MEAT & LIVESTOCK AUSTRALIA

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For the latest in red meat R&D

Improving within-breed genetic evaluation and developing multi-breed genetic evaluation with the Southern Multi-Breed Project

Brad Walmsley

Animal Breeding and Genetics Unit

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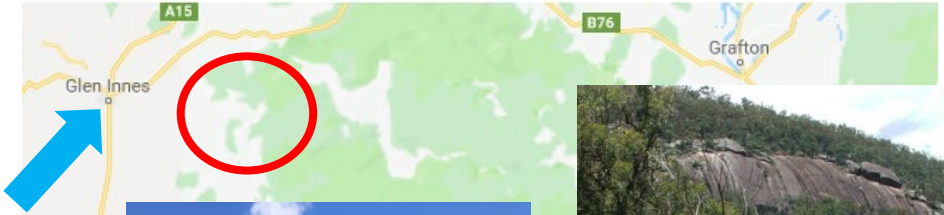
Brad Walmsley



- B. Rural Science - UNE
- Phd

- Responsibilities:
  - BreedObject $Indexes
  - Southern Multi-breed
  - Other things

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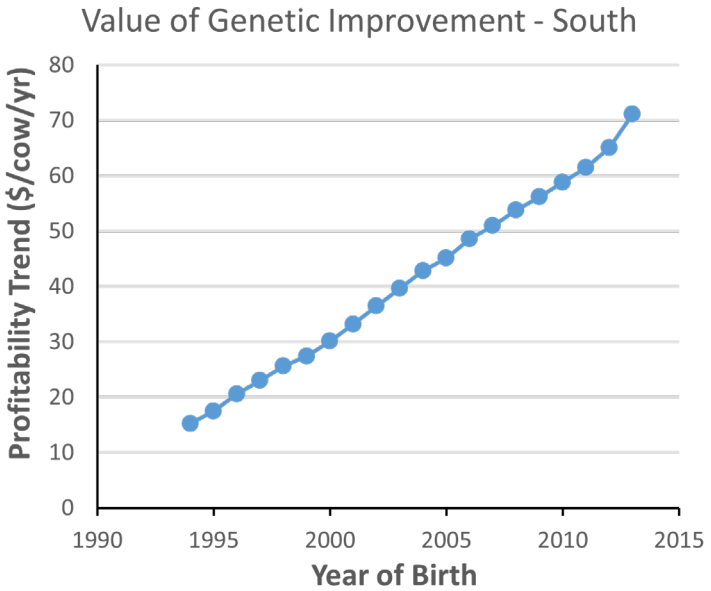
Commercial Profit

Profit = Income – Costs

- **As driven by genetics**



Up to 2014:
~$2.83 / cow / yr

Most recent:
~$4.00 / cow / yr

Best:
>$5.00 / cow / yr

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What drives genetic progress?

$$Response = \frac{selection\ intensity \times selection\ accuracy}{generation\ interval} \text{ Variation}$$

- pick only the best - intensity
- make the right choice more often - accuracy
- breed from them ASAP - generation interval
- identify differences between animals - variation

How fast you make genetic progress is dependent on how you balance these factors.

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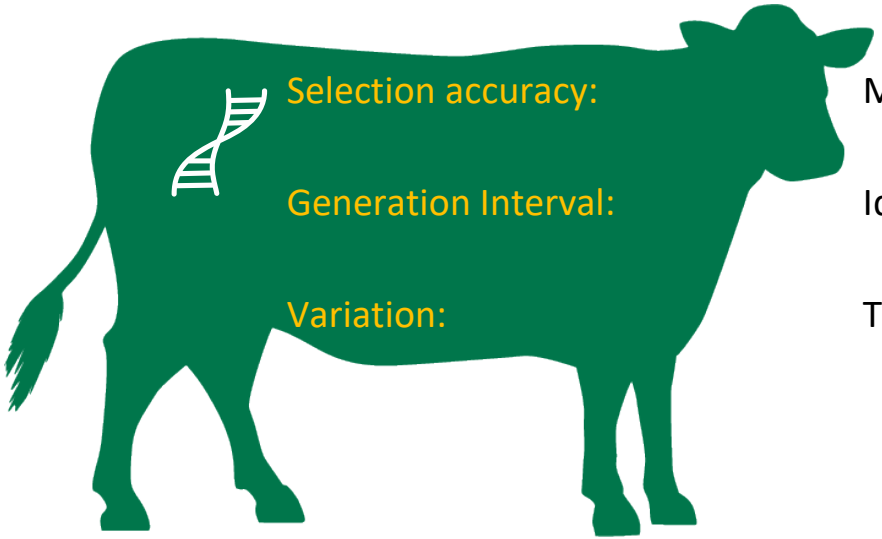
How does genomics help?



More information coming from “relatives”

Identifying earlier who carries good genes

Traits that we can’t measure any other way

Genomics can be used to drive faster rates of genetic gain.

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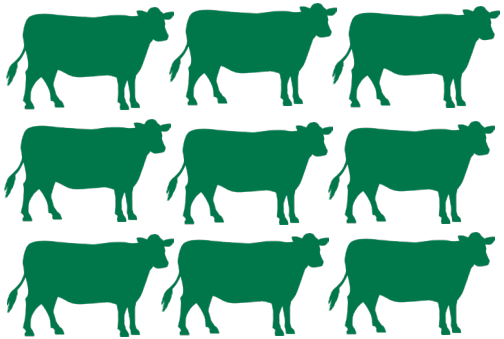
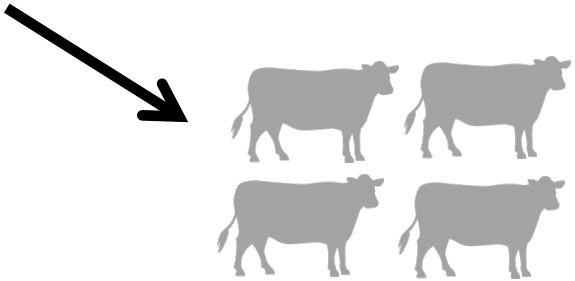
Genomics – basic principle



Reference population:

- measuring phenotypes and genotypes
- hard to measure traits
- late in life traits.



Industry animals:

- DNA tests on young animals
- predict breeding values based on genomic
- relationship and traits measured in reference.

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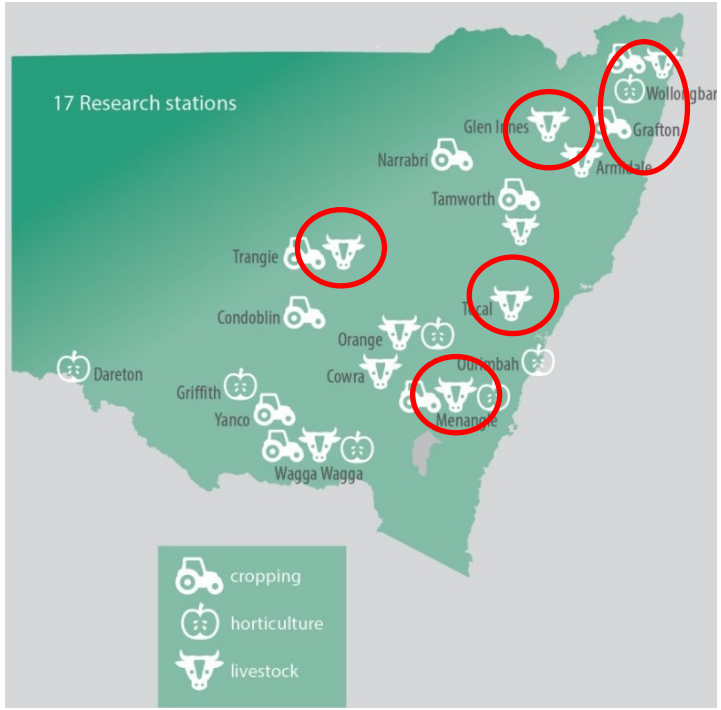
BREEDPLAN Developments

- BREEDPLAN includes genomics (single-step)
  - Brahman (2017)
  - Hereford (2017)
  - Angus (2017)
  - Wagyu (2018)
  - Santa Gertrudis (2021)
  - Droughtmaster (soon)

Improving within-breed genetic evaluation and developing multi-breed genetic evaluation with the Southern Multi-Breed Project

Southern Multi-Breed helping within-breed genetic evaluation

Research Stations



Site Diversity

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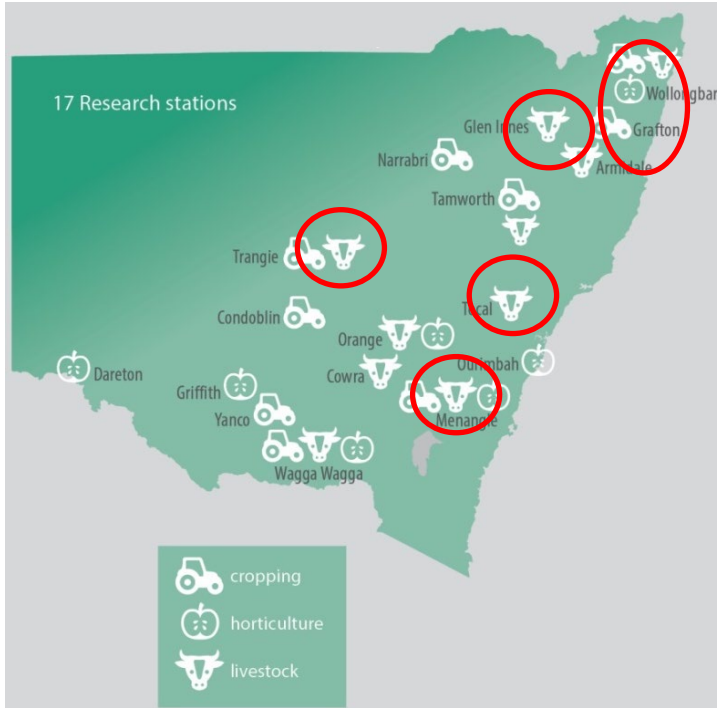
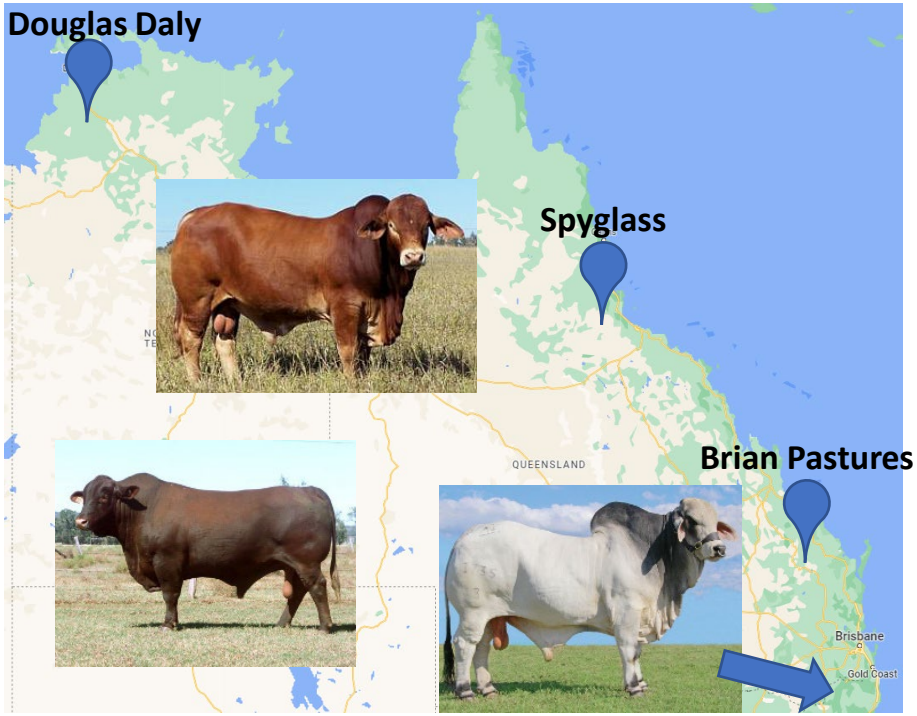
Southern Multibreed



Repronomics



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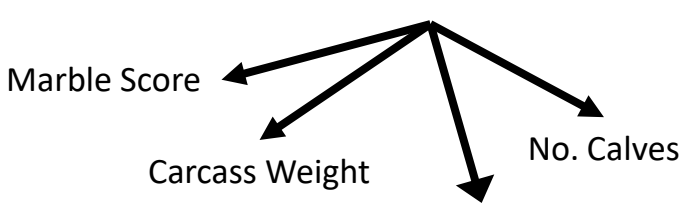
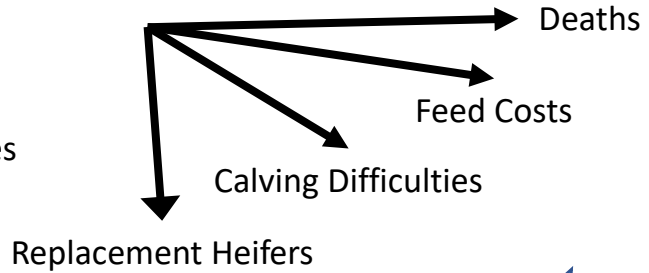
Commercial Profit

Profit = Income – Costs

Hard-to Measure





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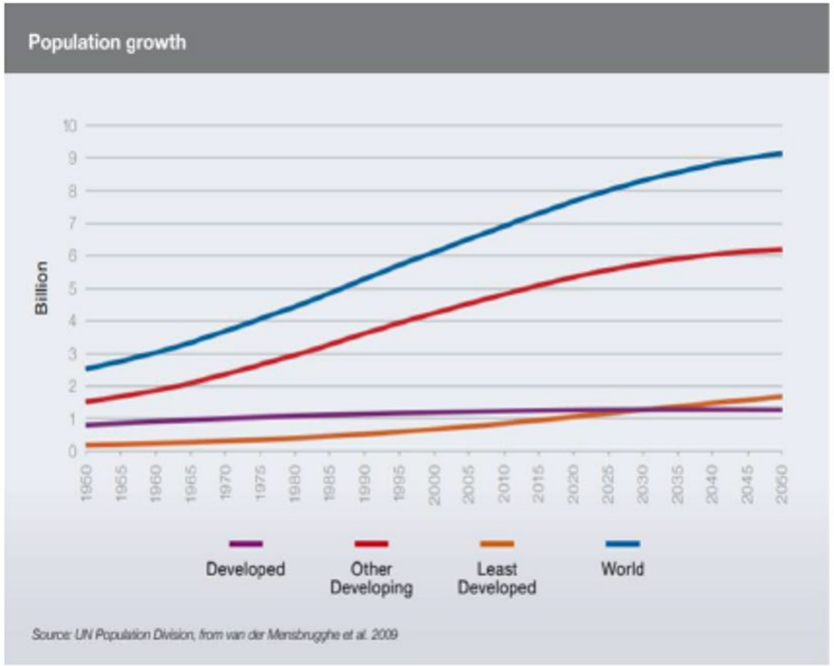
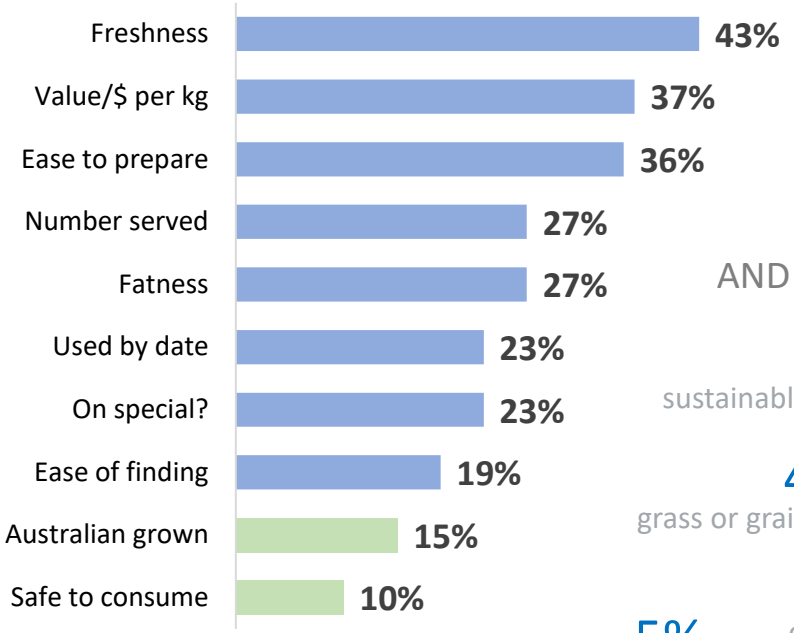
Current BREEDPLAN Traits

Growth	Repro	Carcase	Others
Birth Wt	Gestation Length	Scan (live)	Feed Efficiency
Weaning Wt	Calving Ease	Carcase Wt	Temperament
Yearling Wt	Days to Calving	Marbling	Structure
Sale Wt		Rump/Rib Fat	
Mature Wt		Eye Muscle	
		Tenderness (SF)	

Growing Population



Purchasing decisions



Source: MLA Koji Shopper Research

AND ONLY....

7% sustainable farming

4% grass or grain fed

7% organic

5% meat grading

An extra 1 BILLION people to feed every 15 years

https://news.un.org/en/story/2017/06/560022-world-population-hit-98-billion-2050-despite-nearly-universal-lower-fertility; UN Dept of Economic & Social Affairs, 2017

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REDUCERS: Consumers who are reducing RM consumption not as big as ‘noise’ suggests. Price and health driving reduction.

- Less than **1 in 3** consumers are **reducing** their red meat consumption
- Proportion of reducers has **remained stable** for over a decade
- **Price, health perceptions, environmental** and **animal welfare concerns** are driving reduction

So what? Address concerns of reducers to help them feel good about eating red meat.

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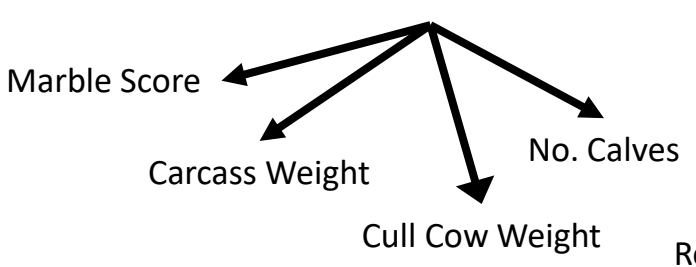
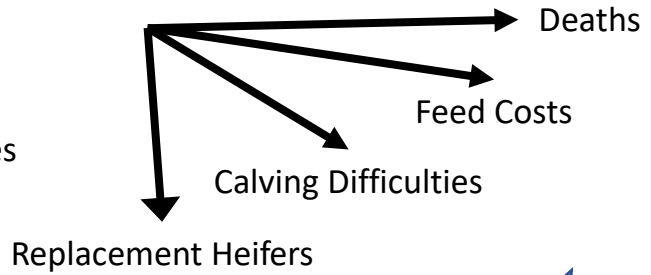
Commercial Profit

Profit = Income – Costs

Hard-to Measure





- What about future Profit?
  - Eating experience
  - Health benefits
  - Welfare
  - Health
  - Horns
  - Methane

$$$

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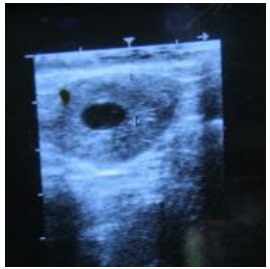
New Traits

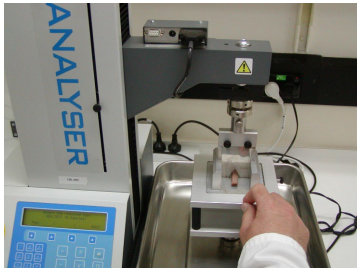
Age at Puberty

1st Calf Re-breed



Source: M. Wolcott

Meat Quality



Source: E. Toohey

Cow Composition

Consumer Testing

Source: P. McGilchrist

Immune Competence

Methane

Horn/Poll

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Improving within-breed genetic evaluation and developing multi-breed genetic evaluation with the Southern Multi-Breed Project

Southern Multi-Breed helping multi-breed genetic development

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Designed Research Program

- Breeds in Southern Australia with highest BREEDPLAN registrations + Brahman

Charolais

Hereford

Shorthorn

Angus

Brahman

Wagyu

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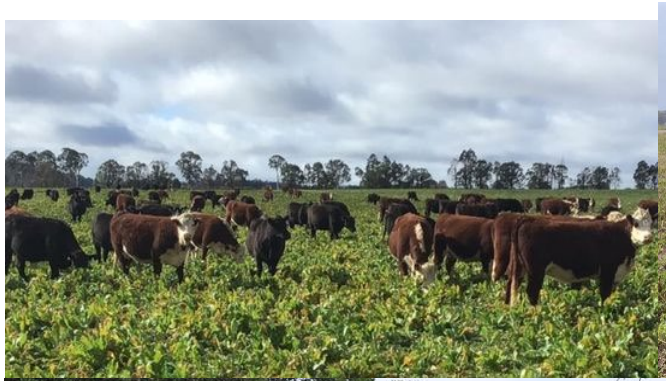
Managed Head-to-Head

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Designed Research Program

- Purebred matings = Purebred calves#
- Designed mating
  - Avoid inbreeding
- Produce comparable progeny
  - All in – All out (No cull, no draft)

Grafton Matings#

		Cow breed		
		AA	BB	HH
Bull Breed	AA	✓	✓	
	BB	✓	✓	✓
	HH		✓	✓

M. Woods 2022

S. Mortimer 2022

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Key Learnings

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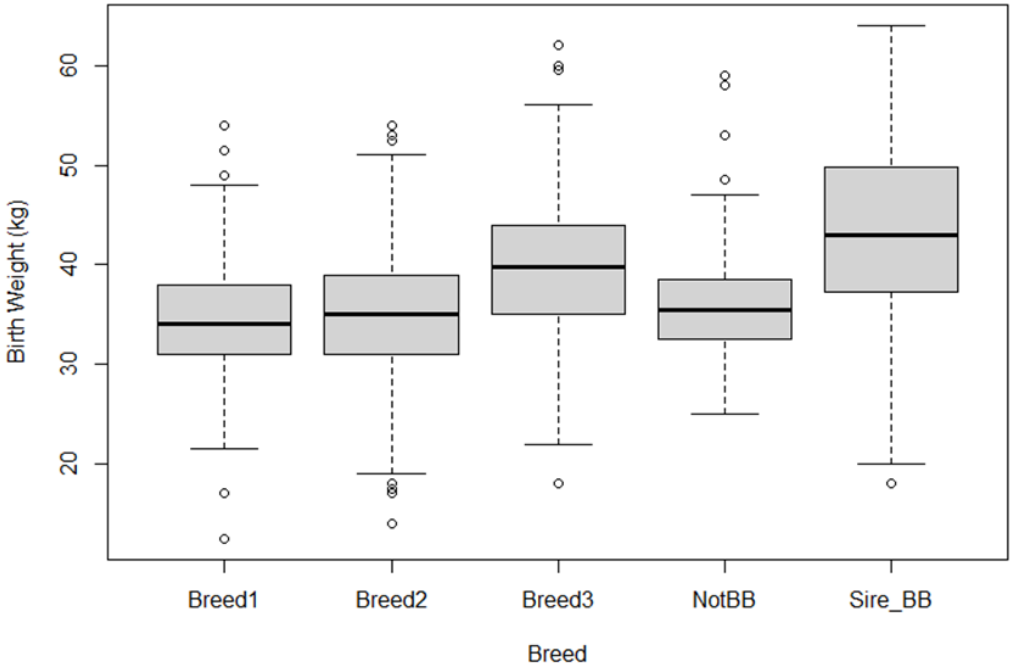
Research Learnings - SMB



- Variation within breeds
- Crossing breeding
  - Similar to Grafton 70s & 80s
- Important ramifications

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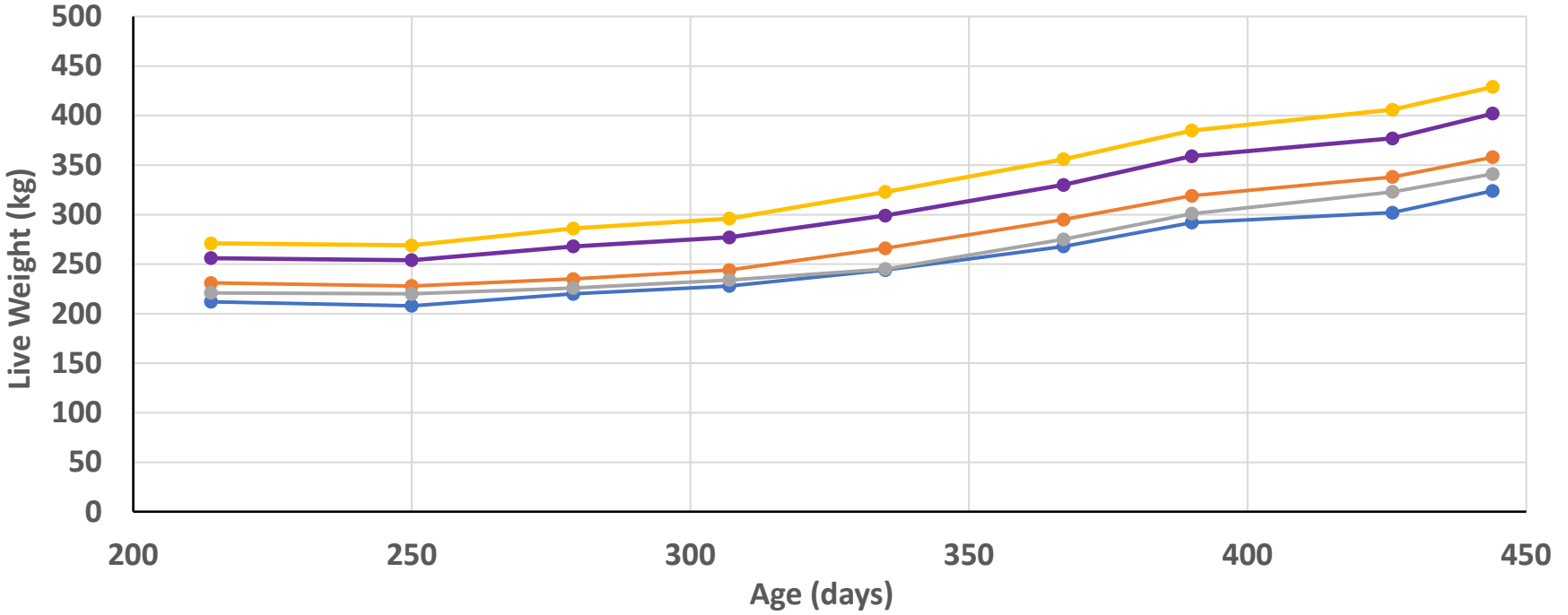
Research Learnings - SMB



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Research Learnings - Repronomics

Daughter Fertility?

Puberty → 8.9 months

Recycle → 4.4 months

20 day difference

DTC EBV

Repronomics[MT] - Johnston 2021

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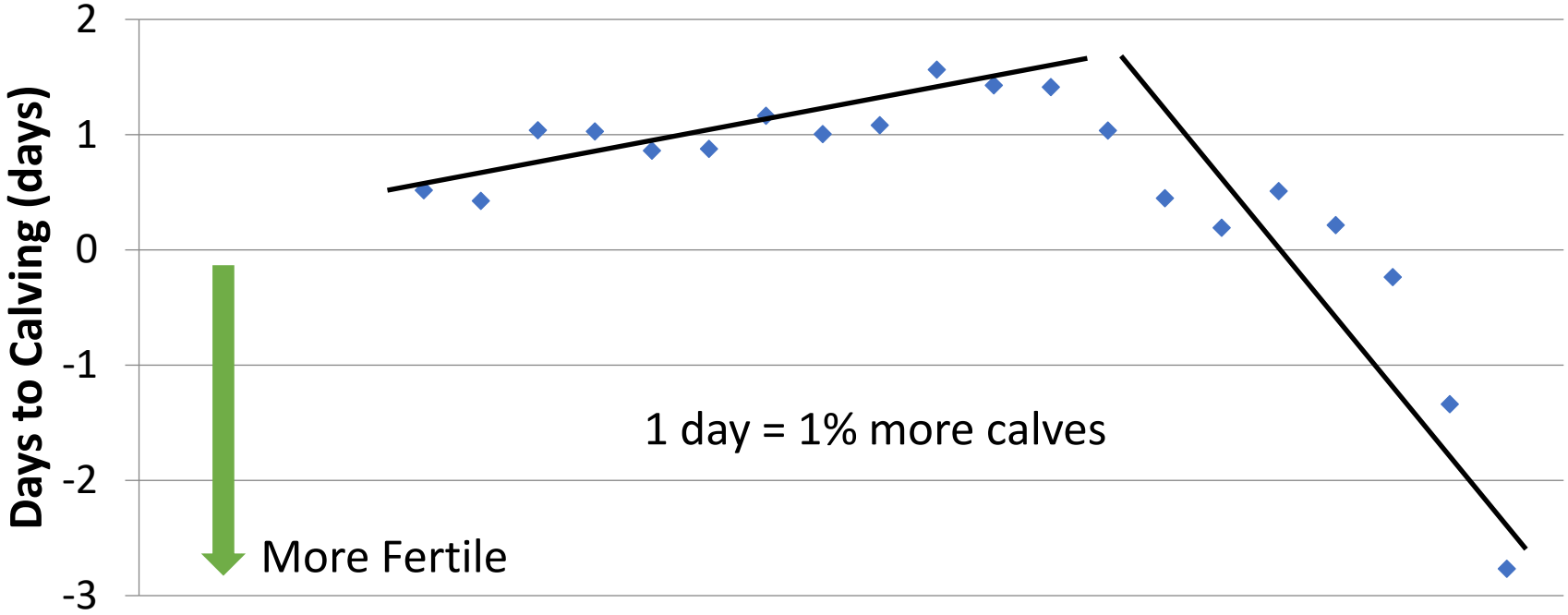
Research Impact - Brahman



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Beef CRC/Repronomics

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Research Impact - Brahman

November 2022 Brahman BREEDPLAN																	
Gestation Length (days)	Birth Wt. (kg)	200 Day Wt (kg)	400 Day Wt (kg)	600 Day Wt (kg)	Mat Cow Wt (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF (%)	Percent Normal Sperm (%)	Flight Time (secs)	Shear Force (kgs)
+0.1	+3.4	+22	+29	+39	+46	+1	+1.7	-4.9	+22	+2.6	-0.7	-1.4	-	0.0	-	-0.11	+0.11
25%	49%	53%	54%	56%	53%	36%	41%	34%	45%	36%	38%	49%	-	29%	-	42%	38%

Traits Analysed: Genomics

November 2022 Brahman BREEDPLAN																	
Gestation Length (days)	Birth Wt. (kg)	200 Day Wt (kg)	400 Day Wt (kg)	600 Day Wt (kg)	Mat Cow Wt (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF (%)	Percent Normal Sperm (%)	Flight Time (secs)	Shear Force (kgs)
0.0	+4.3	+21	+27	+38	+53	0	-0.3	+8.3	+26	+3.1	-1.2	-1.4	+0.9	-0.4	-	+0.03	-0.08
44%	55%	58%	59%	60%	56%	36%	45%	34%	49%	35%	37%	47%	25%	30%	-	43%	38%

Traits Analysed: Genomics

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ABBA BREEDPLAN Database – November 2022

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Others Findings

worst

$2076

difference

best

Carcass Value?

sire averages

$619

difference

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Beef Central & Angus Australia 2018

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Acknowledgements

- David Johnston (AGBU - Repronomics)
- Leadership Team: Kath Donoghue, Jason Siddell & Sam Clark
- Other Scientists (DPI, UNE, AGBU & CSIRO)
- Management and staff at Trangie, Grafton, Tocal, Glen Innes, EMAI, North Coast and Tullimba
- All technical staff (DPI, UNE & CSIRO)
- Project partners – AI, DNA, Merchandise, Breeders, Breed Societies, Producers

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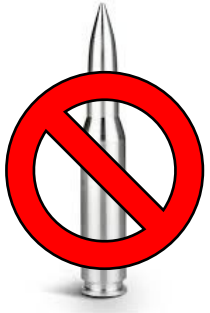
Take home messages

- Work needed to capture benefits of genomics
- Investment in Southern Multibreed and Repronomics™
- Southern Multibreed benefits to emerge in the future
- Repronomics™ benefits can be seen in:
  - Brahman
  - Santa
  - Droughtmaster



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Tools and resources

- BREEDPLAN
- BreedObject $Indexes

- Tropical breeds already benefiting

https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/breeding/southern-multi-breed-smb-project/project-overview

- Google – Southern Multibreed

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