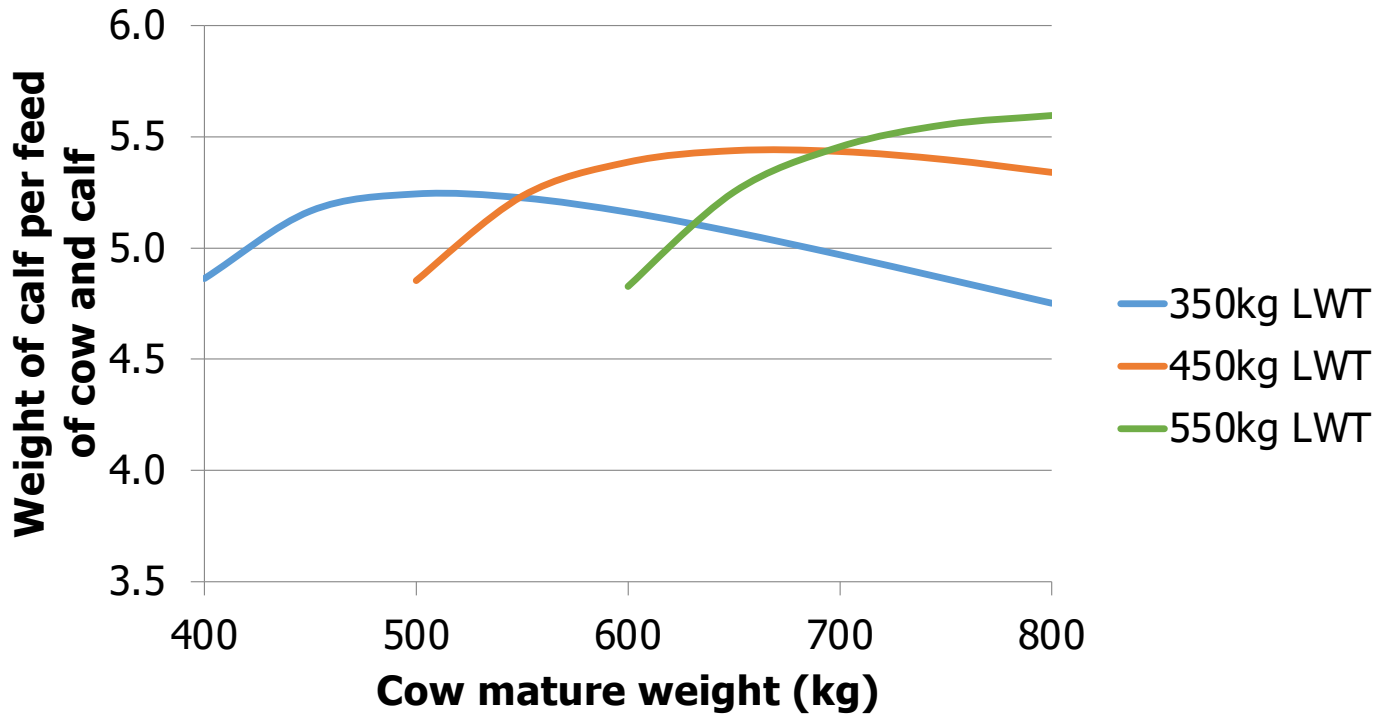
Applications of genetic and breeding technologies and lessons from Australia

Wayne Pitchford

Driver Direction Speed

Efficiency and cow weight for 3 market endpoints



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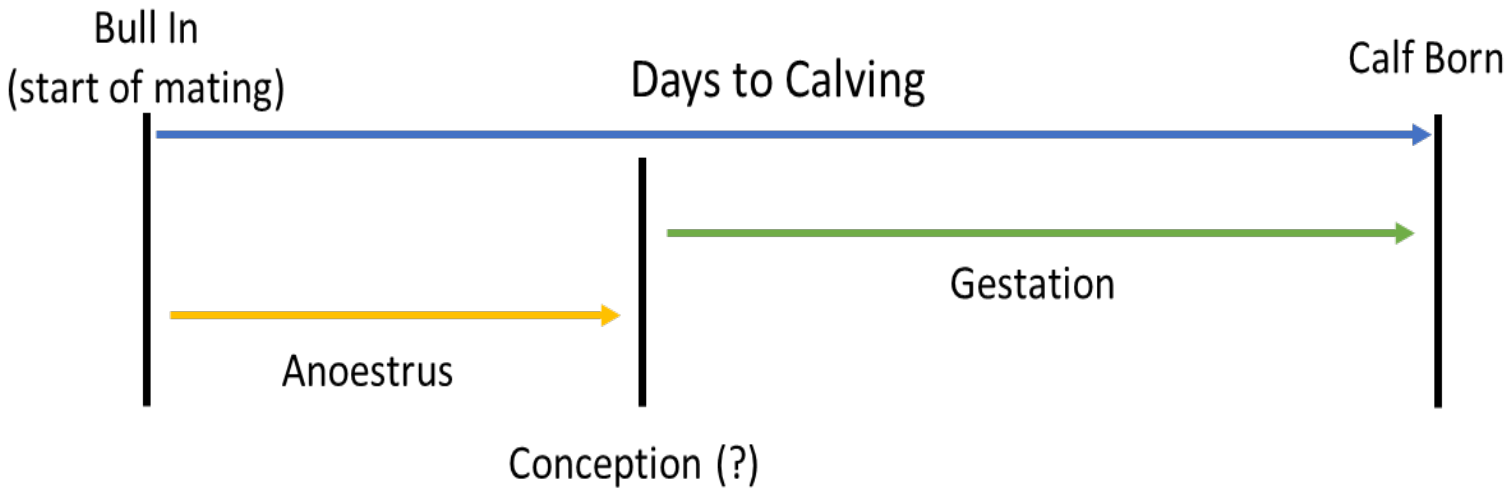
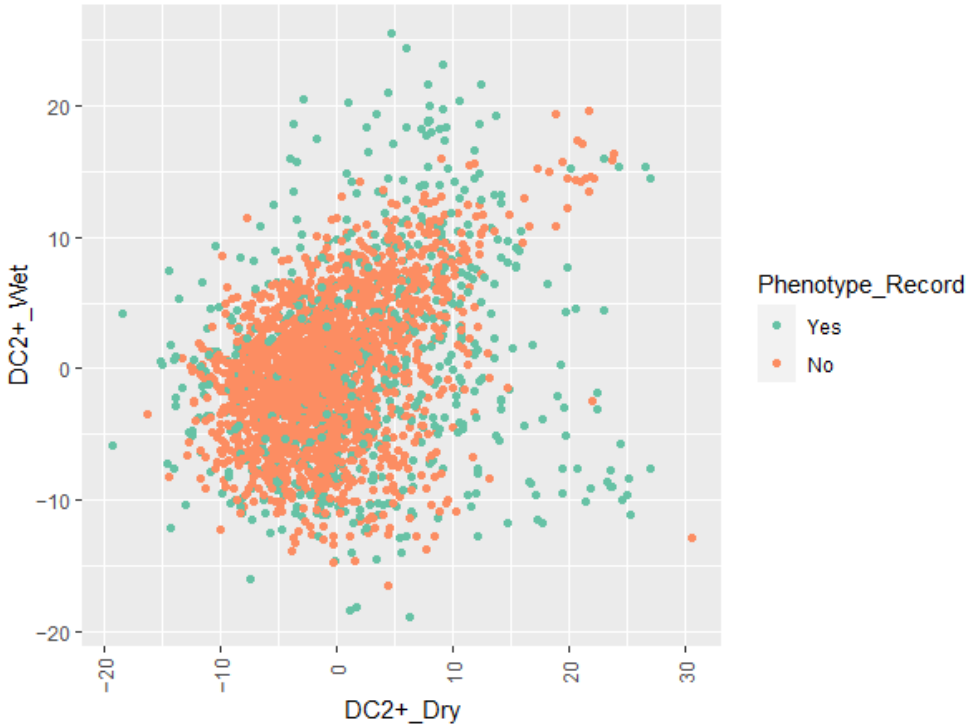
Days to Calving key trait



Beef CRC core results

Heritability	Brahman	Composite
Age at puberty	57	52
Post-partum anoestrus interval	52	25

Lactation Status



Heritability
DC2+_Dry = 0.22
DC2+_Wet = 0.17

Genetic correlation = -0.10

Breeding value correlation = 0.32

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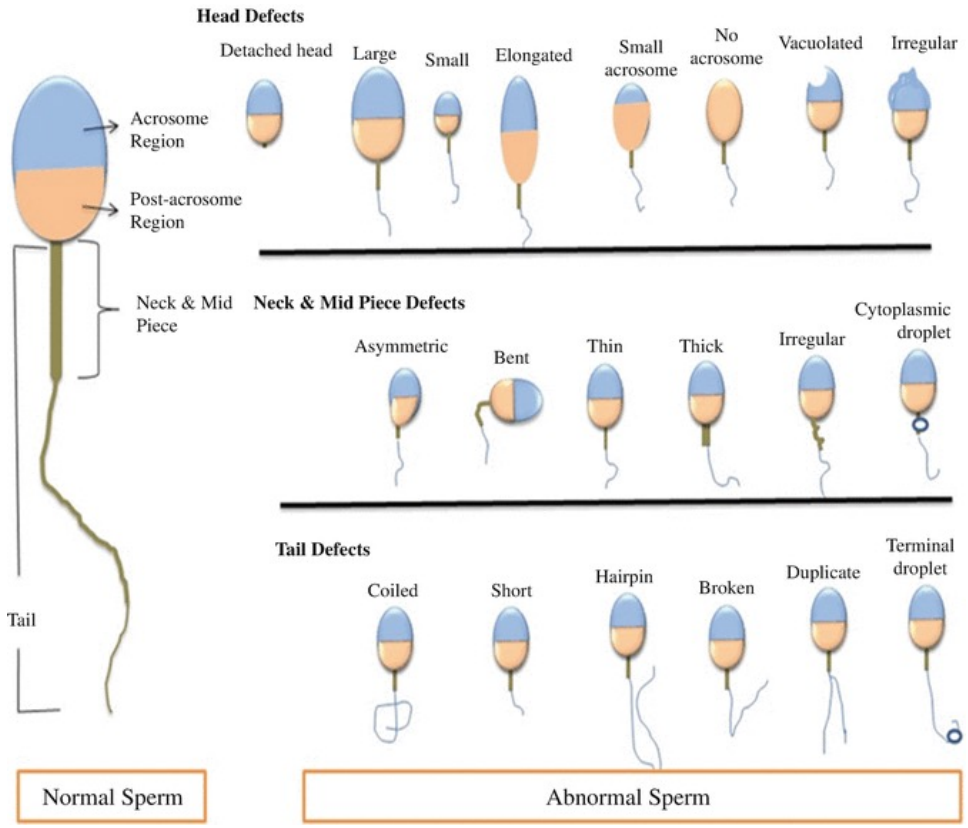
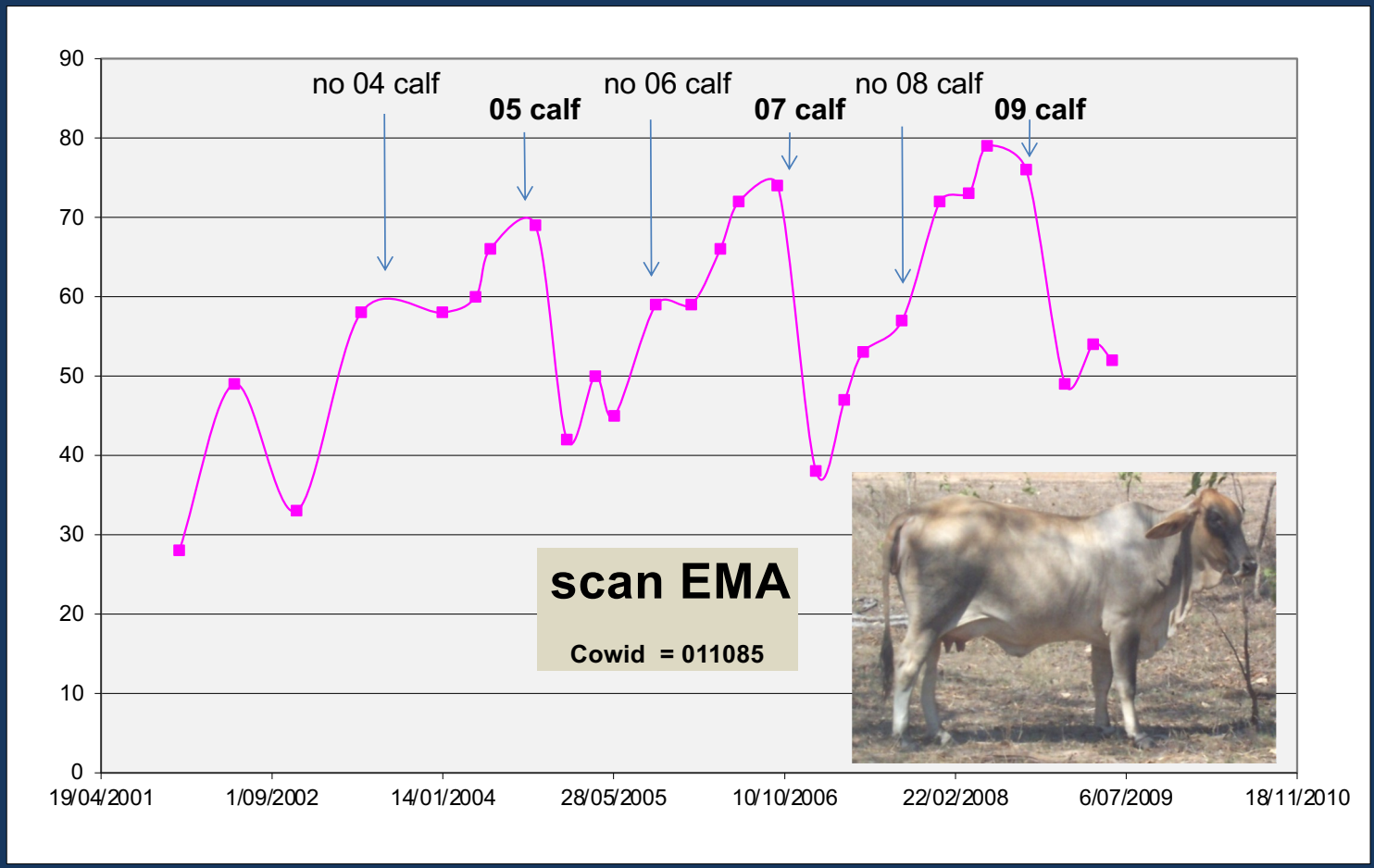
Correlated male traits

- Scrotal circumference
- Sperm defects (percent normal, vacuoles)



Changing body composition



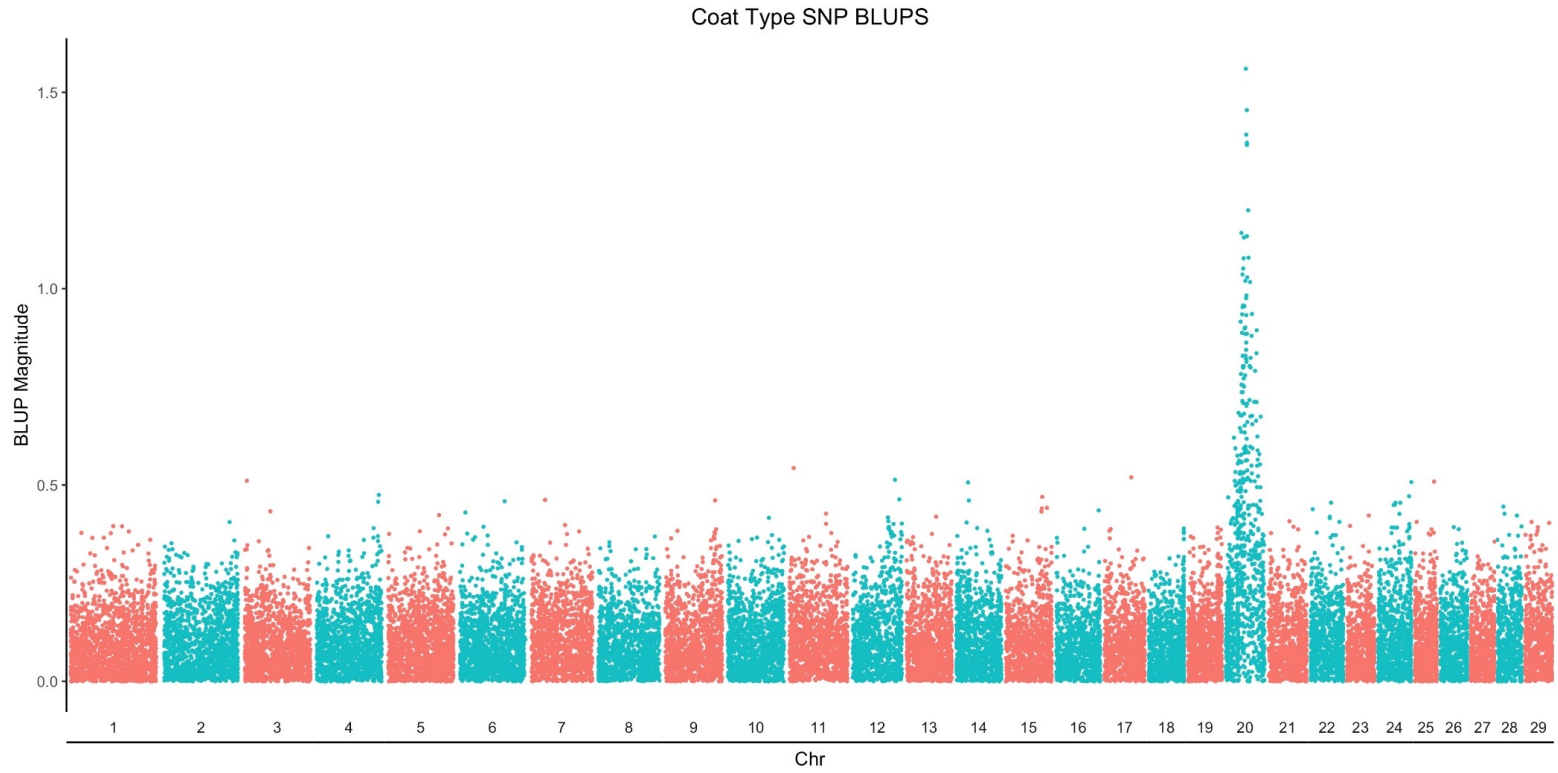
Kenya

Heritability (diagonal), genetic (below)
and environmental (above) correlations

	Weight	Rank	5 score	3 score
Weight	0.50	-0.87	-0.71	-0.58
Rank	-0.98	0.55	0.64	0.71
5 score	-0.99	0.99	0.50	0.81
3 score	-0.99	0.99	0.97	0.44

It is important to use experience of smallholders
If animals can be accurately ranked or scored, these can still be highly heritable

Using scores can identify major genes



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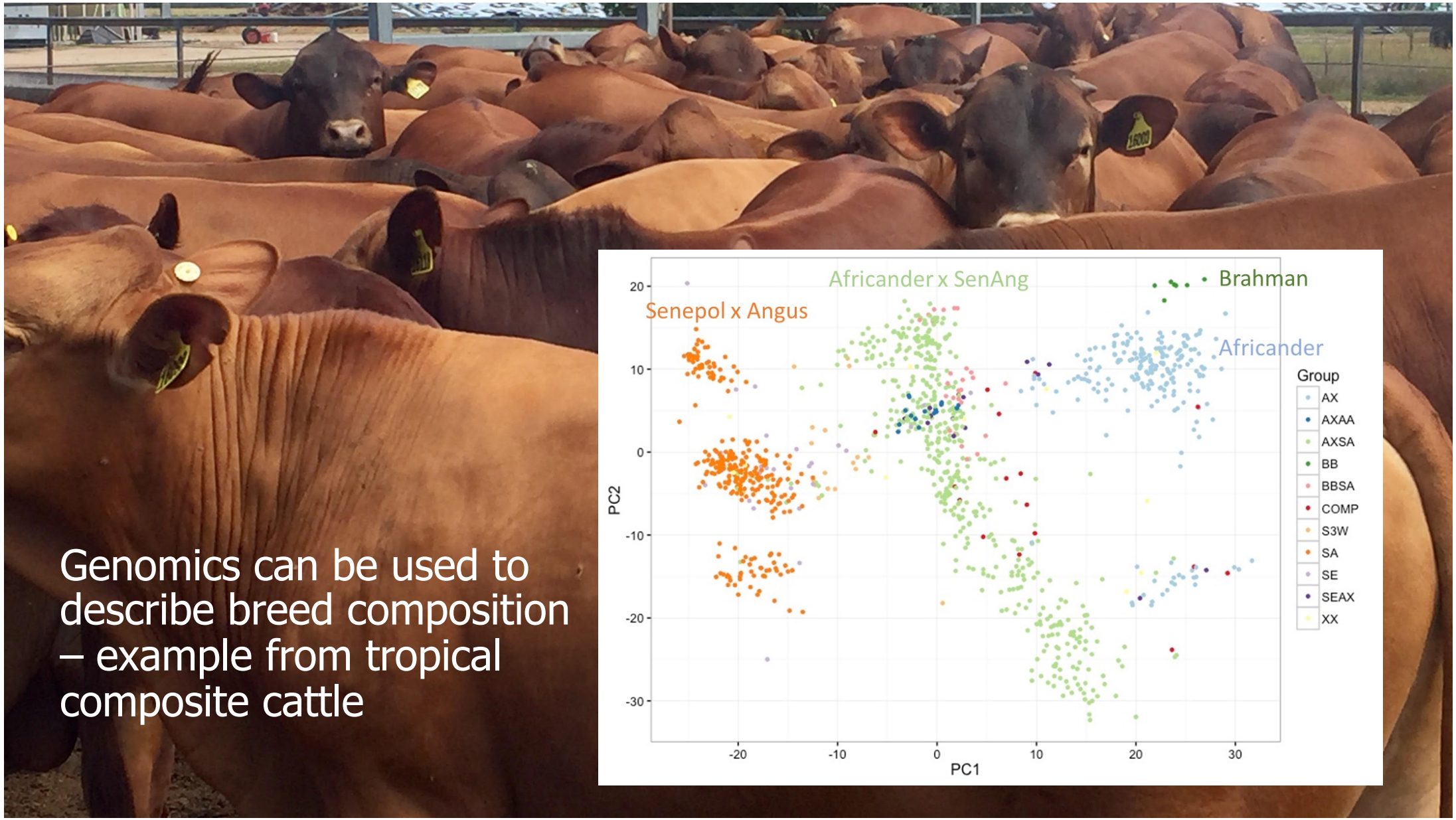
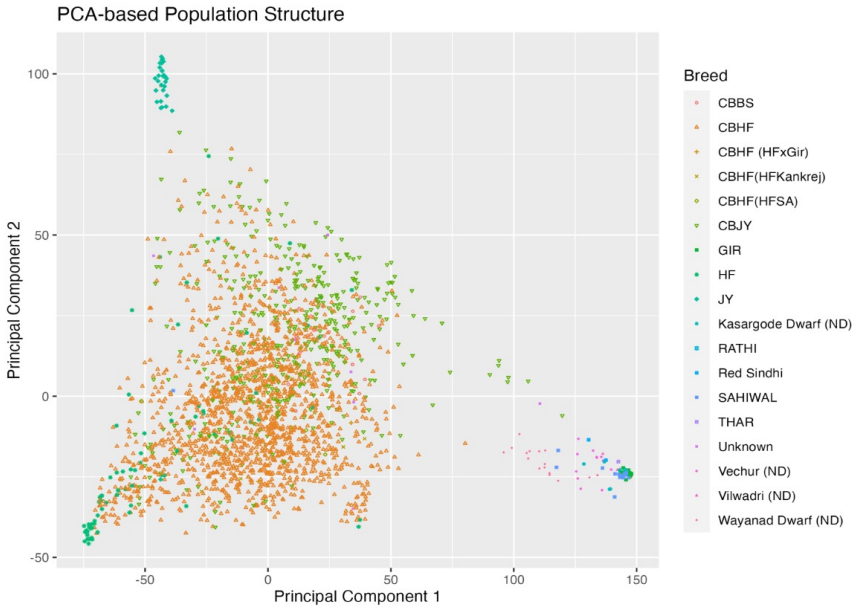


Genomics can be used to describe breed composition – example from tropical composite cattle

Kerala

- Genotype by Environment interaction
- Highlands h^2=0.28, Lowlands h^2=0.13
- Genetic correlation r_G=0.07



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Genomics for multi-breed evaluation

- Include accounting for heterosis and managing inbreeding
- Embrace crossbreeding which has occurred but don't blindly keep doing it
- Biggest is not always best
- Value highly the adaptation and fertility of local cattle
- Develop a good system of measurement

Buying cattle from Australia

- Importance of composites for all sectors of market
- Sufficient tropical adaption
- Improved maternal performance
- Improved early growth and meat quality
- Faster feedlot growth in destination country

Maximising genetic gain

- For a breeding objective of weaning 5 calves
- Accuracy of index with direct measurement low (0.35)
- Genomic testing builds accuracy (double gain)
- Embryo transfer (multiple ovulation or in vitro production) builds speed of genetic gain (double gain)
- Artificial insemination is useful for disseminating superior genetics either into or out of nucleus

Key messages for Vietnam

- Develop a breeding objective (trait emphasis)
  - Likely including adaption, temperament, fertility, growth, muscle, quality
- Develop a breeding nucleus and performance recording system
- Capture data from the field
  - Southern and northern, productivity and likeability traits
- Develop a system for estimating breeding values (+genomics)
- Import genetics aligned to objective
- Select animals on data and make gains
- Widely disseminate superior stock (AI or village cooperatives)