Breedplan EBVs, breeding objectives & cattle structural assessment

stephen.lee@adelaide.edu.au
darren.koopman@adelaide.edu.au

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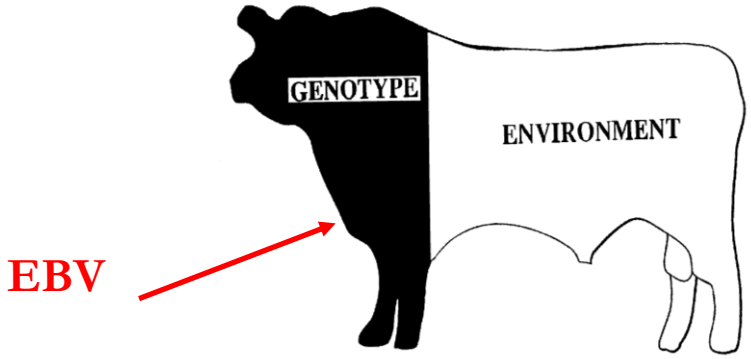
Today topics

- Background to genetics and EBVs
- Using BREEDPLAN EBVs to assess genetic merit
- The role of % accuracy and buying multiple bulls
- Predicting progeny performance
- Using $Indexes for selection

What is an EBV?

- EBV = Estimated Breeding Value.
- Calculated from pedigree and performance information supplied by stud breeders using BREEDPLAN technology
- Describes the GENETICS independent of the ENVIRONMENT



What does the EBV mean ?

Animal	600d weight EBV
Bando	+109

EBVs are reported in actual units (e.g. kilograms).

EBVs are expressed as the difference between an animal's genetics and the base to which an animal is compared.

Therefore – Bando is 109kg genetically heavier than the base of the relevant cattle population at 600 days of age

Comparing EBVs

Each breed is currently running a separate genetic evaluation

Each genetic evaluation compares animals to a separate base

Therefore – EBVs only allow you to compare animals WITHIN A BREED.

Interpreting EBVs in practice

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January 2012 Angus BREEDPLAN															
	Calving Ease Dir (%)	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 (%)
EBV	-1.6	+6.1	+46	+85	+109	+107	+9	+1.5	-2.9	+64	+4.8	-1.1	-1.9	+1.6	+0.5
Acc	39%	78%	70%	71%	72%	64%	47%	74%	38%	62%	52%	60%	62%	52%	48%
Breed Avg. EBVs for 2010 Born Calves Click for Percentiles															
EBV	+0.0	+4.5	+38	+71	+90	+82	+12	+1.4	-2.9	+50	+3.4	-0.1	+0.0	+0.4	+1.0

1. Compare with Breed Average EBVs & percentile rank

2. Consider EBV Accuracy

3. Compare Expected Difference in Progeny Performance

Interpreting EBVs –

Comparing with the Breed Average

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Bando's 600d weight EBV

	Calving Ease Dir (%)	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 (%)
EBV	-1.6	+6.1	+46	+85	+109	+107	+9	+1.5	-2.9	+64	+4.8	-1.1	-1.9	+1.6	+0.5
EBV	+0.0	+4.5	+38	+71	+90	+82	+12	+1.4	-2.9	+50	+3.4	-0.1	+0.0	+0.4	+1.0

Angus breed average 600d weight EBV

Breed average EBVs provide an estimation of the current genetic level of the breed for each particular trait

Therefore – Bando is 19kg genetically heavier than the current breed average at 600 days of age

Interpreting EBVs –

Comparing with the Percentile Table

Percentile Band	Calving Ease Dir (%)	Calving Ease Dtrs (%)	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 (%)	NFI-P (Trial)	NFI-F (Trial)	Docility (Trial)	Long Fed/CAAB Index	Heavy Grass Fed Steer Index	Short Fed Domestic Index	Terminal Index
Top Value	+7.0	+5.3	-9.0	-3.4	+63	+115	+145	+165	+25	+5.1	-9.3	+92	+13.0	+5.1	+5.7	+3.1	+4.4	-0.87	-0.82	+27.8	+173	+127	+114	+110
Top 1%	+4.5	+3.4	-6.1	+0.8	+53	+95	+122	+124	+20	+3.0	-5.8	+72	+7.7	+2.0	+2.3	+1.7	+2.7	-0.87	-0.82	+23.0	+135	+101	+90	+91
Top 5%	+3.1	+2.4	-5.0	+2.0	+49	+88	+112	+110	+17	+2.5	-5.0	+66	+6.0	+1.3	+1.5	+1.2	+2.2	-0.77	-0.72	+17.6	+122	+94	+83	+83
Top 10%	+2.5	+2.0	-4.4	+2.5	+47	+84	+107	+103	+16	+2.2	-4.6	+63	+5.3	+0.9	+1.1	+0.9	+1.9	-0.68	-0.62	+14.4	+115	+89	+79	+79
Top 15%	+2.0	+1.7	-4.0	+2.9	+45	+82	+104	+99	+16	+2.0	-4.3	+60	+4.8	+0.7	+0.9	+0.8	+1.7	-0.56	-0.57	+12.1	+110	+87	+77	+77
Top 20%	+1.6	+1.4	-3.7	+3.3	+44	+80	+101	+95	+15	+1.9	-4.1	+59	+4.5	+0.6	+0.7	+0.7	+1.6	-0.56	-0.54	+10.5	+107	+84	+75	+75
Top 25%	+1.3	+1.2	-3.5	+3.5	+42	+78	+99	+93	+14	+1.8	-3.9	+57	+4.2	+0.4	+0.5	+0.6	+1.4	-0.50	-0.48	+8.8	+103	+82	+73	+73
Top 30%	+1.0	+1.1	-3.3	+3.8	+41	+76	+96	+90	+14	+1.7	-3.6	+56	+3.9	+0.3	+0.4	+0.5	+1.3	-0.48	-0.46	+7.5	+101	+80	+71	+71
Top 35%	+0.8	+0.9	-3.1	+4.0	+40	+74	+95	+88	+13	+1.6	-3.4	+54	+3.6	+0.2	+0.3	+0.4	+1.2	-0.46	-0.43	+6.1	+98	+79	+70	+70
Top 40%	+0.5	+0.7	-2.9	+4.2	+39	+73	+93	+85	+13	+1.5	-3.2	+53	+3.4	+0.1	+0.2	+0.3	+1.1	-0.43	-0.39	+4.7	+95	+77	+68	+68
Top 45%	+0.3	+0.6	-2.7	+4.4	+38	+71	+91	+83	+13	+1.4	-3.0	+51	+3.2	+0.0	+0.0	+0.3	+1.0	-0.41	-0.35	+3.5	+93	+76	+67	+67
Top 50%	+0.1	+0.4	-2.5	+4.5	+38	+70	+89	+81	+12	+1.3	-2.9	+50	+2.9	-0.1	-0.1	+0.2	+0.9	-0.32	-0.31	+2.2	+91	+74	+66	+66
Top 55%	-0.2	+0.3	-2.4	+4.7	+37	+68	+87	+79	+12	+1.2	-2.6	+49	+2.7	-0.2	-0.2	+0.1	+0.8	-0.28	-0.30	+1.0	+88	+73	+64	+64
Top 60%	-0.4	+0.1	-2.2	+4.9	+36	+67	+85	+77	+11	+1.1	-2.4	+47	+2.5	-0.3	-0.3	+0.1	+0.7	-0.27	-0.28	+0.0	+86	+71	+63	+63
Top 65%	-0.7	-0.1	-2.0	+5.1	+35	+65	+83	+75	+11	+1.0	-2.2	+46	+2.2	-0.4	-0.4	+0.0	+0.6	-0.22	-0.25	-1.4	+83	+69	+61	+62
Top 70%	-1.0	-0.2	-1.8	+5.3	+34	+64	+81	+73	+10	+0.9	-1.9	+44	+2.0	-0.5	-0.5	-0.1	+0.5	-0.18	-0.17	-3.0	+80	+67	+60	+60
Top 75%	-1.3	-0.4	-1.6	+5.6	+32	+62	+79	+70	+9	+0.8	-1.6	+42	+1.8	-0.6	-0.7	-0.1	+0.4	-0.15	-0.14	-4.5	+77	+65	+58	+58
Top 80%	-1.6	-0.7	-1.4	+5.8	+31	+60	+76	+67	+9	+0.7	-1.3	+40	+1.5	-0.8	-0.8	-0.2	+0.2	-0.05	-0.09	-6.4	+73	+63	+56	+56
Top 85%	-2.0	-0.9	-1.2	+6.1	+30	+57	+73	+64	+8	+0.6	-0.8	+38	+1.2	-0.9	-1.0	-0.3	+0.1	-0.03	-0.03	-8.3	+69	+60	+53	+54
Top 90%	-2.5	-1.3	-0.9	+6.5	+28	+54	+69	+60	+7	+0.5	-0.3	+35	+0.8	-1.1	-1.2	-0.5	-0.1	+0.09	+0.07	-10.5	+63	+56	+50	+51
Top 95%	-3.4	-2.0	-0.4	+7.1	+25	+49	+63	+53	+6	+0.2	+0.4	+30	+0.4	-1.4	-1.6	-0.7	-0.3	+0.16	+0.14	-14.2	+54	+49	+43	+46
Top 99%	-5.3	-3.4	+0.5	+8.3	+19	+38	+49	+39	+3	-0.3	+1.7	+21	-0.5	-2.1	-2.2	-1.1	-0.5	+0.33	+0.32	-22.7	+37	+34	+31	+33
Low Value	-14.9	-8.0	+3.2	+12.5	+2	+9	+9	-1	-5	-3.1	+5.9	-5	-3.8	-4.8	-4.7	-2.6	-1.4	+0.33	+0.32	-29.6	-5	-1	+3	+4

- The Percentile Table enables breeders to determine exactly where an animal ranks within the breed for each particular trait.
- Bando's 600 day weight EBV of +109 is top 10% of breed

Response to selection

$$\frac{\textit{Genetic Variation} \times \textit{Intensity} \times \textit{Accuracy}}{\textit{Generation interval}}$$

Interpreting EBVs – EBV accuracy

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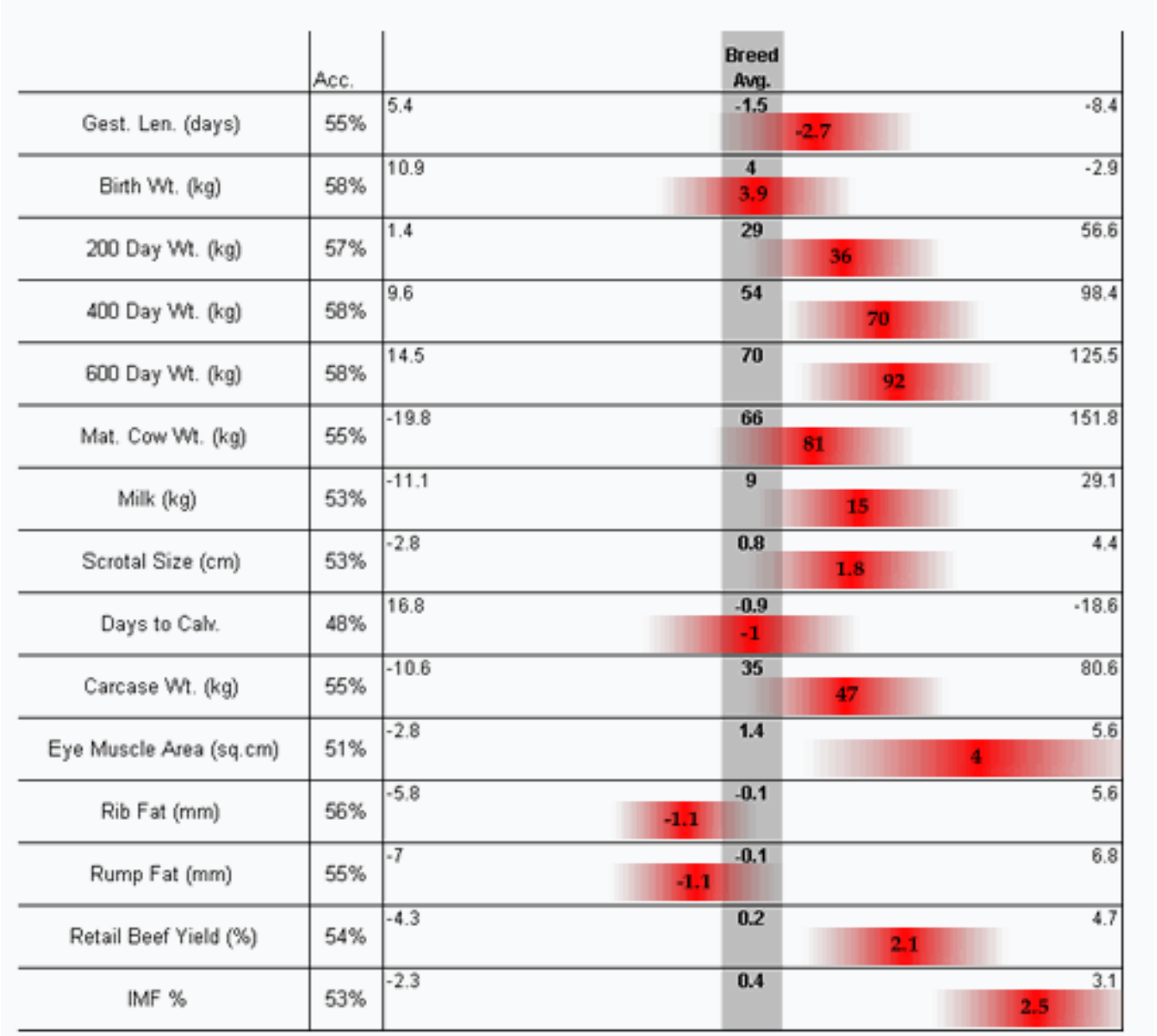
	Calving Ease Dir (%)	Birth Wt. (kg)	200 Day Wt. (kg)	400 Day Wt. (kg)	600 Day Wt. (kg)	Mat. Cow Wt. (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt. (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF (%)
EBV	-1.6	+6.1	+46	+85	+109	+107	+9	+1.5	-2.9	+64	+4.8	-1.1	-1.9	+1.6	+0.5
Acc	39%	78%	70%	71%	72%	64%	47%	74%	38%	62%	52%	60%	62%	52%	48%

ACCURACY

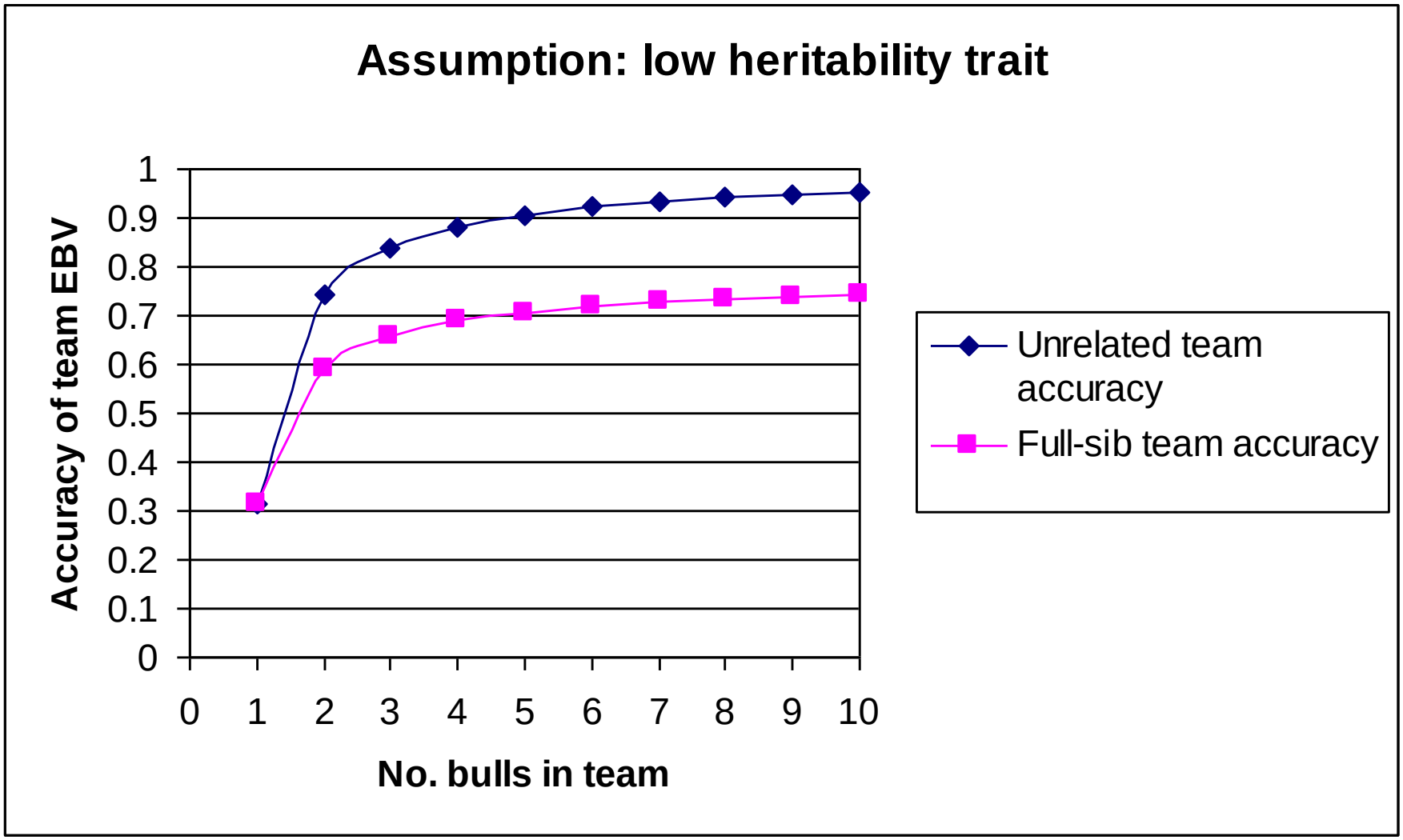
Accuracy provides an indication of how well the EBV is likely to estimate the TRUE breeding value

Potential change in EBV with LOW accuracies



	Acc.		Breed Avg.	
Gest. Len. (days)	55%	5.4	-1.5	-8.4
			-2.7	
Birth Wt. (kg)	58%	10.9	4	-2.9
			3.9	
200 Day Wt. (kg)	57%	1.4	29	56.6
			36	
400 Day Wt. (kg)	58%	9.6	54	98.4
			70	
600 Day Wt. (kg)	58%	14.5	70	125.5
			92	
Mat. Cow Wt. (kg)	55%	-19.8	66	151.8
			81	
Milk (kg)	53%	-11.1	9	29.1
			15	
Scrotal Size (cm)	53%	-2.8	0.8	4.4
			1.8	
Days to Calv.	48%	16.8	-0.9	-18.6
			-1	
Carcase Wt. (kg)	55%	-10.6	35	80.6
			47	
Eye Muscle Area (sq.cm)	51%	-2.8	1.4	5.6
			4	
Rib Fat (mm)	56%	-5.8	-0.1	5.6
		-1.1		
Rump Fat (mm)	55%	-7	-0.1	6.8
		-1.1		
Retail Beef Yield (%)	54%	-4.3	0.2	4.7
			2.1	
IMF %	53%	-2.3	0.4	3.1
			2.5	

What if I buy a team of bulls?



Sire carcass weight EBV vs. progeny difference

28 kg difference

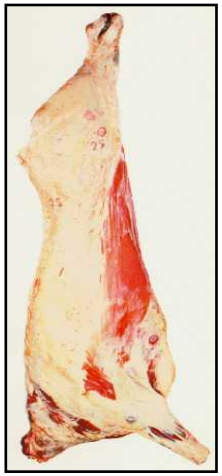
Bottom 5 sires

EBV = +18

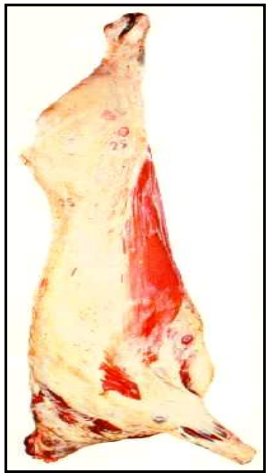
Progeny out of similar cows managed the same

Top 5 sires

EBV = +46



13.5 kg difference



Durham R&D, NSW

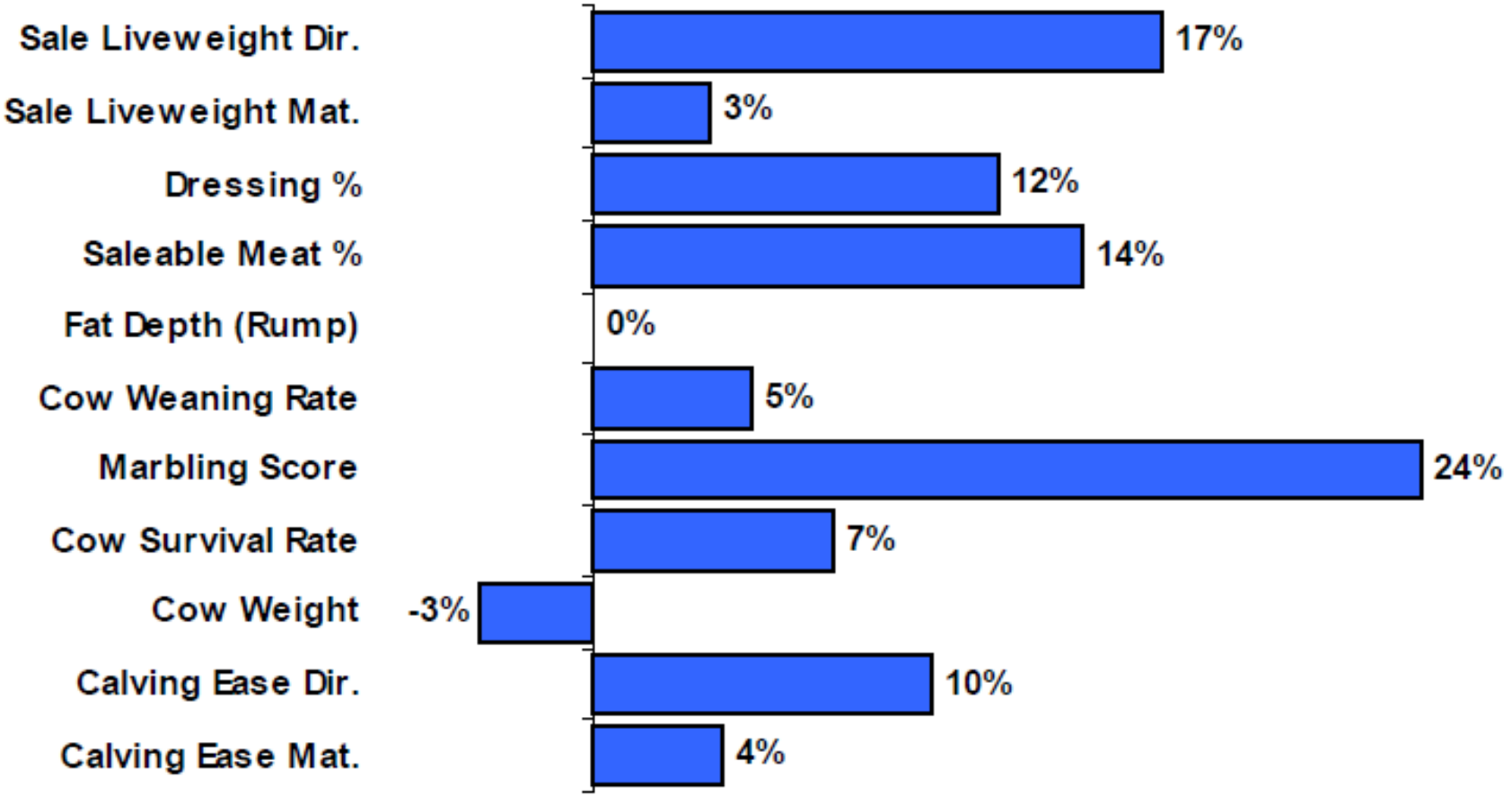
How can I predict progeny performance?

- 600 day weight EBV breed average = +90
- 600 day weight EBV Bando = +109
- Difference = 19kg
- Progeny get half genes from Dad
- So expect 9.5kg heavier @ 600 days
- @$1.80=$17.10
- Assumes cows breed average

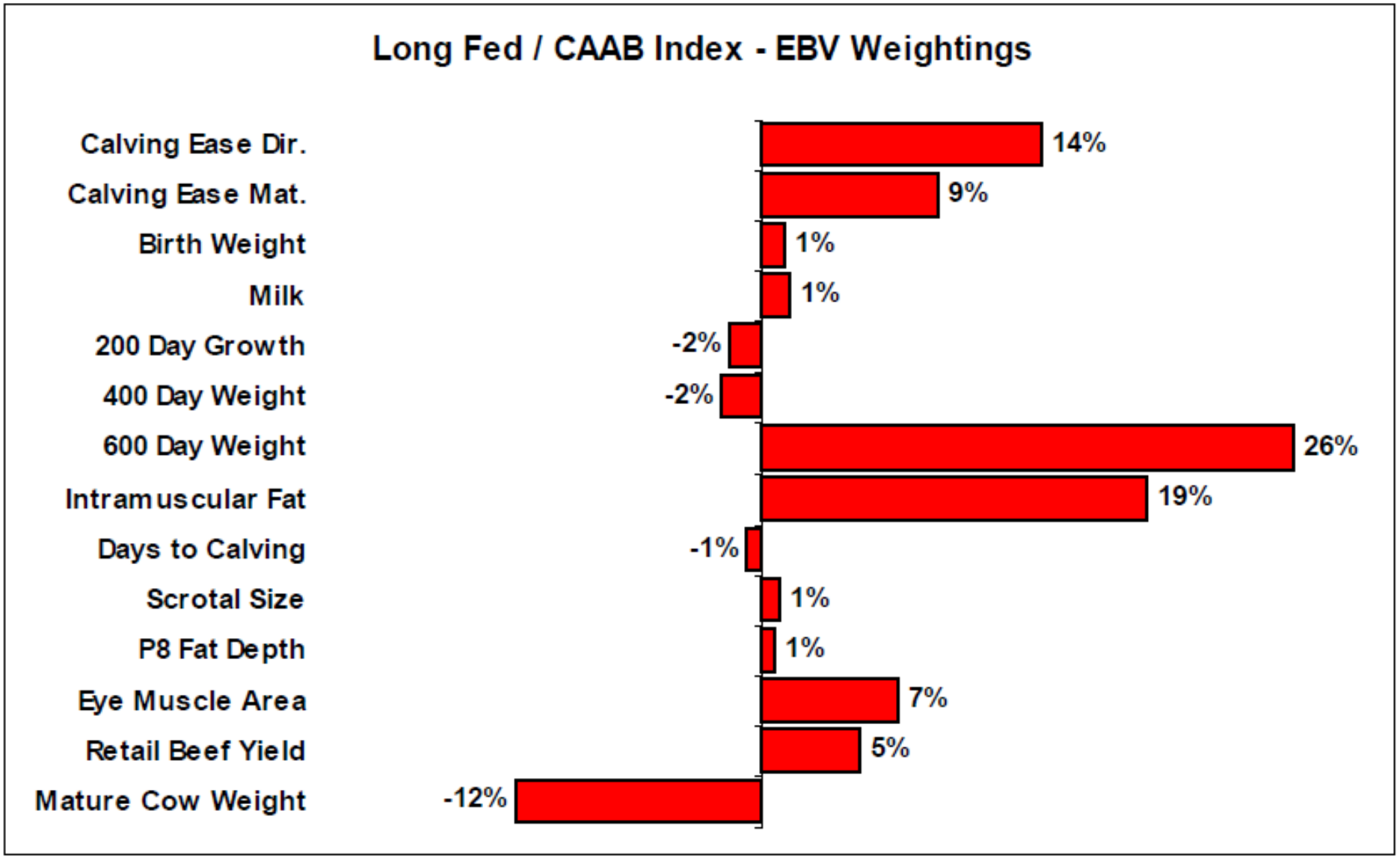
Interpreting EBVs - Summary

- ✓ **EBV = Estimated Breeding Value**
- ✓ **Only compare EBVs within breeds**
- ✓ **Compare EBVs with:**
  - **Breed Average**
  - **Percentile Tables**
- ✓ **Consider Accuracy Values**
- ✓ **½ EBV Difference = Av. Difference in Progeny Performance**

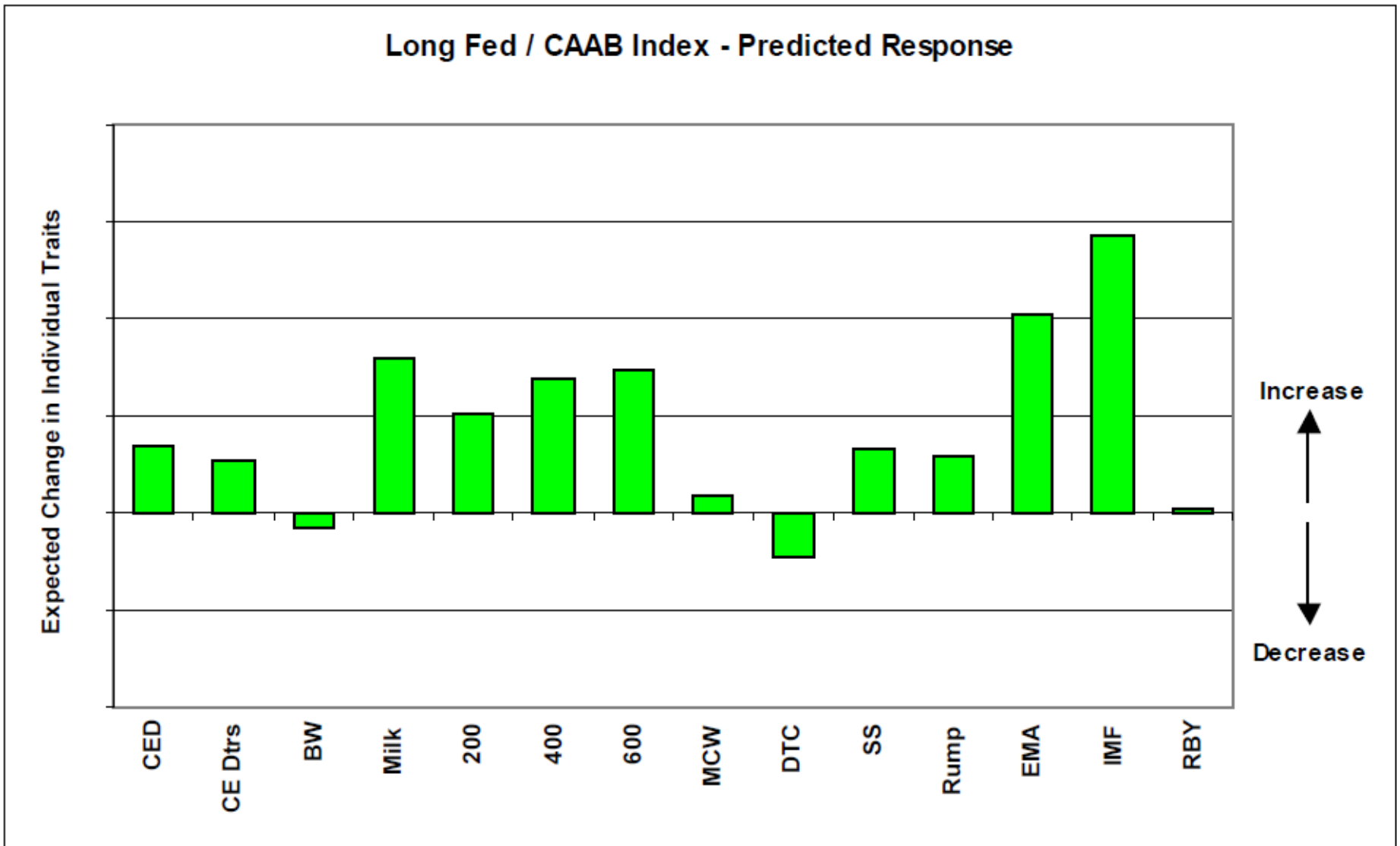
Profit drivers



EBV weightings



Predicted response



How can I predict progeny performance

- CAAB Index breed average = +$90
- CAAB Index top Angus bull = +$172
- Difference = $82
- Progeny get half genes from Dad
- So expect $41 better per cow joined
- Assumes cows breed average (unlikely)

Don’t just use indexes in isolation

Sire	600d Wt	MCWt	Milk (kg)	DC (days)	Rib Fat (mm)	Rump Fat (mm)	RBY (%)	IMF%	Long Fed Index ($)
1	+122	+120	+20	-8.9	-3.5	-3.5	+1.8	+0.6	+104
2	+55	+44	1	-4.9	+4.5	+3.6	-2.0	+3.7	+100
Breed Av.	+89	+81	+12	-2.7	-0.1	0.0	+0.2	+0.8	+90

Not just indexes

Select animals using genetic tools (BREEDPLAN EBVs and Selection Indexes)

Visual Appraisal (e.g. structural soundness, temperament) and Bull Breeding Soundness Evaluation

Messages

- ✓ **EBV = Estimated Breeding Value**
- ✓ **Describes the GENETICS independent of the ENVIRONMENT**
- ✓ **Only compare EBVs within breeds**
- ✓ **Compare EBVs with:**
  - **Breed Average**
  - **Percentile Tables**
- ✓ **Consider Accuracy Values**
- ✓ **½ EBV Difference = Av. Difference in Progeny Performance**