THE UNIVERSITY OF MELBOURNE

Melbourne Veterinary School

5.7 Breeding

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Breeding

- Without breeding there are no new animals to restock a herd
- Not all beef enterprises have breeding animals, may purely be a fattening enterprise and purchase from other breeders e.g. buy in 10-month-old steer and sell 2-year-old steers
- Indonesia imports significant numbers of young Australian animals as lacks land to produce enough livestock for fattening (significant feed not suitable for human consumption but useful for feedlotting cattle)
- Gestation period of about 280 days (most of the year pregnant and some of that time also lactating)
- Usually cycle 30-90 days after giving birth (condition score/nutrition)
- Always wean calves at least a few months before parturition

How many bulls?

- How many bulls per 100 cows?
- Depends on bull quality and if they have been assessed?
- BBSE (see video following this)
- Common for a veterinarian to do a BBSE, usually a few months pre joining (allows additional bulls to be purchased)
- Serving capacity test might be conducted, or serving ability
- How to allocate? Size of paddock and feed, topography (hills, watercourses, trees etc), likely cow cyclicity, environmental conditions (heat/rain etc)
- Varies – in NT likely 4 bulls per 100 cows, in Vic 2-3 bulls.
- Benefit of multisire joining to reduce risk

Cow condition score

- Please review the websites following this video for images of condition scoring
- Target CS for cows in Southern Australia
- No lower than 2.5 at calving for autumn
- No lower than 2.5 at start of mating for autumn calving
- No lower than 2.0 at calving for spring calving (these cows will get better nutrition than autumn calving)
- Similar figures for cows in tropical areas but time of calving moved, allow extra CS where lack of supplementary feed, ideally CS 3 at calving

Critical mating weight (CMW)

CMW varies with frame score and breed

85% of heifers to become pregnant over six week joining (will vary for each enterprise)

General rule = 60-65% of adult weight

Growth rate required for CMW = (Mating weight – birth weight)/days between birth and mating (600+g/d for 2 y.o)

MLA RECOMMENDATIONS FOR HEIFERS REACHING CMW[5]

Guide to minimum weights (kg) of weaner heifers at puberty[6].

Frame score	Weight at puberty	Mating weight at 15 months	Weight at 0-3 months pregnancy	Weight at 4-6 months pregnancy	Calving weight at 24 months	Mature weight
1	240	260	296	319	333	400
2	270	300	342	369	387	470
3	290	330	377	409	430	530
4	310	365	419	454	487	600
5	340	400	459	499	525	670

Source of genetics

- Bulls, artificial insemination or embryo transfer (or livestock purchase)
- AI and ET most commonly used by stud industry, but if bull prices increase then more commercial may use AI
- Range of options to synchronise cows to AI on same day (FTAI)
- Identify heat via range of methods (usually paint or device on tail)
- Requires multiple musters of the herd
- ET often used in studs to access entire new lines of genetics that may not be available otherwise
- Bull costs currently vary from 5,000 to more than 50,000, many commercial bulls selling in the 10,000 range

Crossbreeding

- Range of genetics can be combined to meet a target outcome
- If you owned Herefords, could join to Angus to stop the need for disbudding/dehorning
- Relatively simple to make this change
- Some traits however have many genes involved – how do we assess? Breedplan

Breedplan

- For traits such as growth there are many genes involved
- Expression is a combination of genes and environment (feed)
- We want to be able to assess the genes part of that!
- BREEDPLAN – BLUP analysis to produce EBVs
- EBVs = genetic merit for a particular trait (removes environmental influence – note = ESTIMATED!)
- Compares result to genetic base in particular year
- Uses actual animal data combined with all relative data and cohort data

Breedplan EBVs

Weight	Fertility/Calving	Carcase	Other
Birth Weight	Scrotal Size	Eye Muscle Area	Docility
Milk	Days to Calving	Fat Depth	Net Feed Intake
200 Day Growth	Gestation Length	Retail Beef Yield	Structural Soundness
400 Day Weight	Calving Ease Direct	Intramuscular Fat	Flight Time
600 Day Weight	Calving Ease	Carcase Weight	
Mature Cow Weight	Daughters	Shear Force*	

Joining	Birth	Weaning	Yearling	18 Months	Maturity
Mating Program Details	Date of Birth	200 Day Weight	400 Day Weight	600 Day Weight	Cow Disposal Code
AI Dates	Birth Weight	Mature Cow Weight (dams)	Scrotal Circumference		Mature Cow Weight
Preg Test Results	Calving Difficulty Scores	Docility Score	← Scanning Measures → (EMA, Fats,		
	Recipient Dam Details	Flight Time	← Structural Score →		

Breedplan

- Doesn’t give you full physical information, still need to assess the animal e.g. structural traits
- Allows faster genetic progress (but choose wisely in case you progress in wrong direction!)
- Selection often across an index rather than single trait

Genomics

- Challenge with genetics is need individual animal information to get high levels of accuracy, so need to wait a year or two for some traits such as 400 day weight
- Fertility can take decades
- Genomics can improve selection process once sample is collected – potentially in first week of life
- Thousands of genetic markers (SNPs) assessed from hair sample
- Very beneficial in stud selection process
- Requires a genomics herd/flock to maintain accuracy (phenotype/genotype)

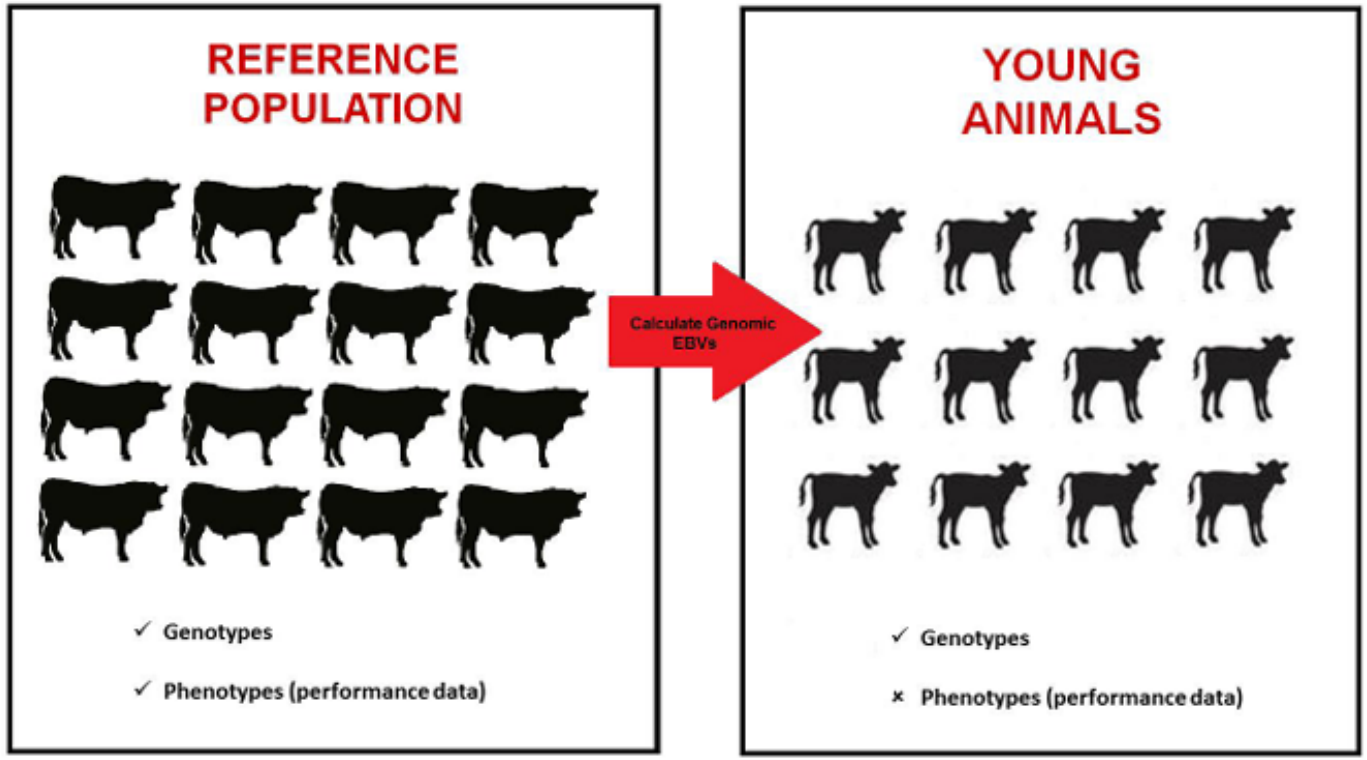

Figure 1. A reference population is critical to the implementation and ongoing success of genomic evaluations. The reference population consists of animals which have phenotypes (performance data for economically important traits) and genotypes available. The relationship between the genotypes and phenotypes of the reference population can be used to calculate genomic EBVs for young animals which have genotypes but do not have phenotypes (performance data).

http://sbts.une.edu.au/media/1069/genomicsintro.pdf

Example

- Bull sale

Mid March 2023 TransTasman Angus Cattle Evaluation												
	Calving Ease				Growth					Fertility		Temp.
	Calving Ease Dir	Calving Ease Dtrs	Gestation Length	Birth Weight	200 Day Growth	400 Day Weight	600 Day Weight	Mat Cow Weight	Milk	Days to Calving	Scrotal Size	Docility
EBV	-2.2	-2.3	-6.0	+5.9	+65	+117	+163	+166	+21	-6.2	+2.5	+11
Acc	67%	59%	74%	77%	76%	75%	75%	74%	69%	52%	73%	65%
Perc	83	90	30	85	4	3	1	1	22	13	33	89

	Carcase						Feed Efficiency	Structural			Selection Index	
	Carcase Weight	Eye Muscle Area	Rib Fat	Rump Fat	Retail Beef Yield	IMF	NFI-F	Claw Set	Foot Angle	Leg Angle	Angus Breeding Index	Angus Breeding Low Feed Cost Index
EBV	+97	+3.9	-0.4	-1.8	+0.2	+2.9	+0.36	+0.44	+0.82	+0.92	$216	$405
Acc	69%	68%	69%	69%	64%	70%	60%	69%	69%	69%	-	-
Perc	2	78	57	76	66	29	73	1	16	16	32	10

Traits Observed: BWT,200WT,400WT,600WT,SC,Scan(EMA,Rib,Rump,IMF),DOC,Genomics