BREEDPLAN

The world’s most widely used genetic evaluation system for beef cattle

Presented by Dr Michael Bradfield
Requirements for a Traceability system

- An authority
- A Database
- Means of identifying animals
- Creating the necessary documents
- Required legal framework
- Educates industry participant’s
- Monitoring, enforcement and evaluation procedures
- Query system
BREEDPLAN® Genetic Evaluation

- BREEDPLAN® is the world’s most widely used genetic evaluation system for beef cattle
- Developed in Australia
- Used by: - 44 breeds
  - 100+ breed associations
  - across 15 countries
- Growth, carcase and fertility EBVs are evaluated together in a multi trait model + calving ease + other traits
- Database over 40 million animals
BREEDPLAN® Separates Genetics from Environment

When you look at an Animal’s weight

- 70% of what you see is the contribution of the environment (feed quality, disease, management)
- 30% is due to genetics

The genetic component is transmitted from one generation to the next.

It is the genetics that makes an animal valuable for BREEDING.
Heritability

- Heritability is the proportion of genetic superiority or inferiority that an animal passes on to its progeny.

- Heritabilities vary with traits and breeds. Some commonly used values are given.

<table>
<thead>
<tr>
<th>Trait</th>
<th>Heritability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>10%</td>
</tr>
<tr>
<td>Gestation length</td>
<td>22%</td>
</tr>
<tr>
<td>Weaning growth</td>
<td>20%</td>
</tr>
<tr>
<td>Marbling</td>
<td>20%</td>
</tr>
<tr>
<td>Eye muscle area</td>
<td>25%</td>
</tr>
<tr>
<td>400 day weight</td>
<td>30%</td>
</tr>
<tr>
<td>Fat depth</td>
<td>30%</td>
</tr>
<tr>
<td>Birth Weight</td>
<td>40%</td>
</tr>
<tr>
<td>Scrotal size</td>
<td>42%</td>
</tr>
</tbody>
</table>
Conducting Genetic Evaluations in 16 Countries
BREEDPLAN® is used in many countries by some breeds - for example:

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. of Countries</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hereford</td>
<td>7</td>
<td>Australia, New Zealand, UK, USA Canada, Argentina &amp; Uruguay</td>
</tr>
<tr>
<td>Brahman</td>
<td>4</td>
<td>Australia, USA South Africa, Namibia</td>
</tr>
<tr>
<td>Simmental</td>
<td>5</td>
<td>Australia, New Zealand, UK South Africa, Namibia</td>
</tr>
<tr>
<td>Limousin</td>
<td>4</td>
<td>Australia, New Zealand South Africa, Namibia</td>
</tr>
</tbody>
</table>
ABRI/BREEDPLAN Services in Southern Africa

Agent in Botswana Government support

20 Breeds +
100% of National Market

28 Breeds
- Beef Cattle
- Sheep
- Goats
- Horses
- Dairy

80% of National Market

Seven Major Beef Breeds (40% of National market)
- Game register
LRF Provides High Research & Development Support Through it’s Strategic Alliances

Agricultural Research Council  9
Livestock Registering Federation  4
University of Free State  3

Animal Genetics Breeding Unit  20
Agricultural Business Research Institute  5

TOTAL = 41 Scientists
### Traits For Which BREEDPLAN EBVs/EPDs Are Produced

<table>
<thead>
<tr>
<th>Growth</th>
<th>Fertility/Birth</th>
<th>Carcase</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Weight</td>
<td>Scrotal Size</td>
<td>Carcase Weight</td>
<td>Docility</td>
</tr>
<tr>
<td>Growth:</td>
<td>Days to Calving</td>
<td>Eye Muscle Area</td>
<td>Net Feed Intake</td>
</tr>
<tr>
<td>200 Day</td>
<td>Gestation Length</td>
<td>Fat Depth:</td>
<td>Flight Time</td>
</tr>
<tr>
<td>400 Day</td>
<td>Calving Ease</td>
<td>Rump</td>
<td>Shear Force</td>
</tr>
<tr>
<td>600 Day</td>
<td>Direct</td>
<td>Rib</td>
<td>Structural Soundness</td>
</tr>
<tr>
<td>Maternal (Milk)</td>
<td>Daughters</td>
<td>Intramuscular Fat</td>
<td></td>
</tr>
<tr>
<td>Mature Cow Weight</td>
<td></td>
<td>Retail Beef Yield</td>
<td></td>
</tr>
</tbody>
</table>
BREEDPLAN Is Producing Marker-Assisted EBVs

**PEDIGREE**
- Parents & Sibs
- Progeny

**PERFORMANCE**
- Own Records
- Correlated Traits

**MARKER ASSISTED EBVs**

**GENOMIC PREDICTIONS**
- DNA Sample
- Prediction Equation
  - Pfizer
  - Beef CRC

Making EBVs More Accurate
Routine Across-Country Evaluations

Analyses are run on combined datasets

- Australia and New Zealand*
- South Africa and Namibia
- Pan American Hereford - USA, Canada, Uruguay and Argentina
- Murray Grey - Australia, NZ, USA, Canada and UK
- Limousin – Namibia, South Africa, Australia and New Zealand

Preparation of a multi-country evaluation for Brahman is underway

Comparable EBVs/EPDs to identify and more readily use the elite genetics

* Commenced in 1990
Suite of Genetic Improvement Tools

A number of complementary decision making tools can be interfaced with BREEDPLAN

- BreedObject
- TakeStock
- MateSel
- Quality assurance products
- GeneProb
- Internet Solutions
**HerdMASTER**

*Used in 12 Countries*
Internet Solutions

EBV Percentiles for WATASANTA EARTHQUAKE 1336
January 2011 Santa Gertrudis GROUP BREEDPLAN

200 Day Wt. - Lighter
400 Day Wt. - Lighter
600 Day Wt. - Lighter
Milk - Lower
Scrotal Size - Smaller
Eye Muscle Area - Smaller
Rib Fat - Leaner
Rump Fat - Leaner
Retail Yield - Lower
Domestic Index - Lower
Export Index ($) - Lower

Heavier
Heavier
Heavier
Higher
Bigger
Bigger
Fatter
Fatter
Higher
Higher

50th Percentile is the Breed Avg. EBVs for 2010 Born Calfes
BREEDPLAN International Summary

- Used by 100+ breed associations
- 44 breeds
- 16 countries serviced
- 60,000 users
- 460,000 beef registrations per year
- EBVs/EPDs produced on 22 traits
- Does across-country evaluations routinely
- Internet information system - 3 million pages per month
- DNA data included in marker-assisted EBVs
- Total database exceeds 40 million pedigree cattle
- R&D budget A$12M - $20M pa in period 2001 – 2012
- Interfaced to 6 genetic improvement tools
ABRI & LRF Contacts

Dr Michael Bradfield
AgriBSA
54 Main Rd
Irene, 0062
SOUTH AFRICA

Tel: +27 12 6675258
Fax: +27 12 6675259
Email: info@agribsa.co.za
www.agribsa.co.za

Mr Alex McDonald - Managing Director
Agricultural Business Research Institute
University of New England
Armidale NSW 2351 AUSTRALIA

Tel: +61 2 6773 3555
Fax: +61 2 6772 5376
Email: office@abri.une.edu.au

Visit the BREEDPLAN SA website:
http://www.breedplan.co.za