MEAT & LIVESTOCK AUSTRALIA

meatup FORUM

For the latest in red meat R&D

Breeding Value Basics

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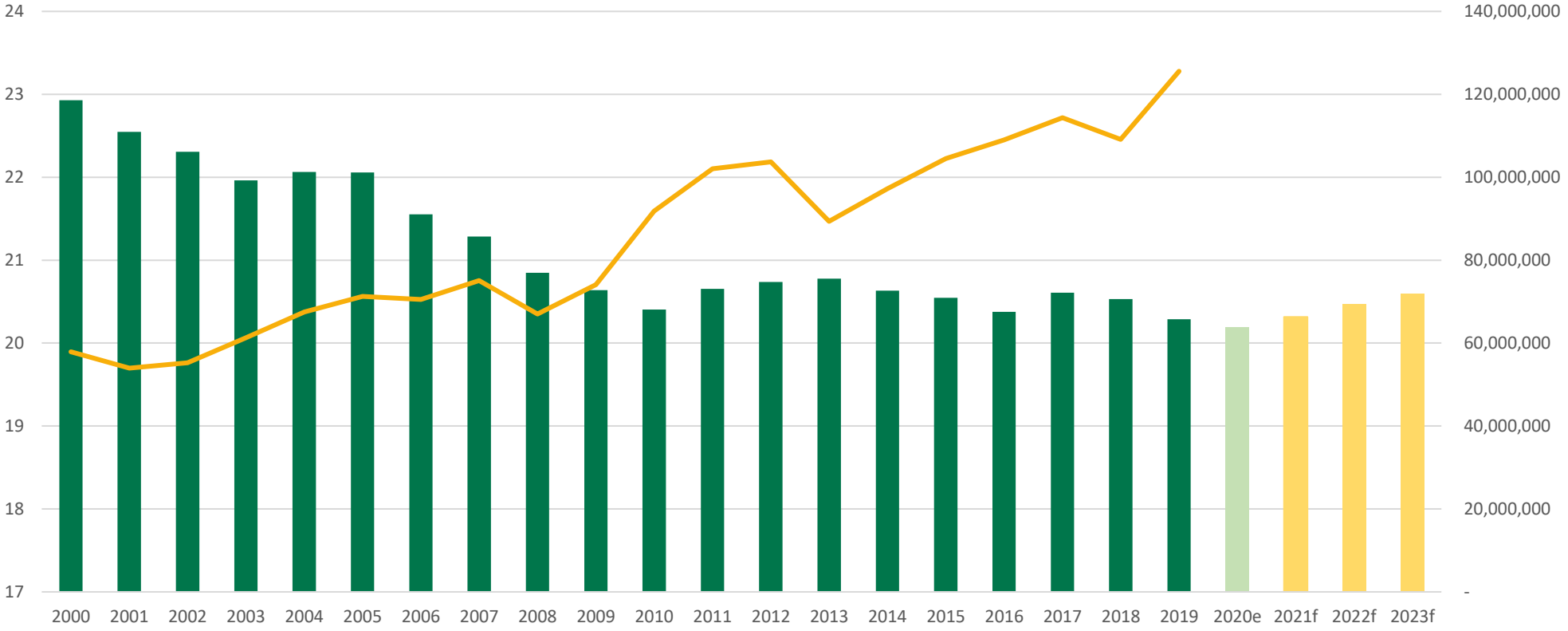
Meat & Livestock Australia

1. Why we have genetic evaluations



Genetic improvement is accumulative and permanent

1. Why we have genetic evaluations

We can make more accurate selection decisions if we know what impacts performance

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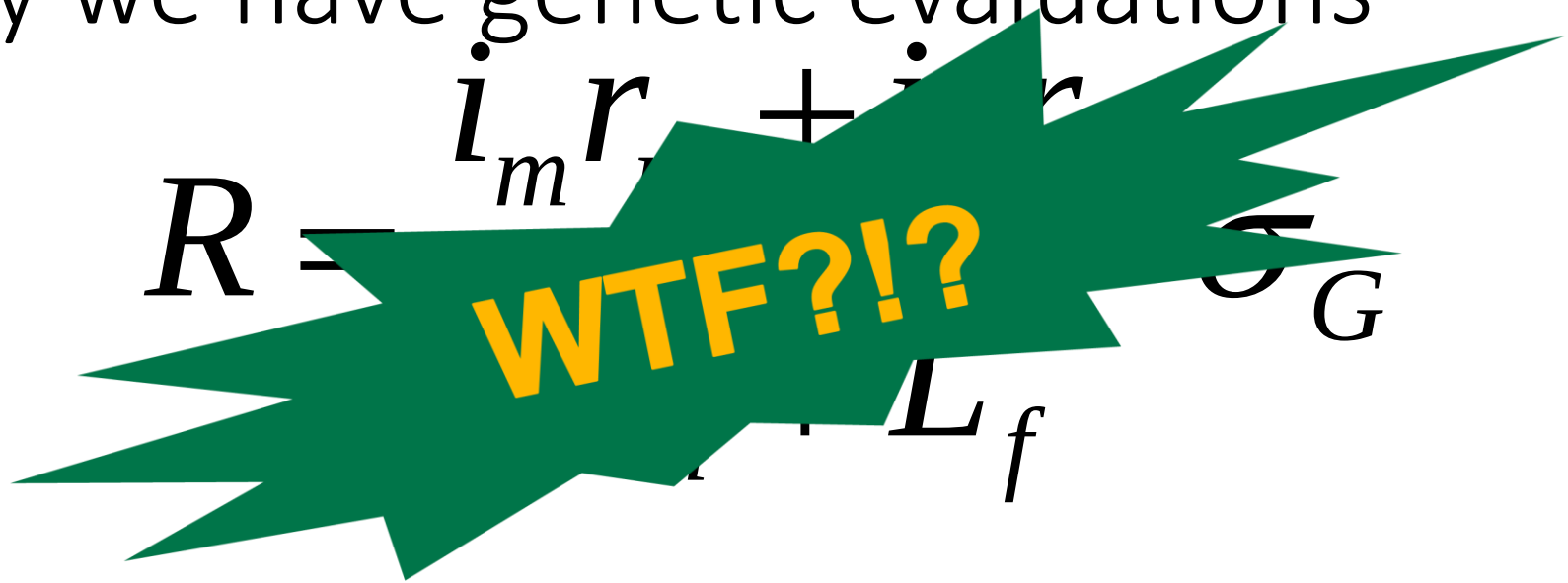
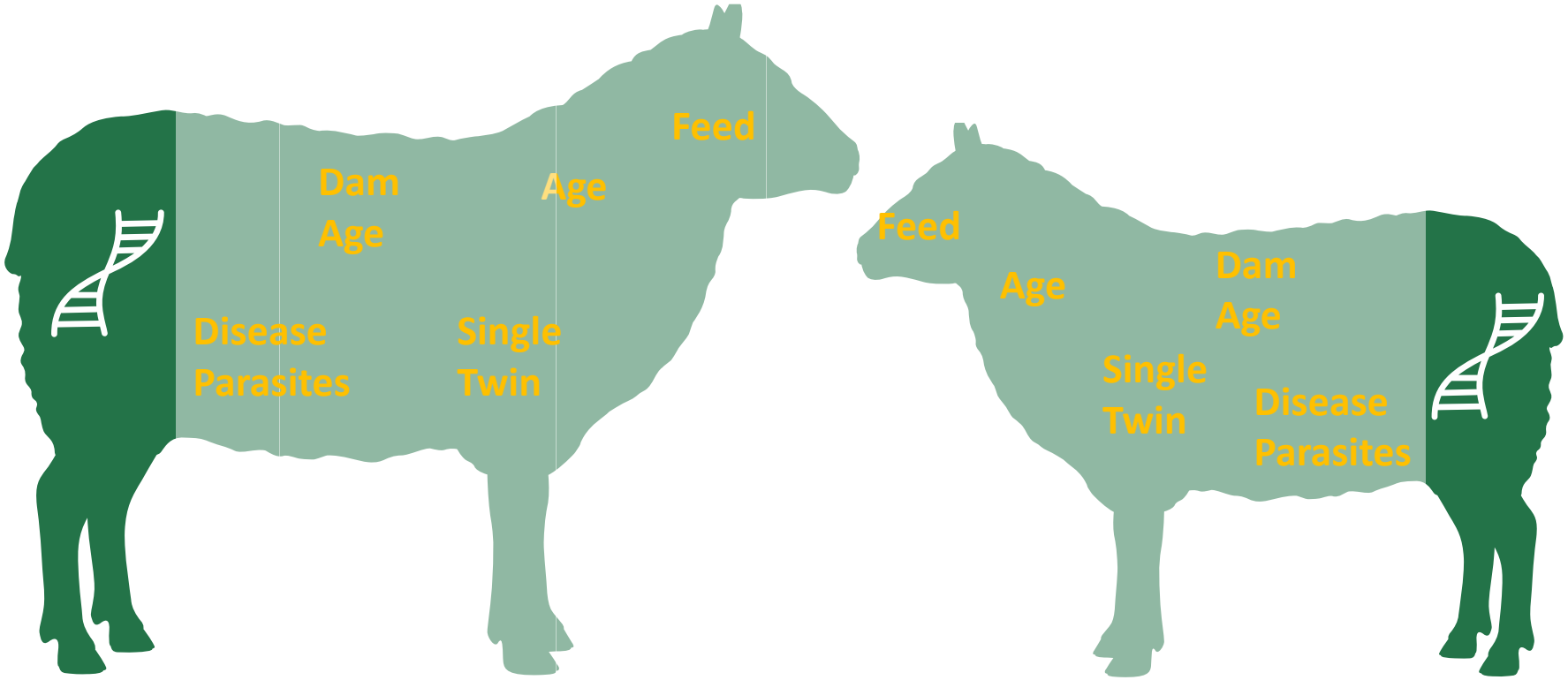


In English… $$Genetic\ Gain = \frac{Selection\ Accuracy \times Selection\ Intensity}{Generation\ Interval} Variation$$

The breeder's equation dictates how much progress we can make towards our breeding objective

1. Why we have genetic evaluations



We can make more accurate selection decisions if we know what impacts performance

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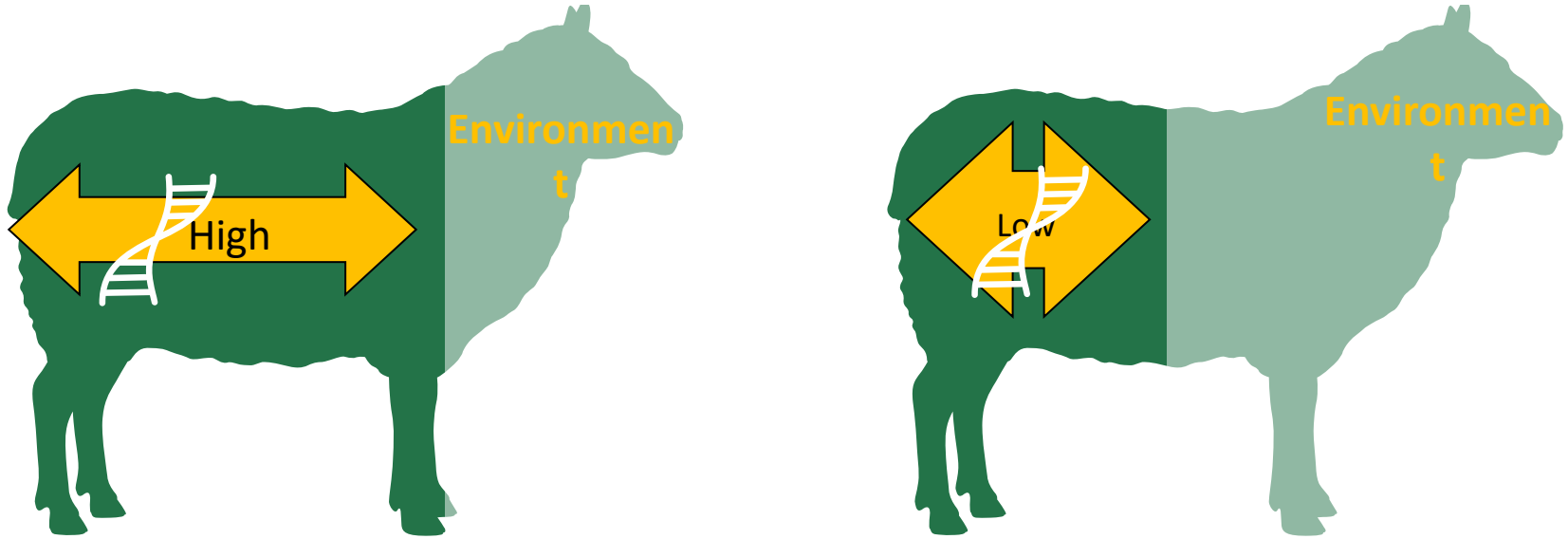
1. Why we have genetic evaluations

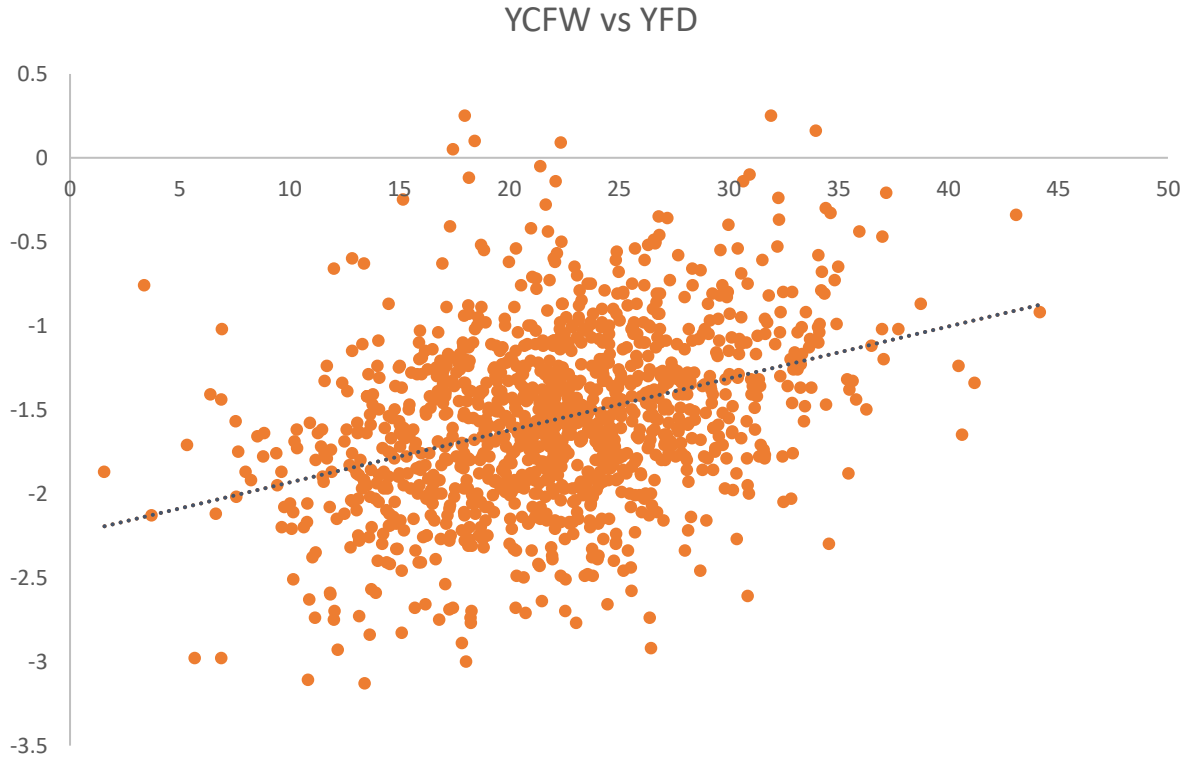
- Heritability is the proportion of phenotypic variance due to additive genetic effects (breeding value)
- The more heritable a trait
  - The more of the observed variation is due to breeding value rather than environmental effects
  - The more of parental superiority is passed on to progeny



We can make more accurate selection decisions if we know what impacts performance

1. Why we have genetic evaluations

Genetic correlation is an estimate of the additive genetic effect that is shared between traits.



The correlation between two traits

- Can tell you if they are likely to share the same genes
- Can tell you the impact of improving one trait on another

We can make more accurate selection decisions if we know what impacts performance

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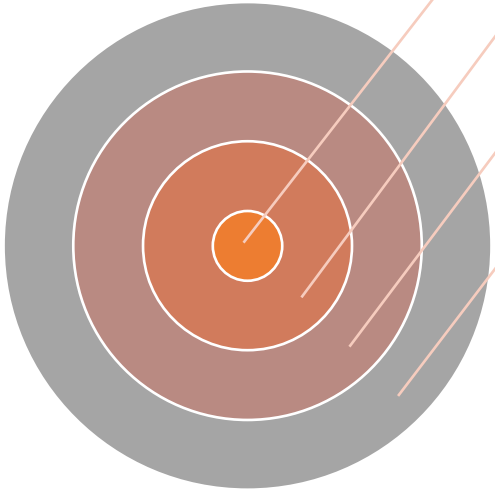
1. Why we have genetic evaluations



Across flock and drop (**EBVs**)

Within flock and within drop (**FBVs**)

Sire adjusted means

Raw data

No data

We can improve our decision accuracy by accounting for what impacts performance

1. Why we have genetic evaluations

- **Genetic improvement is accumulative and permanent**
- **The breeder's equation dictates our rate of progress**
- **We can improve our decision accuracy by accounting for what impacts performance**

2. Understanding breeding values

Growth traits

Live weight

Carcase & eating quality traits

Eye muscle & Fat depth

Intramuscular fat

Lean Meat Yield

Etc.

Wool traits

Fleece weight

Fibre diameter

Staple strength

Staple length

Etc.

Reproduction traits

Number of lambs Born

Number of lambs weaned

Health traits

Worm egg count

Breech wrinkle

Breeding Values are available for the major production and welfare traits

2. Understanding breeding values

Fertility

- Days to calving

Calving ease

- Calving ease daughters

Growth traits

- 400 day weight
- Mature cow weight

Carcase traits

- Carcase weight
- Intramuscular fat

Temperament

- Flight speed

Breeding Values are available for the major production and welfare traits

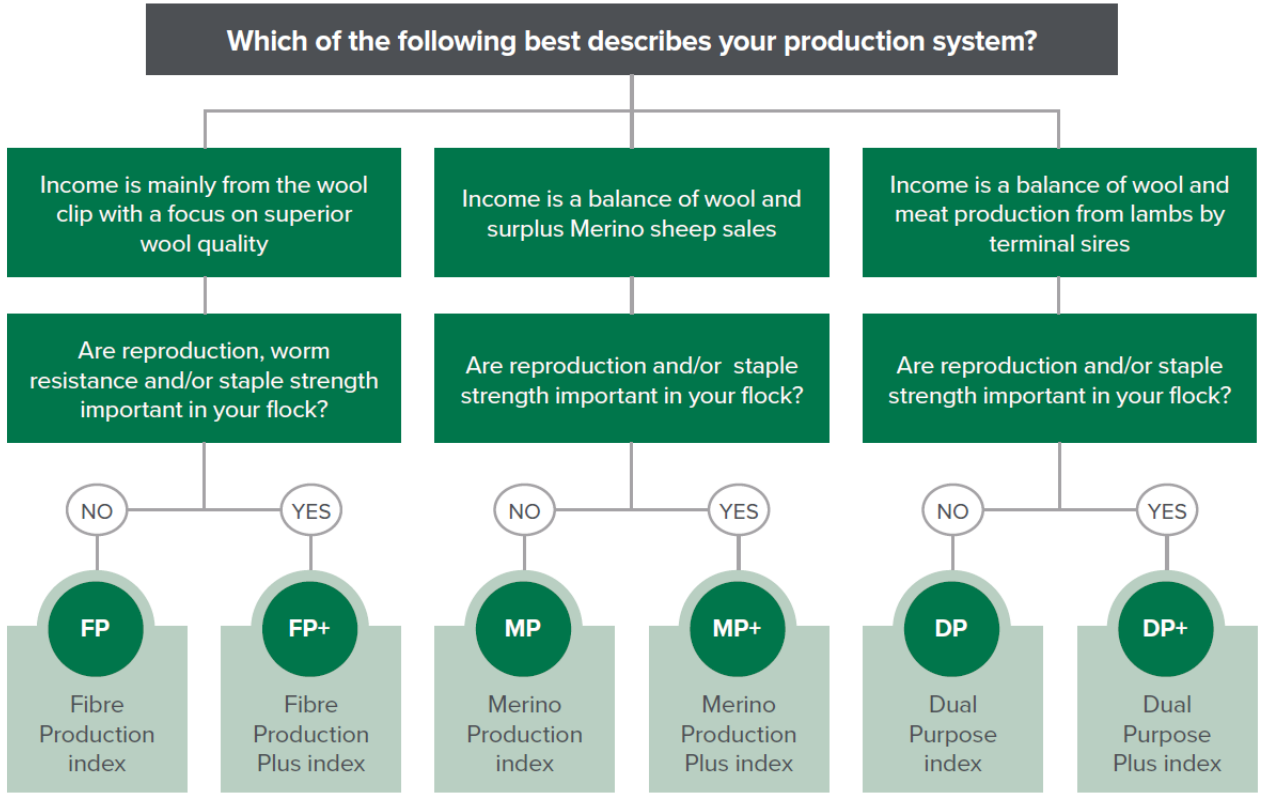
2. Understanding breeding values

1. Based around 0
2. Compare against today's average
3. Move the same way as the trait
4. Accuracy reflects the info used

October 2020 Brahman BREEDPLAN																		
	Gestation Length (days)	Birth Wt. (kg)	200 Day Wt (kg)	400 Day Wt (kg)	600 Day Wt (kg)	Mat Cow Wt (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF (%)	Percent Normal Sperm (%)	Flight Time (secs)	Shear Force (kgs)
EBV	+1.2	+5.5	+34	+44	+60	+71	-3	+1.1	+7.7	+34	+3.0	-1.2	-1.3	+1.2	-0.2	-	+0.03	-0.10
Acc	47%	61%	68%	65%	75%	66%	30%	69%	33%	56%	40%	38%	49%	30%	35%	-	50%	41%
Breed Avg. EBVs for 2018 Born Calves Click for Percentiles																		
EBV	-0.2	+2.6	+19	+27	+37	+41	-2	+0.8	-1.1	+22	+2.6	-0.4	-0.5	+0.6	-0.1	+0.0	+0.00	+0.02

Breeding Values provide a way to benchmark animals and estimate genetic merit

2. Understanding breeding values



Breeding Values provide a way to benchmark animals and estimate genetic merit

2. Understanding breeding values

Animals born in 2019

Band	Yfd u	Ycfw %	Yfdcv %	Ysl mm	Yss Nktex	NLW %	Ysc cm	Ywec %	Pwt kg	Ywt kg	Yfat mm	Yemd mm	DP+	MP+	FP+
0	-6.0	49.3	-4.4	31.9	11.6	23	6.5	-89	14.6	17.7	2.9	4.8	236.9	226.6	208.8
1	-3.3	36.2	-2.6	21.9	6.6	15	4.9	-71	9.7	12.5	2.0	3.0	200.0	193.2	175.6
2	-2.9	34.1	-2.4	20.5	5.8	14	4.6	-68	9.1	11.8	1.8	2.8	193.9	188.1	171.3
3	-2.7	32.7	-2.2	19.5	5.3	13	4.4	-63	8.6	11.3	1.6	2.6	190.0	184.6	168.6
4	-2.6	31.7	-2.1	18.7	5.0	12	4.3	-58	8.3	11.0	1.5	2.5	187.3	182.1	166.5
5	-2.5	30.9	-2.0	18.0	4.7	11	4.2	-56	8.1	10.7	1.4	2.4	184.9	180.0	164.8
10	-2.2	28.1	-1.8	15.8	3.7	9	3.7	-46	7.1	9.7	1.2	2.0	177.1	173.4	158.8
15	-1.9	26.1	-1.6	14.3	3.1	8	3.3	-40	6.5	8.9	1.0	1.8	171.9	168.9	154.9
20	-1.8	24.6	-1.5	13.2	2.6	6	3.1	-35	6.0	8.4	0.9	1.5	168.0	165.3	152.1
25	-1.6	23.2	-1.3	12.2	2.2	5	2.9	-31	5.6	7.8	0.7	1.3	164.8	162.2	149.7
30	-1.5	22.1	-1.2	11.4	1.8	5	2.7	-27	5.2	7.4	0.6	1.2	162.0	159.4	147.5
35	-1.4	20.9	-1.1	10.6	1.5	4	2.5	-23	4.9	7.0	0.5	1.0	159.4	156.9	145.5
40	-1.2	19.8	-1.0	9.9	1.2	3	2.3	-20	4.6	6.6	0.4	0.8	157.0	154.5	143.5
45	-1.1	18.7	-0.9	9.2	0.8	3	2.1	-17	4.3	6.2	0.3	0.7	154.6	152.1	141.7
50	-1.0	17.7	-0.8	8.5	0.5	2	2.0	-13	3.9	5.8	0.2	0.5	152.2	149.8	139.8
55	-0.9	16.6	-0.7	7.8	0.2	1	1.8	-10	3.6	5.4	0.1	0.4	149.9	147.4	138.0
60	-0.8	15.5	-0.6	7.1	-0.1	1	1.6	-6	3.3	5.0	0.0	0.3	147.5	145.0	136.0
65	-0.7	14.4	-0.5	6.4	-0.4	0	1.5	-4	3.0	4.6	-0.1	0.1	145.2	142.5	133.9
70	-0.6	13.2	-0.4	5.5	-0.7	-1	1.3	-1	2.6	4.2	-0.2	0.0	142.7	140.0	131.5
75	-0.5	11.9	-0.2	4.6	-1.1	-2	1.1	3	2.2	3.7	-0.3	-0.2	139.9	137.1	128.9
80	-0.3	10.4	-0.1	3.5	-1.5	-3	0.9	8	1.7	3.2	-0.4	-0.3	136.6	133.7	125.8
85	-0.1	8.6	0.1	2.2	-2.0	-4	0.7	14	1.2	2.6	-0.5	-0.5	132.6	129.8	122.3
90	0.1	6.4	0.3	0.6	-2.6	-5	0.4	22	0.5	1.8	-0.7	-0.7	127.2	124.5	117.4
95	0.5	2.7	0.7	-2.0	-3.6	-7	0.0	37	-0.5	0.7	-0.9	-1.0	117.9	114.8	109.4
96	0.6	1.4	0.8	-2.9	-3.9	-8	-0.1	41	-0.8	0.3	-1.0	-1.1	114.6	110.9	106.3
97	0.7	-0.1	1.0	-4.2	-4.3	-9	-0.2	45	-1.1	-0.1	-1.1	-1.3	109.6	105.1	101.9
98	0.9	-2.6	1.2	-6.3	-4.9	-10	-0.4	53	-1.6	-0.7	-1.2	-1.4	101.6	96.3	93.7
99	1.3	-9.8	1.5	-9.1	-5.8	-14	-0.7	62	-2.4	-1.8	-1.4	-1.7	86.0	80.7	75.3
100	3.8	-37.0	3.8	-20.7	-11.1	-42	-2.9	142	-7.7	-7.6	-2.5	-3.5	3.6	35.0	23.4

Breeding Values provide a way to benchmark animals and estimate genetic merit

2. Understanding breeding values

- **Breeding Values are available for the major production and welfare traits**
- **Indexes give the overall merit, or score, to achieve a certain production goal**
- **Breeding Values provide a way to benchmark animals and estimate genetic merit**

3. Using the breeding values

Which traits to focus on when buying genes? That depends on your;

Environment

Target market

Herd Performance

Profit Drivers

Which genes to buy depends on your breeding objective

3. Using the breeding values

Specific

Measurable

Attainable

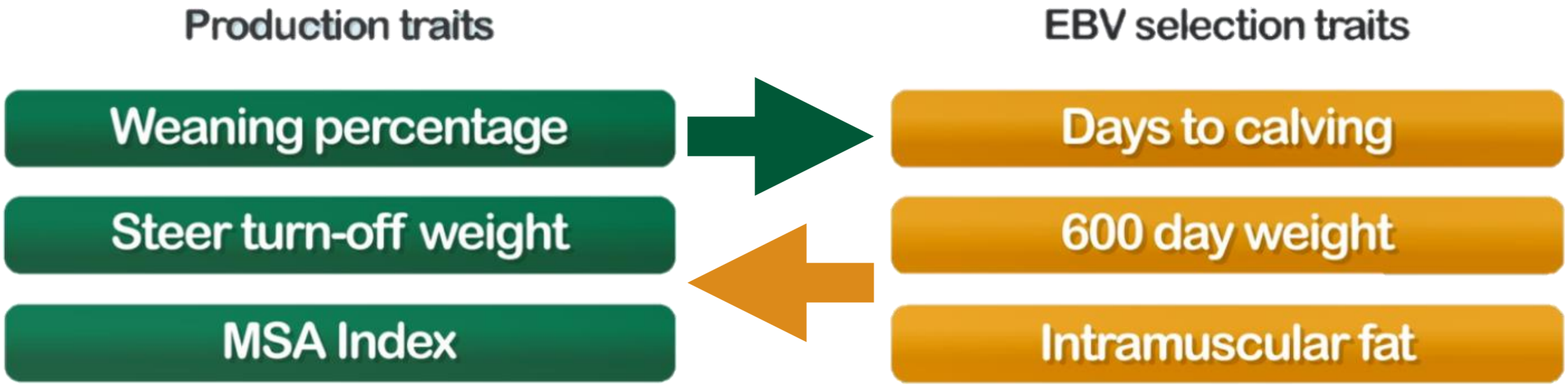
Relevant

Time Based

- ✓ Answer the ‘W’ questions
- ✓ Identify the metrics to identify change
- ✓ Weigh up the effort, time & cost
- ✓ Provide why it is right for your business
- ✓ Keep you on track

Which genes to buy depends on your breeding objective

3. Using the breeding values



Converting production to breeding values will help to achieve your breeding objective

3. Using the breeding values

400 day weight	Bull A	Bull B
EBV	+36	+24
Accuracy	65%	67%
Percentile	15%	60%
Breed average	+ 26	+26

Bull A vs Bull B

36 – 24 = 12kg

12/2 = 6kg

Bull A will have progeny that are on average 6kg heavier than progeny from Bull B.

Linking your position to breeding values allows you to make more progress

3. Using the breeding values

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20	-1.8	24.6	-1.5	13.2	2.6	6	3.1			8.4	0.9				
25	-1.6	23.2	-1.3	12.2	2.2	5	2.9			7.8	0.7				
30	-1.5			11.4	1.8	5	2.7				0.6				
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Linking your position to breeding values allows you to make more progress

3. Using the breeding values

- Ways to know your flock/herd position in EBV language
  1. Submit data to genetic evaluations (studs)
  2. Average the breeding values of your sire team
  3. Commercial DNA test (flock profiles, heifer select)
  4. 50th percentile band

Linking your position to breeding values allows you to make more progress

3. Using the breeding values

Animals born in 2019

Band	Yfd	Ycfw	Yfdcv	Ysl	Yss	NLW	Ysc	Ywec	Pwt	Ywt	Yfat	Yemd	DP+	MP+	FP+
	u	%	%	mm	Nktex	%	cm	%	kg	kg	mm	mm			
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4	-2.6	31.7	-2.1	18.7	5.0	12	4.3	-58	8.3	11.0	1.5	2.5	187.3	182.1	166.5
5	-2.5	30.9	-2.0	18.0	4.7	11	4.2	-56	8.1	10.7	1.4	2.4	184.9	180.0	164.8
10	-2.2	28.1	-1.8	15.8	3.7	9	3.7	-46	7.1	9.7	1.2	2.0	177.1	173.4	158.8
15	-1.9	26.1	-1.6	14.3	3.1	8	3.3	-40	6.5	8.9	1.0	1.8	171.9	168.9	154.9
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45	-1.1	18.7	-0.9	9.2	0.8	3	2.1	-17	4.3	6.2	0.3	0.7	154.6	152.1	141.7
50	-1.0	17.7	-0.8	8.5	0.5	2	2.0	-13	3.9	5.8	0.2	0.5	152.2	149.8	139.8
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Linking your position to breeding values allows you to make more progress

3. Using the breeding values

- **Which genes to buy depends on your breeding objective**
- **Converting production to breeding values will help to achieve your breeding objective**
- **Linking your position to breeding values allows you to make more progress**

Take home messages

1. **Genetic evaluations provide a way to make greater permanent improvement**

2. **Breeding Values are the tools to benchmark animals**

3. **By linking breeding values to your animals and breeding objective your rate of progress will be greater**

Tools and resources

bredwell fedwell

mla.com.au/events

Breeding EDGE Workshop

mla.com.au/events

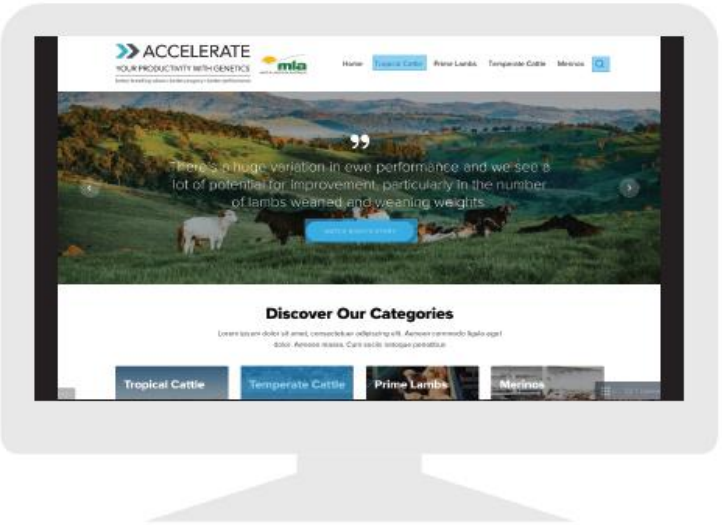
TBTS
TROPICAL BEEF TECHNOLOGY SERVICES

tbts.une.edu.au

SBTS
SOUTHERN BEEF TECHNOLOGY SERVICES

sbts.une.edu.au

ACCELERATE
YOUR PRODUCTIVITY WITH GENETICS
better breeding values > better progeny > better performance



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