Impact of Beef CRC technologies on efficiency of beef production
The Opportunity

Meat consumption (kg/cap/yr)
The Challenge

Need to **double beef production** over next 30 years, in an environmentally sustainable way, with less or more expensive

- Land
- Water
- Grain
- Energy
- Labour
Focus on efficiency & profitability

\[
\text{Profit} = \text{Income} - \text{Costs} \\
\text{Profit} = \text{Price} \times \text{Throughput} - \text{Costs}
\]
Focus on efficiency & profitability

Profit = Income - Costs

↑ Profit = ↑ Price x ↑ Throughput - ↓ Costs

↑ Profit $/kg/ha

↑ Price $/kg

↑ Throughput Kg/ha

↓ Growth Kg/hd/yr

↑ Reprod %

↓ Deaths %

Nutrition

Genetics

Health
Beef CRC timeline

- Beef CRC 1: CRC for the Cattle and Beef Industry (Meat Quality)
- Beef CRC 2: CRC for Cattle and Beef Quality
- Beef CRC 3: CRC for Beef Genetic Technologies

CRC1
CRC2
CRC3
Measuring success

Beef CRC performance measured directly in terms of value added to Australian beef businesses
Beef CRC technologies

- Improved compliance with beef market specs
- Improved animal welfare (leading to improved productivity)
- Improved genetic gains
Improved compliance with beef market specs

Science underpinning Meat Standards Australia

...the world’s only meat grading scheme to guarantee palatability based on consumer preferences
Improved compliance with beef market specs
Improved compliance with beef market specs

- *BeefSpecs* calculator
- *BeefSpecs* drafting tool
- *BeefSpecs* optimisation model
- *BeefSpecs* maternal model

http://beefspecs.agriculture.nsw.gov.au
Improved compliance with beef market specs
Incidence of dark cutting

2.8% decrease since 2006

(MSA Feedback & Benchmarking System, 2010)
Improved cattle welfare

Vaccines to control BRD
Improved cattle welfare

Diagnostic test for polledness
Increased Gross Margin per AE
(individual herd, grass-finished, relative to Brahman)
Extra Gross Margin for Grain Finishing
(crossbred and composite relative to Brahman)

5c/kg tenderness premium on 60% of fed steers

$9

10c/kg marbling premium on 15% of fed steers

$5

Growth rate and feed efficiency differences

$38

Extra gross margin = $52 per AE

+ $7 and $24 for base model
Improved genetic gains

Genetic progress in profitability (Angus B3 Index)


- Growth traits
- Reproduction traits
- Scanned carcase traits
- Actual carcase traits & NFI
- DNA markers

1986-1991: $0.64/year
1991-1996: $1.84/year
1996-2001: $2.96/year
2001-2006: $4.40/year
Genomic information

DNA test for tendernessness
7K (7,000 SNPs)  

50K (50,000 SNPs)  

700K (770,000 SNPs)  

Genomic Breeding Values
### Across-breed prediction accuracy

<table>
<thead>
<tr>
<th>Trait</th>
<th>Accuracy</th>
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<tbody>
<tr>
<td>Feed conversion efficiency</td>
<td>0.44</td>
</tr>
<tr>
<td>Fat depth (P8 site)</td>
<td>0.27</td>
</tr>
<tr>
<td>Tenderness</td>
<td>0.38</td>
</tr>
<tr>
<td>Retail beef yield</td>
<td>0.13</td>
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<tr>
<td>Marbling</td>
<td>0.30</td>
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<tr>
<td>Eye muscle area</td>
<td>0.16</td>
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<tr>
<td>Carcase weight</td>
<td>0.30</td>
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<tr>
<td>Hip height</td>
<td>0.36</td>
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<tr>
<td>Yearling weight</td>
<td>0.36</td>
</tr>
<tr>
<td>Age at puberty in cows</td>
<td>0.28</td>
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<tr>
<td>Post-partum anoestrous interval</td>
<td>0.21</td>
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<tr>
<td>Cow fertility when lactating</td>
<td>0.36</td>
</tr>
<tr>
<td>Age at puberty in bulls</td>
<td>0.28</td>
</tr>
<tr>
<td>Percent normal sperm</td>
<td>0.31</td>
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</tbody>
</table>
Integrated with BREEDPLAN

Genomic Breeding Values

Phenotypic records
- Shear force
- Taste panel

Correlated Traits
- Flight time
- Meat colour
- Others

Pedigree
- Sire
- Dam
- Progeny
- Relatives

Size of effects
Heritabilities, variances
Size of r_g
Relationships

BREEDPLAN EBVs FOR TENDERNESS

Method also applies to other traits
Beef CRC take-home messages

- Since 1993, Beef CRC’s science has delivered >$2 billion of value-add (*but CRC cannot claim all credit*)
- Benefit of just two CRC technologies has repaid total $66m Commonwealth investment by more than 18-fold
- Impacts of CRC outputs over next 15-20 years likely to be at least as great as impacts measured to Dec 2011
- Outcomes could never have been achieved without multi-disciplinary, multi-organisational (and in some cases, multi-national) collaboration
- Nor without the strong and generous support of all the Beef CRC’s partner organisations
Beef producers should use any technologies available to improve efficiency and profitability!

And recognise that improvements in productivity also improve the environment by reducing methane emissions per kg of product
Improved efficiency & productivity $\rightarrow$ improved environment
Australian Museum Caring for our Country
Landcare Eureka Prize for Sustainable Agriculture
Finalists: The Cattle Methane Team