GENERATION NEXT.

B+LNZ GENETICS – GENETICS MODULE

Sarah Powdrell

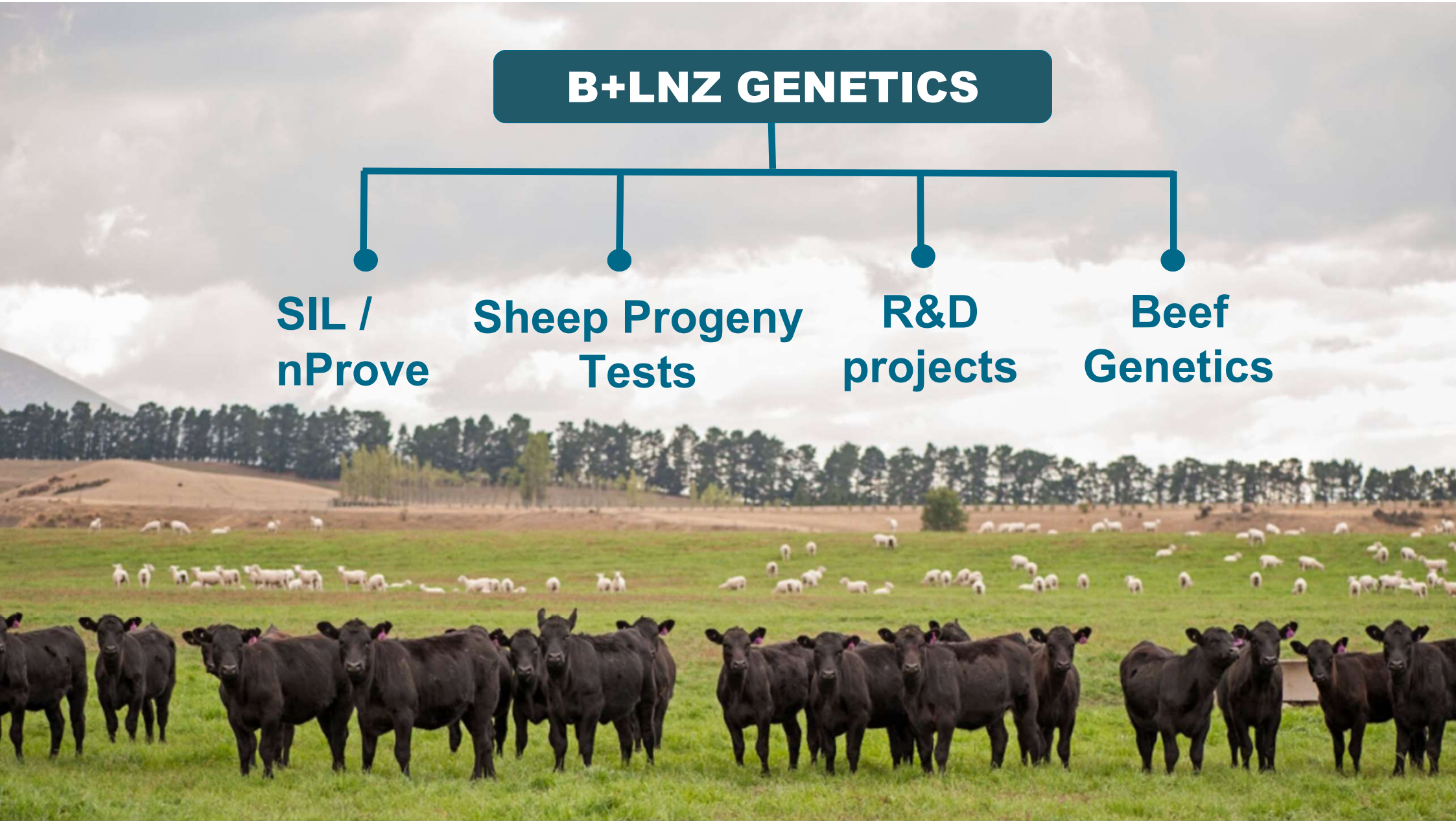
Genetics Operations Specialist – Sheep

History:

- Opoho Station, East Coast, Northern HB
- Sheep Breeding Coordinator – Innovis Breeding Sheep, Wales
- Breeding Programme Coordinator – Focus Genetics Australia

Paul Crick

- Farming an 850ha sheep, beef and deer farm in Gladstone, Wairarapa
- ARDG Romney stud breeder
- North Island CPT site
- National chair of B+LNZ's Farmer Council


B+LNZ GENETICS
SIL / nProve
Sheep Progeny Tests
R&D projects
Beef Genetics

Central Progeny Test (CPT) – HUB Sites

Create genetic linkages (or connections) across breeds that would not happen naturally in industry.

This allows connected rams to be objectively compared with each other regardless of breed.

CPT – HUB Sites

North Island – Wairarapa,
NI Hill Country
Paul Crick & Dayanne
Almeida

South Island – Otago,
SI Lowland/Rolling Hill

AgResearch Invermay

CPT – Next Generation Site

Low Input PT, Orari Gorge Geraldine

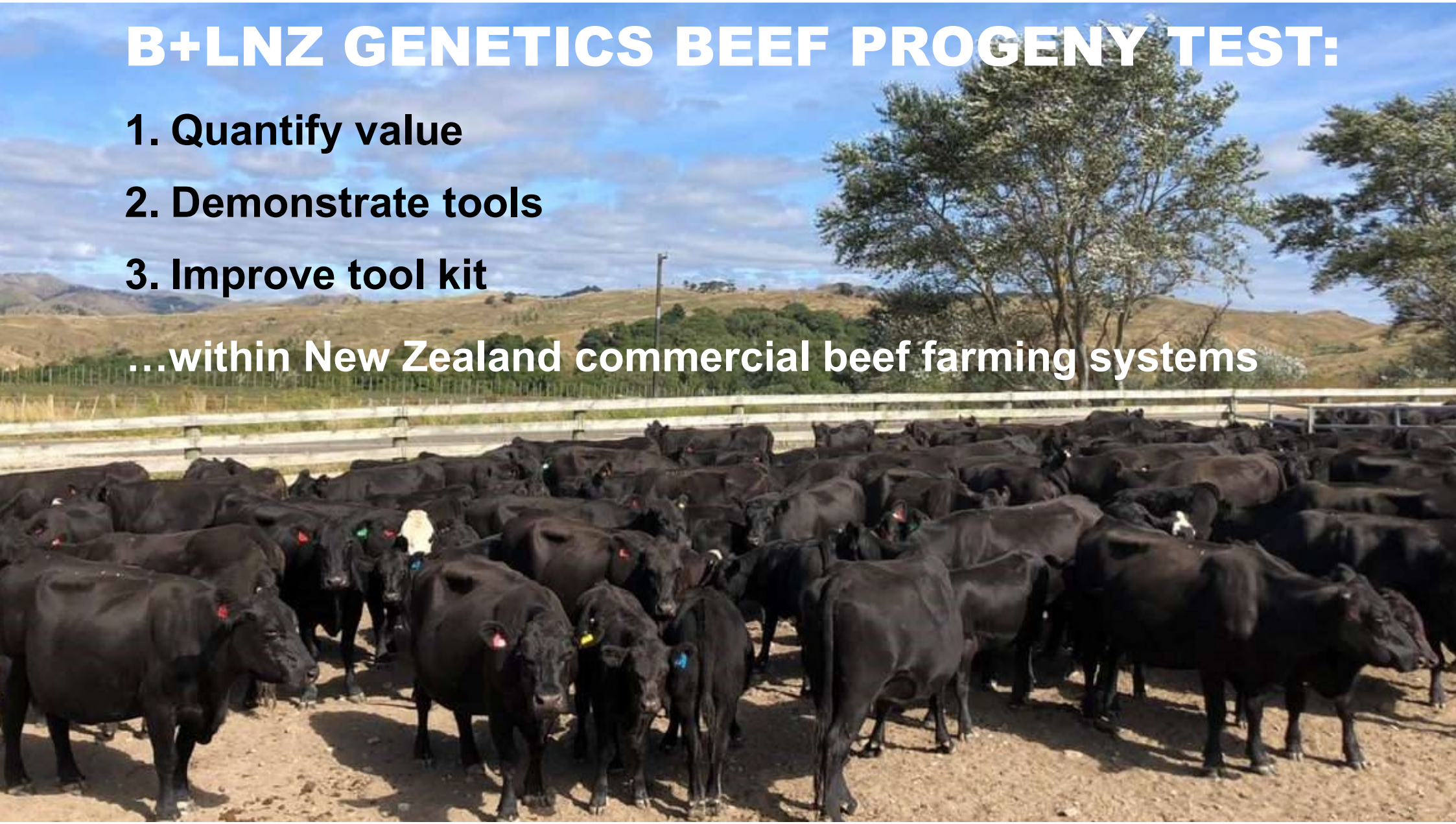
- MPI SFF co-funded project - Dec 2022
  - Ethically and sustainably produced high value lamb
- Minimal external inputs (e.g. drenches, treatments, and labour)
  - **Welfare** traits (tail traits, bareness)
  - More robust to **combat disease** (worm resistance, pneumonia)
  - **Environmentally efficient** (reduced methane emissions through feed efficiency)

nProve

Commercial farmer tool to find and compare ram breeders

Ram breeder tool to report from and load data for NZGE

Visit nprove.nz


B+LNZ GENETICS BEEF PROGENY TEST:
1. Quantify value
2. Demonstrate tools
3. Improve tool kit
…within New Zealand commercial beef farming systems

DAIRY BEEF PROGENY TEST

- 101 bulls tested between 2016 and 2019.

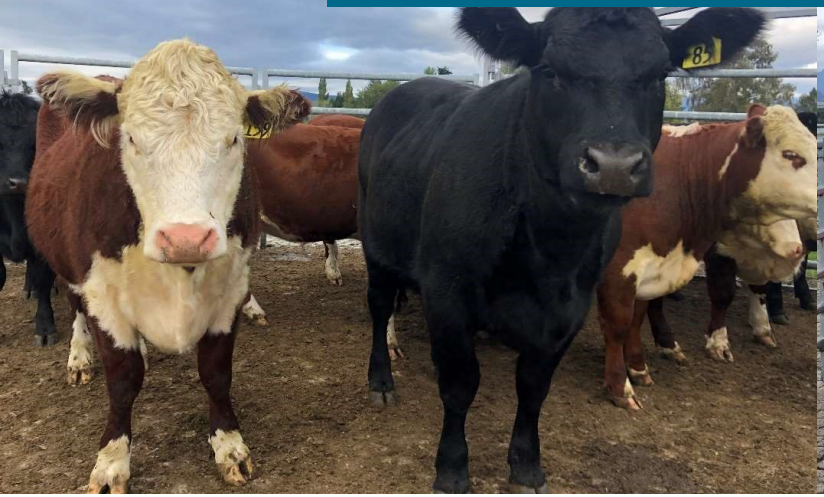
- Gestation length range of 13 days.
- 36-38kg birthweight range.
- No significant calving difficulty caused (>1%).
- 600-day weight range of 67kg.

- 97% cattle graded P2, with the remainder L2.
- Carcase weight, dressing out percentage and EMA greatly affected by sire.

AB6
SP AB7

INFORMING NEW ZEALAND BEEF

INZB is a future focused seven-year programme (2021–2027) designed to generate more income for beef producers and the economy while protecting the environment.



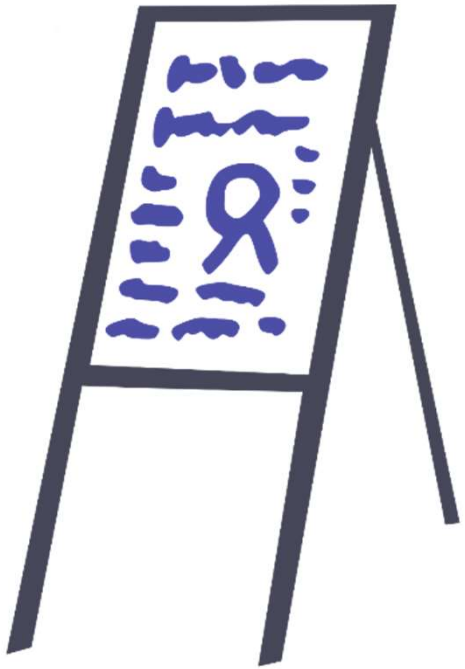
Slide 11

AB6 I plan on speeding through slides 3 - 5. Really we don't want to overload these girls/guys. Did you want to throw in a slide re the main sheep projects here? Actually probably sheep first then beef so it fits with the diagram in slide 2?
Anna Boyd, 3/08/2021

SP8 Done
Sarah Powdrell, 5/08/2021

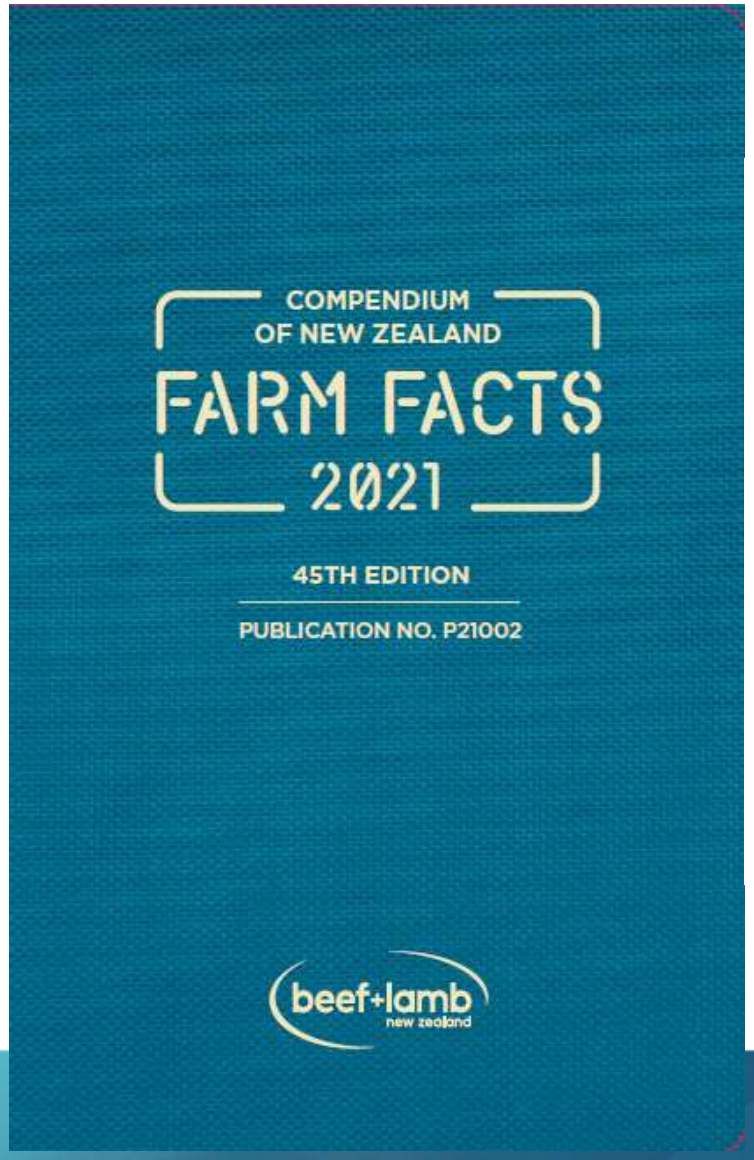
AB7 I was thinking: create awareness of B+LNZ Genetics and the projects. Genetics 101 (very high level) - so slides 8 - 22. But happy to take some of these out?
Anna Boyd, 3/08/2021

Exercise One:
Genetics Knowledge



Why Genetics?

- Makes and saves $$$$
- Cheap investment for potentially significant gain
- Enables efficiency, more with less
- New “technology”, every year - sustainability
- Permanent and cumulative



LIVESTOCK OVERVIEW

LIvestock numbers at 30 June (million)

	2010		2020		% CHANGE	
	No.	SU	No.	SU	No.	SU
Sheep	32.6	29.3	26.0	23.2	-20%	-21%
Beef Cattle	3.9	19.1	3.9	18.7	0%	-2%
Dairy Cattle	5.9	37.9	6.2	39.6	+5%	+4%
Deer	1.1	2.0	0.8	1.5	-27%	-25%
TOTAL STOCK UNITS[1]	-	**88.4**	-	**82.9**	-	**-6%**

1 Includes goats.

Source: Beef + Lamb New Zealand Economic Service, Statistics New Zealand

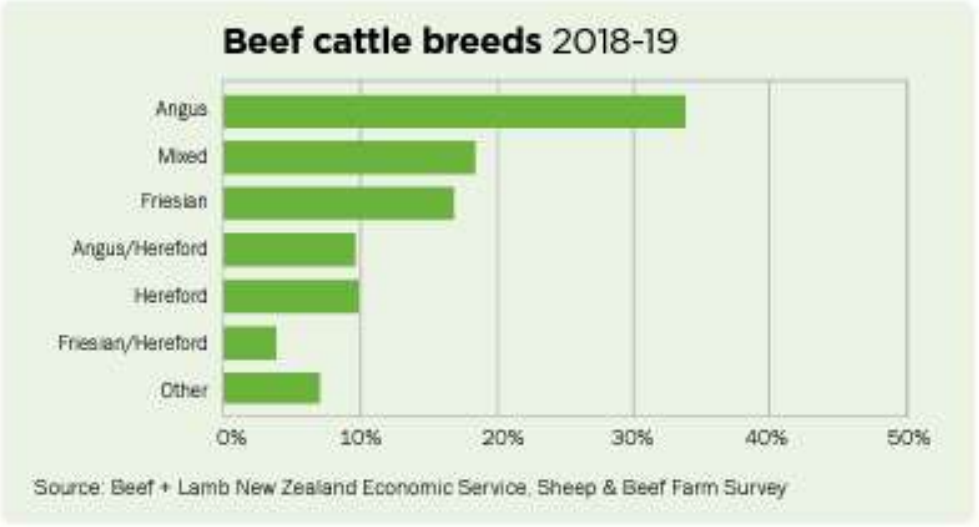
- 3.9 million
- 1.1 million beef breeding cows and heifers
- 68% in the North Is

- Angus the dominant breed, followed by mixed breed.
- Beef also produced from cull dairy cows, bobby calves and bull beef.

BEEF CATTLE

Beef cattle at 30 June 2020

Beef cattle numbers were 3.9 million at 30 June 2020 of which 1.1 million were beef breeding cows and heifers. 68% of total beef cattle were in the North Island. Few farmers devote themselves exclusively to beef production. In general, the raising and finishing of beef cattle is carried out in conjunction with sheep farming. In addition, beef is produced from cull dairy cows, bobby calves and raising young bulls to produce bull beef.

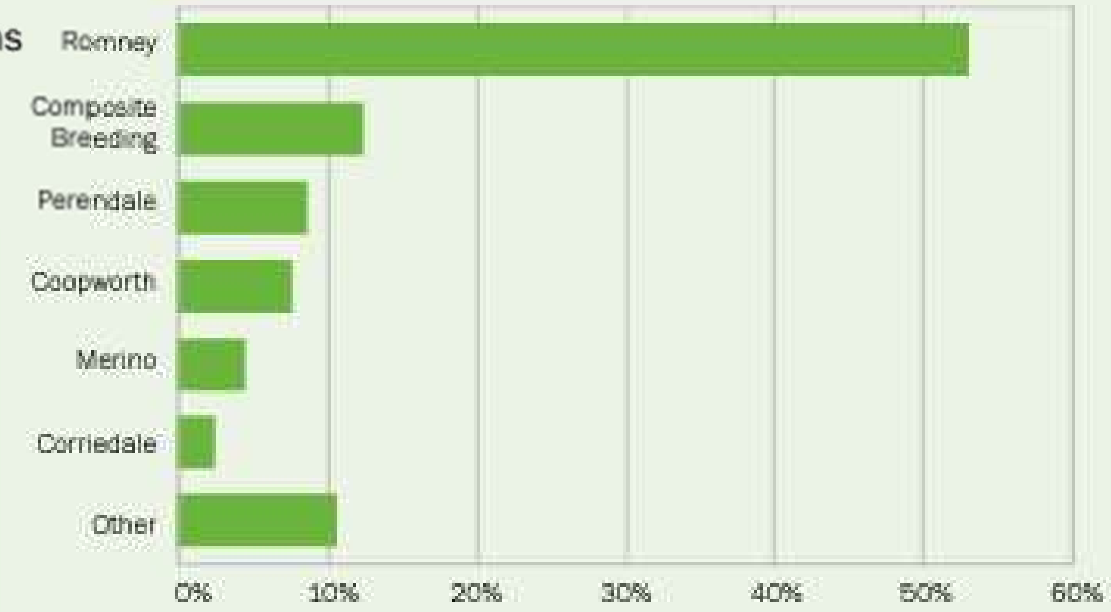


SHEEP

Sheep at 30 June 2020

16.6	million breeding ewes
9.5	million ewe hoggets, dry ewes, wethers and rams
26.0	million sheep
-20.1	% on 2010
-3.0	% on 2019

Sheep breeds 2018-19



Source: Beef + Lamb New Zealand Economic Service, Sheep & Beef Farm Survey

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In 30 years:

- 55% less sheep
- only 10% loss in production

Livestock productivity

	Unit	1990-91	2019-20p	Change
Lambing Performance	lambs/100 ewe	102	129	+27%
Lamb Weight	kg/head	13.9	19.0	+37%
Lamb Production	kg/ewe	9.8	21.5	+120%
Wool Production	kg/head	5.3	5.1	-4%
Steer Weight	kg/head	297	312	+5%
Milk Production	kgMS/cow	259[1]	385	+49%

1 Figure is from 1992-93.

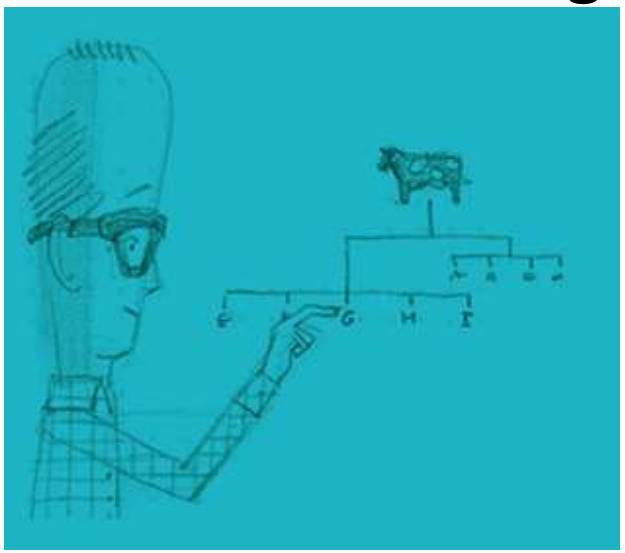
Source: Beef + Lamb New Zealand Economic Service, Livestock Improvement Corporation Ltd, DairyNZ

How have we achieved this?

How have we achieved this?

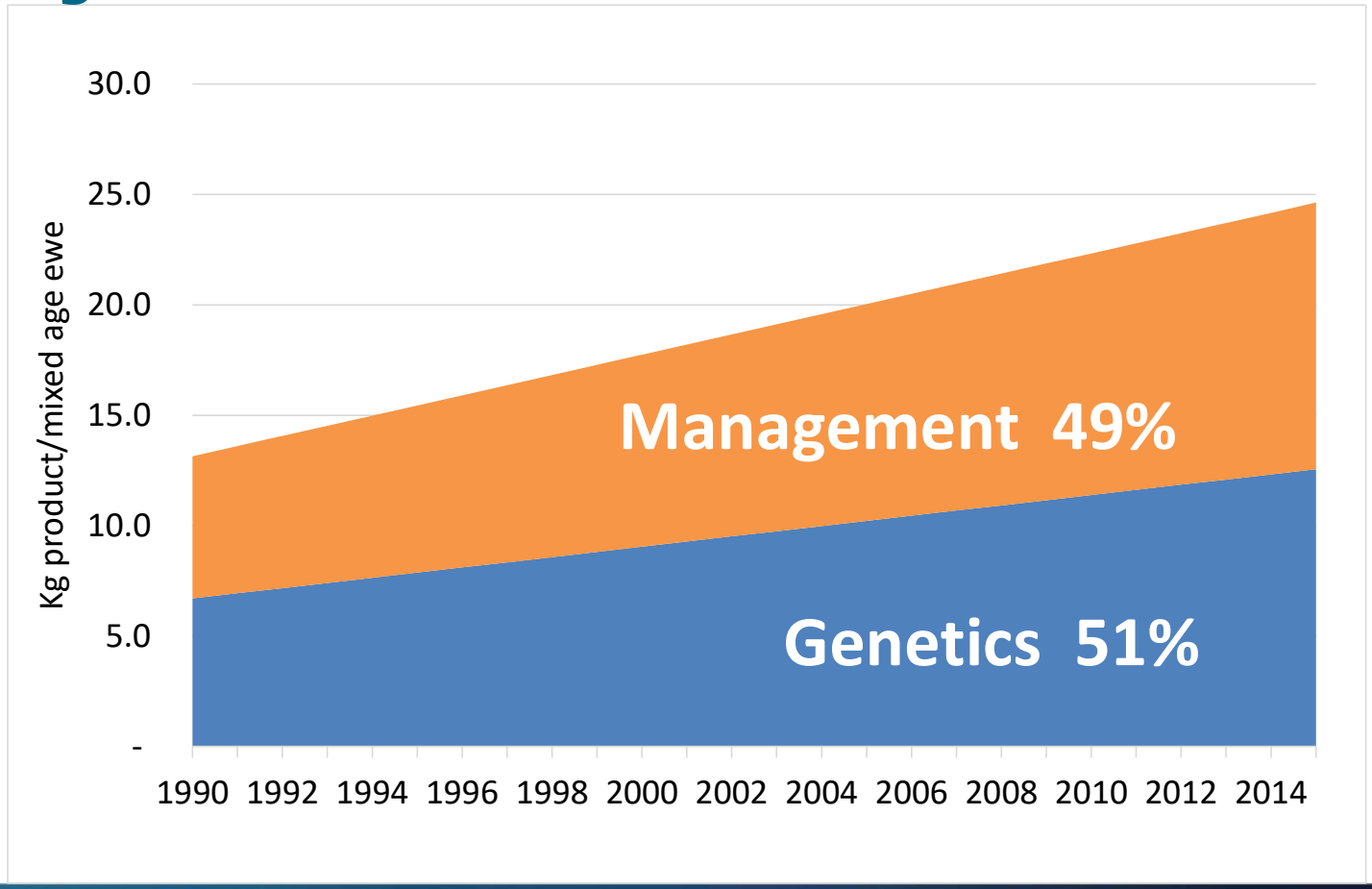
Feeding

Breeding



Productivity: Partitioned into genetics & management

G x E

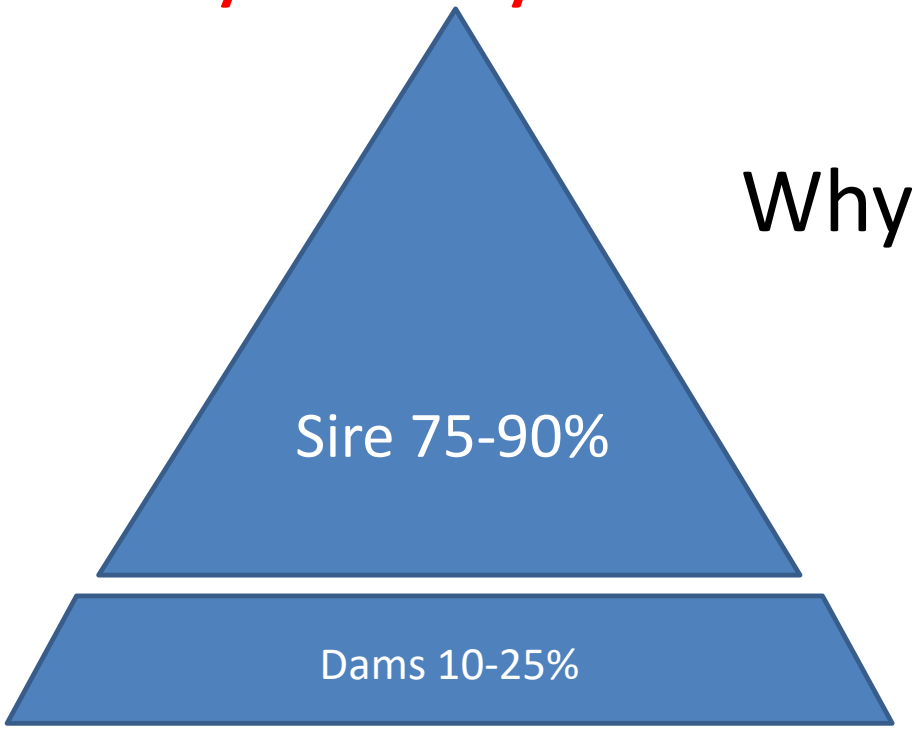


Source: AbacusBio MPI report 2016


“Sires are an investment in on-farm productivity and profitability - choose wisely”

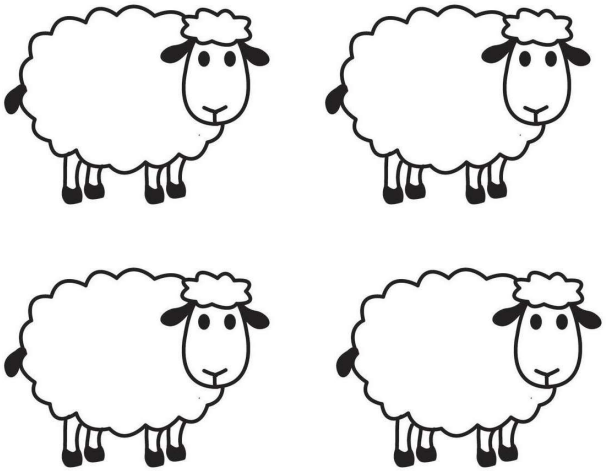
Impact of a sire

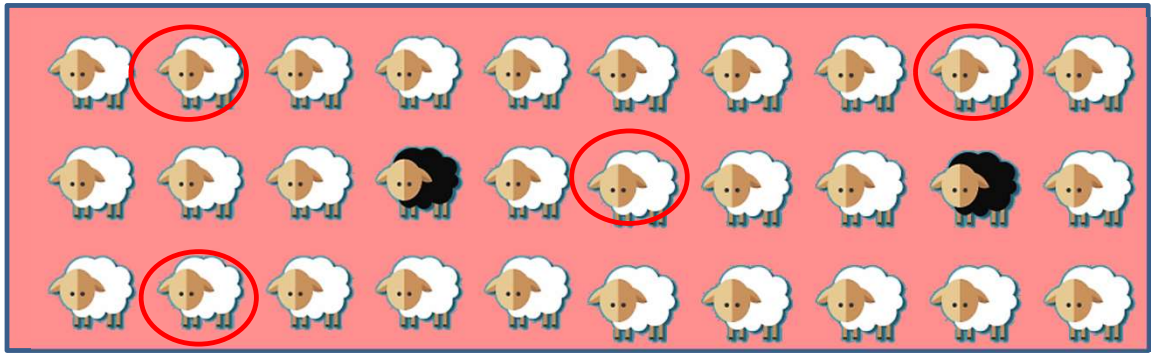
80% of your flock/herd's merit is determined by the sires you use



Why?

The Impact of a sire





The Impact of a sire

A single ram can have up to 10 years of influence on your flock's performance.

Break










Pearl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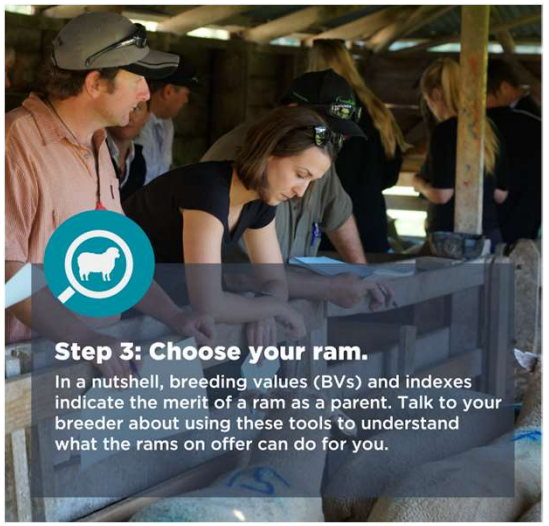
GENETICS

Better Sire Selection - Process

- Breeding objective
- Know your system's goals & constraints

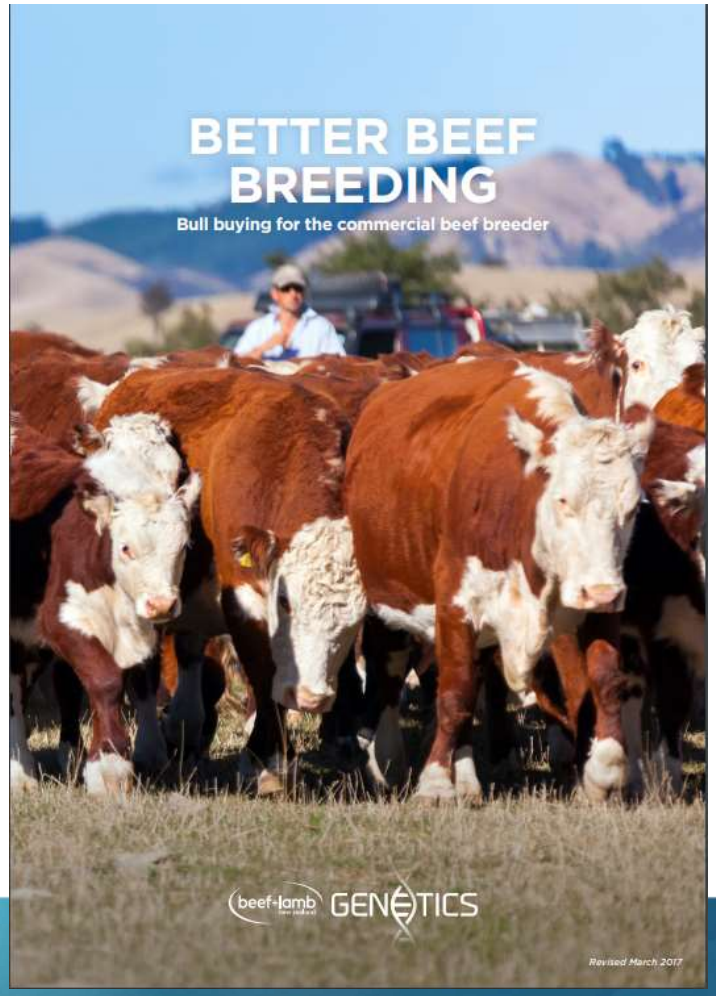
- nProve
- Breedplan
- Breeder conversation

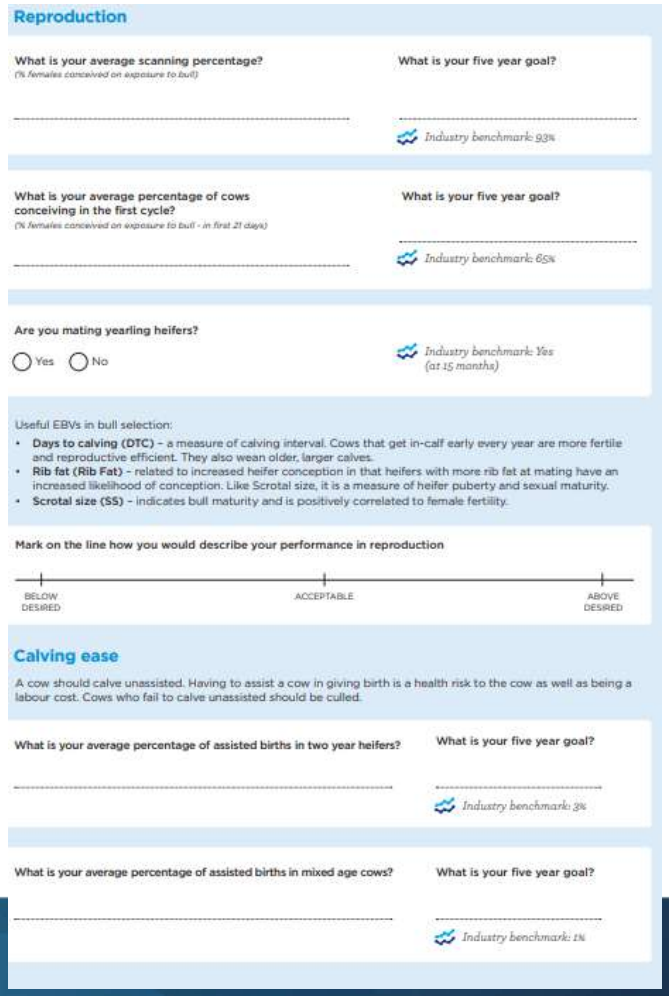


- Breeding values
- Indexes
- Structure

- Look after your sire and he'll look after you!

Better Beef Breeding Guide





Reproduction

What is your average scanning percentage?
(% females conceived on exposure to bull)

What is your five year goal?

Industry benchmark: 93%

What is your average percentage of cows conceiving in the first cycle?
(% females conceived on exposure to bull - in first 21 days)

What is your five year goal?

Industry benchmark: 65%

Are you mating yearling heifers?

◯ Yes ◯ No

Industry benchmark: Yes (at 15 months)

Useful EBVs in bull selection:

- **Days to calving (DTC)** – a measure of calving interval. Cows that get in-calf early every year are more fertile and reproductive efficient. They also wean older, larger calves.
- **Rib fat (Rib Fat)** – related to increased heifer conception in that heifers with more rib fat at mating have an increased likelihood of conception. Like Scrotal size, it is a measure of heifer puberty and sexual maturity.
- **Scrotal size (SS)** – indicates bull maturity and is positively correlated to female fertility.

Mark on the line how you would describe your performance in reproduction

BELOW DESIRED | ACCEPTABLE | ABOVE DESIRED

Calving ease

A cow should calve unassisted. Having to assist a cow in giving birth is a health risk to the cow as well as being a labour cost. Cows who fail to calve unassisted should be culled.

What is your average percentage of assisted births in two year heifers?

What is your five year goal?

Industry benchmark: 3%

What is your average percentage of assisted births in mixed age cows?

What is your five year goal?

Industry benchmark: 1%

- Reproduction (Fertility)
- Calving Ease
- Maternal
- Growth
- Carcase / Meat Quality
- Conformation

- Health
- Functional

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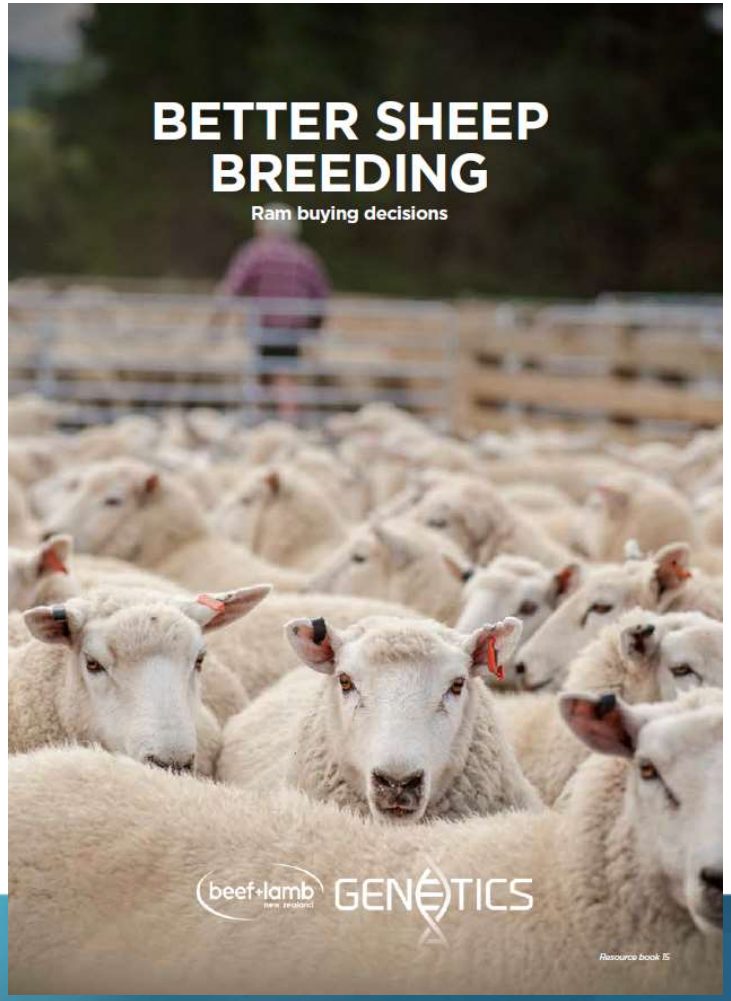
Better Sheep Breeding Guide



MAKE A GENETIC PLAN

Selecting maternal rams

		Now	Goal
Reproduction	What is your current scanning % (lambs present including triplets/ewe mated) *Benchmark 180% Easier, 165% Harder country*		
Survival	What % of lambs survive to weaning (wean %/scan %) *Benchmark 80% Easier, 80% Harder country*		
Growth	What % of your lambs do you finish to slaughter *Benchmark 100% Easier, 50% Harder country*		
	What is your average carcass weight *Benchmark 19 kg Easier, 17 kg Harder country*		
	What is your average dressing (carcass weight/kill weight = dressing%) *Benchmark 43% Easier, 43% Harder country* *- **note** this is different to meat yield considered elsewhere*		
	What is your average wean weight *Benchmark @ 90 days 30 kg Easier, 25 kg Harder country*		
	What % achieve kill weight at weaning *Benchmark 25% Easier, 10% Harder country*		
Adult size	What do your ewes weigh in prime (BCS=3) condition? *Benchmark 70 kg Easier, 65 kg Harder country—**note** lambs from bigger ewes can reach kill weights earlier but these ewes cost more to maintain over the year.*		
Wool	Is wool weight important for your flock?—***note** fine wool has different indexes than traditional strong wool. Ask your breeder if you have special requirements*		

Selecting terminal rams

		Now	Goal
Survival	What % of lambs survive to weaning (lambs present/ewe mated, wean %/scan % *Benchmark 90% Easier, 80% Harder country*		
Growth	What % of your lambs do you finish to slaughter *Benchmark 100% Easier, 70% Harder country*		
	What is your average carcass weight *Benchmark 19 kg Easier, 17 kg Harder country*		
	What is your average dressing (carcass weight/kill weight = dressing%) *Benchmark 43% Easier, 43% Harder country* *—**note** this is different to meat yield considered elsewhere*		
	What is your average wean weight *Benchmark @ 90 days: 30 kg Easier, 25 kg Harder country*		
	What % achieve kill weight at weaning *Benchmark 25% Easier, 10% Harder country*		
Meat	What % of your lambs qualify for a yield premium?		

Additional Traits:

- Meat
- Hogget Fertility
- Facial eczema
- WormFEC
- Resilience
- Dag
- BCS
- Bare points

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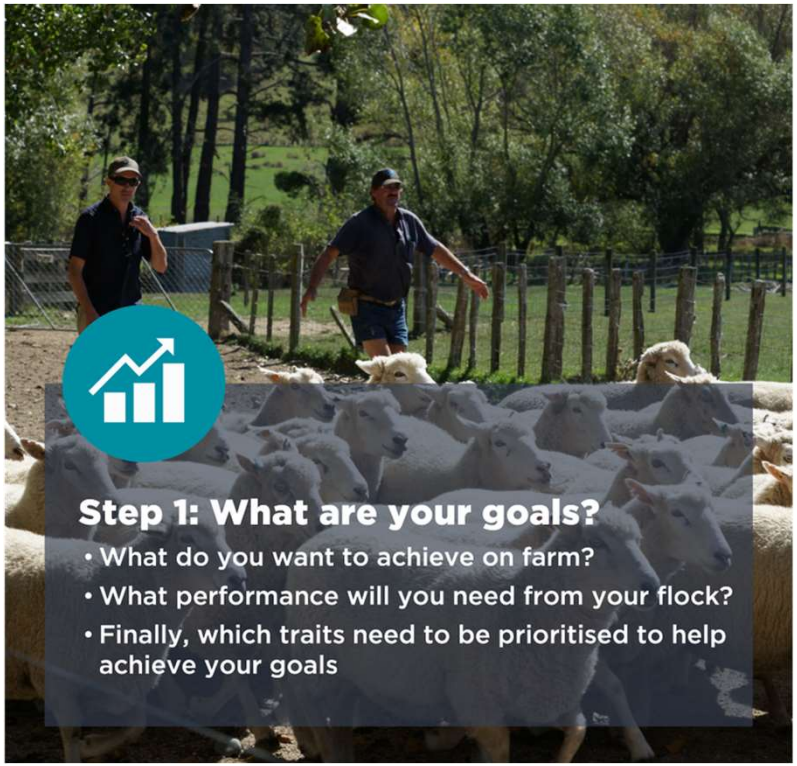
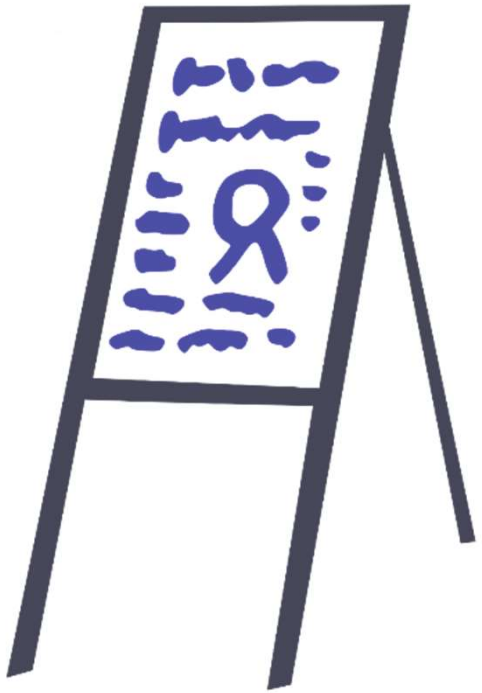
Your on farm goals

- **Everyone is different**
- **Your farming system is individual to you**
- **What makes you, costs you or saves you money?**

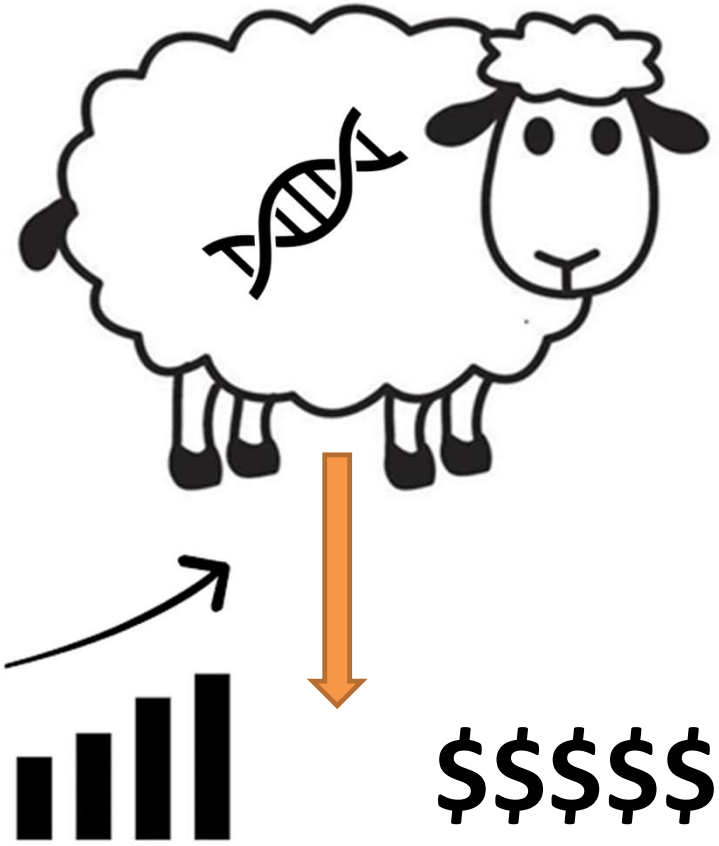
More lambs = more dags ?

Exercise Two:
How do you choose?



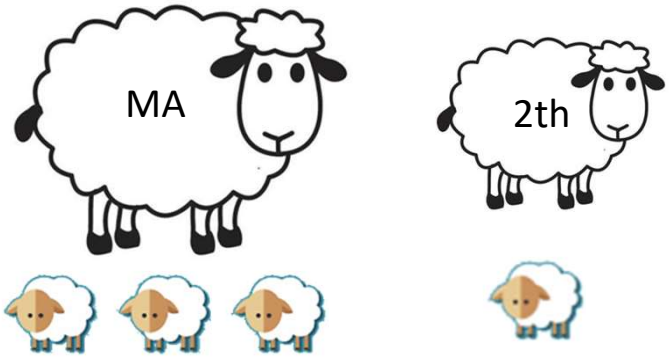


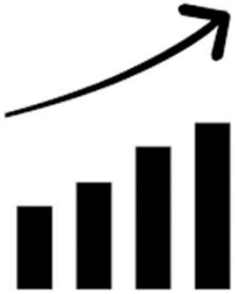
Unconscious bias



Unconscious bias

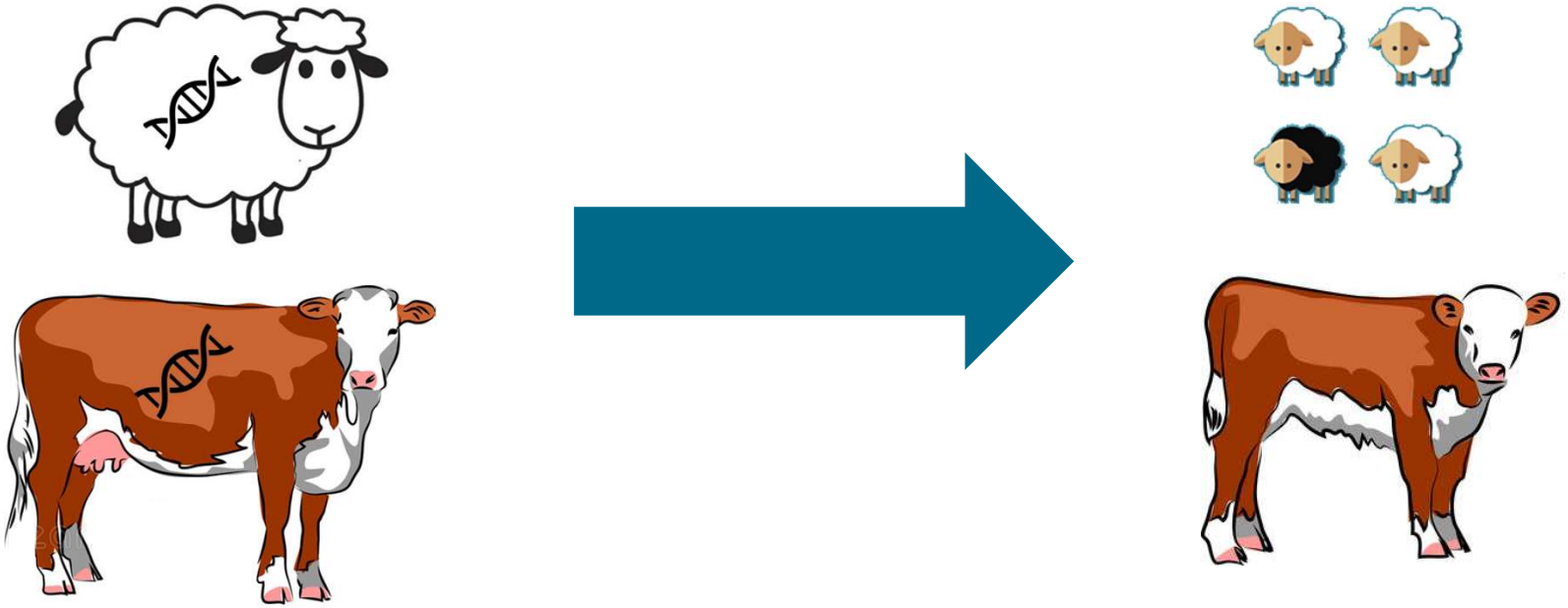
PERFORMANCE = GENETICS + ENVIRONMENT





Breeding Values

The best estimate of the animal's genetic merit, as a parent, for particular traits.

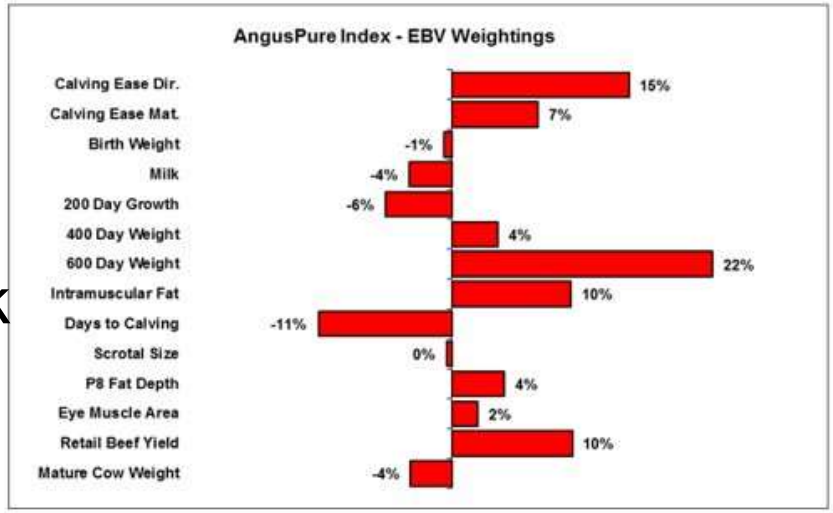


Estimated Breeding Values (EBVs)

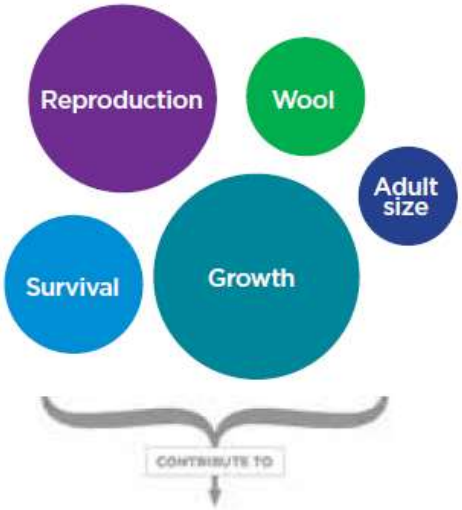
- An animal's genetic merit for each trait.
- Not possible to determine an animal's true breeding value, it is possible to estimate it.
- Some can be genomically enhanced (gBVs)
- Reported in the units which the measurements are taken in.
- A "good" value can be positive or negative depending on the trait.
- Takes in to account all information possible (unbiased)
- There are MANY!!! See SIL Terminology handout

Indexes

- Describes a different production/market scenario
- Relates to a typical commercial herd/flock
- Weighted
  - economic weight
    - The weighting is determined by what economic value **<u>one unit change</u>** of each breeding value would be
  - multiple EBVs contribute to the value
  - animals with the same index value may have different BVs for individual traits
- Balanced and simplified decision
- Sheep SIL/nProve indexes = **BIGGER IS BETTER**



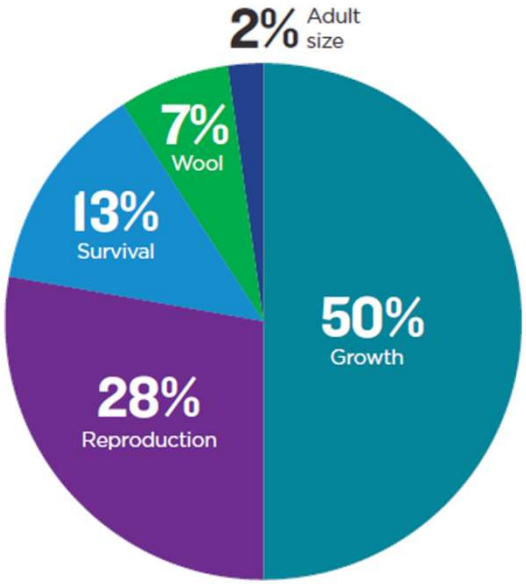
Maternal and Terminal Sheep Indexes

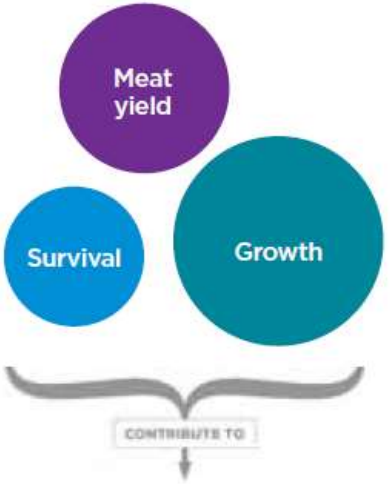


NZMW

B+LNZ GENETICS | MATERNAL WORTH

For NZ Maternal Worth, increased profit in response to selection based on these core indexes comes from:

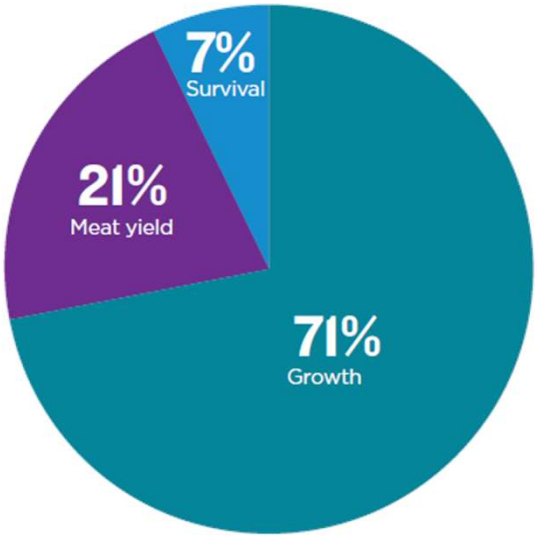




NZTW

B+LNZ GENETICS | TERMINAL WORTH

For NZ Terminal Worth, increased profit in response to selection based on these core indexes comes from:



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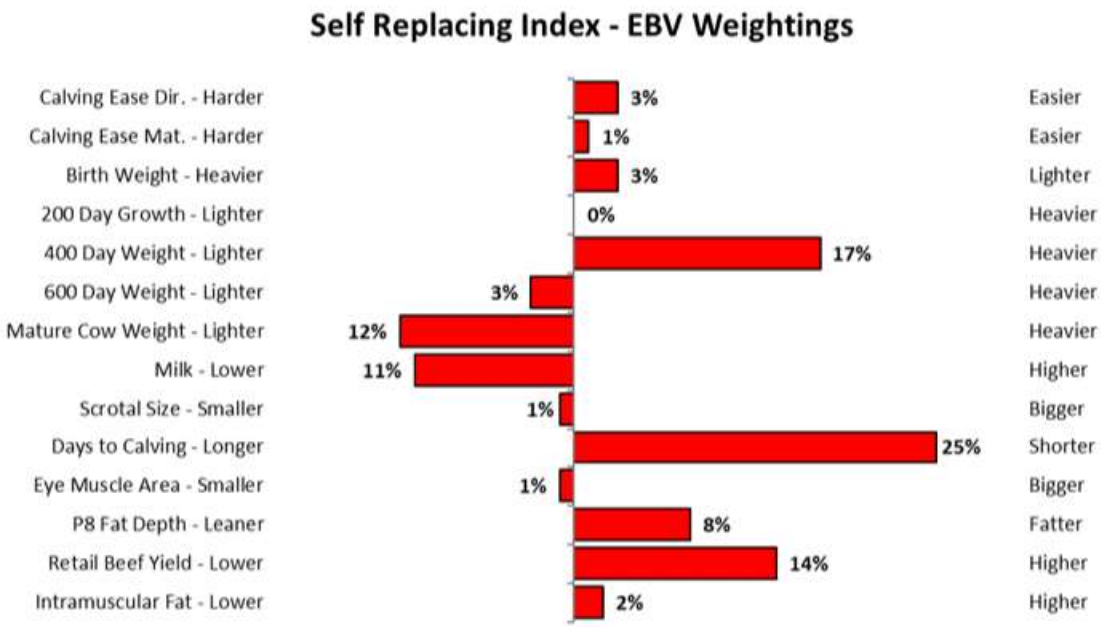
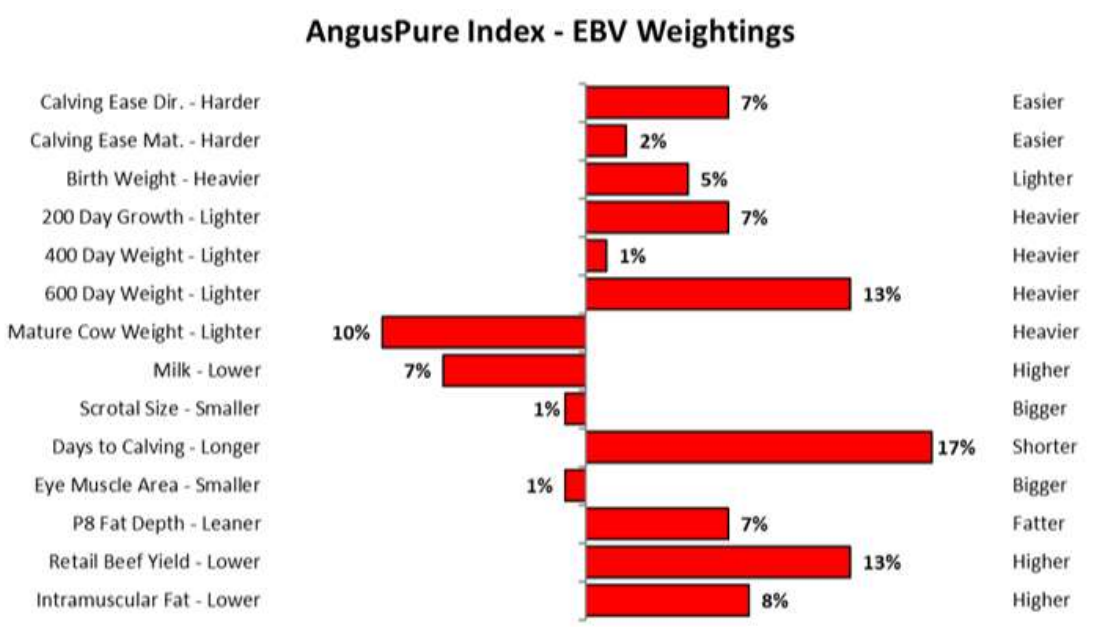
Self replacing (SRI) and Angus Pure (API) Cattle Indexes





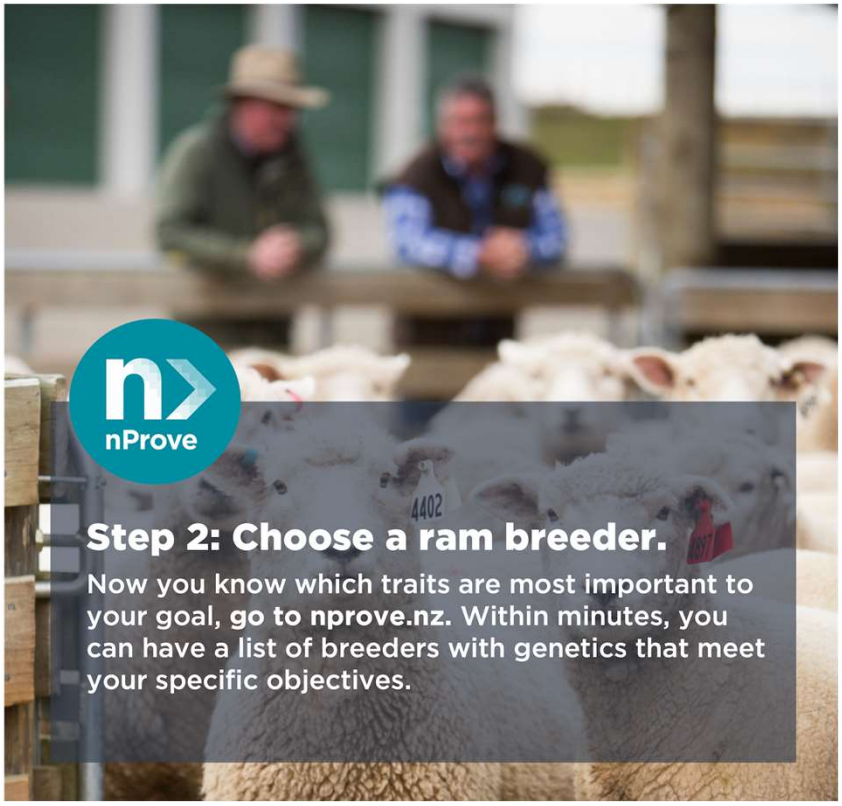
Using Indexes

- **It is important to use indexes as part of a selection strategy – alongside other tools such as BVs and visual assessment!!!**

1. Identify the Index of most relevance to you
2. Rank animals using the chosen index
   - Compare to Percentile Bands Table
3. Consider the BVs of importance
4. Consider other traits of importance

Lunch

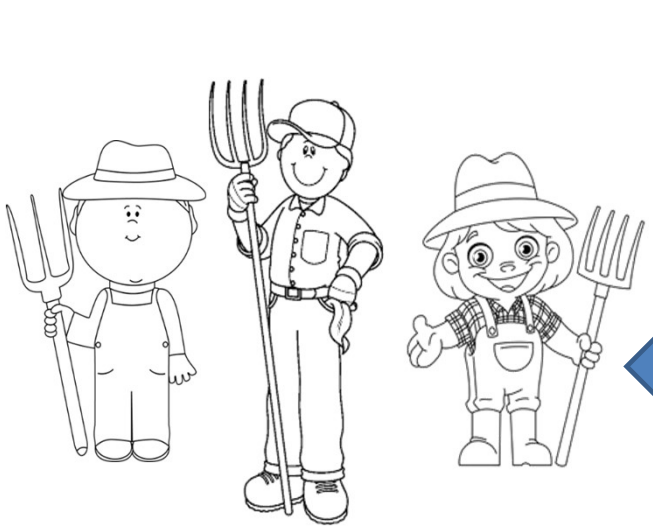
Finding the right breeder



nProve™

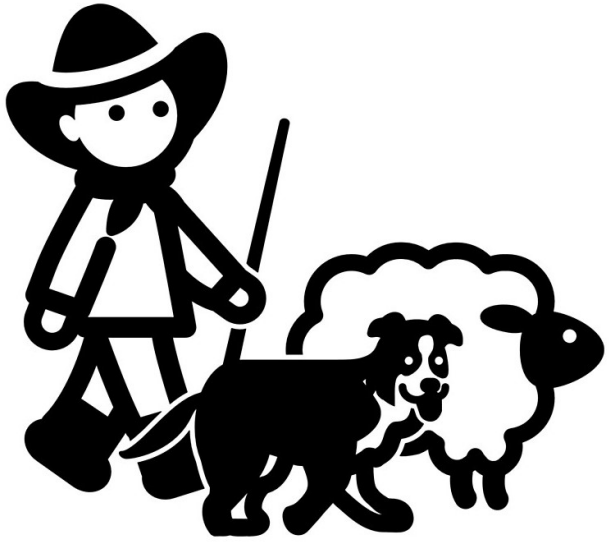
Who can help me achieve my goals?

Finding the right breeder



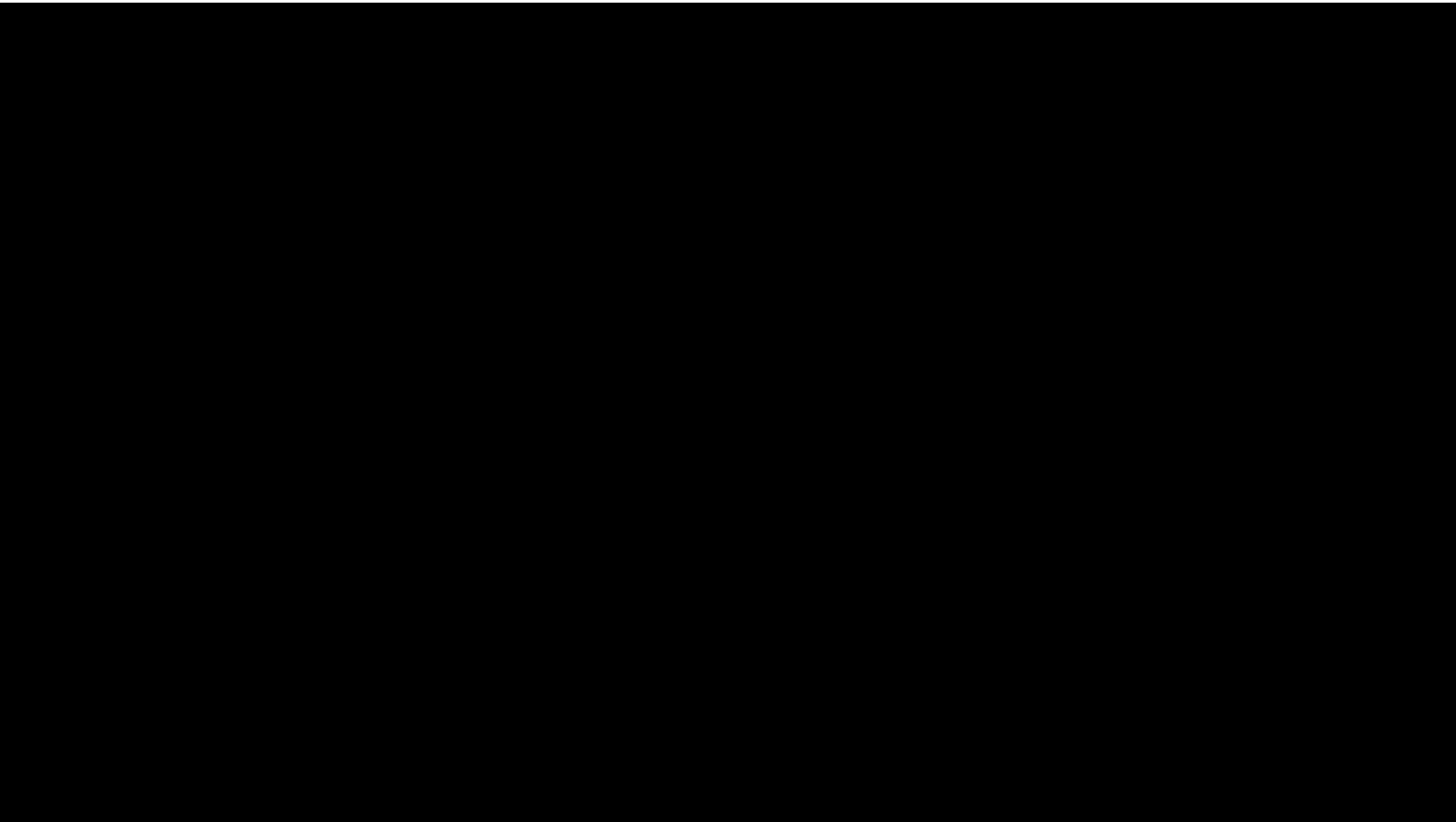
Commercial Farmer

nProve™



Breeder

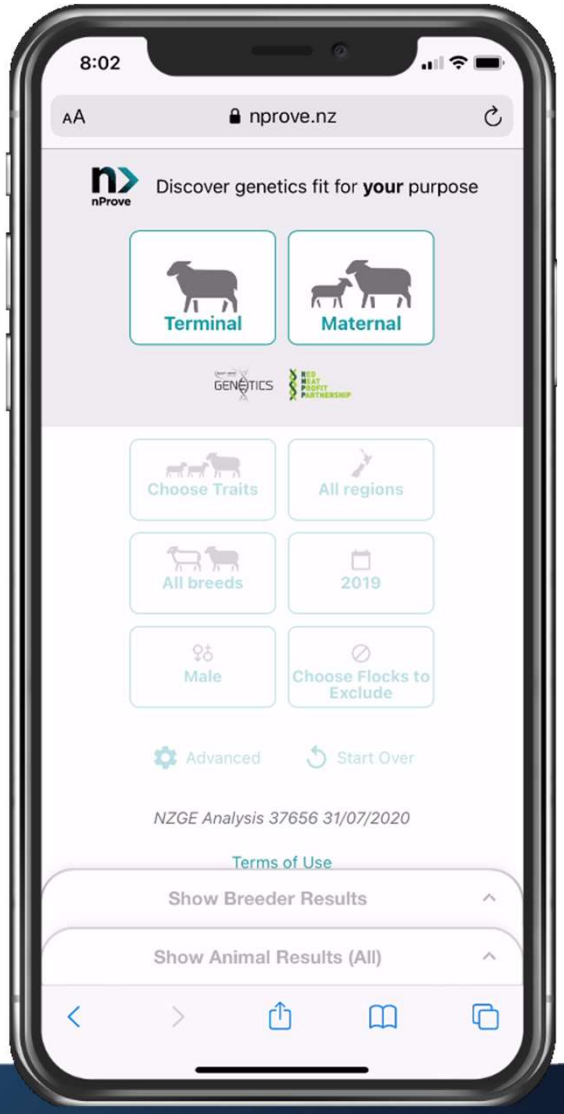
nProve helps you find the right fit for your objective



Finding the right breeder

nProve™

Visit nprove.nz



Scenario #1

- Terminal system
- North Island
- Good all rounder
- Chasing growth

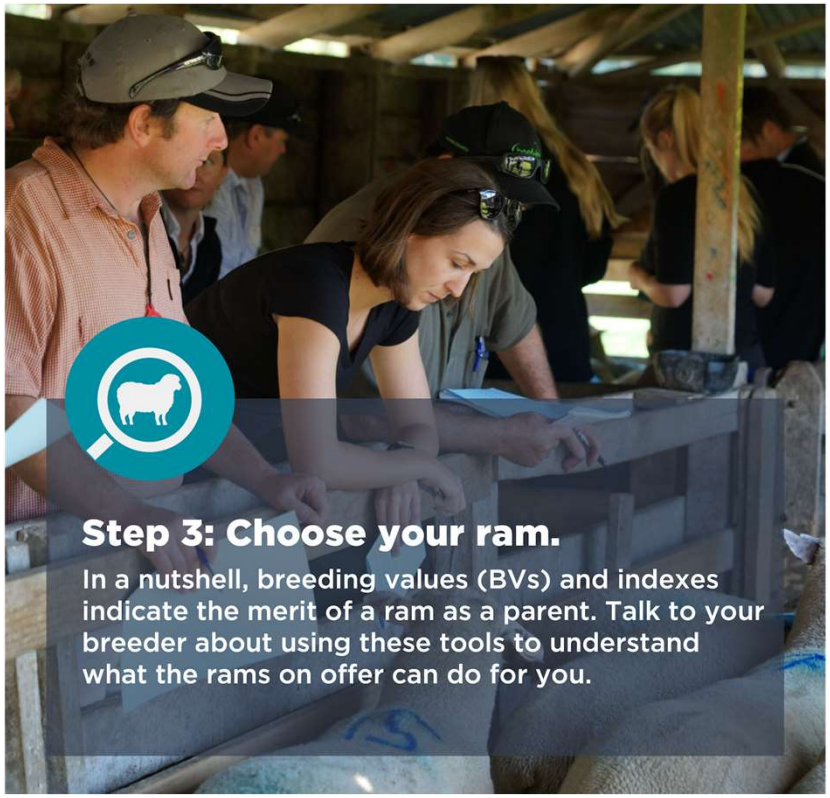
Scenario #2

- Self replacing system
- North Island
- Good all rounder
- FE is important
- Reducing wool

Questions to ask your breeder

- Share animals you found on nProve
- Genetic Trend Graphs
- Additional traits not on nProve
- How are animals structurally assessed prior to sale
- Animal health records

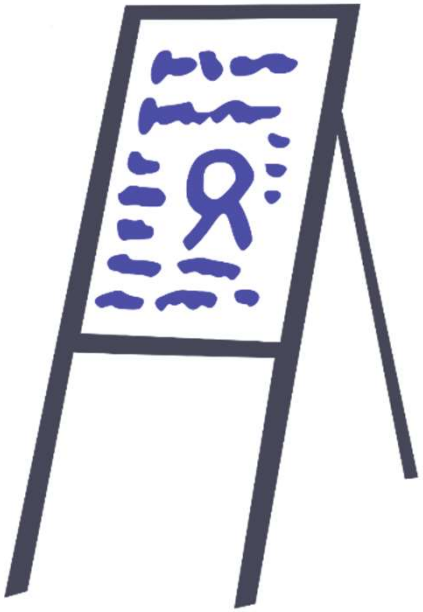
Questions to ask your breeder



SALES PROCESS

- Auction or Private selection
- Selection pecking order
- Purchase price ranges
- How do they price their sires
- Catalogue or sire lists available before sale
- **What information will be available to you on sale day**

Exercise Three:
Sale Day Information



1. Name an index and a BV listed in your catalogue.
2. Does it show percentile bands?
3. What is a question you would ask the breeder of this catalogue to clarify?

Catalogue #1

Lot: 1	530-20	**Sire:** D316-16	**Dam:** T869-18	**NLB:** 1	**Sire of Dam:** T774-16	
MW&F: 2776	**RK:** 73	**DPF:** 851	**RK:** 101	**DPG:** 1270	**RK:** 73	**NLB:** 0.134
Wool: Medium-Strong		**Quality:** 6		**Feet:** A		
Comment:			**Price:**	**Buyer:**		

Lot: 1A	133-20	**Sire:** D314-17	**Dam:** B113-16	**NLB:** 1212	**Sire of Dam:** Waimai 1235-13	
MW&F: 2847	**RK:** 52	**DPF:** 986	**RK:** 5	**DPG:** 1799	**RK:** 7	**NLB:** 0.097
Wool: Medium-Strong		**Quality:** 7		**Feet:** A+		
Comment: In Canterbury March-August. Dam's dam top ewe.			**Price:**	**Buyer:**		

Catalogue #2

LOT 58 | **FLOCK PREFIX:** | **ANIMAL ID** 90/20 | **BREED:** Southdown

SOUTHDOWN

VENDOR:

Sex:	Ram
Birth Date:	20/08/20
Dam NLBorn:	.122
Dam NLWeaned:	.122
Foot Score:	2,3
Scanned by:	Peter Clulee

SIL FLOCK:	**BREED FLOCK:**	**AUCTIONEER:**
4448	3144	Carrfields

SIRE: Willowhaugh 405/18
Willowhaugh 1/16
Willowhaugh 26/14

DAM: Willowhaugh 188/16
Willowhaugh 72/14
Willowhaugh 439/12

TRAITS	NLB	WWT 100 days	LWB 200 days	EMA 100 days	FATY (Yield)	FW12 Hogget	NZTW Index	NZMW Index
gBV		5.312	8.432	1.381	-0.428		1603	
Source		*Across Flock*	*Across Flock*	*Across Flock*	*Across Flock*		*Across Flock*	
% Band		20%	20%	20%	60%		30%	
Actual	2/2	39.5 kgs	58.5 kgs	19.7 cm²	3 mm	kgs		
Date (day/month)		22/11/20	19/02/21	19/02/21	19/02/21			

REMARKS: NZMW+M 2314. Sire WLH 405/18 was a member of winning Quality Meat Yield Class of two Rams & awarded Best Carcase Southdown at 2019 NZAG Show Christchurch.

PURCHASED: **PRICE:**

beef+lamb new zealand GENETICS

Catalogue #3

Lot 2

TAG#: 65/20 | **B/R:** 3/3 | **SIRE TAG:** 1241/15 | **DAM TAG:** 56/17 | **DAMS NLB:** 113

	*NZMW	*MW+M	*DPCR	*DPS	*DPG	*DPA	*DPM	*DPW	*DPF	WTYPE
INDEX	3113	3429	591	276	2060	-31	316	217	-250	F7
% RANK	10	10	15	70	15	15	60	30	90	

NOTES: | PURCHASER: | $

TAG#: 23/20 | **B/R:** 3/3 | **SIRE TAG:** 1241/15 | **DAM TAG:** 815/13 | **DAMS NLB:** 22223231

	*NZMW	*MW+M	*DPCR	*DPS	*DPG	*DPA	*DPM	*DPW	*DPF	WTYPE
INDEX	3093	3538	724	488	2283	-553	445	151	-179	M6
% RANK	10	10	10	45	10	55	45	50	80	

NOTES: Top Growth, dam has longevity | PURCHASER: | $

TAG#: 331/20 | **B/R:** 1/1 | **SIRE TAG:** 61/18 | **DAM TAG:** 543/18 | **DAMS NLB:** 1

	*NZMW	*MW+M	*DPCR	*DPS	*DPG	*DPA	*DPM	*DPW	*DPF	WTYPE
INDEX	2878	3032	752	741	1759	-485	154	112	172	F5+
% RANK	15	20	5	15	30	50	75	60	40	

NOTES: Top repro & Surv | PURCHASER: | $

NZGE Oct 2021 Averages for 2020 born rams	PERCENTILE	*NZMW	*MW+M	*DPCR	*DPS	*DPG	*DPA	*DPM	*DPW	*DPF
	50%	1920	2229	357	456	1305	-483	279	140	86

Catalogue #4

2020 Ram - Selection List

Report Flocks
Flock Prefix
Flock Owner

Period **2020**

Sire Id	Dam Id	Dam'sNLB	B/R	Animal Id	Index	Rank from 2660	NLB gBV	WWT gBV	LW8 gBV	FW12 gBV	EMAc gBV	WWT	LW6	EMA	EM/LW	FW12	LW12	Animal Id
600/17	498/14	122232	2/2	**2116/20**	1496	**774**	0.099	1.40	2.97	0.44	0.79	33	39	10.8	25%	3.9	54	**2116/20**
64/18	4134/13	22313322	2/1	**2121/20**	1942	**382**	0.170	1.25	3.23	0.03	-0.24	38	46	15.0	29%	3.5	51	**2121/20**
5080/19	6143/18	122	2/2	**2130/20**	2635	**89**	†0.123	†3.25	†6.68	†0.01	†1.25	37	50	16.0	29%	3.2	57	**2130/20**
5080/19	6143/18	122	2/2	**2131/20**	2880	**41**	†0.168	†4.32	†8.26	†-0.04	†0.37	39	49	16.4	30%	3.1	64	**2131/20**
5389/18	4312/15	222232	3/3	**2137/20**	2225	**227**	†0.210	†3.95	†7.15	†0.20	†0.30	36	48	15.0	28%	3.4	60	**2137/20**
5402/18	6718/15	122222	2/2	**2141/20**	2493	**135**	†0.128	†4.69	†7.09	†0.05	†0.24	45	52	14.4	25%	3.0	62	**2141/20**
4210/18	5597/15	133233	3/2	**2148/20**	1593	**674**	0.152	2.15	5.42	0.22	0.19	31	44	12.1	25%	3.5	59	**2148/20**

On Sale Day

- Be prepared
- Talk to your breeder
- Don’t be afraid to ask questions
- Structure is still important

After Sale Day

Look after your investment!

https://www.blnzgenetics.com/

- **Anna Boyd,** *Genetics Operations Specialist - Beef*
- Mob 027 201 9956
  Email anna.boyd@blnzgenetics.com

- **Sarah Powdrell,** *Genetics Operations Specialist - Sheep*
- Mob 027 457 0480
  Email sarah.powdrell@blnzgenetics.com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