Understanding the EBVs and Accuracy

EBVs

An Estimated Breeding Value (EBV) is an estimate of an animal's true breeding value, or genetic merit. EBVs do not necessarily reflect the animal's observed performance, which is a combination of both genetic and environmental (non-genetic) influences. EBVs are an estimate of the genetic component of the animal's performance.

EBVs allow for comparison of animals born in different years and seasons because they adjust for known environmental differences, such as age of animal, age of dam, birth type, rearing type and nutrition, and adjust for known genetic differences, such as preferential joining and unequal representation between contemporary groups. Whilst EBVs provide the best basis for comparison of the relative genetic merit of animals reared under different environments and management conditions, they can only be used to compare animals analysed within the same evaluation.

EBVs consider all available information including:

- an animal's own performance,
- the relationship between different traits,
- the relationship between animals, and
- the performance of **all animals** in the database across all years of recording.

For across herd comparisons, a full data set is needed. The more information that is available, the more accurate will be the EBVs. BREEDPLAN requires the whole progeny drop and full pedigree information to provide the best and most valid comparisons.

BREEDPLAN EBVs can be provided for a number of economically important traits. The number of traits analysed and reported will be dependent upon the quantity and quality of data recorded for each trait.

EBVs are expressed as the differences between an animal's genetics and the genetic base to which the animal is compared. The absolute value of any EBV is not critical; of interest is the difference in EBVs between animals. EBVs are usually reported in the units in which the measurements are taken (e.g. kilograms for the weight EBVs).

Birth Weight EBV

Birth Weight EBVs are estimates of genetic differences between animals in calf birth weight. Birth Weight EBVs are expressed in kilograms (kg). Small or moderate Birth Weight EBVs are more favourable.

200-Day Growth EBV

200 Day Growth EBVs are estimates of the genetic differences between animals in live weight at 200 days of age due to their genetics for growth. EBVs are expressed in kilograms (kg). This EBV is a measure of an animal's early growth to weaning. It is an important trait for breeders turning off animals as vealers or weaners. Larger, more positive 200 Day Growth EBVs are generally more favourable.

400-Day Weight EBV

400 Day Weight EBVs are estimates of the genetic differences between animals in live weight at 400 days of age. EBVs are expressed in kilograms (kg). This EBV is important for breeders turning off animals as yearlings. Larger, more positive 400 Day Weight EBVs are generally more favourable.

600-Day Weight EBV

600 Day Weight EBVs are estimates of the genetic differences between animals in live weight at 600 days of age. EBVs are expressed in kilograms (kg). This EBV is important for breeders targeting the production of animals suited for heavy weight grass or grain fed markets. Larger, more positive 600 Day Weight EBVs are generally more favourable.

Mature Cow Weight EBV

Mature Cow Weight EBVs are estimates of the genetic differences between cows in live weight at 5 years of age. Mature Cow Weight EBVs are expressed in kilograms (kg). Animals with higher, more positive Mature Cow Weight EBVs would be expected to produce progeny with a higher mature weight than animals with lower Mature Cow Weight EBVs. What level of Mature Cow Weight EBV is optimal will depend on the individual herd and its breeding objective(s).

Milk EBV

Milk EBVs provide an estimate of the maternal genetic contribution of a dam to the 200 day weight of her calf. In the case of sires, this estimates the maternal genetic effect that his daughters will contribute to the 200 day weight of their progeny. The Milk EBV is expressed in kilograms (kg). Larger, more positive, Milk EBVs indicate a greater maternal genetic contribution to 200 day weight.

Scrotal Size EBV

Scrotal Size EBVs provide an estimate of the genetic differences between animals in scrotal circumference at 400 days of age. Scrotal Size EBVs are expressed in centimetres (cm). Larger, more positive, Scrotal Size EBVs are generally more favourable.

Carcase Weight EBV

Carcase Weight EBVs are estimates of the genetic differences between animals in hot standard carcase weight at 650 days of age. Carcase Weight EBVs are expressed in kilograms (kg). Larger, more positive, Carcase Weight EBVs are generally more favourable.

Eye Muscle Area EBV

Eye Muscle Area (EMA) EBVs are estimates of the genetic differences between animals in eye muscle area at 12/13th rib site in a standard weight steer carcase. EMA EBVs are expressed in square centimetres (cm^2). Larger, more positive, EMA EBVs are generally more favourable.

Rib Fat EBV

Rib Fat EBVs are estimates of the genetic differences between animals in fat depth at the 12/13th rib site in a standard weight steer carcase. Rib Fat EBVs are expressed in millimetres (mm). More positive or more negative Rib Fat EBVs may be more favourable, depending on your breeding goals relating to the finishing ability of your animals.

Rump Fat EBV

Rump Fat EBVs are estimates of the genetic differences between animals in fat depth at the P8 rump site in a standard weight steer carcase. Rump Fat EBVs are expressed in millimetres (mm). More positive or more negative Rump Fat EBVs may be more favourable, depending on your breeding goals relating to the finishing ability of your animals. Stock with positive Fat EBVs are likely to produce progeny that are fatter, or earlier maturing, on average than stock with lower or negative Fat EBVs.

Retail Beef Yield EBV

Retail Beef Yield (RBY) EBVs are estimates of genetic differences between animals in boned out retail beef yield in a standard weight steer carcase. RBY EBVs are reported as differences in percentage (%) yield. Larger, more positive, RBY EBVs are generally more favourable.

Intramuscular Fat EBV

Intramuscular Fat (IMF) EBVs are estimates of genetic differences between animals in intramuscular fat (marbling) at the 12/13 rib site in a standard weight steer carcase. IMF EBVs are reported as differences in percentage (%) IMF. Larger, more positive, IMF EBVs are generally more favourable. For markets where marbling is important (e.g. Meat Standards Australia (MSA), Japanese B2/B3 market, restaurant trade), higher IMF EBVs can increase carcase value.

Accuracy

By definition, an EBV is an estimate of an animal's true breeding value and therefore it may change with the addition of more pedigree and performance information. An accuracy value is presented with every EBV.
The **accuracy** provides a measure of the stability of the EBV and gives an indication of the amount of information that has been used in the calculation of that EBV. The higher the accuracy the lower the likelihood of changes in the animal's EBV as more information is analysed for that animal, its progeny or its relatives.

BREEDPLAN uses all available information to calculate EBVs and calculates EBVs of related (correlated) traits via indirect observations e.g. the EBVs for carcase traits are usually estimated from live animal scanning measurements. These correlated estimates will have lower accuracy than when estimates come from direct observations.

Accuracy cannot account for breeder-influenced data quality issues, such as how well management groups are defined.

The following guide may be useful for interpreting accuracy:

Accuracy Range	Interpretation
Less than 50%	EBVs are preliminary and could change substantially as more performance information becomes available.
50-74%	Medium accuracy, usually based on the animal's own records and pedigree.
75-90%	Medium-high accuracy. Some progeny information included.
More than 90%	High accuracy estimate of the animal's true breeding value. It is unlikely that EBVs will change much with addition of more progeny data.

It is important to keep accuracy in perspective. Accuracy and genetic merit are not the same things. It is possible for animals to have very low EBVs, but for these EBVs to be highly accurate. Conversely, animals may have high EBVs with low accuracy.

Animals should be compared on EBVs regardless of accuracy. However, where two animals have the same EBV, assuming all other factors are equal, the animal with the higher accuracy would be the safer choice. This is because it would have greater reliability of progeny outcomes than the animal with the lower accuracy.

More information on **accuracy** is available from the BREEDPLAN website.