

Seeing through your buyer's eyes: A behavioral economics experiment on how bull buyers use EPDs



Charley Martinez
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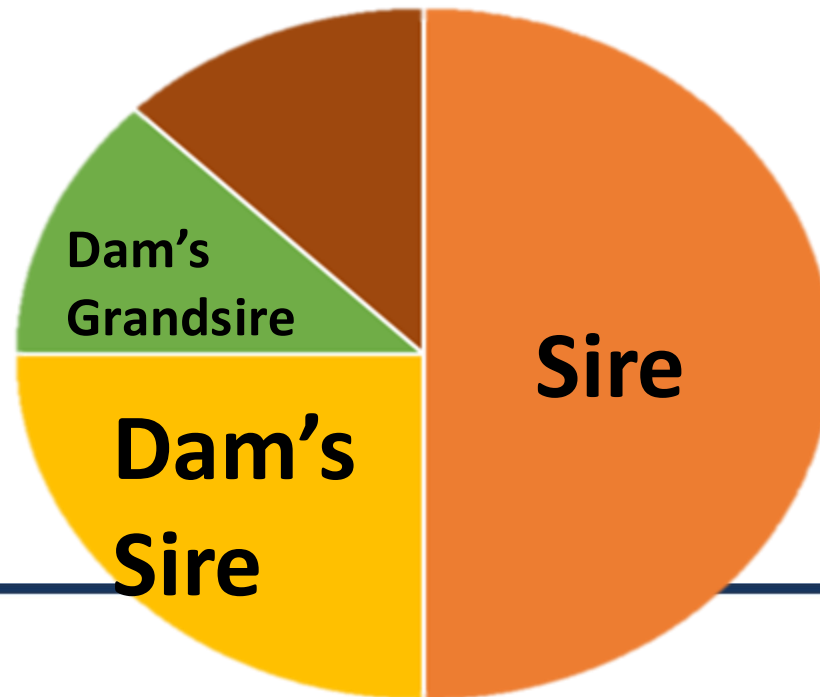


The bull decision is one of the most consequential decisions a cattle operation makes



Bull selection plays an outsized role in genetic progress

In a one bull herd, the last three bull purchases account for 87.5% (on average) of the genetics in your calf crop!



What makes bull selection challenging?




- 1) Bulls have an outsized “footprint”
- 2) Bad purchase can hamper a herd long-term
- 3) Our “search space” is HUGE
- 4) Lots of traits matter for our overall profitability
i.e. lots of “right” answer combinations
- 5) Balancing market segments

Multi-year behavioral experiment: *How are producers using EPDs?*



RESEARCH ARTICLE

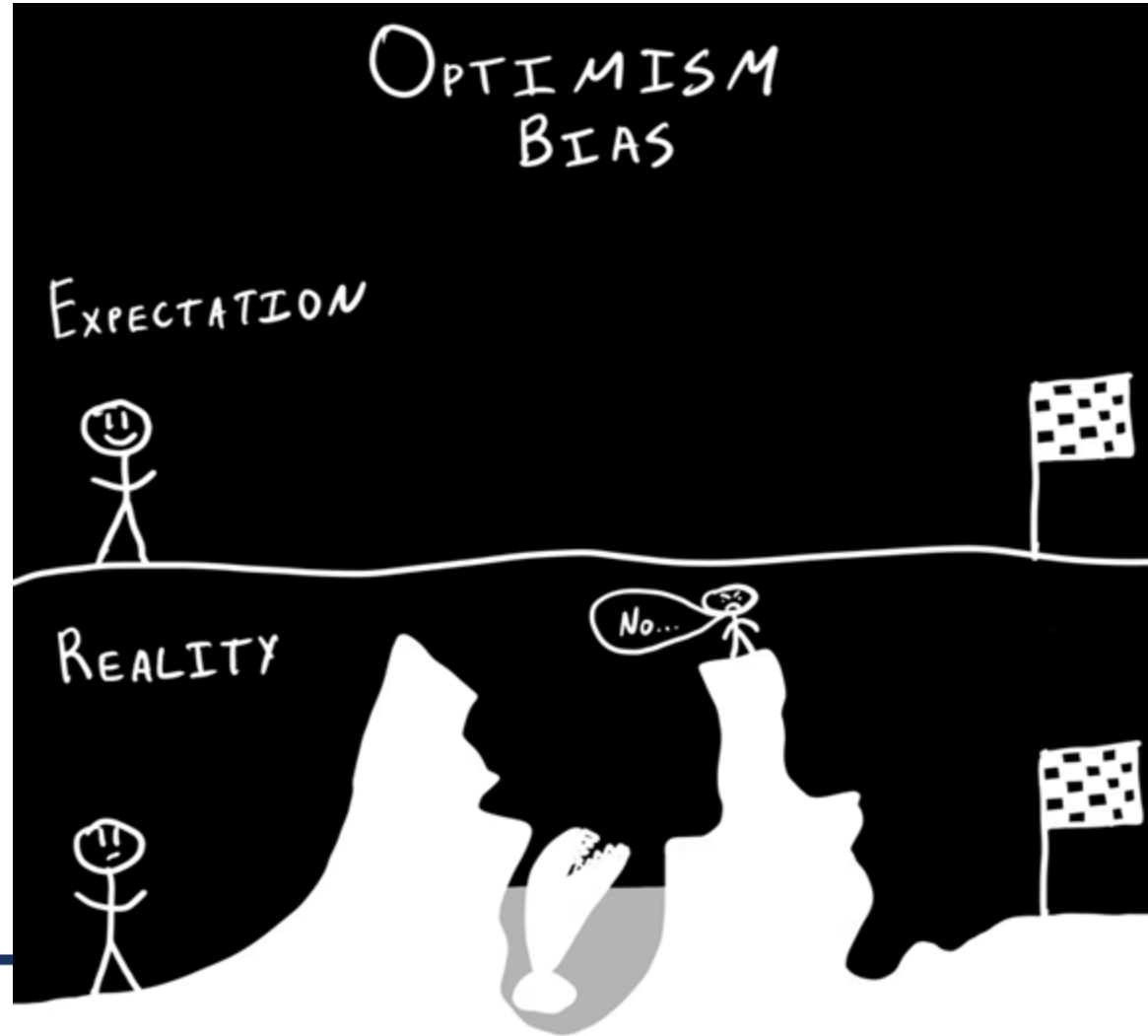
Predicting Seedstock Bull Prices: Does Information Matter?

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Troy N. Rowan³, Mykel R. Taylor² and Elmin Alizada²

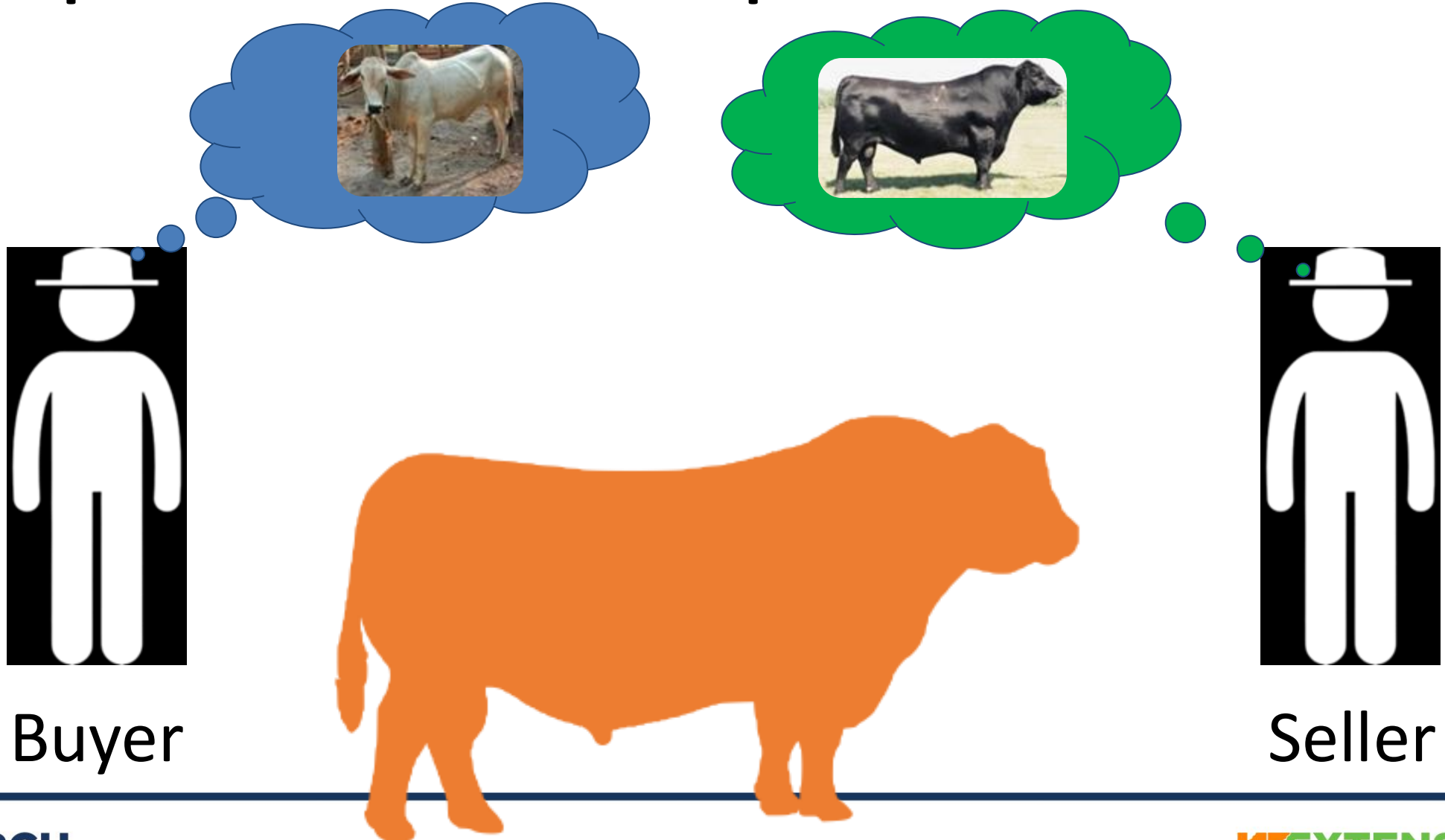
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Experiment #1:



Experiment #1: Optimism Bias



134 GF 0694H

♂GGP

Homozygous Black
ASA #3883404

Homozygous Polled
0694H

1/2 SM 7/16 AN S
BD: 10/7/2020

Adj. BW (ratio)
79 (105)

Adj. 205 (ratio)
637(86)

Adj. 365 (ratio)
1067 (91)

Frame Score
5.5

GIBBS 3393A STATEMENT

GIBBS 1317Y HY BRD 7090T

GIBBS 6784D STATELINE

GIBBS LADY BAUGHN 223B

GIBBS 2653Z MABELLE0659X

947X

	CE	BW	WW	YW	MCE	MILK	MWW	STAY	DOC	YG	MARB	REA	API	TI
EPD	10.2	-0.2	55.5	90.7	6.5	25.8	53.5	15.2	10.4	-0.18	0.76	0.50	143.2	76.3
Rank	80	40	99	95	60	25	85	55	75	65	3	80	25	55



88

GF 0226H

♂GGP

Homozygous Black
ASA #3882943

Homozygous Polled
0226H

1/2 SM 1/2 AN
BD: 9/6/2020

Adj. BW (ratio)
73 ()

Adj. 205 (ratio)
642()

Adj. 365 (ratio)
1134 ()

Frame Score
6.0

GW STEP OUT 672X

BALDRIDGE BRONC

REDHILL 672X X004 231A

GIBBS 7099E STAR 0532X

GW MISS PREM BEEF X004

GIBBS 0532X SM STAR P342

	CE	BW	WW	YW	MCE	MILK	MWW	STAY	DOC	YG	MARB	REA	API	TI
EPD	11.3	-1.7	82.8	135.2	6.9	17.1	58.5	22.2	13.3	-0.27	0.62	0.93	168.8	92.4
Rank	65	15	25	15	50	95	60	2	30	40	10	10	3	4



Please enter your price prediction for this bull

Remember that you will earn an additional \$10.00 if your price prediction is within the range of [True Market Price - \$500.00; True Market Price + \$500.00]:

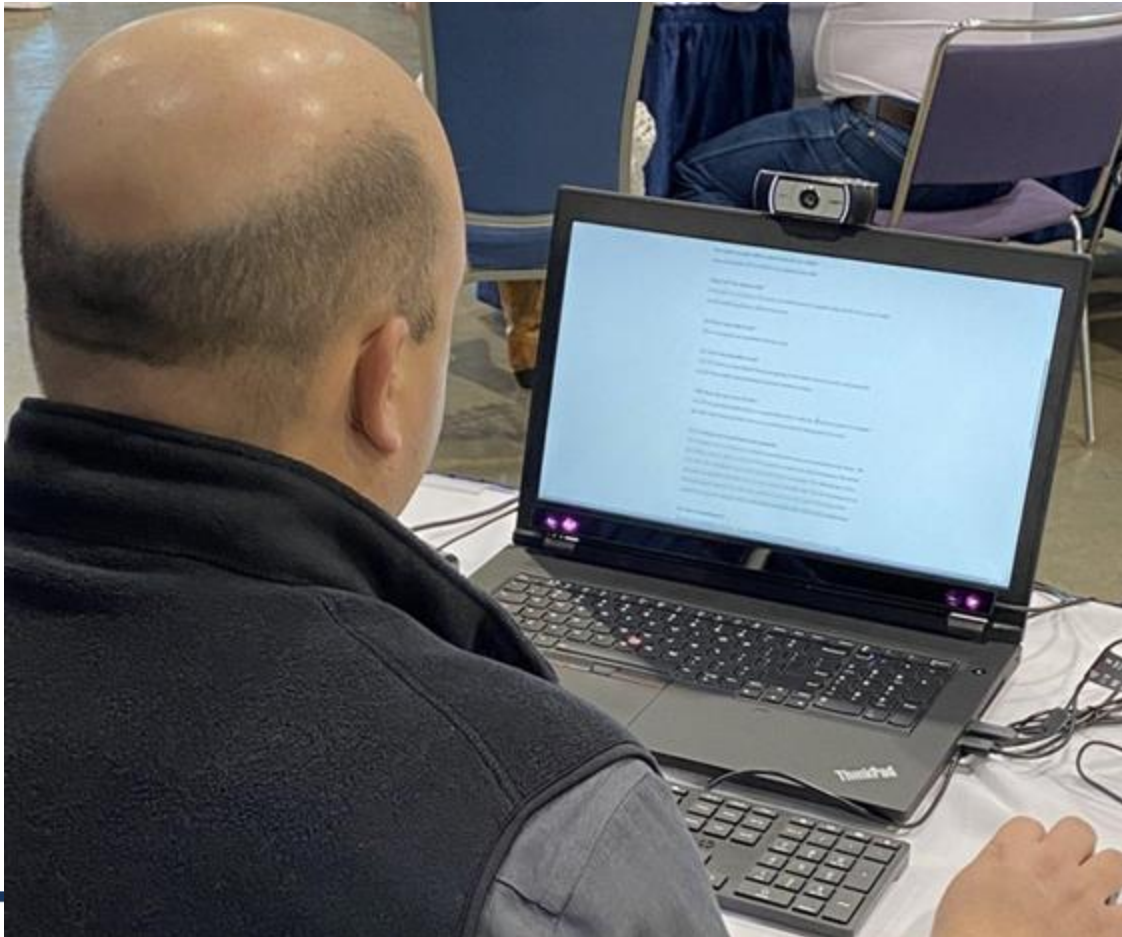


Summary of Main Findings

- **Sellers** are consistently less likely to make accurate predictions
- **Optimism bias is not found** to exist **when information is provided** in seedstock bull markets.
- High-risk participants have a lower probability of making accurate price predictions relative to low-risk participants
- Participants utilizing GE-EPDs and EPD % ranks **show increased accuracy**

Experiment 2

What are producers using to make decisions?



	BW	WW	YW	Milk	CW	Marb	RE	\$M	SW	SB	SC
EPD	I+2.9	I+68	I+114	I+19	I+38	I+.16	I+.62	58	60	106	195
%	85	25	35	85	60	85	40	50	50	80	80

We want to understand

- What information do producers use?
- Which EPDs get looked at?
- Does the order of information matter?
- Does type of Information Matter?

Layouts

4 UT Mr 1160
 Birth Date: 01-11-2020 Bull 19771265 Tattoo: 1160

#+*KM Broken Bow 002 #*Summitcrest Complete 1P55
 *Sitz Alpine 11076 #Summitcrest Princess 0P12
 18385837 *Sitz Ellunas Elite 1874 #*Mogck Bullseye
 *HCC Rolling Thunder 5531 Sitz Ellunas Elite 4011
 *HCC Lucy 3531-0186
 #Stevenson Benchmark N190
 UT Miss 1388 UT Miss 1747
 19174036 UT Miss 1012

BW	Ratio
N/A	N/A
Adj. 205 Wt	Ratio
716	99
Adj. 365 Wt	Ratio
1218	96

CED	BW	WW	YW	SC	DOC	CEM	MILK	\$EN								
+10	.32	-.8	.49	+50	.46	+87	.41	+1.11	.38	+21	.33	+13	.24	+26	.27	+7

CWT
+28
Adj. Scan Wt
1038

ANGUSGS CE 5
 • Bull out of i

Lot 33																			
PEN: 7		DOB: 9/9/2019		Tat: 9123		EPD		Acc.		CUS		WT		Ratio		CG#			
ANGUS										MARB	0.73	0.35	4.1	Adj. WW	761	----	----		
CCC MERRITT 030		Act. BW: 62		REA		0.41	0.36	12.3	Adj. YW	1241	102	70							
CROUTHAMEL PROTOCOL 302		Wean Mgt: C		FAT		-0.001	0.33	0.25	ADG	4.52	106	70							
CCC LADY RAIN 932		Dam Age: 4		CW		59	0.39	----	WDA	3.26	100	70							
		Frame Sc: 5.6		On Test		Off Test	Sale Price:		Buyer										
DEER VALLEY ALL IN		Scrotal: 39.2		Age		351	435	Genomic Test:		Notes									
DIAMOND M ALL IN 45		Claw Set: 6		Wt.		1040	1420	Angus GS											
MOND M COUNTESS DESIGN 45		Foot Ang: 5		Hip Ht.		49	51.8												
		CED		BW		WW		YW		MILK		CEM		DOC		SC		\$W	
EPD		6		1.1		68		124		35		6		28		1.73		82	
Acc.		0.35		0.54		0.47		0.38		0.32		0.35		0.35		0.4		----	

Leachman \$Profit™ Indexes		
		\$31,467
Percentile Rank - Top <0.1%		
\$Ranch	74	0.4%
\$Feeder	266	0.1%
Feed:Gain	-0.28	<0.1%
Intake	45	80%
Accuracy	★	
C. Ease		
Growth	★★★	
Maternal	★★★★	
Feed/Carc	★★★★★	
Disposition	★★★★	
Leachman ABCs as of 2/20/20		
BW	-0.2	18%
WW	55	8%
YW	122	2%
MILK	38	Avg: 18
SC	1.41	0.1%
HT	0.40	Avg: 0.43
MAT WT	47	Avg: 26
REA	0.58	20%
IMF	1.37	<0.1%
CAR WT	807	69%
BF	0.04	<0.1%
PAP	-1.82	<0.1%

How are producers utilizing selection tools?

			Production								Maternal						
Name	Tattoo	Registration Birth Date	CED Acc	BW Acc	WW Acc	YW Acc	RADG Acc	DMI Acc	YH Acc	SC Acc	HP Acc	CEM Acc	Milk Acc	MKH MkD	MW Acc	MH Acc	\$EN
Animal Name (Individual detail link)	80	98765435251 07/08/80	+10 .99	+2.4 .99	+59 .99	+98 .99	+16 .99	+27 .99	+3 .99	+1.06 .99	+13.1 .80	+10 .95	+23 .99	2681 11634	+19 .98	+3 .99	+3

Management					Carcass						
Doc Acc	Claw Acc	Angle Acc	PAP Acc	HS Acc	CW Acc	Marb Acc	RE Acc	Fat Acc	C Grp/Pg		U Grp/Pg
+6 .99	+50 .85	+51 .85	+1.14 .43	+56 .48	+37 .89	+55 .90	+22 .89	+017 .88	17 51		5 10

Angus-on-Dairy \$Values		\$Values					
\$AxH %	\$AxJ %	\$M	\$W	\$F	\$G	\$B	\$C
-133 95%	-134 95%	+45	+60	+46	+29	+95	+168

Normal

Flip EPDs

% Rank

I

II

No % Rank

IIII

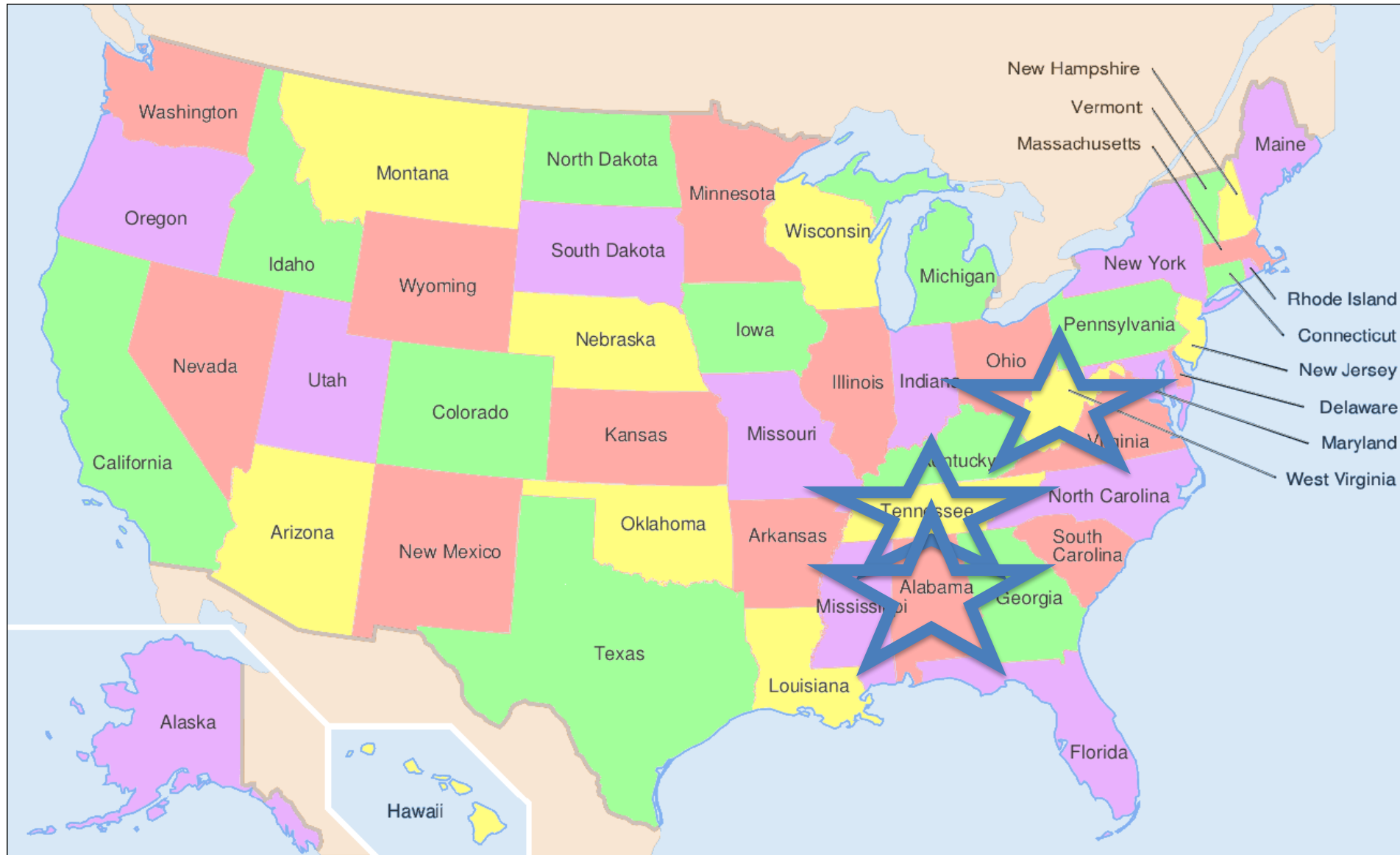
III



	\$C	\$B	\$W	\$M	FAT	RE	Marb	CW	DOC	Milk	HP	SC	YW	WW	BW	CED
EPD	236	121	76	79	0.041	0.46	0.87	34	14	37	15.5	1.29	113	67	0.9	6
%			10	15						3	20	25		35		

We want to understand

- What information do producers use?
- Which EPDs get looked at?
- Does the order of information matter?
- Does type of Information Matter?
- Can we use information seeking patterns to our advantage?
- Increased accuracy=Better judgement





n = 6 Angus
TN-October 2022 Sale- \$M



n = 6 Simmental
TN-October 2022 Sale- API



n = 6 Hereford
TN-November 2022- \$BMI

The True Market Price of the bull is \$6250 . The accurate prediction range was \$5750-\$6750.

Since your price prediction was \$3500, you made inaccurate decision.

Please click next.



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	CED	BW	WW	YW	SC	HP	Milk	DOC	CW	Marb	RE	FAT	\$M	\$W	\$B	\$C
EPD	16	-2.7	71	118	0.54	14.6	29	12	49	0.99	0.76	0.060	85	80	152	282
%	1	2	25	35		25	30			15	30		5	4	30	15

Your Prediction is

3500

SIGNALS

MARKERS

ANNOTATIONS



Please enter your price prediction for this bull

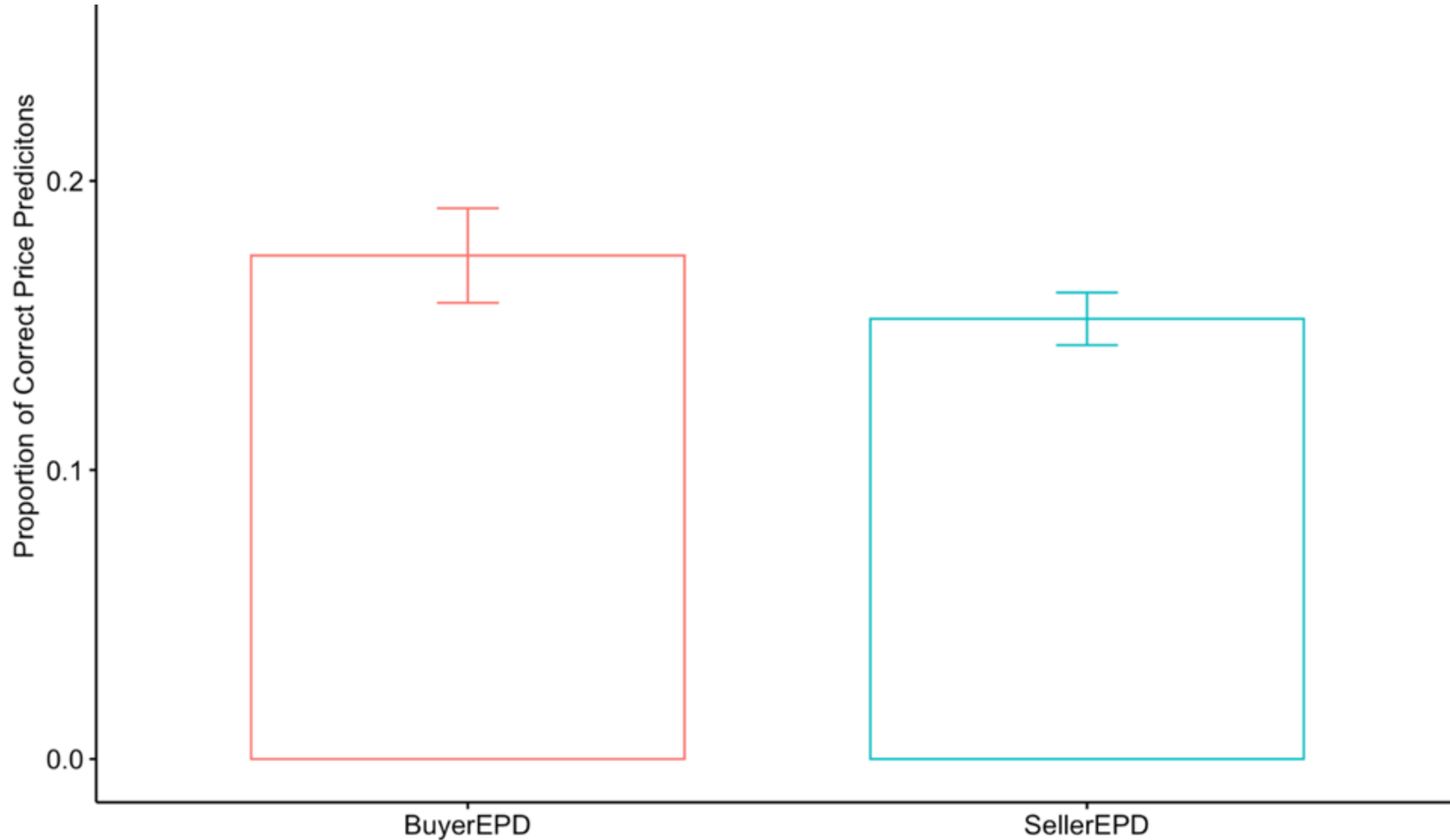
Remember that you will earn an additional \$10.00 if your price prediction is within the range of [True Market Price - \$500.00; True Market Price + \$500.00]:



Variable	N	Mean
Has Angus in herd	168	134 (79.76%)
Has Simmental in herd	168	47 (27.98%)
Has Hereford in herd	168	55 (32.74%)
Uses EPD	168	135 (80.36%)
Uses GE-EPD	168	84 (50%)
Uses Phenotype	168	152 (90.48%)
Uses EPD Rank	168	105 (62.5%)
General Confidence [0,100]	168	79.76
Financial Confidence [0,100]	168	74.84
Risk Tolerance [0,10]	168	6.39
Tolerance to Delay Gratification [0,10]	168	7.61
General trust of others [0,10]	168	6.42
Proportion of income from cattle operation	168	25.87
Age	168	43.1
Male	168	122 (72.62%)
Producer is the Full Time Job	168	58 (34.52%)

Variable	Alabama, N = 95	Tennessee, N = 69
Has Angus in herd ¹	75 (79%)	57 (83%)
Has Simmental in herd ¹	28 (29%)	21 (30%)
Has Charolais in herd ¹	28 (29%)	15 (22%)
Uses EPD ¹	62 (65%)	54 (78%)
Uses GEEPD ¹	33 (35%)	35 (51%)
Uses Physical Characteristics ¹	84 (88%)	67 (97%)
Uses EPD Percentile Rank ¹	56 (59%)	37 (54%)
General Confidence [0,100] ²	77 (19)	78 (17)
Financial Confidence [0,100] ²	77 (17)	77 (19)
Risk Tolerance [1,10] ²	6.27 (2.01)	6.59 (1.86)
Proportion of income from cattle operation ²	30 (30)	34 (29)
Age ²	47 (17)	51 (15)
Cattle business is full-time job ¹	38 (40%)	26 (38%)

Accurate Prediction % By Role



Accuracy

Treatment	Average	Min	Max
Regular- Percentile Rank	<u>20.57%</u>	0.00%	43.24%
Regular- No Percentile Rank	<u>21.23%</u>	2.22%	40.00%
Inverted- Percentile Rank	<u>23.19%</u>	2.50%	47.50%
Inverted- No Percentile Rank	<u>21.14%</u>	0.00%	36.96%

Angus Bulls	1**	2	3**	4*	5**	6	Average
Regular- Percentile Rank	0.0%	13.5%	13.5%	24.3%	2.7%	29.7%	14.0%
Regular-No Percentile Rank	4.4%	15.6%	22.2%	22.2%	8.9%	33.3%	17.8%
Inverted- Percentile Rank	2.5%	15.0%	15.0%	25.0%	17.5%	32.5%	<u>17.9%</u>
Inverted-No Percentile Rank	6.5%	10.9%	10.9%	28.3%	15.2%	26.1%	16.3%

** - High Quality Bull, * - Low Quality Bull

Sim-Genetic Bulls	1**	2**	3	4	5*	6*	Average
Regular- Percentile Rank	24.32%	40.54%	35.14%	8.11%	24.32%	37.84%	28.38%
Regular-No Percentile Rank	28.89%	37.78%	24.44%	11.11%	31.11%	40.00%	28.89%
Inverted- Percentile Rank	20.00%	35.00%	45.00%	20.00%	40.00%	47.50%	<u>34.58%</u>
Inverted-No Percentile Rank	28.26%	34.78%	32.61%	19.57%	36.96%	32.61%	30.80%

** - High Quality Bull, * - Low Quality Bull

Hereford Bulls	1**	2	3	4**	5*	6*	Average
Regular- Percentile Rank	10.81%	27.03%	43.24%	0.00%	10.81%	24.32%	<u>19.37%</u>
Regular-No Percentile Rank	4.44%	37.78%	31.11%	2.22%	15.56%	11.11%	17.04%
Inverted- Percentile Rank	5.00%	32.50%	25.00%	7.50%	12.50%	20.00%	17.08%
Inverted-No Percentile Rank	0.00%	36.96%	30.43%	0.00%	6.52%	23.91%	16.30%

** - High Quality Bull, * - Low Quality Bull

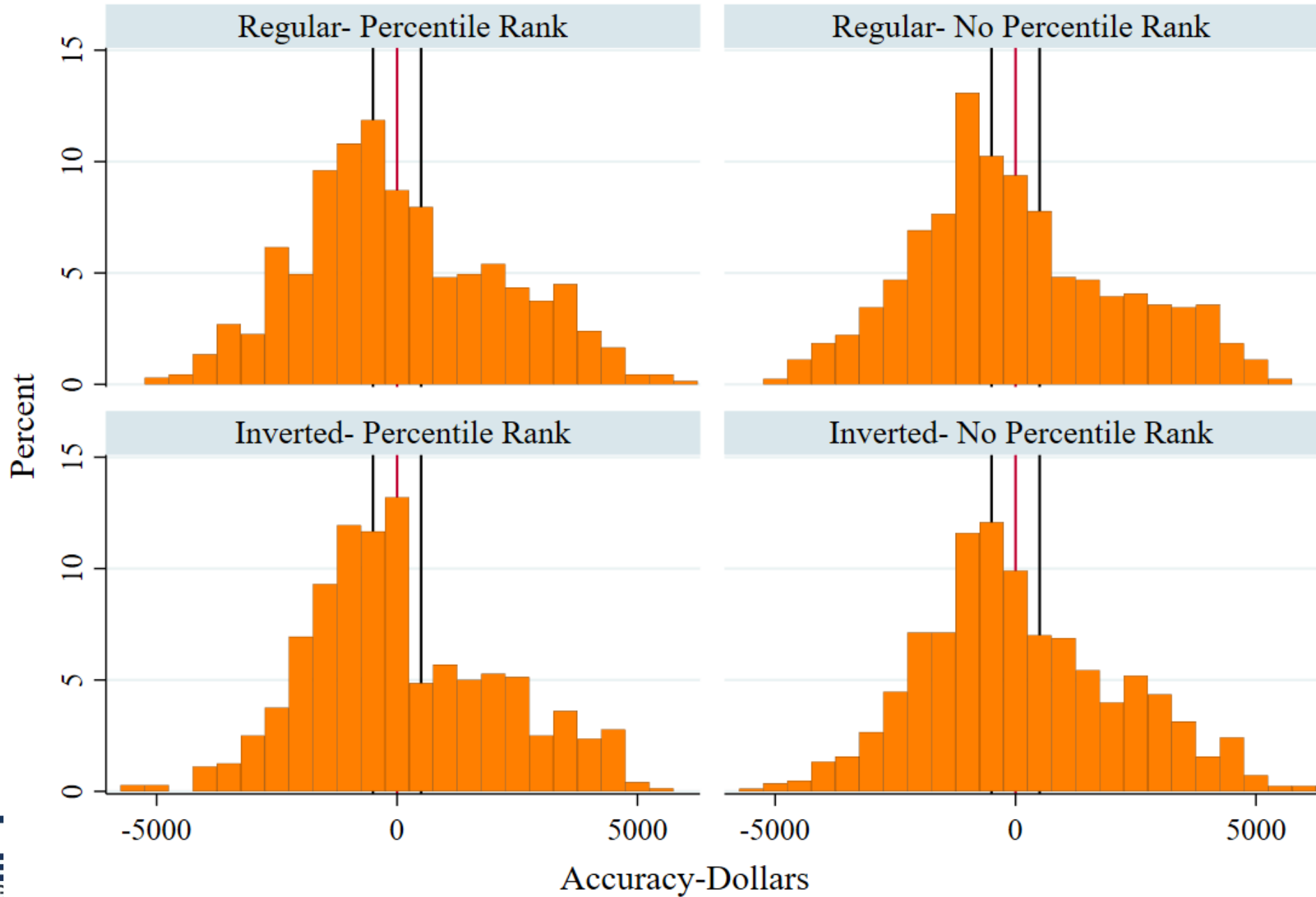
6 Highest Bulls	1**	2**	3**	4**	5**	6
Price	\$8,500	\$7,500	\$7,500	\$6,500	\$6,250	\$6,000
Regular- Percentile Rank	0.00%	2.70%	10.81%	0.00%	13.51%	27.03%
Regular-No Percentile Rank	2.22%	8.89%	4.44%	4.44%	22.22%	37.78%
Inverted- Percentile Rank	<u>7.50%</u>	<u>17.50%</u>	5.00%	2.50%	15.00%	32.50%
Inverted-No Percentile Rank	0.00%	15.22%	0.00%	6.52%	10.87%	36.96%

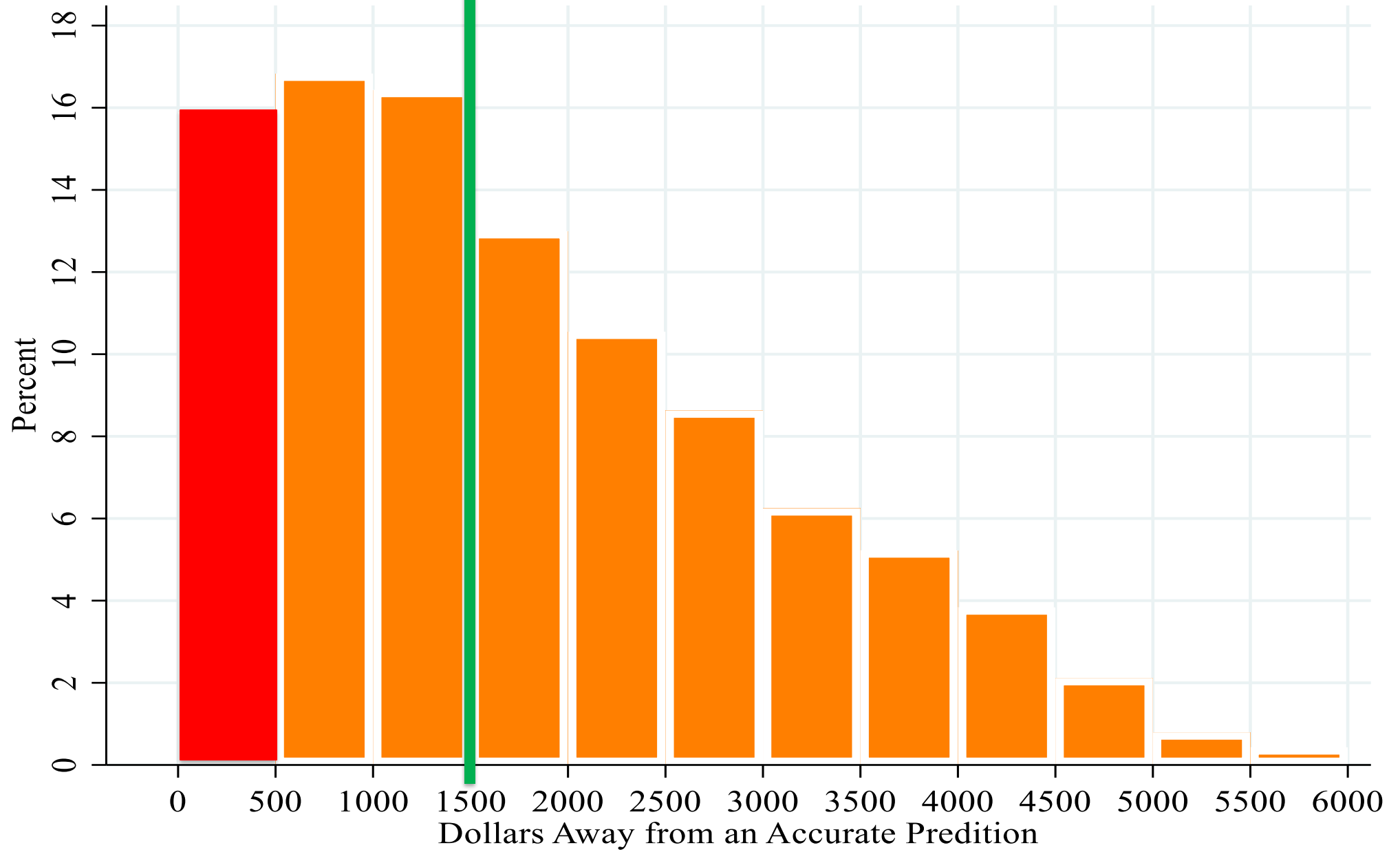
** - High Quality Bull, * - Low Quality Bull

6 Lowest Bulls	1	2	3	4	5	6
Price	\$3,750	\$2,750	\$2,750	\$2,500	\$2,250	\$2,000
Regular- Percentile Rank	35.14%	8.11%	24.32%	37.84%	10.81%	24.32%
Regular-No Percentile Rank	24.44%	11.11%	31.11%	40.00%	15.56%	11.11%
Inverted- Percentile Rank	<u>45.00%</u>	<u>20.00%</u>	<u>40.00%</u>	<u>47.50%</u>	12.50%	20.00%
Inverted-No Percentile Rank	32.61%	19.57%	36.96%	32.61%	6.52%	23.91%

** - High Quality Bull, * - Low Quality Bull

Variable	N	Mean
Has Angus in herd	168	134 (79.76%)
Has Simmental in herd	168	47 (27.98%)
Has Hereford in herd	168	55 (32.74%)
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Uses Phenotype	168	152 (90.48%)
Uses EPD Rank	168	105 (62.5%)
General Confidence [0,100]	168	79.76
Financial Confidence [0,100]	168	74.84
Risk Tolerance [0,10]	168	6.39
Tolerance to Delay Gratification [0,10]	168	7.61
General trust of others [0,10]	168	6.42
Proportion of income from cattle operation	168	25.87
Age	168	43.1
Male	168	122 (72.62%)
Producer is the Full Time Job	168	58 (34.52%)





What can make me get closer or
further away?

Variable	Coefficient
Above Average Price Bull	-524.36
High Guessers	484.80
Angus Breeders	124.81
Use GE-EPDs	-109.73
Use Physical Characteristics	-269.06
Confident People	-720.95
High Genetic Bulls	1089.90
Low Genetic Bulls	-480.74
Age	3.40
Male	-133.35
Full Time	146.14
Retired	323.74



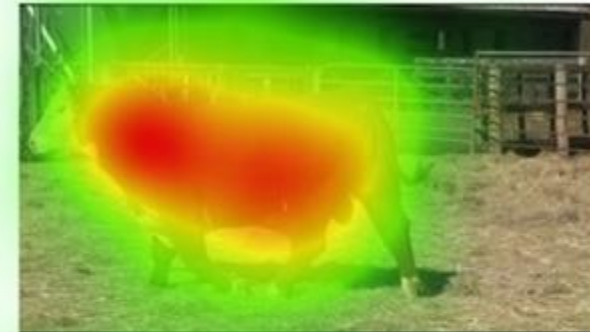
	SC	SB	SW	SM	FAT	RE	Marb	CW	DOC	Milk	HP	SC	YW	WW	BW	CED
EPD	263	149	82	70	0.034	0.62	0.46	67	15	39	14.2	0.86	125	72	1.2	5



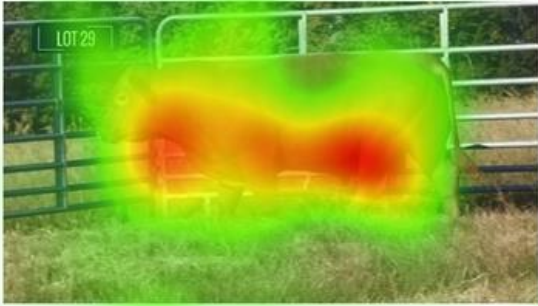
	SC	SB	SW	SM	FAT	RE	Marb	CW	DOC	Milk	HP	SC	YW	WW	BW	CED
EPD	254	163	50	77	0.009	0.61	0.75	50	25	20	13.7	1.00	117	71	1.8	10
%	20	20	30	15		25	35	20	20	30	35	3	10	15		



	\$CHB	\$BII	\$BMI	REA	Marb	CW	Milk	SC	YW	WW	BW	CED
EPD	145	506	410	0.74	0.22	89	29	1.3	114	71	2.9	9.0



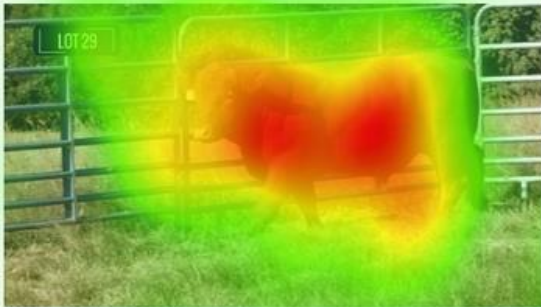
	\$CHB	\$BII	\$BMI	REA	Marb	CW	Milk	SC	YW	WW	BW	CED
EPD	145	496	418	0.71	0.11	86	32	1.8	112	71	3.9	14.7



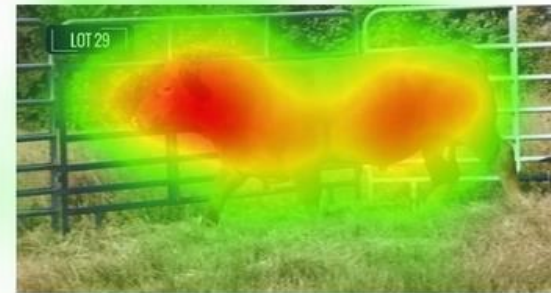
	CE	BW	WW	YW	MCE	Milk	MWW	STAY	DOC	YG	Marb	REA	API	TI
EPD	15.1	-1.4	74.9	114.1	8.8	28.3	65.8	21.8	16.1	-0.28	0.62	0.73	167.4	88.3
%	20	25	55	55	20	15	25	3	10	40	10	40	5	15



	CE	BW	WW	YW	MCE	Milk	MWW	STAY	DOC	YG	Marb	REA	API	TI
EPD	15.1	-1.4	74.9	114.1	8.8	28.3	65.8	21.8	16.1	-0.28	0.62	0.73	167.4	88.3



	TI	API	REA	Marb	YG	DOC	STAY	MWW	Milk	MCE	YW	WW	BW	CE
EPD	88.3	167.4	0.73	0.62	-0.28	16.1	21.8	65.8	28.3	8.8	114.1	74.9	-1.4	15.1



	TI	API	REA	Marb	YG	DOC	STAY	MWW	Milk	MCE	YW	WW	BW	CE
EPD	88.3	167.4	0.73	0.62	-0.28	16.1	21.8	65.8	28.3	8.8	114.1	74.9	-1.4	15.1
%	15	5	40	10	40	10	3	25	15	20	55	55	25	20

Take Aways

- Layout matters for accuracy
 - Indexes HELP!!
- Increased information Usage=Increased Accuracy in the market
 - GE-EPDS
- Lays ground work for future research

In the previous question, you indicated that a Maternal bull is the optimal match for the displayed set of heifers. Now we ask you to decide if this bull best matches your objectives for the ranch breeding objective:

BULL #2



Act. BW	40
Adj. WW	505
Adj. YW	1051
Adj. SC	34.05
Adj. IMr	7.25
Adj. REA	12.5

CED	BW	WW	YW	DMI	SC	DOC	MW	MILK	CLAW	ANGLE	HP
+13	+0	+63	+117	+76	+1.33	+12	+89	+23	+50	+48	+8.3
10%	25%	50%	40%	35%	20%	50%	70%	55%	50%	85%	
CEM	AI	CV	MARB	IF	SI	SI	SI	SG	SB	SC	
+16	-1.53	+04	+2.21	+0.44	+0.38	+43	+57	+123	+137	+260	+380
2%	4%	15%	1%	2%	85%	70%	55%	3%	1%	1%	1%

Yes

No



In the previous question, you indicated that a Terminal bull is the optimal match for the displayed set of heifers. Now, we ask you to decide if this bull best matches your suggestion and the overall breeding objective:

BULL #4



Act. BW	78
Adj. WW	885
Adj. YW	1395
Adj. SC	37.61
Adj. IMF	8.09
Adj. REA	15.8

CED	BW	WW	YW	DMI	SC	DOC	MW	MILK	CLAW	ANGLE	HP
+6	+2.9	+76	+137	+1.25	+22	+25	+84	+25	+47	+46	+12.5
55%	85%	15%	15%	60%	90%	20%	30%	60%	40%	40%	45%
CEM	PAP	CW	MARB	RE	FAT	\$M	\$W	\$F	\$G	\$B	\$C
+14	+76	+75	+1.64	+1.06	+0.07	+68	+64	+135	+110	+224	+384
5%	40%	5%	1%	5%	45%	40%	35%	1%	1%	1%	1%

Yes

No

Powered by Qualtrics

SIGNALS

Other: GSR RAW (Shimmer)

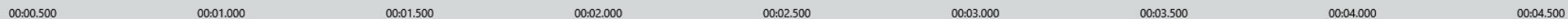


PPG: PPG (Shimmer)



MARKERS

ANNOTATIONS





Charley Martinez

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 [@FarmMgt](https://twitter.com/FarmMgt)