Current DNA Technology

K-STATE Research and Extension

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Our Goal in Beef Cattle Selection

- Make the best possible selection decisions for our operation
  - Optimize selection gains
  - Reduce risk of making a 'bad' decision
- If you are a seedstock producer you'll want to provide the best information possible to your customers
  - Selling a Cadillac or a Chevy?

Should you use genomic tools in your operation?

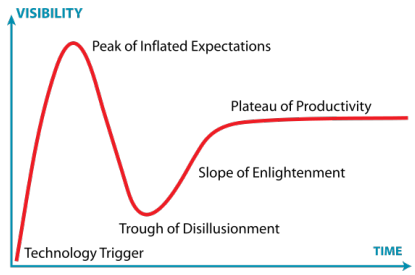
YES!!!!

Any questions?

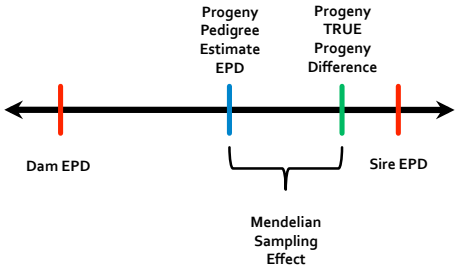
Should you use genomic tools in your operation?

- Commercial Producer
  - Selection of yearling/two-year old bulls with genomically enhanced EPD
  - Replacement females-under the right circumstances
    - Objectives-ROI
    - Parentage may get you far enough
    - Replacement selection strategy: attributes for success as cow (environmental) then genetics
- Seedstock: bull and replacement heifer candidates
  - Marker Assisted Marketing vs. Marker Assisted Selection

Genomic Technology Adoption in Beef Industry

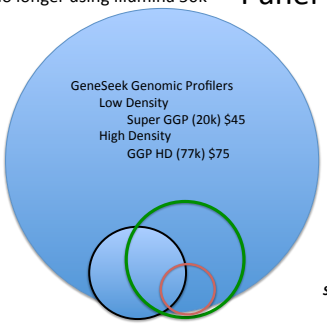


Finding True Genetic Merit



Panel Comparison

No longer using Illumina 50k



Orange = GGP-Super LD 19k
Green = GGP-HD (taurus) 70k
Black = Illumina 50K

GGP also include custom SNP

50k and GGP-HD share 28K
50k and GGP-Super LD share 8k

Source: Garrick, BIF GPW 2013

Also a separate GGP-HD-I (Indicus)

There are multiple minor variants of all these panels!

Imputation

Sire (HD)
….TCACCGCTGAG….
….CAGATAGGATT….

Offspring (LD)	Offspring (Imputed)
….??G??????A??….	….CAGATAGGATT….
….??T??????T??….	….??T??????T??….

Source: Spangler, 2014 NBCEC Brown Bagger

Lower Density Panels

AHA Predictive Accuracy 2,980 6-fold

Trait	Actual	Imputed
Birth Weight	0.67	0.65
Calving Ease Direct	0.68	0.67
Calving Ease Maternal	0.51	0.50
Fat Thickness	0.47	0.46
Marbling	0.42	0.42
Mature cow weight	0.64	0.62
Rib Eye Muscle Area	0.49	0.46
Scrotal Circumference	0.43	0.42
Weaning Weight Direct	0.53	0.50
Weaning Weight Maternal	0.37	0.35
Yearling Weight	0.61	0.59
Mean	0.53	0.51

Actual = 50k
Imputed = 10k (from GGP-LD)

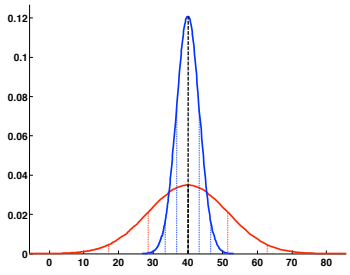
Source: Garrick, BIF GPW 2013

What Impact Can (will) Genomics Have?

- Genomic information has the potential to increase accuracy
  - Proportional to %GV
  - Impacts inversely related to EPD accuracy
    - High Acc animals get least benefit
- Multiple trait selection is critical and could become more cumbersome
  - Economic indexes help alleviate
  - Use index values that meet your breeding objective

Possible Change

ACC	CE	BW	WW	YW	MCE	MILK
0.0	7.8	3.0	16.3	25.7	7.9	11.9
0.1	7.0	2.7	14.7	23.1	7.1	10.7
0.2	6.2	2.4	13.0	20.6	6.3	9.5
0.3	5.5	2.1	11.4	18.0	5.5	8.3
0.4	4.7	1.8	9.8	15.4	4.7	7.1
0.5	3.9	1.5	8.2	12.9	4.0	6.0
0.6	3.1	1.2	6.5	10.3	3.2	4.8
0.7	2.3	0.9	4.9	7.7	2.4	3.6
0.8	1.6	0.6	3.3	5.1	1.6	2.4
0.9	0.8	0.3	1.6	2.6	0.8	1.2
1.0	0.0	0.0	0.0	0.0	0.0	0.0



Difference in EPD Accuracy

Acc = 0.30, SEP = 11.4 Acc = 0.8, SEP = 3.3

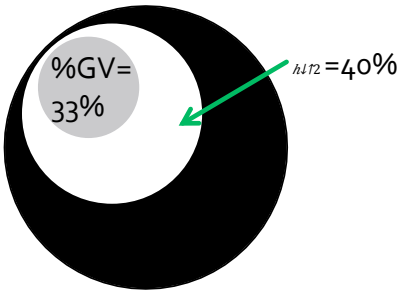
Increased Accuracy-Benefits

- Mitigation of risk
- Faster genetic progress

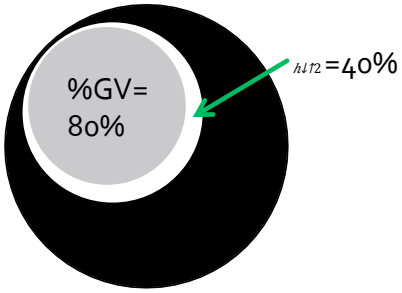
$$\Delta_{BV} / t = \frac{r_{BV,EBV}\, i\sigma_{BV}}{L}$$

- Increased accuracy does not mean higher or lower EPDs!
  - Increased information can make EPDs go up or down

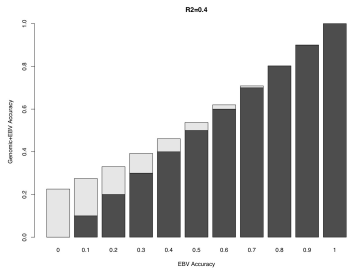
Panel %GV = 33%



Panel %GV = 80%

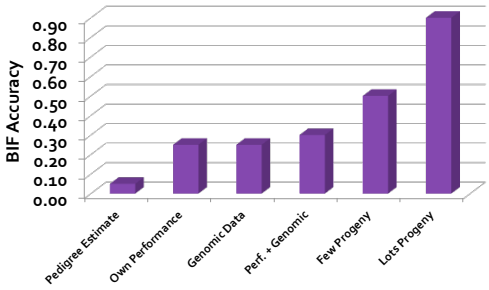


Impact on Accuracy-- %GV=40%

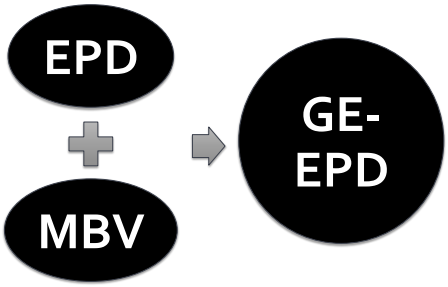


Spangler, 2011

Sources of Information



Integrated Information



Thank You!
Questions?
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