An introduction to BREEDPLAN and using EBVs in bull buying

Angus Society of Australia
Locked Bag 11
Armidale NSW 2350
Ph: 02 6773 4608
Fax: 02 6772 3095
Email: emma@angusaustralia.com.au

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 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 carcase 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 carcase 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

<table>
<thead>
<tr>
<th>JANUARY 2003 ANGUS GROUP BREEDPLAN EBVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving Ease DIR</td>
</tr>
<tr>
<td>EBV</td>
</tr>
<tr>
<td>ACC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JANUARY 2003 ANGUS GROUP BREEDPLAN EBVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrotal Size (cm)</td>
</tr>
<tr>
<td>EBV</td>
</tr>
<tr>
<td>ACC</td>
</tr>
</tbody>
</table>

Figure 6a-1. Lot 7. Waugh W34

2003 Armidale Feeder Steer School
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:

```
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:

```
= ½ x EBV difference (100 – 70)
= 15 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