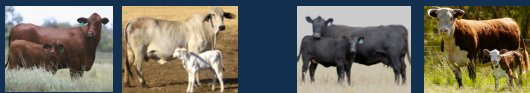


Genetic evaluation of female reproduction traits

David Johnston

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AGBU

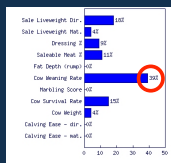
Overview



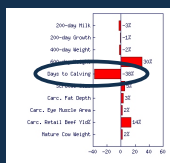
- Importance of reproduction
- Days to calving EBV (=EPD)
 - definition
 - recording
 - models and example EBVs
- Success and current challenges
- Alternative traits

Importance of reproduction

- key profit driver in beef
- low and slow compared to other species
- but often not 100%
- genetic basis but lots of environmental effects
- mostly primary trait in genetic indexes
- cow costs biggest cost....must wean a calf



Profit drivers (ERTs)



Selection criteria (EBVs=EPDs)

Days to calving calculation



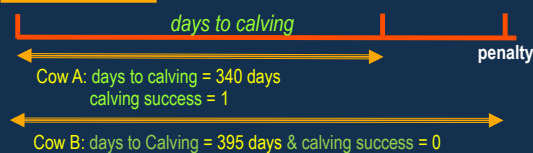
Bull-in date



Date of birth



Non-calver



Days to calving records

- natural mating only (currently)
- repeat records (6 per cow)
- 1st record before given age (avoid selected)
- Contemporary group =
 - + herd
 - + bull-in date + bull id
 - + current lactation status
- record culled not-pregnant (or transferred etc)
- birth date, sex of calf
- key is whole herd inventory system ... all females mated
 - not just recorded calves ...non-calvers



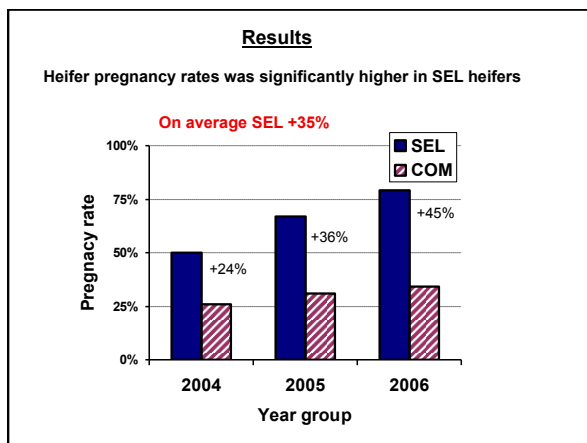
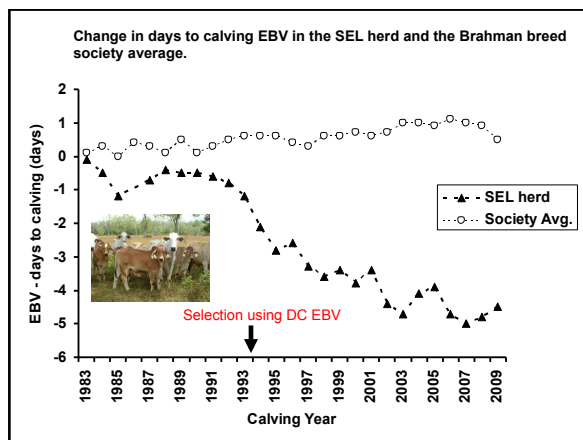
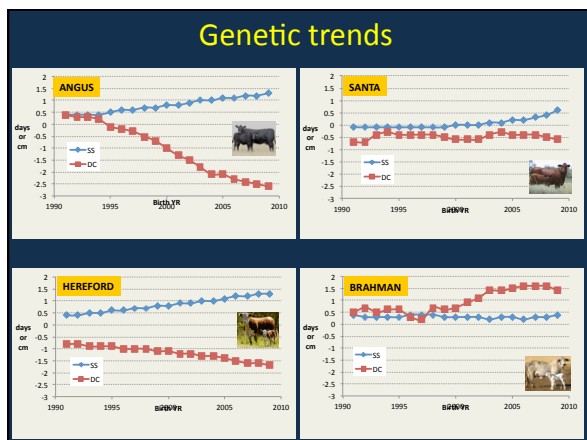
Number of DC records*

- Angus = 158,126
- Hereford = 106,838
- Brahman = 26,018
- Santa = 15,280



Also Simmental, Belmonts, Murray Grey

* Valid records in the analysis



...but there are issues



Recording

- natural mating only – but need better records
- too passive, too easy.. need active recording
- breeds high AI & ET low records (herds)
- inventory linked to fees (good data?)

Industry

- low heritability .. “can’t change” perception
- all nutrition!
- waiting for promised genomics ...but little data!

Collecting better data ...including artificial breeding

• Excel template
 • On farm recording packages

other possible traits

Ovarian scanning

Corpus Luteum (CL)

First observed CL

AGE AT PUBERTY & Post calving recycle

- 2,200 cows BRAH & TCOMP
- 4-8 wks from 14 months to 9 yrs

Brahman sires

heifer age at puberty EBVs (days)

$h^2 = 0.55$

BELMONT 510/97	-185
LANCEFIELD 4999M	-148
BELMONT 268/97	-145
BELMONT 79/96	-143
LANCEFIELD DESTINY	-139
TARTRUS ABEL MANSO	-99
NEWCASTLE WATERS TOBY	-89
CONA CREEK 2852	-85
LANCEFIELD 4461	-83
WAVERLEY QUARTZ DE MANSO	-82
.	.
TARTRUS CRUZ MANSO	47
LANCEFIELD AMBITION	56
JDH MANGUM MANSO	68
TARTRUS 3292	68
CARINYA MAX	69
ALLAWAH M119	75
ALLAWAH M90	89
CONA CREEK EQ773	137
ALLAWAH M137	145
CONA CREEK 3062	154

5.6 month difference daughter's age at puberty

impact on maiden calving rate, many not pubertal at 1st mating

Wet 1st calf cow resumption of cycling

Heritability = 50%

- 48 % wet 1st calf BRAH cows only resumed cycling after calf weaned
- Calving rate: wets 41% vs dries 81%

EXAMPLE

3.7 month difference resume cycling

1st calf wet cows

40% difference in calving rate

MALE REPRODUCTION TRAITS

Tropical breeds

N=3,500

Heritability of bull traits

Trait	BRAH	TCOMP
LH 4m	0.30	0.45
Inhibin 4m	0.70	0.65
IGF-1 6m	0.45	0.35
Scrotal 6m	0.45	0.40
Scrotal 12m	0.65	0.50
Sperm 12m	0.35	0.20
%Normal 24m	0.20	0.25

Genetic correlations key bull traits

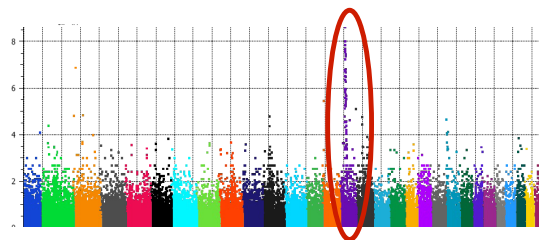
Bull Trait	Sperm12m	%Normal 24m	Female AP
BRAH			
Inhibin 4m	-0.05	-0.40	0.30
IGF-I 6m	0.20	0.35	-0.60
Scrotal 12m	0.65	0.30	-0.45

- Males traits correlated with early female reproductive performance
- currently analyzing with cow re-cycling traits
- then with female lifetime reproduction



Genomics studies (50K & 800k)

- low h^2 traits need 10's thousands of records (+ genotypes)
- found SNP affecting AGECL in Brahmins
- significant SNP in one region of one chromosome



Improving reproduction



- days to calving EBV
 - easy to record
 - large differences if you record (Tropicals)
 - can improve GE (split mating 1 & 2)
 - captures AP and PPAI in tropical expt.
 - maybe we can AI matings (better data)
- alternate measures
 - ultrasound scanning e.g. age at puberty
 - lactation anoestrous measures (Tropicals)
 - new correlated male measures
 - weaning success (capture calf loss)
 - gene markers ..no data ..no genomic predictions

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For you to consider



- Is reproduction a profit driver in your herd
- How big are the difference in your breed and herd?
- Is there an opportunity to improve through genetics?
- Can commercial breeders find better genetics?
- Is it possible to record these traits in your breed?