

An introduction to BREEDPLAN and using EBVs in bull buying

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Session 6a

Introduction

The selection of a sire is one of the most important decisions a beef producer can make. 87 per cent of the genetic composition of a calf crop is determined by the sires used over the last three generations.

The bull that you see is a result of an interaction between that bull's genes and the environment. BREEDPLAN is a system to isolate the genetics or animal's breeding value from the influence of factors such as feed and management. It provides predictions of the genetic merit of individual animals called **Estimated Breeding Values (EBVs)**.

Most sale catalogues that you receive will have an EBV box for each animal. EBVs are available for a range of traits influencing fertility, growth, maternal, and carcass performance. For Angus cattle there are currently EBVs available for 18 traits. This paper covers understanding EBVs and then their practical use when selecting bulls.

How are EBVs Calculated?

EBVs are calculated using:

- Information on the animal's performance for example weight or rump fat or scrotal size. This is adjusted to a standard age or carcass weight.
- The performance of relatives.
- Where the genetic relationship between two traits is reasonably strong, information on one trait can help us estimate an animal's breeding value for another trait, e.g. birth weight and growth.

EBVs are expressed in everyday units e.g. kg for growth and mm for fat.

How can animals in different environments be compared?

BREEDPLAN isolates the environmental influence by:

- When breeders submit performance data to BREEDPLAN it includes management group so calves in the improved pasture paddock

JANUARY 2003 ANGUS GROUP BREEDPLAN EBVS									
	Calving Ease DIR	Calving Ease DTRS	Gest. Length (Days)	Birth Weight (kg)	200D Growth (kg)	400D Growth (kg)	600D Growth (kg)	Mature Weight (kg)	Milk (kg)
EBV	+0.4	+1.4	-4.4	+5.1	+39	+74	+92	+85	+14
ACC	35%	35%	67%	78%	73%	69%	73%	64%	58%

JANUARY 2003 ANGUS GROUP BREEDPLAN EBVS									
	Scrotal Size (cm)	Days to Calving (Days)	Carcass Weight (kg)	EMA (sq cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF %	NFI (kg/day)
EBV	+0.4	-2.8	+47	+0.4	-0.2	-0.9	+1.4	-0.2	-0.1
ACC	54%	45%	63%	56%	63%	63%	60%	56%	57%

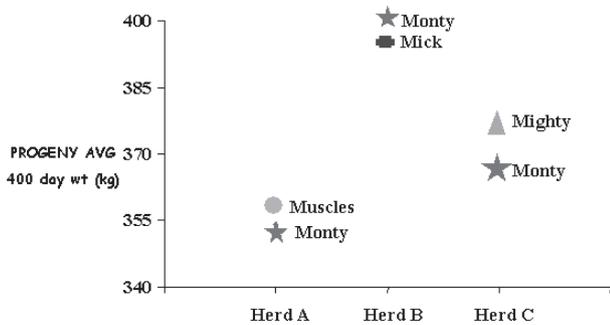
Figure 6a-1. Lot 7. Waugh W34

might be management group 1 and calves in the paddock with a mob of wethers might be management group 2.

- Common genetics across mobs and properties (“link animals”) allow the effect of feed or different management practices to be taken into account. Widespread use of the same genetics by AI has facilitated this.

For example if we are comparing animals on three properties with different feed quantity and quality. Property A has poor nutrition, property B has very good nutrition, and property C has average nutrition.

The three properties use the same sire (link sire) called Monty by A.I. They also each use a different home sire. Herd A uses “Muscles”, Herd B uses “Mick” and Herd C uses “Mighty”. At each property Monty’s progeny are compared with the progeny of a home sire:



Taking into account actual weight differences between the progeny groups:

- Muscles vs Monty = +5 kg
- Mick vs Monty = -5 kg
- Mighty vs Monty = +10 kg

The progeny differences are doubled to create EBVs for the bulls (as a sire only contributes half of its genes to its progeny):

- Muscles: +10
- Mick: -10
- Mighty: +20
- Monty: 0

This example assumes large progeny numbers. With lower progeny numbers and traits of lower heritability the initial EBVs will be less than double the progeny differences. Adjustments will also be made if the cows are known to have different BREEDPLAN figures.

Interpreting EBVs

You are bull shopping and reading a sale catalogue. You see that a bull has a 600 day weight EBV of +100. How does that impact on your selection decision? What does +100 mean?

There are a number of ways to tell whether +100 is good, average, or bad.

1. Reference to current breed average EBVs

EBVs are shown as positive or negative differences from the breed base. For example a bull with a 600 Day weight EBV of +100 is estimated to have genetic merit for growth at 600 days of age 100kg above the breed base of 0. This breed base is a historical average not the current breed average. In many breeds this base was set in the 1970s. It is important to know that over time the breed average EBV will change. Eg the Angus breed’s average 600 day weight EBV for 2001 drop calves is +67. Breed average EBVs, what you should be benchmarking against, are published in breed society Group BREEDPLAN sire summaries and also available through breed society websites.

2. Compare with the EBVs for other sale bulls of the same breed

600 day weight EBVs won’t tell you how heavy the progeny of a sire will be. The actual level will be influenced by factors such as feed and management. EBVs should be interpreted as differences or rankings rather than absolutes.

For example if the next bull in the catalogue had a 600 Day weight EBV of +70 then the expected difference in the bull’s progeny would be:

$$= \frac{1}{2} \times \text{EBV difference} (100 - 70) \\ = 15 \text{ kgs at 600 days}$$

Only half the EBV difference because each parent contributes only half of its genes to each of its calves.

You can’t yet compare EBVs of animals of different breeds. If you were looking at a Hereford bull’s 600 day weight EBV you would be referencing against +48 as the average of 2001 drop calves rather than +66. The lower figure is because the two breeds have a different historical base. It doesn’t indicate that Angus have heavier 600 day weights than Herefords.

3. Use EBV percentile bands

EBV percentile bands allow you to benchmark a particular animal’s EBVs against the performance recorded population for that breed. Breed Average EBV percentile band tables are published in Group BREEDPLAN directories and available on breed society websites. Graphs of an animal’s EBV percentiles are also available on breed society websites.

EBV Accuracies

The E of EBV stands for **Estimated**. An estimate of the animal's genetic merit. Make sure that you look at the accuracy of the EBVs. The accuracy of an EBV reflects the amount of information used to estimate the animal's breeding value as a percentage of the total amount of information needed to calculate the breeding value with certainty. The accuracy of an EBV will vary depending on the amount of information that has been submitted to Breedplan on that animal and its relatives and the heritability of the trait.

Because most sale bulls don't yet have progeny recorded, the accuracy of their EBVs can be relatively low- 35% to 78%. Their EBVs can therefore change quite substantially. As information on a bull's progeny is submitted to Breedplan the EBV will be fine tuned and the accuracy will increase meaning that the likelihood and size of future changes is decreased. Sires used heavily e.g. bulls listed in AI catalogues will often have high accuracy EBVs of 90% and above.

Use EBVs and Visual Appraisal

It is important to note that not all traits of economic importance have EBVs available. For example, structural soundness, maturity type, and temperament EBVs aren't available for most beef bulls and shouldn't be neglected when making selection decisions. Look at both the animals and the figures!!!

Summary

EBVs are useful for bull buyers because they:

1. Are a tool to isolate the genetics or animal's breeding value from the influence of factors such as feed and management.
2. Estimate a bull's worth for traits that can't be assessed when looking at a live animal eg feed efficiency
3. Reduce the risk of selection decisions. EBV accuracies quantify the risk involved

But when you use EBVs bear in mind that:

1. Not all traits of economic importance have EBVs available
2. They are only an estimate and therefore subject to change. Because most sale bulls don't yet have progeny recorded, the accuracy of their EBVs is relatively low. Their EBVs can therefore change quite substantially, particularly if performance information on that bull has not been submitted to BREEDPLAN for a trait.

See also "Bull buying Exercises", paper S9. Ed

