Genetic Selection Tools for *indicus* Influenced Cattle

John Genho
Neogen has a stake in genetic prediction for indicus-influenced breeds.
Why aren’t indicus cattle used more across the USA?

1. Carcass Quality
2. Fertility
3. Limited access to genetics/bull producers
4. Docility
5. Tradition
6. Other
Why use *indicus*-influenced cattle?
Why use *indicus*-influenced cattle?
Can breeders of *indicus*-influenced cattle…

... overcome the negatives (whether real or perceived)

... while maintaining the positives?
King Ranch Selection Strategy
King Ranch - Genetic Trend in Marbling
Change in marbling score and percent choice

2005 Cattle

2020 Cattle
How did they do this?

• Gathered data and kept pedigrees straight.
• Invested in genomics - single step models since 2012.
• Used index selection – **No Single Trait Selection!!**
• *Consistency from year to year*
## King Ranch – Maternal Traits

<table>
<thead>
<tr>
<th>correlation between epds</th>
<th>ww epd</th>
<th>milk epd</th>
<th>adg epd</th>
<th>heifer preg epd</th>
<th>stay2 epd</th>
<th>stay5 epd</th>
<th>cow wt epd</th>
<th>maternal index</th>
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<td>0.80</td>
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Brangus Maternal Selection Strategy
Brangus - Age at First Calf EPD

- A prediction of the days in age a cow will be when her first calf is born - lower number is better.

- Heifer development group as contemporary group.

- Heritability = 0.22 ± 0.07

- Genetic Correlations:
  - Mature Cow Weight = 0.35
  - Body Condition Score = 0
  - Scrotal Circumference = -0.27
  - Back Fat = 0.32
  - Milk = 0.55
Brangus – Other Maternal EPDs

• Stayability
  • Probability cow will be in herd at 5 years old.
  • Heritability = 0.16

• Heifer Pregnancy
  • Probability cow will have calf as heifer given she was exposed.
  • Heritability = 0.19

• Mature Cow Weight
  • Expected weight of cow at 5 years old, at constant body condition score.
  • Heritability = 0.25
Expressed in standard deviations – i.e. index value of 1 is 1 standard deviation above average for the index.

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<td>Age at First Calf</td>
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Brahman Selection Strategy
Docility

• Score ranging from 1-5 with 1 being calmest

• Scores collected at weaning

• Heritability = 0.29 ± 0.02

• EPD expressed as probability of being docile – ie higher is better
Genetic Progress in Docility

Graph showing the trend of docility scores from 2006 to 2020. The y-axis represents the docility scores, ranging from 0 to 8. The x-axis represents the years from 2006 to 2020.

The graph includes two linear regressions:
- Raw Scores: $y = -0.3741x + 757.09$
- Percent 4&5: $y = -0.036x + 74.398$

The ABBA (American Brahman Breeders Association) logo is present at the bottom right corner of the page.
Genetic Progress in Docility

Graph showing trends in docility over time with equations for different data sets:
- Raw Scores: $y = -0.3741x + 757.09$
- EPDs: $y = 0.1155x - 230.55$
- Percent 4&5: $y = -0.036x + 74.398$
In ABBA data, correlation between Tenderness and Docility is 0.25

More docile animals have more tender carcasses.
Beefmaster Selection Strategy
What are the foundation breeds and percentages of Beefmaster cattle?

1. 1/4 Hereford, 1/4 Shorthorn, 1/2 Brahman
2. 3/8 Brahman, 5/8 Hereford/Shorthorn
3. 1/4 Hereford, 1/4 Shorthorn, 1/2 *bos indicus*
4. Nobody knows
Calving Interval EPD

Given a cow calved within the first 2 ½ years of life, how many days until her second calf is born.

RFI EPD

Several breeders have invested in feed efficiency equipment.

Stayability EPD

Probability that a cow will stay in the herd until 5 years of age.
## Correlation between new EPDs

<table>
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<tr>
<th>correlation in EPDs</th>
<th>yw epd</th>
<th>sc epd</th>
<th>age first calf epd</th>
<th>stay epd</th>
<th>calving int epd</th>
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</table>
Animals in Whole Herd Reporting

Cow Age Distribution
Santa Gertrudis Selection Strategy
Genetic Trend of Growth Traits

- Release of Genomic Enhanced EPDs

- b=0.16

- b=1.68


- Calf Crop Year

- Average EPD

- Birth Weight
- Weaning Weight
- Milk
- Yearling Weight
Genetic Trend for Fertility For Breeders Submitting Records

![Graph showing genetic trend for fertility over time. The x-axis represents Calf Crop Year ranging from 1990 to 2020. The y-axis represents Average EPD ranging from -0.04 to 0.14. Three lines are plotted: blue line for Heifer Preg, orange line for Breed Back, and gray line for Scrotal Circumference.]
Genetic Trend for Fertility
For Breeders Submitting Records

Average EPD vs. Calf Crop Year

- b = 0.011

Breed Back
What about commercial cattle??
Conclusion

Threshold of Acceptability

Inferior Breed

Superior Breed
Why aren’t indicus cattle used more across the USA?

1. Carcass Quality
2. Fertility
3. Limited access to genetics/bull producers
4. Docility
5. Tradition
6. Other
Losses from decreased heterosis in straight bred cattle don’t make up for gains.
Questions??