

Utilising genetics to enhance your breeding program

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- Introduction to the worlds best system to select bulls
- Show how to select animals which suit you
- About genetics & trends
- Illustrate the power of genetics in the Blackrock herd
- How much is a bull worth?

There are two areas of influence producers can exert upon their herd:

- Influence by environment
- Influence by genetics

Influence by environment covers everything that goes down the animals mouth, ie the food available, protein energy etc. Environmental influences account for approx 70% of the animals visual performance. The remaining 30% is due to genetics.

This presentation focuses on the genetic influence on animal's performance and this influence is most effectively transmitted via the sire.

The sire's three measured areas of influence are:

1. Fertility – days to calving
 - calving ease
 - gestation length
 - scrotal size
2. Growth – Birth weight
 - 200 day weight
 - 400 day weight
 - 600 day weight
 - mature weight
 - milk
3. Carcase – Fat
 - Muscle
 - Carcase weight
 - IMF (Intramuscular Fat)
 - Yield

Fortunately we have a system to measure all these criteria between bulls of different ages, from different farms and from different countries. Developed in Australia used by an estimated 50, 000 farms internationally and considered to be the worlds best genetic evaluation system BREEDPLAN

BREEDPLAN expresses the genetic merit of an animal in EBV's. Within each breed EBV's can be used to compare one animal against another. Each animal has a genetic profile which can be expressed as a %

Illustration of Angus percentile band in Appendix 1 (page 67).

EBV's can be used to improve the performance of your cattle.

Calculation of an EBV

$$\begin{aligned} \text{If group average wt} &= 400 \text{ kg} \\ \text{And weight of individual} &= \underline{440 \text{ kg}} \\ &+ 40 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{Heritability} & \quad * \underline{25\%} \\ \text{Then,} & \end{aligned}$$

$$\text{EBV} = +10 \text{ kg}$$

EBV's are largely free ie bulls with better genetics don't always cost more.

Breed Involvement

All major breeds have EBV's available to assist in sire selection. Is your bull breeder involved? Some breeds have been involved longer than others and have over time altered the genetic composition of the breed to better meet changing market demands.

EBV'S have the power to peel away the influence of feed to give the most accurate method of assessing the genetic potential of the animal.

Illustrations Of The Power Of Genetics

Table 1. Genetic Performance at Blackrock Angus

BLACKROCKS GENETIC PROGRESS								
Year	Birth Wt	Milk	200	400	600	Fat	Muscle	Carcase wt
74	0	1	3	10	16	0	-0.3	4.2
76	0	1	2	7	13	0.2	-0.2	3.5
78	0	3	3	11	16	0.5	-0.2	4.5
80	0	2	5	14	22	0.3	0	8
82	0	0	5	12	18	0.6	-0.1	6
84	0	4	8	18	26	0.5	-0.2	9
86	1	5	10	20	30	1	-1.2	11
88	2	5	14	27	37	0.5	0.1	16
90	3	7	20	36	48	0.3	0.2	21
92	3	7	21	39	51	0	0.1	22
94	4	9	25	46	59	-0.2	0.6	25
96	4	7	29	52	67	-0.4	1.1	29
98	4	8	31	56	72	-0.5	1.3	33
2000	4	7	33	58	72	-0.4	1.5	38

Paddock Performance at Blackrock Angus

Actual 200-day weights have been averaged over a five-year period. These are raw data figures only and reflect both genetic and environmental influences. The 200-day weights have increased reflected in the 200-day weight EBV.

Actual 200 Day weights

1973 - 1977 average	252 kg
1995 - 1999 average	296 kg

4kg increase from both genetics and management/environment

Sire Mating Analysis At Blackrock Angus

Each year several different sires are used, the birth weight EBV's of each sire and the resulting birth weight of his calves are compared, from the analysis it is clear a correlation exists between the sires birth weight EBV and the actual birth weight of his calves.

Table 2. Sire Mating Analysis at Blackrock Angus

Bull	A	B	C	D	E	F	G
EBV Bwt. (Kgs)	2.7	3.0	3.1	6.6	7.7	8.0	8.1
Calf Weight (Kgs)	34	34	34	40	40	43	42

How much is a bull worth?

In beef cattle the EBV range in 400-day weight is worth about \$50/calf to the producer and about \$80 retail yield. A well managed breeding program should achieve genetic gain of 2-3% pa. Always obtain EBV's before buying a sire.

	Bull		
	A	B	C
400-Day Weight	30	50	70
Difference between Bull A & Bull C			
		40kg	
Sire influence		20kg	

At 100 calves/bull and a value of \$1.60/kg

Extra gross value = $100 \times 20\text{kg} \times \1.60

= \$3200

Genetic selection using EBV's is a cheap way to lift the performance of your herd.



Appendix 1

Angus GROUP BREEDPLAN EBV percentile bands for animals born in 2000*

Use this table as a guide to compare individual animals with the current genetic level of the Angus breed

	Calving Ease			Growth & Maternal				Fertility		Carcass							
	DIR (%)	Gestation Length (days)	Birth Weight (kg)	200-Day Weight (kg)	400-Day Weight (kg)	Mature Cow Wt. (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcass Wt (kg)	Eye Muscle Area (sq. cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	Intra-Muscular Fat %		
																200-Day Weight (kg)	400-Day Weight (kg)
Highest 1%	3.9	3.4	-4.7	0.4	44	77	100	106	17	2.6	-4.7	55	3.9	1.6	2.3	2.3	1.9
Highest 5%	2.7	2.6	-3.4	1.5	39	70	90	93	14	1.9	-3.4	48	2.7	1.0	1.4	1.6	1.4
Highest 10%	2.1	2.0	-2.8	2.1	36	66	85	86	13	1.7	-2.8	44	2.3	0.7	1.0	1.3	1.1
Highest 15%	1.7	1.7	-2.4	2.5	35	63	81	81	12	1.5	-2.4	42	2.0	0.5	0.8	1.0	0.9
Highest 20%	1.3	1.4	-2.2	2.8	33	61	78	78	11	1.3	-2.0	40	1.8	0.3	0.6	0.9	0.7
Highest 25%	1.1	1.1	-1.9	3.1	32	59	76	75	10	1.2	-1.8	38	1.6	0.2	0.4	0.7	0.6
Highest 30%	0.8	0.9	-1.7	3.3	31	57	73	72	10	1.1	-1.5	37	1.5	0.1	0.3	0.6	0.5
Highest 35%	0.6	0.7	-1.6	3.5	30	55	71	70	9	1.0	-1.3	35	1.3	0.0	0.2	0.5	0.4
Highest 40%	0.3	0.5	-1.4	3.7	29	54	69	68	9	1.0	-1.1	34	1.2	-0.1	0.0	0.4	0.4
Highest 45%	0.1	0.4	-1.2	3.9	28	52	67	65	8	0.9	-0.9	33	1.1	-0.1	-0.1	0.3	0.3
Highest 50%	-0.1	0.2	-1.1	4.1	27	51	65	63	8	0.8	-0.7	31	1.0	-0.2	-0.2	0.2	0.2
Lowest 45%	-0.4	0.1	-1.0	4.2	26	49	64	61	7	0.7	-0.5	30	0.9	-0.3	-0.3	0.1	0.2
Lowest 40%	-0.6	-0.1	-0.8	4.4	25	48	62	59	7	0.7	-0.2	29	0.7	-0.4	-0.4	0.0	0.1
Lowest 35%	-0.8	-0.2	-0.7	4.6	24	46	60	57	6	0.6	0.0	28	0.6	-0.5	-0.5	0.0	0.1
Lowest 30%	-1.1	-0.4	-0.5	4.8	23	44	57	54	6	0.5	0.2	26	0.5	-0.6	-0.6	-0.1	0.0
Lowest 25%	-1.4	-0.7	-0.4	5.1	22	42	55	52	5	0.5	0.4	25	0.4	-0.7	-0.8	-0.2	0.0
Lowest 20%	-1.8	-0.9	-0.2	5.3	21	40	53	49	5	0.4	0.7	23	0.3	-0.8	-0.9	-0.4	-0.1
Lowest 15%	-2.2	-1.3	0.0	5.6	20	38	50	46	4	0.3	1.0	22	0.1	-0.9	-1.1	-0.5	-0.2
Lowest 10%	-2.7	-1.8	0.2	6.0	18	35	46	43	3	0.1	1.4	19	-0.1	-1.1	-1.3	-0.7	-0.3
Lowest 5%	-3.6	-2.4	0.6	6.5	15	31	41	37	2	-0.1	2.0	16	-0.4	-1.4	-1.7	-1.0	-0.5
Lowest 1%	-5.4	-4.4	1.4	7.6	10	23	31	27	0	-0.6	3.1	10	-1.1	-1.9	-2.4	-1.7	-0.9

▲ Lower values more favourable

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