	142.17	83.77	12.50	0.50	83.20	0.27	125.50	6.80	25.70	66.50	17.60	13.10	33.70	-0.45	0.24	-0.09	0.96	-0.37
35	139.04	82.41	12.10	0.70	81.80	0.26	122.80	6.50	25.10	65.50	17.20	12.70	32.30	-0.44	0.21	-0.09	0.93	-0.36
40	136.24	81.12	11.80	1.00	80.40	0.25	120.40	6.20	24.40	64.50	16.80	12.30	30.80	-0.43	0.18	-0.09	0.91	-0.36
45	133.60	79.86	11.40	1.20	79.20	0.25	118.30	5.90	23.90	63.50	16.30	12.00	29.40	-0.42	0.16	-0.09	0.89	-0.35
50	131.10	78.74	11.10	1.50	78.00	0.24	116.20	5.60	23.30	62.40	15.90	11.60	28.20	-0.41	0.14	-0.08	0.87	-0.34
55	128.58	77.55	10.80	1.70	76.90	0.23	114.00	5.30	22.80	61.40	15.50	11.30	26.90	-0.40	0.12	-0.08	0.85	-0.33
60	126.04	76.39	10.40	1.90	75.70	0.23	111.90	5.10	22.20	60.40	15.00	10.90	25.70	-0.39	0.10	-0.08	0.83	-0.33
65	123.73	75.30	10.10	2.10	74.50	0.22	109.70	4.80	21.60	59.40	14.50	10.50	24.40	-0.38	0.08	-0.08	0.80	-0.32
70	121.51	74.15	9.70	2.40	73.30	0.21	107.60	4.50	21.10	58.40	14.10	10.10	23.10	-0.37	0.06	-0.07	0.78	-0.31
75	119.16	73.00	9.30	2.60	72.00	0.21	105.40	4.20	20.40	57.40	13.60	9.70	21.70	-0.35	0.04	-0.07	0.76	-0.30
80	116.80	71.84	8.80	2.90	70.60	0.20	102.90	3.90	19.80	56.30	13.00	9.20	20.30	-0.34	0.02	-0.07	0.73	-0.29
85	114.16	70.42	8.20	3.20	68.90	0.19	100.00	3.50	19.00	55.20	12.40	8.60	18.60	-0.32	-0.01	-0.06	0.70	-0.28
90	111.21	68.78	7.40	3.60	66.90	0.18	96.70	3.00	18.00	53.80	11.70	7.70	16.70	-0.30	-0.04	-0.06	0.67	-0.27
95	106.74	66.34	6.10	4.30	63.90	0.16	91.70	2.20	16.60	51.70	10.70	6.20	13.70	-0.27	-0.09	-0.05	0.61	-0.25
Avg	131.10	78.74	11.10	1.50	78.00	0.24	116.20	5.60	23.30	62.40	15.90	11.60	28.20	-0.41	0.14	-0.08	0.87	-0.34



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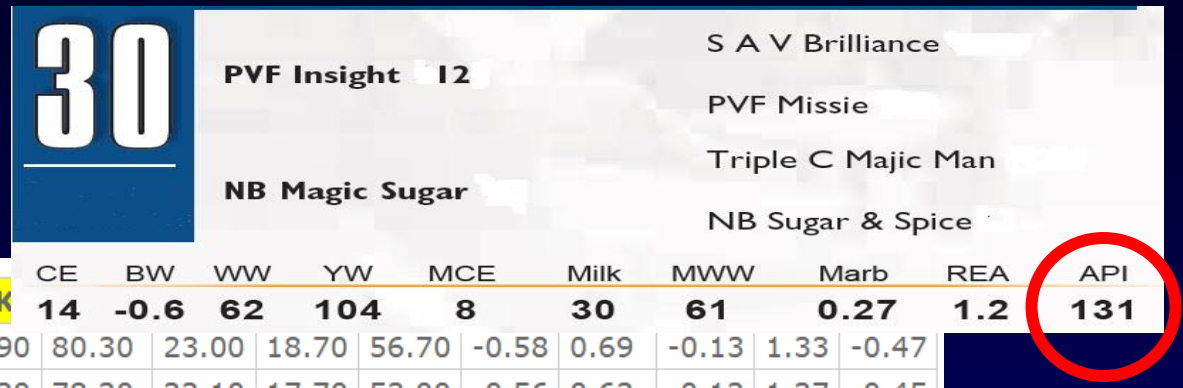
2	177.49	99.92	17.50	-3.00	100.10	0.36	155.30	10.30	33.20	78.20	22.10	17.70	53.00	-0.56	0.62	-0.12	1.27	-0.45
3	173.48	98.05	16.80	-2.60	98.00	0.35	152.00	9.90	32.40	77.00	21.60	17.20	50.50	-0.55	0.57	-0.12	1.23	-0.44
4	170.33	96.78	16.40	-2.30	96.50	0.34	149.40	9.60	31.70	76.10	21.20	16.70	48.70	-0.54	0.54	-0.11	1.21	-0.44
5	168.03	95.66	16.00	-2.00	95.30	0.33	147.20	9.40	31.10	75.30	20.90	16.30	47.20	-0.53	0.51	-0.11	1.18	-0.43
10	159.72	91.75	14.80	-1.20	91.30	0.31	140.00	8.50	29.30	72.30	19.90	15.20	42.60	-0.50	0.42	-0.11	1.10	-0.41
15	154.11	89.01	14.00	-0.60	88.70	0.30	135.10	7.90	28.10	70.50	19.20	14.50	39.50	-0.48	0.36	-0.10	1.05	-0.40
20	149.50	87.03	13.40	-0.20	86.60	0.28	131.40	7.50	27.20	69.00	18.60	14.00	37.20	-0.47	0.31	-0.10	1.02	-0.39
25	145.48	85.27	12.90	0.20	84.70	0.28	128.20	7.10	26.40	67.70	18.10	13.50	35.30	-0.46	0.27	-0.10	0.98	-0.38
30	142.17	83.77	12.50	0.50	83.20	0.27	125.50	6.80	25.70	66.50	17.60	13.10	33.70	-0.45	0.24	-0.09	0.96	-0.37
35	139.04	82.41	12.10	0.70	81.80	0.26	122.80	6.50	25.10	65.50	17.20	12.70	32.30	-0.44	0.21	-0.09	0.93	-0.36
40	136.24	81.12	11.80	1.00	80.40	0.25	120.40	6.20	24.40	64.50	16.80	12.30	30.80	-0.43	0.18	-0.09	0.91	-0.36
45	133.60	79.86	11.40	1.20	79.20	0.25	118.30	5.90	23.90	63.50	16.30	12.00	29.40	-0.42	0.16	-0.09	0.89	-0.35
50	131.10	78.74	11.10	1.50	78.00	0.24	116.20	5.60	23.30	62.40	15.90	11.60	28.20	-0.41	0.14	-0.08	0.87	-0.34
55	128.58	77.55	10.80	1.70	76.90	0.23	114.00	5.30	22.80	61.40	15.50	11.30	26.90	-0.40	0.12	-0.08	0.85	-0.33
60	126.04	76.39	10.40	1.90	75.70	0.23	111.90	5.10	22.20	60.40	15.00	10.90	25.70	-0.39	0.10	-0.08	0.83	-0.33
65	123.73	75.30	10.10	2.10	74.50	0.22	109.70	4.80	21.60	59.40	14.50	10.50	24.40	-0.38	0.08	-0.08	0.80	-0.32
70	121.51	74.15	9.70	2.40	73.30	0.21	107.60	4.50	21.10	58.40	14.10	10.10	23.10	-0.37	0.06	-0.07	0.78	-0.31
75	119.16	73.00	9.30	2.60	72.00	0.21	105.40	4.20	20.40	57.40	13.60	9.70	21.70	-0.35	0.04	-0.07	0.76	-0.30
80	116.80	71.84	8.80	2.90	70.60	0.20	102.90	3.90	19.80	56.30	13.00	9.20	20.30	-0.34	0.02	-0.07	0.73	-0.29
85	114.16	70.42	8.20	3.20	68.90	0.19	100.00	3.50	19.00	55.20	12.40	8.60	18.60	-0.32	-0.01	-0.06	0.70	-0.28
90	111.21	68.78	7.40	3.60	66.90	0.18	96.70	3.00	18.00	53.80	11.70	7.70	16.70	-0.30	-0.04	-0.06	0.67	-0.27
95	106.74	66.34	6.10	4.30	63.90	0.16	91.70	2.20	16.60	51.70	10.70	6.20	13.70	-0.27	-0.09	-0.05	0.61	-0.25
Avg	131.10	78.74	11.10	1.50	78.00	0.24	116.20	5.60	23.30	62.40	15.90	11.60	28.20	-0.41	0.14	-0.08	0.87	-0.34



%	API	TI	CE	BW	WW	ADG	YW	MCE	MLK									
1	183.86	102.86	18.40	-3.80	103.40	0.38	161.10	10.90	34.90	80.30	23.00	18.70	56.70	-0.58	0.69	-0.13	1.33	-0.47
2	177.49	99.92	17.50	-3.00	100.10	0.36	155.30	10.30	33.20	78.20	22.10	17.70	53.00	-0.56	0.62	-0.12	1.27	-0.45
3	173.48	98.05	16.80	-2.60	98.00	0.35	152.00	9.90	32.40	77.00	21.60	17.20	50.50	-0.55	0.57	-0.12	1.23	-0.44
4	170.33	96.78	16.40	-2.30	96.50	0.34	149.40	9.60	31.70	76.10	21.20	16.70	48.70	-0.54	0.54	-0.11	1.21	-0.44
5	168.03	95.66	16.00	-2.00	95.30	0.33	147.20	9.40	31.10	75.30	20.90	16.30	47.20	-0.53	0.51	-0.11	1.18	-0.43
10	159.72	91.75	14.80	-1.20	91.30	0.31	140.00	8.50	29.30	72.30	19.90	15.20	42.60	-0.50	0.42	-0.11	1.10	-0.41
15	154.11	89.01	14.00	-0.60	88.70	0.30	135.10	7.90	28.10	70.50	19.20	14.50	39.50	-0.48	0.36	-0.10	1.05	-0.40
20	149.50	87.03	13.40	-0.20	86.60	0.28	131.40	7.50	27.20	69.00	18.60	14.00	37.20	-0.47	0.31	-0.10	1.02	-0.39
25	145.48	85.27	12.90	0.20	84.70	0.28	128.20	7.10	26.40	67.70	18.10	13.50	35.30	-0.46	0.27	-0.10	0.98	-0.38
30	142.17	83.77	12.50	0.50	83.20	0.27	125.50	6.80	25.70	66.50	17.60	13.10	33.70	-0.45	0.24	-0.09	0.96	-0.37
35	139.04	82.41	12.10	0.70	81.80	0.26	122.80	6.50	25.10	65.50	17.20	12.70	32.30	-0.44	0.21	-0.09	0.93	-0.36
40	136.24	81.12	11.80	1.00	80.40	0.25	120.40	6.20	24.40	64.50	16.80	12.30	30.80	-0.43	0.18	-0.09	0.91	-0.36
45	133.60	79.86	11.40	1.20	79.20	0.25	118.30	5.90	23.90	63.50	16.30	12.00	29.40	-0.42	0.16	-0.09	0.89	-0.35
50	131.10	78.74	11.10	1.50	78.00	0.24	116.20	5.60	23.30	62.40	15.90	11.60	28.20	-0.41	0.14	-0.08	0.87	-0.34
55	128.58	77.55	10.80	1.70	76.90	0.23	114.00	5.30	22.80	61.40	15.50	11.30	26.90	-0.40	0.12	-0.08	0.85	-0.33
60	126.04	76.39	10.40	1.90	75.70	0.23	111.90	5.10	22.20	60.40	15.00	10.90	25.70	-0.39	0.10	-0.08	0.83	-0.33
65	123.73	75.30	10.10	2.10	74.50	0.22	109.70	4.80	21.60	59.40	14.50	10.50	24.40	-0.38	0.08	-0.08	0.80	-0.32
70	121.51	74.15	9.70	2.40	73.30	0.21	107.60	4.50	21.10	58.40	14.10	10.10	23.10	-0.37	0.06	-0.07	0.78	-0.31
75	119.16	73.00	9.30	2.60	72.00	0.21	105.40	4.20	20.40	57.40	13.60	9.70	21.70	-0.35	0.04	-0.07	0.76	-0.30
80	116.80	71.84	8.80	2.90	70.60	0.20	102.90	3.90	19.80	56.30	13.00	9.20	20.30	-0.34	0.02	-0.07	0.73	-0.29
85	114.16	70.42	8.20	3.20	68.90	0.19	100.00	3.50	19.00	55.20	12.40	8.60	18.60	-0.32	-0.01	-0.06	0.70	-0.28
90	111.21	68.78	7.40	3.60	66.90	0.18	96.70	3.00	18.00	53.80	11.70	7.70	16.70	-0.30	-0.04	-0.06	0.67	-0.27
95	106.74	66.34	6.10	4.30	63.90	0.16	91.70	2.20	16.60	51.70	10.70	6.20	13.70	-0.27	-0.09	-0.05	0.61	-0.25
Avg	131.10	78.74	11.10	1.50	78.00	0.24	116.20	5.60	23.30	62.40	15.90	11.60	28.20	-0.41	0.14	-0.08	0.87	-0.34

How Does EPD Acc Work?

- Acc = .00 – 1.00
- Accuracy increases as more data is collected on the animal or to a lesser degree by data collected on relatives
- A large increase in accuracy is gained when a young animal is genomically tested

Example of Acc

- Two bulls with a CED of 8.0
  - –Bull A Acc = .05
  - –Bull B Acc = .35

Acc and Possible Change

	Production								Management					Maternal					Carcass			
Accuracy	CED	BW	WW	YW	RADG	DMI	YH	SC	Doc	Claw	Angle	PAP	HS	HP	CEM	Milk	MW	MH	CW	Marb	RE	Fat
.05	9.7	2.55	14.9	24.3	.065	.763	.47	.76	16.7	.14	.12	2.15	.26	7.7	10.4	9.5	38	.52	20	.29	.30	.041
.10	9.2	2.42	14.1	23.0	.061	.723	.44	.72	15.8	.13	.12	2.04	.25	7.3	9.9	9.0	36	.49	19	.28	.28	.039
.15	8.7	2.28	13.3	21.7	.058	.682	.42	.68	14.9	.12	.11	1.93	.23	6.9	9.3	8.5	34	.46	18	.26	.27	.037
.20	8.2	2.15	12.6	20.5	.054	.642	.39	.64	14.0	.11	.11	1.81	.22	6.5	8.8	8.0	32	.43	17	.25	.25	.034
.25	7.7	2.02	11.8	19.2	.051	.602	.37	.60	13.2	.11	.10	1.70	.21	6.1	8.2	7.5	30	.41	16	.23	.23	.032
.30	7.2	1.88	11.0	17.9	.048	.562	.34	.56	12.3	.10	.09	1.59	.19	5.7	7.7	7.0	28	.38	15	.22	.22	.030
.35	6.7	1.75	10.2	16.6	.044	.522	.32	.52	11.4	.09	.09	1.47	.18	5.3	7.1	6.5	26	.35	14	.20	.20	.028
.40	6.2	1.61	9.4	15.4	.041	.482	.29	.48	10.5	.09	.08	1.36	.16	4.9	6.6	6.0	24	.33	13	.18	.19	.026
.45	5.6	1.48	8.6	14.1	.037	.442	.27	.44	9.7	.08	.07	1.25	.15	4.5	6.0	5.5	22	.30	12	.17	.17	.024
.50	5.1	1.34	7.9	12.8	.034	.401	.25	.40	8.8	.07	.07	1.13	.14	4.1	5.5	5.0	20	.27	11	.15	.16	.022
.55	4.6	1.21	7.1	11.5	.031	.361	.22	.36	7.9	.06	.06	1.02	.12	3.7	4.9	4.5	18	.24	10	.14	.14	.019
.60	4.1	1.08	6.3	10.2	.027	.321	.20	.32	7.0	.06	.05	0.91	.11	3.3	4.4	4.0	16	.22	9	.12	.12	.017
.65	3.6	.94	5.5	9.0	.024	.281	.17	.28	6.1	.05	.05	0.79	.10	2.9	3.8	3.5	14	.19	7	.11	.11	.015
.70	3.1	.81	4.7	7.7	.020	.241	.15	.24	5.3	.04	.04	0.68	.08	2.4	3.3	3.0	12	.16	6	.09	.09	.013
.75	2.6	.67	3.9	6.4	.017	.201	.12	.20	4.4	.04	.03	0.57	.07	2.0	2.7	2.5	10	.14	5	.08	.08	.011
.80	2.1	.54	3.1	5.1	.014	.161	.10	.16	3.5	.03	.03	0.45	.05	1.6	2.2	2.0	8	.11	4	.06	.06	.009
.85	1.5	.40	2.4	3.8	.010	.120	.07	.12	2.6	.02	.02	0.34	.04	1.2	1.6	1.5	6	.08	3	.05	.05	.006
.90	1.0	.27	1.6	2.6	.007	.080	.05	.08	1.8	.01	.01	0.23	.03	.8	1.1	1.0	4	.05	2	.03	.03	.004
.95	.5	.13	.8	1.3	.003	.040	.02	.04	.9	.01	.01	0.11	.01	.4	.5	.5	2	.03	1	.02	.02	.002

Acc and Possible Change

Accuracy	CED
.05	9.7
.10	9.2
.15	8.7
.20	8.2
.25	7.7
.30	7.2
.35	6.7

Example of Acc

- Two bulls with a CED of 8.0
  - –Bull A Acc = .05
    - 8 ± 9.7 = -1.7 to +17.7
  - –Bull B Acc = .35
    - 8 ± 6.7 = +1.3 to +14.7

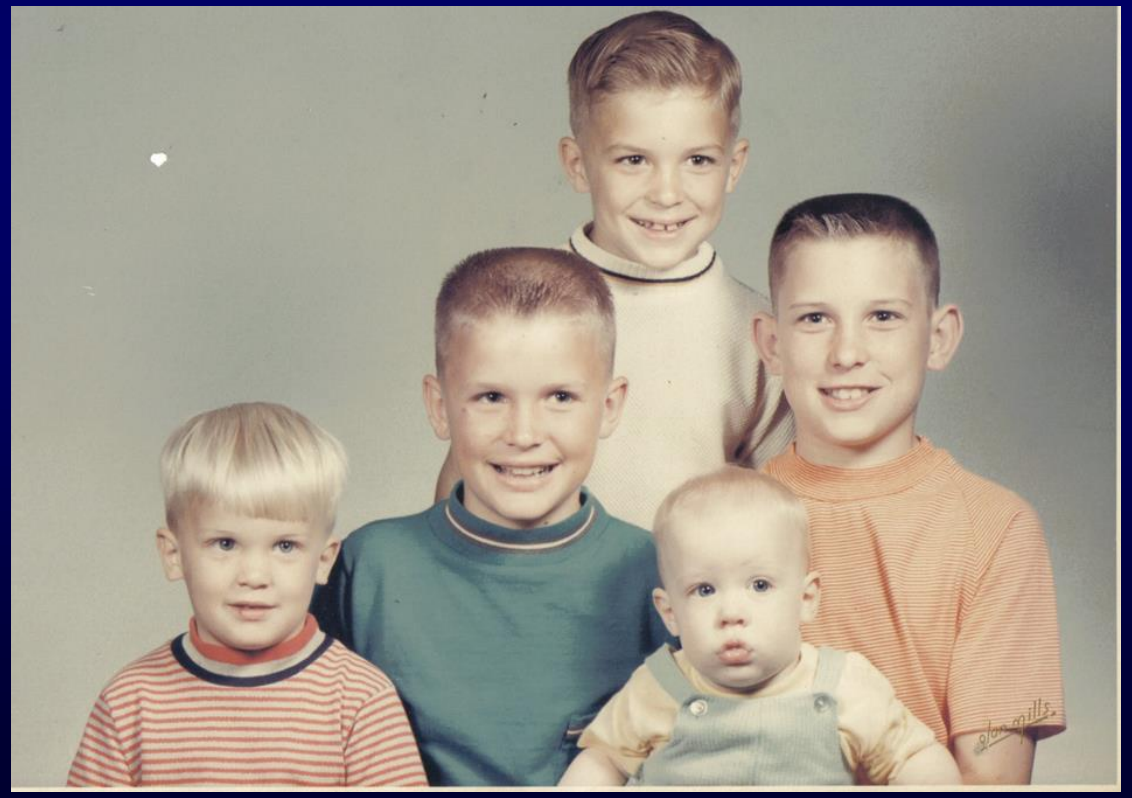
Why Genomics?

GE-EPDs
North American Limousin Foundation

Accuracy of EPD

Improved Pedigree

- Accurate Parentage!
- Improved relationships



Bullock Genomics

Name	Match Date	Relationship Range	Shared Centimorgans	Longest Block	X-Match	Linked Relationship	Ancestral Surnames
Mr. William Frank Bullock Jr.	03/18/2017	Parent/Child	3,384	267			Bullock (Mississippi) / Bullock (Georgia) / Barclay (TX, TN, NC) / Foster (Georgia) / Gant
Lukas Bullock	03/18/2017	Parent/Child	3,384	267			
Juliet Edna Bullock	05/30/2017	1st Cousin - 2nd Cousin	588	92			Bullock (Texas, Louisiana, Miss. Georgia) / Day (Texas, Miss.)
Kathy Adkins	03/18/2017	2nd Cousin - 3rd Cousin	210	42			Hodges (West Virginia) / Shrewsbury (West Virginia) / Tibbs (Virginia) / Callahan
Thomas B Barclay Jr.	03/18/2017	2nd Cousin - 3rd Cousin	203	52			Barkley / Bartlett / Bartly
Larry B. Hargrove	03/18/2017	2nd Cousin - 3rd Cousin	159	29			Anderson (Texas, Mississippi, Georgia,) / Bullock (Texas, Mississippi, Georgia) /

From Family Tree DNA

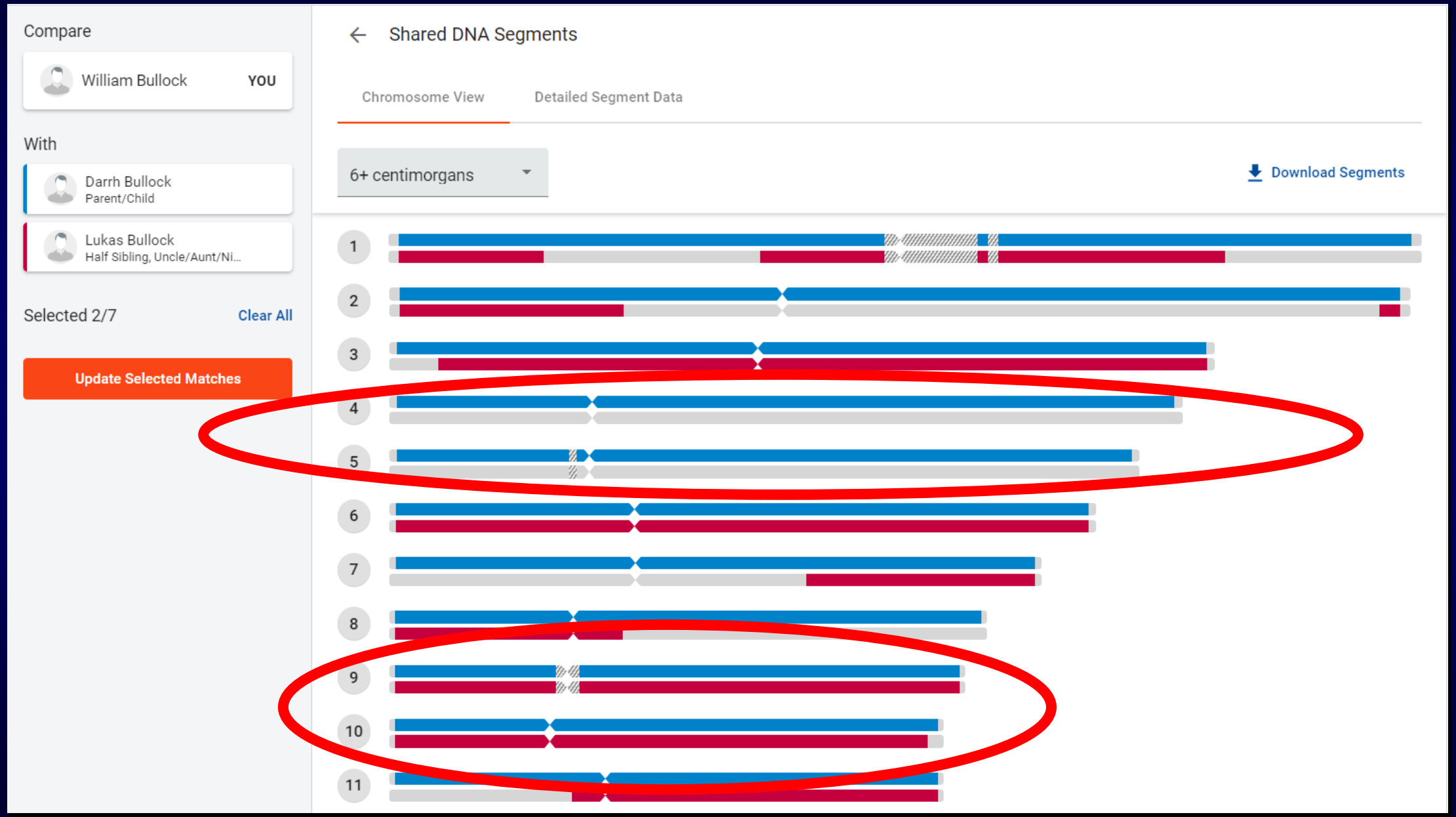
Relationships

- Parent – Offspring = 50%
- Grandparent – Grandchild = 25%
- Full Siblings = 50%
- Half Siblings = 25%
- 1st Cousins = 12.5%

What is possible?

- Parent – Offspring = 50%
- Grandparent – Grandchild = 0 - 50%
- Full Siblings = 0 - 100%
- Half Siblings = 0 - 50%
- 1st Cousins = 0 - 25%

Bullock Genomcis



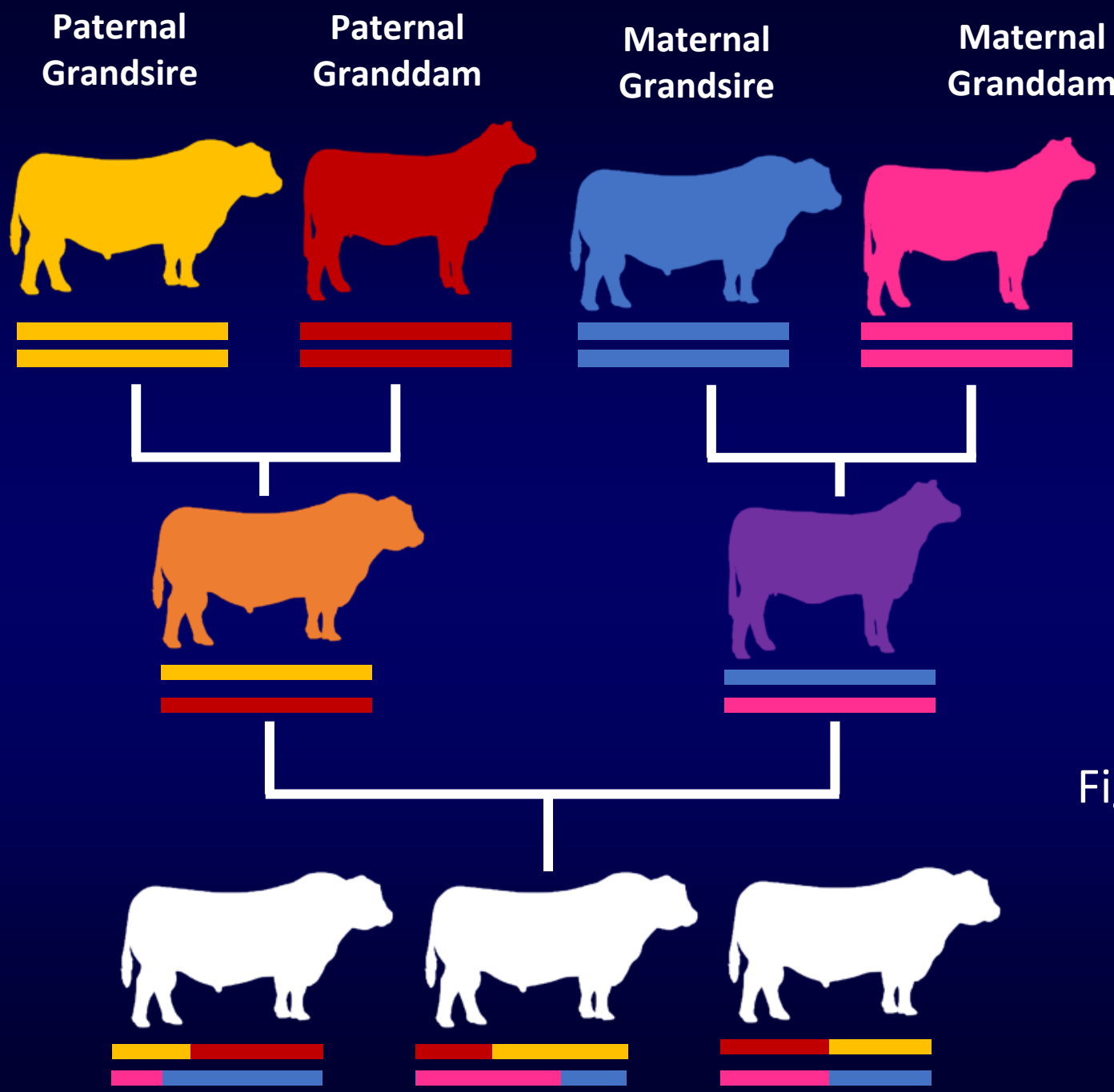
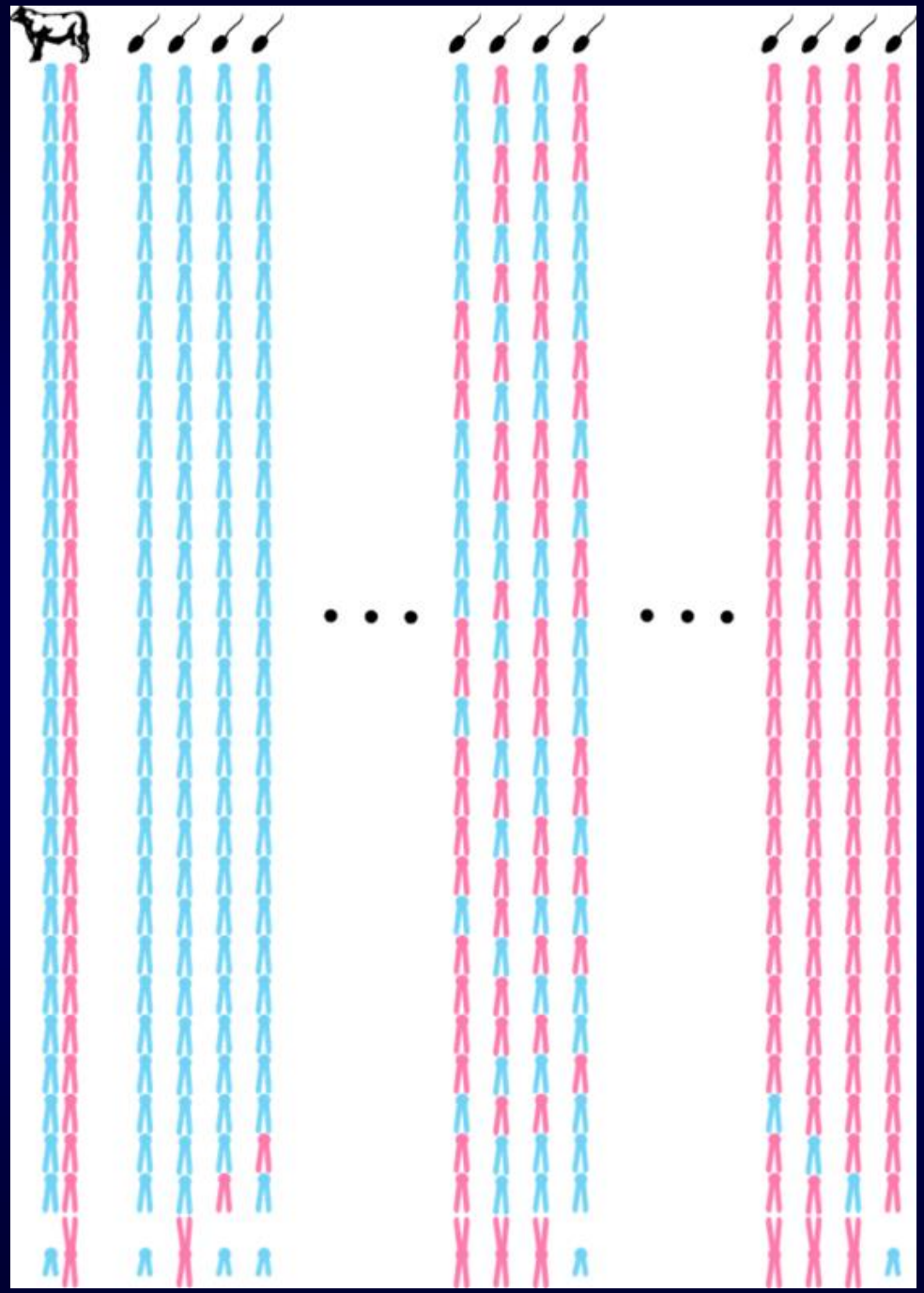


Figure c/o Troy Rowan



Billions of possibilities! All due to the random shuffle of genes!

Figure c/o Jared Decker

An Example from Angus

- 6 – Full Sibs
- Exp. Relationship = 0.50
- Exp. Pedigree – 0.59
  - Inbreeding
- Actual = 0.49-0.65

Progeny Equivalents for Genomics Testing

TRAIT	AAA	AHA	IGS
Calving Ease Direct	28	17	25+
Weaning Weight	26	12	25+
Yearling Weight	21	9	25+
Calving Ease Maternal	18	4	4
Milk	33	15	19
Stayability	No EPD	----	15
Marbling	9	3	8

Spangler, 2022, Pers. Com.

Progeny Equivalents for Genomics Testing

TRAIT	AAA	AHA	IGS
Calving Ease Direct	28	17	25+
Weaning Weight	26	12	25+
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Progeny Equivalents for Genomics Testing

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Stayability	No EPD	----	15
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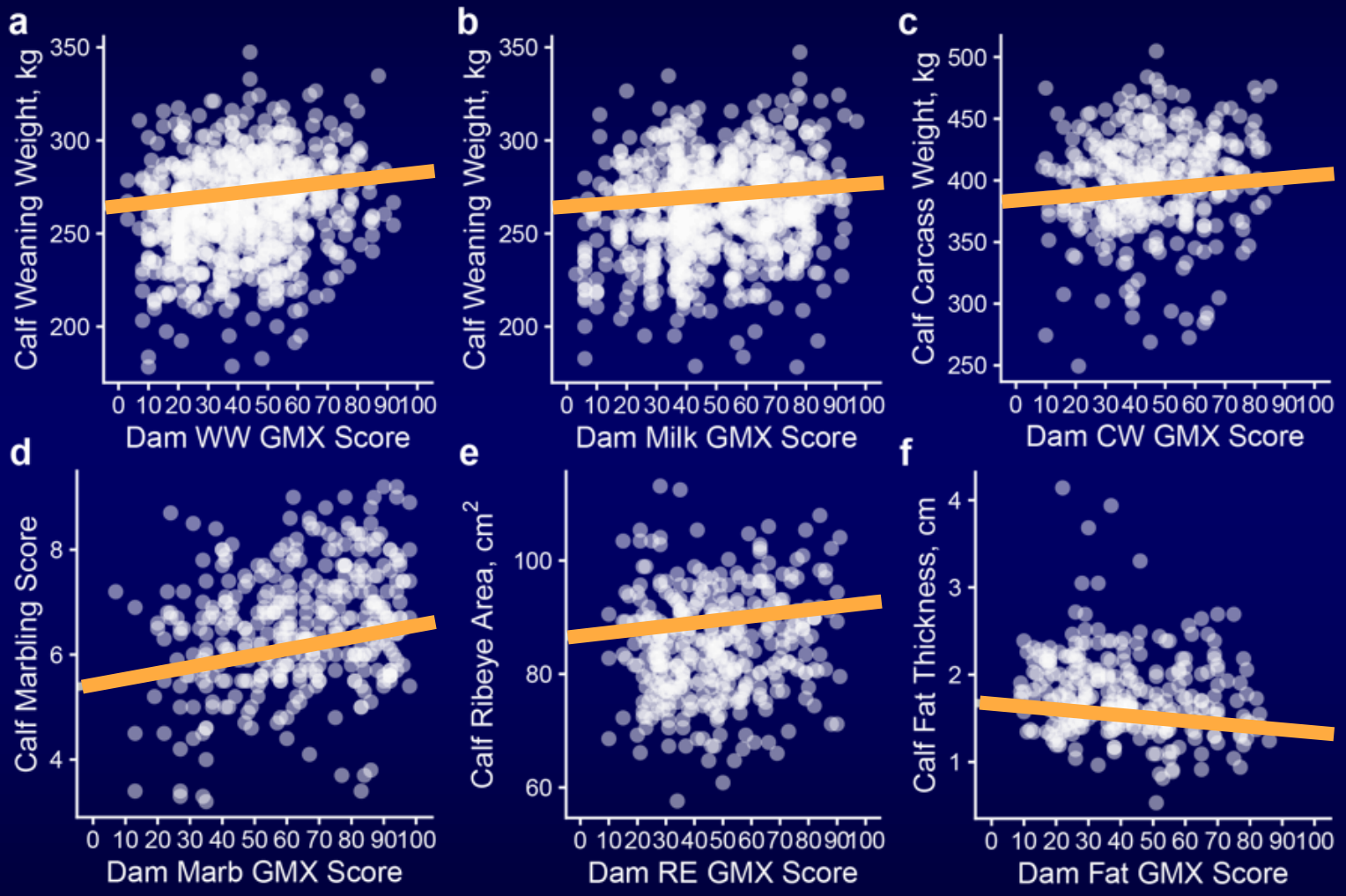
Spangler, 2022, Pers. Com.

Commercial heifer genomic tests work!

Multi-year commercial genomic test validation

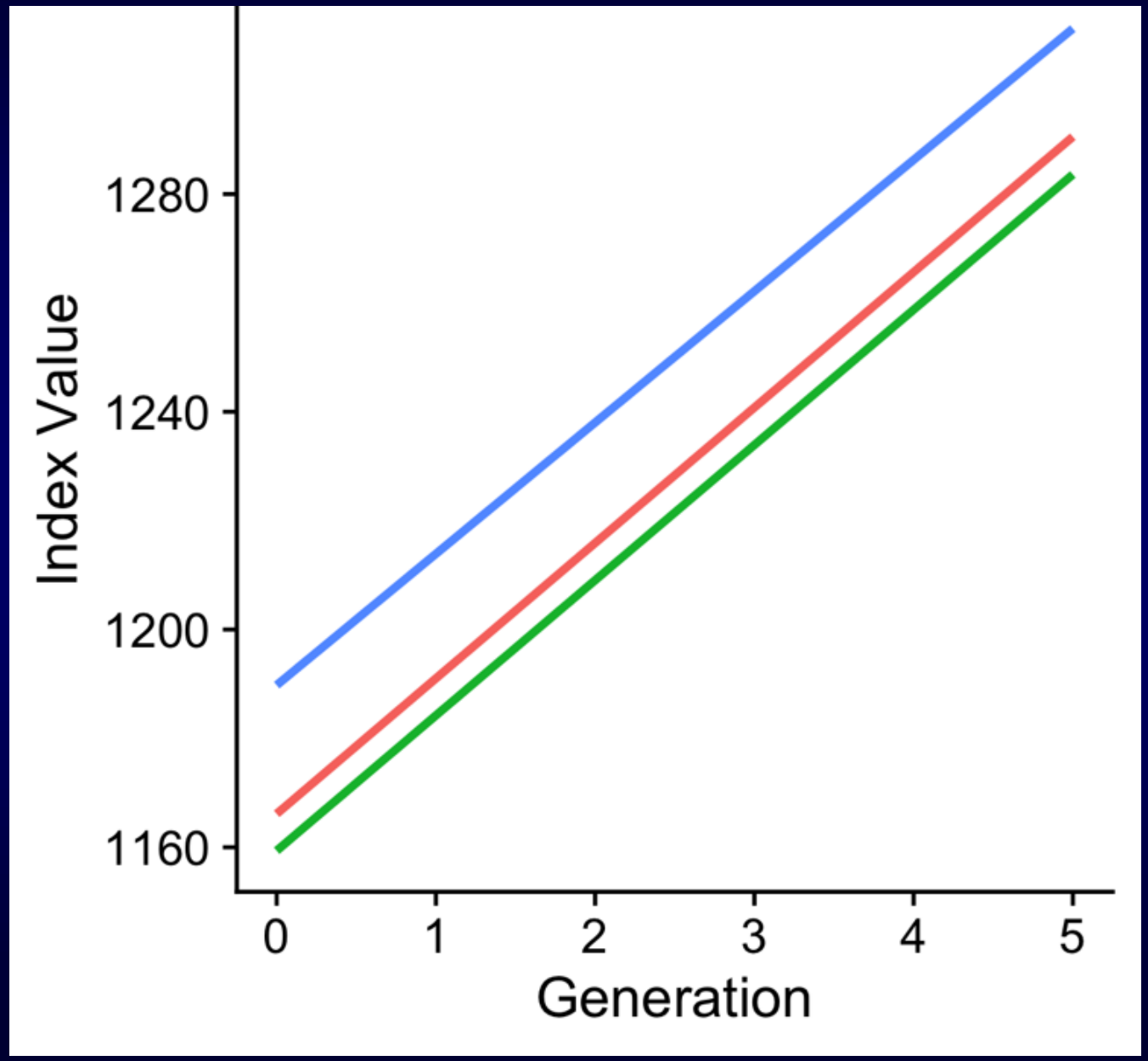
Dam genomic scores vs. actual calf phenotypes



Arisman et al. 2022

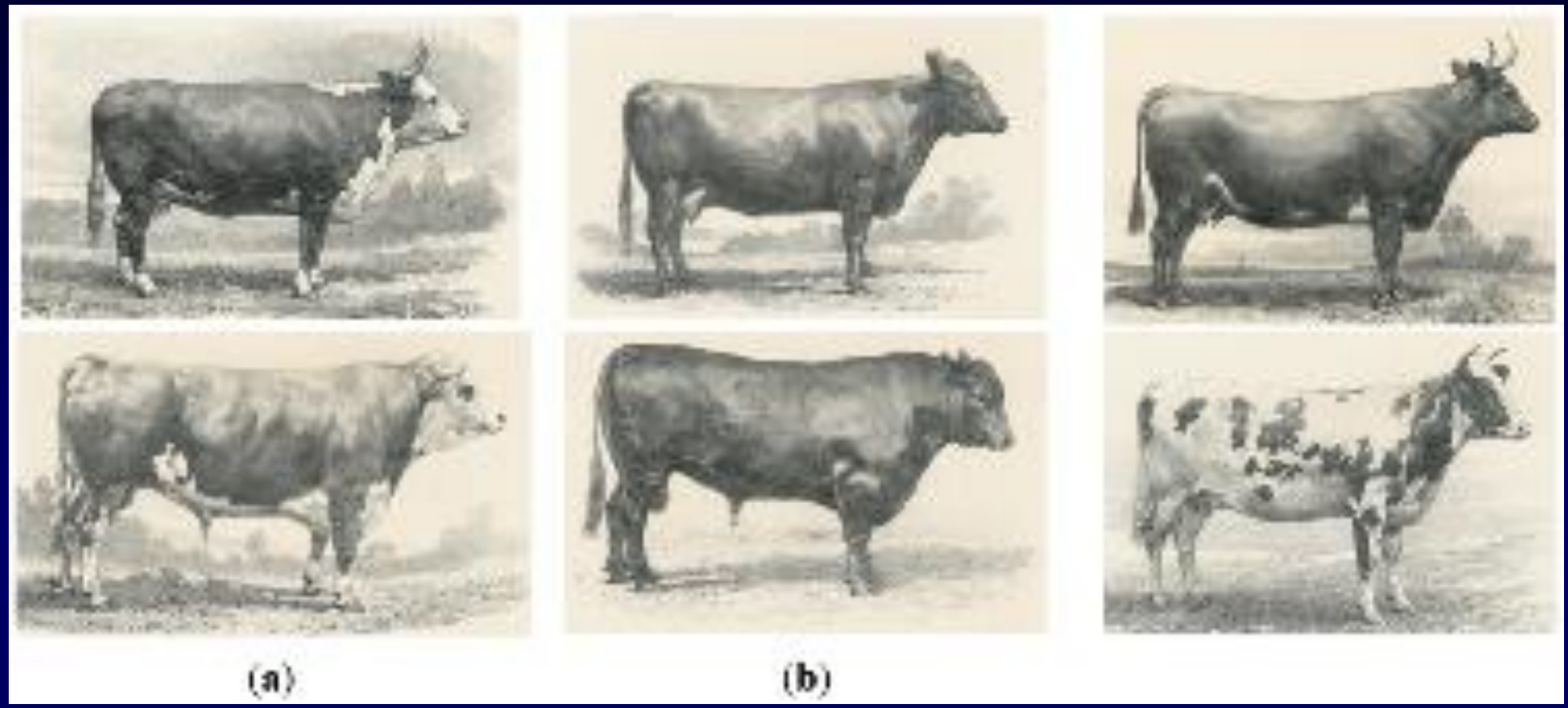
Do commercial genomics move the needle?

- Seedstock animals drive the genetic trends in commercial cattle sector
- Genomic test does generate some added genetic merit
- Does the added information pay for the cost of the tests?



Take Home Messages!

- Commercial cattlemen should be taking advantage of crossbreeding
- EPD are the best selection tool for the traits they are computed
- Match genetics to management and market
- Genomics improve the accuracy of EPD, thus reducing your risk of misidentifying the right selection choice



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