Why are EBVs important when buying a bull?

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The purchase of a stock bull is one of the most important decisions a pedigree breeder and beef producer can make and represents an investment in genetic material that will have a major impact on the financial performance of the herd.

Pedigree breeders and beef producers need to assess their herd's breeding objectives and identify areas where performance can be improved through selective breeding when buying a bull. Although a stockman's eye is an important tool when selecting a bull for breed characteristics and structural soundness for example, it simply is not possible to identify a bull's breeding potential by eye alone as the bull that a buyer sees is a result of an interaction between that bull's genes and the environment in which he has been raised. For example, intensively fed bulls will generally look superior when compared to lesser fed bulls however they may not breed as well. Buyers need to remember that an animal's genetics are the only attribute that will pass from one generation to the next and the amount a bull is fed plays absolutely no role in how it's progeny will perform. Therefore it is necessary for buyers to remove the influence of non-genetic differences from what they see, otherwise their judgement may be biased towards bulls that are better fed, rather than those better bred.

For this reason pedigree breeders and beef producers should use Estimated Breeding Values (EBVs) to identify bulls that are truly genetically superior. EBVs are measurements of genetic potential, which can be used to assess a bull's breeding merit for a specific trait. They take into account the performance data collected on the animal and its known relatives, the relationships that exist between performance traits (correlations) and the degree to which a trait is passed on from one generation to another (heritability). This data is analysed using a statistical computer program called BLUP (Best Linear Unbiased Predictor) that calculates how much of an animal's performance is due to its breeding merit and how much is due to the environment in which it has been raised so that its "true" genetic potential can be assessed . The resulting EBVs are exhibited in the same units as the traits they represent (e.g. kg for liveweight) and are expressed relative to a common baseline.

When using EBVs to assist in selection decisions, buyers should select a bull according to the traits that are most relevant to their breeding programme. The most important EBVs will depend on whether the bull is being chosen as a terminal sire, a dual purpose/maternal bull where some of his heifers will be kept for breeding, or a bull bought to use on heifers. The priority in all cases is a live calf. One of the main advantages of having a comprehensive range of EBVs is that it is possible for the buyer to avoid extremes in particular traits and select for animals with balanced overall performance (see figure 1).

When interpreting a bull's EBVs the buyer needs to be aware that its EBVs must be halved to estimate how much of his genetic superiority will be passed on to his progeny (the other half coming from the cow to which it is mated). EBVs are still easy to understand however as they are expressed in the same units as the traits they represent as aforementioned thus preventing confusion, ie. a bull with a 400 Day Weight EBV of +40 will produce calves 20kg heavier at 400 days of age than a bull with an EBV of 0. It is also important to note that comparisons can be made using EBVs between bulls of the same breed, but not different breeds.

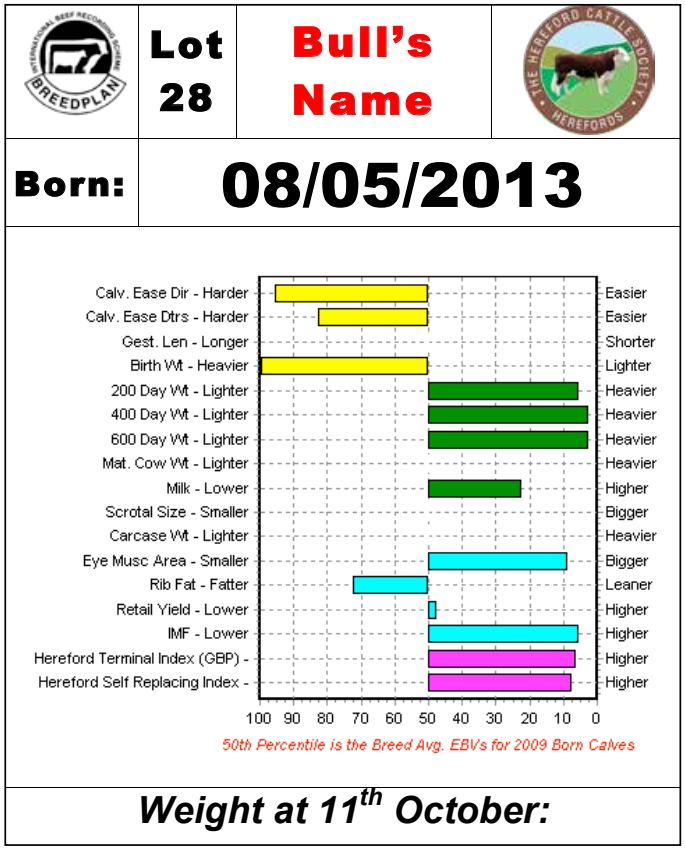
At all official Society sales and at some shows, a bull's EBVs for each trait are displayed on a chart. These charts make it easy for the buyer to assess a bull's

Estimated Breeding Values

EBV	Interpretation	Commercial influence	Guide
Ease of Calving Attributes			
Birthweight (kg)	Negative Values = Lighter calves at birth	Size of calf at birth	Enables sire to be selected to produce smaller calves at birth, reducing calving difficulties.
Gestation Length (days)	Negative Values = Shorter gestations	Length of pregnancy	Shorter gestation lengths tend to result in easier calvings, because birthweights tend to be lower.
Calving Ease (%)	Positive Values = More unassisted calvings	Calving ease of a bull's progeny	Identifies sires whose calves will tend to be born without assistance.
Growth and Carcase Attributes			
200 Day Growth (kg) 400 Day Growth (kg)	Positive Values = Faster growth rates	Growth rate	Selection for faster growth will result in animals that have heavier carcases at a constant fat class or leaner carcases at a constant age.
Muscle Depth (mm)/ Eye Muscle Area (cm^2)	Positive Values = Deeper loin muscles	Depth of loin	Selecting for muscling traits will increase the yield of lean meat in the carcase.
Backfat Depth (mm)	Negative Values = Leaner carcases	Leanness of the carcase	Indicates animals capable of producing leaner carcases, which can be taken to heavier weights without becoming overfat.
Maternal Attributes			
200 Day Milk (kg)	Positive Values = More productive female replacements	Milking ability of female replacements	Indicates female breeding lines that will produce more milk and so wean heavier calves.
Maternal Calving Ease/ Calving Ease Daughters (%)	Positive Values = Daughters will have more unassisted calvings	Calving ease of the female line	Highlights bulls whose female progeny will calve without assistance.

Figure 1: List of EBVs produced for beef breeding evaluations

genetic strengths and weaknesses and are available for a wide range of traits influencing fertility, calving ease, growth, maternal, and carcase performance. The vertical mid-point on the chart is the breed average for each recorded trait. Bars that lie to the right of the mid-point indicate the EBV is above breed average (superior). The further the line is to the right, the better. Similarly, bars to the left of the central line indicate the EBV is below breed average. It is important for pedigree breeders and beef producers to be aware that access to this type of information is also freely available online on the relevant breed society websites www.herefordcattle.org.



Whilst EBVs are an aid to the selection of breeding stock for specific traits, they can also be combined into "Breeding Indexes" to meet a specific breeding objective. Each trait is weighted according to its relative economic value to provide a single figure on which selection decisions can be based. Different breeds use different Breeding Indexes. Commonly used Indexes include the Terminal Sire Index and the Self Replacing Index. A recent EBLEX-funded study conducted at Harper Adams comparing performance of calves from a top 10% terminal sire index with calves from a top 70% sire found that an extra £42 per calf profit can be made by selecting high EBVs (Marsh, 2012). In addition to this, in self-replacing herds a bull's genes generally continue to be expressed for over 20 years, so it is important to invest wisely and use EBVS with confidence when buying a bull.

References

Marsh, S.P., 2012, Evaluation of progeny from Top 10% and Top 70% Terminal Index Aberdeen Angus bulls intensively finished on a cereal beef system, Animal Science Research Centre, Harper Adams University College, August 2012

Food waste biggest single GHG problem

– but livestock production should be less intensive, says European Commission's report

Published in Global Change Biology

The European Commission's Joint Research Centre has said greenhouse gas (GHG) emissions from across the EU's livestock sector could be mitigated by up to 60 per cent if the industry took advantage of all the reduction options available to it.

Contributors, which include researchers in the UK, Italy and the Netherlands, said mitigation could prevent as much as 377 million tonnes of CO2 equivalent from being released into the atmosphere each year.

It identifies the minimising of food waste as having the greatest impact because it would lead to less animal products having to be produced in the first instance. Its estimate is that CO2 equivalent emissions could be cut by 39-79 million tonnes.

The report also rejects industry suggestions that a shift to intensive grain-based livestock systems is the best way to minimise GHG emissions saying that these can sometimes produce more carbon if land use change is taken into account.

Whilst it acknowledges that carbon sequestration through permanent grass and grazing has the potential to compensate for livestock emissions at farm level it warns that accumulated carbon can be lost during an unusually dry summer. Its overview is that less-intensive grazing systems, with lower fertiliser inputs, should be favoured. It is recommended that the exploitation of rough grazing lands should be encouraged in areas where this does not interfere with other conservation of biodiversity objectives.

Additionally it recommends that emissions can be further mitigated by anaerobic digestion of food waste and animal manures – especially as the digested end product can be used as high quality, low odour fertiliser.

The EU Commission report that less intensive grazing systems should be adopted