Comparing carcase and beef quality and herd profitability in Northern Australia

BEEF CRC Fact Sheet

Can we change carcase and beef quality attributes by selection without compromising key fitness traits like reproductive performance and adaptation to harsh environmental stressors? This pivotal question in Australian beef cattle genetic improvement is currently being answered by a range of projects underway by the Beef Cooperative Research Centre using multiple traits and multi-faceted strategies for improving carcase and beef quality, feed efficiency, female fertility and adaptation to tropical environments, and use of tools such as Estimated Breeding Values (EBVs), genetic (DNA-based) markers, ultrasound scanning and meat processing and cattle management strategies.

FAST FACTS

- Potential to produce steers with an extra $120 worth of retail beef yield and heifers able to produce calves early and consistently each year, at the right time of the year in northern Australia
- Research aims to use genetic and non-genetic technologies to give the beef industry the ability to identify sires able to produce progeny for specific requirements
- Involving more than 5000 specially bred experimental steers and heifers on properties across northern Australia, the eight year project is targeting key traits of reproduction, feed efficiency, adaptation and carcass and meat quality traits and researching whether particular traits are compromised when specific market specifications are desired.

Background

Results from the Beef CRC indicate traits such as retail beef yield, marbling and feed efficiency are heritable and will respond well to selection. However, moderate to strong antagonistic genetic relationships exist between retail beef yield and feed efficiency on the one hand and marbling and fat thickness on the other. Higher yielding, more efficient animals produce progeny that are leaner and marble less than progeny of lower yielding, less efficient animals. Hence, selection to improve retail beef yield or feed efficiency is likely to reduce fat deposition throughout the body. Body condition is an important factor in female reproductive performance and a minimum fat cover may be necessary for puberty and conception. Selection of beef cattle for increased beef yield or improved feed efficiency that results in reduced fat cover in breeding females may therefore reduce female fertility. Such relationships may be stronger in harsh environments and in Bos indicus breeds that suff er more from lactational anoestrus.

A breeding program using Brahman and Belmont Red/ tropically adapted composite cattle was specifically designed to investigate relationships between all component traits affecting profitability in the tropics. The experimental cattle will also be genotyped for DNA markers related to carcase and meat quality and parasite resistance to demonstrate the use of gene marker tests to select commercial cattle for carcase and beef quality attributes and adaptation.

Measurements - Steers

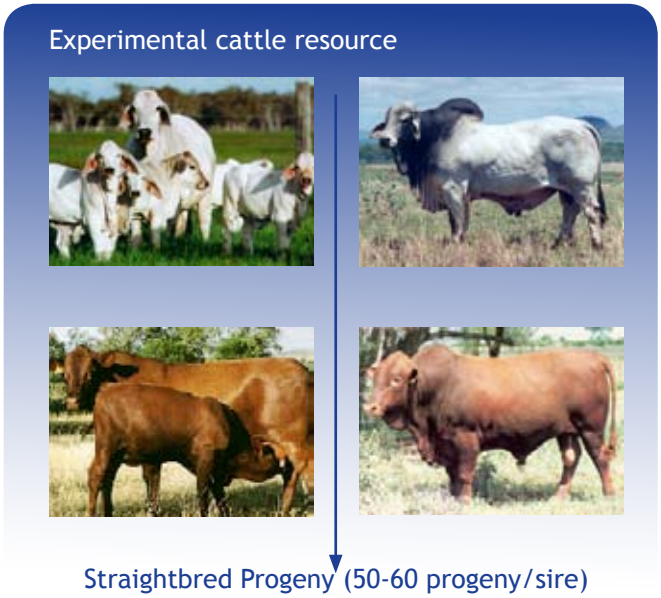
- Growth from weaning to slaughter
- Temperament and adaptation
- Feed intake and insulin-like growth factor 1 (IGF-I)
- Genotypes for 23 markers for carcase and beef quality and parasite resistance
- Complete carcase and beef quality attributes
- Tenderstretch versus achilles-hanging of carcases

Measurments - Heifers

- Growth from weaning to slaughter
- Temperament, adaptation and IGF-1
- Ovarian scanning to determine age of puberty
- Full reproductive measurements in breeding herds for first 3 joining periods
- Genotypes for 23 markers for carcase and beef quality and parasite resistance

Experimental Design

- Two breeds – Brahman & Belmont Red/tropically adapted composite representing extremes of breed difference amongst tropically adapted breeds of traits of interest 4,800 progeny (1,200 per sex/breed); 40-50 sires per breed; 50-60 progeny per sire
- Known and unknown sires; known sires selected mainly on divergent yield and marbling
- Strong genetic linkages across herds and years and to industry data through BREEDPLAN



Residual Feet Intake (RFI)

Preliminary results show:

- importance of RFI in steers in tropics similar to temperate (domestic) market systems
- importance of RFI in cows in tropics may be quite low
- feed efficiency measures for tropics need to be inexpensive
- use of markers (eg IGF-1, DNA tests)likely to be important in tropics

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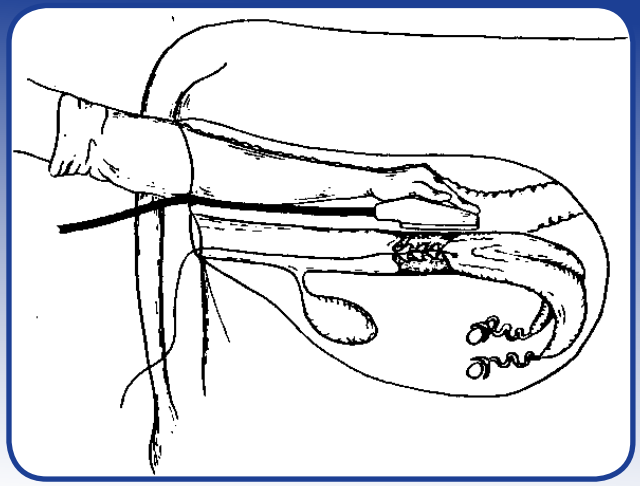
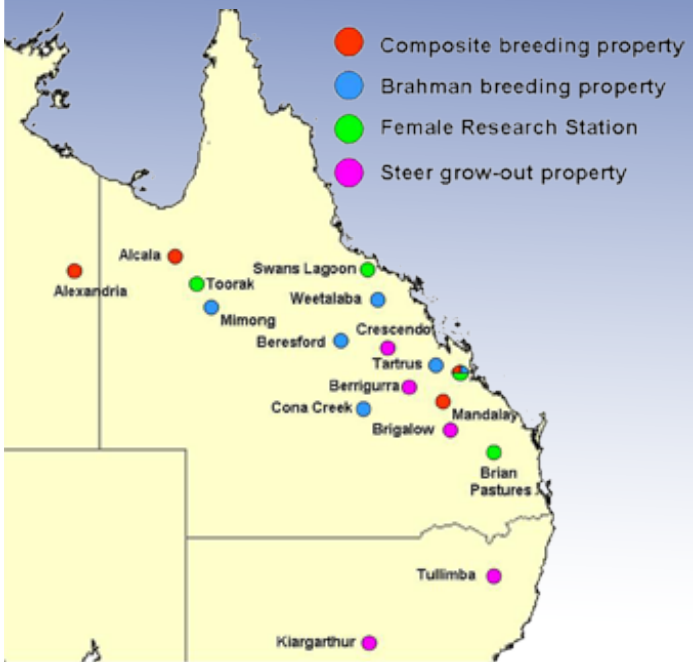
Female Fertility Traits

- Ultrasound scanning used to record fat thickness and ovarian activity
- Heifers scanned each 4-8 weeks after reaching 200kg to determine cyclicity
- Scanning also used during joining to determine:
  1. time of first CL for noncycling heifers;
  2. early pregnancies and possibly embryonic losses; and
  3. return to cyclicity of lactating cows
- Full reproductive data collected to 5 years of age



Industry Outcomes from the project will:

- Encourage better designed breeding programs, specifi cally targeting tropical and subtropical beef production systems.
- Provide informed decisions on the economic viability of changed management practices to improve carcase and beef quality attributes of female fertility.
- Allow incorporation of gene marker profi les into genetic evaluation schemes like BREEDPLAN to increase genetic progress.
- Through a South African component of the project, identify genetically superior animals that will promote the international exchange of superior germplasm to enhance productivity of beef herds in northern Australia.



Project Sponsors

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