By Sam Boon—AHDB Beef & lamb Breeding Services Manager

Bull Selection using EBVs

Part 1. Getting started with EBVs

It isn't easy to identify a bull on physical appearance alone, the way a bull looks will be influenced by his feeding, age, health and genetic merit – so bull buyers need an objective way to select the right bull for their herd.

This is true for growth and carcase traits – and vital for traits you can't see like calving ease or the fertility of a bulls daughters.

Over 1000 pedigree herds up and down the country are involved in performance recording using either Breedplan, Signet or Egenes for data analysis. Whilst different breeds use different service providers, the principles behind genetic evaluations are the same for all.

Pedigree and performance data is analysed to calculate how much of each animals performance is due to its breeding merit and how much is due to the environment in which it has been raised. This assessment of breeding potential is expressed as Estimated Breeding Values (EBVs).

Which EBVs are important?

The EBVs can be split into three groups – those influencing:

> Ease of calving
> Growth and carcase traits
> Maternal performance

The traits influencing ease of calving include:

> Birth weight – to enable producers to select for smaller calves at birth
> Calving ease – to enable the selection of bulls whose calves will be born more easily
> Gestation length – to enable the selection of bulls with shorter gestation length

The traits influencing growth and carcase traits include:

> 200, 400 and 600 day weight EBVs
> Muscle depth / muscle area EBVs
> Fat depth EBVs

These are fairly self-explanatory, selecting for bulls with high EBVs for growth traits enables faster finishing and carcases capable of being taken to heavier weights.

High muscle depth tends to be linked to superior carcase conformation, whilst the fatness EBVs can be used to optimise levels of finish. Negative fat depth EBVs will tend to produce leaner progeny whereas more positive values will tend to lead to animals that lay down finish earlier in their development

Trials at Harper Adams in Limousin and Aberdeen Angus have regularly shown benefits of £30-40 calf through the use of high EBVs sires for these traits. This could be worth an extra £5000 over the lifetime of the bull – a return on investment more than justifying a small additional investment in superior genetics.

Part 2. Selecting for maternal traits

When selecting a bull to breed female replacements life is more complicated; because many of the traits have a low heritability, are only expressed in female relatives and with data only being available on half the population these traits often take a long time to assess.

However, these traits often have a high economic importance and will influence the herd for many years, being passed from generation to generation through the female line.

EBVs routinely available include:

> Maternal calving ease – the ease with which a cow gives birth
>
> 200 day milk – the maternal component of 200 day weight – identifying bulls whose daughters will produce more milk
>
> Longevity – or more correctly productive lifespan – indicating breeding lines which may have lower replacements rates
>
> Cow mature size

Cow mature size is a really interesting trait, because selecting breeding lines with high calf growth rates has tended to increase cow mature size over time. This creates economic benefits for the calf finisher – but comes at a cost to the efficiency of the suckler herd – as bigger cows tend to cost more to keep and suffer more fertility problems under a harsh environment.

More moderately framed cows can also be stocked more heavily, increasing output per hectare.

Breeding indexes

The challenge for beef producers is trying to decide which traits to prioritise and why decisions always need to be based on the individual farm, breeding indexes are designed to help identify superior animals for an overall breeding index.

For Breedplan recorded breeds there is commonly

> A terminal sire index - which takes into account both growth and carcase traits and traits influencing ease of calving.
>
> A self-replacing index – which takes into account growth and carcase traits, traits influencing ease of calving and traits influencing maternal performance – accounting for the value of the genes expressed by female replacements.

For Signet recorded breeds, there are a series of sub-indexes:

> Beef value – which identifies animals with superior growth and carcase traits
>
> Calving value – which identifies bulls with superior genes for ease of calving
>
> Maternal value – which pulls together those traits influencing maternal performance

Breeding indexes provide a fantastic overview to identify elite animals, but it is essential that producers look at an animal's EBVs to ensure the bull has the right balance of EBVs for the farm of interest.

Accuracy Values

Every EBV and index is also accompanied by an accuracy value – this indicates how much data is behind an animal's record and how close the EBVs is likely to be to the animal's true breeding value.

Accuracy values tend to be similar for young bulls, although they should highlight whether the animal has actually been performance recorded for a particular trait – or whether its EBVs are based on a parental average alone.

Accuracy values are more useful when looking at semen from older bulls, particularly for maternal traits – as these animals may have been more widely tested and the maternal traits for attributes like milk and lifespan are thus more reliable.

Finding the numbers

Buyers often ask where to find breeding information and whilst it can be readily accessed in sale catalogues at major sales, most beef breeding information is in the public domain and can be access through the websites run by the major breed Societies or Signet Breeding Services.

Search engines based on the UK Number will quickly bring up an animal's pedigree and EBVs on most smart phones, providing instant access to information.

Interpreting the numbers

The next piece of information required by a potential bull buyer is a benchmark of performance for the current calf crop – this way they can tell whether a value of +20 for 400 day weight is in the top or bottom 10% of the breed.

A fantastic aid for producers is thus the sales chart which shows EBVs on a bar chart, where the midline of the chart is the average performance of the population. Bars to the right of the midline are generally indicative of superior performance although care must be taken for traits like fat depth and mature size where an optimum value is often ideal and extremes should be viewed with more caution.