SBTS TBTS

TechTalk

November 2014

A Commercial Producers Basic Guide to Using BREEDPLAN Information

The purchase of replacement sires in a beef breeding enterprise is a major investment. As a commercial producer not only should you feel confident that the information which you use to make bull purchasing decisions is reliable but also an accurate description of the genetics you will be introducing to your herd. A Bull Breeding Soundness Evaluation (BBSE) test will evaluate a bull's ability to produce an adequate quantity of good quality semen, desire and capacity to serve females, and a visual assessment can determine both structural soundness and temperament. However it can be very difficult to identify bulls which are genetically superior for traits such as carcass attributes, daughters milking ability and female fertility, when visual differences between bulls are the result of both genetics (which will be passed on to offspring) and environmental effects such as feed regime and age (which will not be passed on to offspring). A way of getting around the problem of identifying what is genetics and what is nutrition and environment is through the use of EBV's.

Estimated Breeding Values (EBVs)

An animal's breeding value is its genetic merit, half of which will be passed on to its progeny in its DNA. While we will never know the exact breeding value, it is possible using both pedigree, an animal's own performance (e.g. weights, eye muscle size etc) and the performance of all known relatives, to make good estimates of an individual animals breeding value. These are called Estimated Breeding Values (EBVs).

EBVs are expressed as the difference between an individual animal's genetics and the genetic base to which it is being compared. The genetic base can broadly be explained as an historic group of animals. In general, each breed is running its own breed specific BREEDPLAN analysis with its own genetic base, which means you can only compare EBVs with other animals of the same breed.

EBVs are reported in the units in which the measurements are taken (e.g. kilograms for the weight EBVs). Thus a value of +12kg for 400 day weight means the animal is genetically superior by 12kg at 400 days of age compared with the genetic base of the relevant cattle population. On average, half of this difference is passed on to the animal's' progeny.

Using EBVs in Practice

EBVs are used to identify genetic differences between animals for the analysed traits. To use EBVs in practice it is recommended that:

1. *EBVS only be compared within breed.* Each breed is currently running a separate BREEDPLAN evaluation with a different genetic base, meaning the EBVs of different breeds are not comparable.
2. *Compare an animal's EBV to the breed average GROUP BREEDPLAN EBVs.* The breed average EBVs provide an estimate of the current genetic level of the breed for individual traits.
3. *Compare and animal's EBV to the GROUP BREEDPLAN Percentile bands table.* The percentile bands table enables the animal to be ranked within the breed based on its EBVs.
4. *Consider the accuracy of the EBV* (refer to description below under Accuracy)
5. *Consider EBVs in association with other economically important traits* that may not be accounted for in the EBV e.g. structural soundness, temperament, bull breeding soundness evaluations etc.

Table 1. Interpreting EBV Accuracy

Accuracy Range	Interpretation
Less than 50%	The EBVs are preliminary. EBVs in this range will have been calculated based on very little information. These EBVs could change substantially as more direct performance information becomes available on the animal
50 - 74%	The EBVs are of medium accuracy. EBVs in this range will usually have been calculated based on the animal's own performance and some limited pedigree information.
75 – 90%	The EBVs are of medium-high accuracy. EBVs in this range will usually have been calculated based on the animal's own performance coupled with the performance for a small number of the animal's progeny.
90% and above	The EBVs are a high accuracy estimate of the animal's true breeding value. It is unlikely that EBVs will change considerably with addition of more progeny data.

Accuracy

An accuracy value is presented with every EBV and gives an indication of the amount of information that has been used in the calculation of that EBV, as shown in Table 1. The higher the accuracy, the lower the likelihood of change in the animal's EBV as more information is analysed for that animal or its relatives.

Although the accuracy of an EBV should be considered, animals should be compared on EBVs regardless of accuracy. Where two animals have the same EBV however, the animal with the higher accuracy would normally be used more heavily than the bull with the lower accuracy because the results can be predicted with more confidence

EBV Traits

Before purchasing a bull/s it is recommended that commercial producers first determine their breeding objectives, for example to increase yearling growth or female fertility, and thereby select which traits they wish to focus their purchasing decisions on. The following is a brief description of EBV traits currently available. Not all traits are available for all breeds. It is recommended that purchasers make balanced selection decisions across a number of traits, as focusing all selection decisions on a single trait may have an undesirable effect on other traits. For example, continuously selecting for high growth may result in increased incidences of dystocia.

Birth Traits

Gestation Length: The GL EBV (days) is based on AI records. Lower (negative) GL EBVs indicate shorter gestation length and generally easier calving.

Birth Weight: The Birth Weight EBV (kg) is based on the measured birth weight of animals, adjusted for dam age. The lower the value the lighter the calf at birth and the lower the likelihood of a difficult birth occurring. This is particularly important when selecting sires for use over heifers.

Calving Ease DIR (%): Estimates of the genetic differences between animals in the ability of their calves to be delivered from 2 year old heifers without assistance.

Calving Ease DTRS (%): Estimates of the genetic differences between animals in the ability of their 2 year old daughters to calve without assistance.

Fertility traits

Scrotal Size: The SS EBV (cm) is an indicator of male fertility in regards to semen quality and quantity. Scrotal circumference measurements are taken between 300 and 700 days and adjusted to 400 days of age .This EBV is an indicator of male fertility to semen quality and quantity higher (positive) EBVs indicate higher fertility. SS is also positively associated with female fertility.

Day to Calving: The DTC EBV (days) is an indicator of female fertility based on the time between a cows first exposure to a bull and when she subsequently calved. Cows that calve late in the season or fail to calve are penalised. Lower (negative) EBV's are preferred indicating shorter days to calving for the sires daughters.

Growth traits

Milk: 200-Day Milk EBV (kg) is an estimate of an animal's milking ability. For sires, this EBV is indicative of their daughter's milking ability as it affects the 200-day weight of their calves.

200-Day Growth: The 200-Day EBV (kg) is calculated from the weight of animals taken between 80 and 300 days of age. Values are adjusted to 200 days and for dam age. This EBV is the best single estimate of an animal's genetic merit for growth to early ages.

400-Day Weight: The 400-Day Weight EBV (kg) is calculated from the weight of progeny taken between 301 and 500 days of age, adjusted to 400 days and for dam age. This EBV is the best single estimate of an animal's genetic merit for yearling weight.

600-Day Weight: The 600-Day Weight EBV (kg) is calculated from the weight of progeny taken between 501 and 900 days of age, adjusted to 600 days and for dam age. This EBV is the best single estimate of an animal's genetic merit for growth beyond yearling age.

Mature Cow Weight: The Mature Cow Weight EBV (kg) is an estimate of the genetic difference in cow weight at 5 years of age. Lower or more moderate EBVs are generally more favourable.

Carcase

Carcase Weight: The Carcase Weight EBV (kg) estimates the genetic difference in carcase weight at a standard age of 650 days.

Eye Muscle Area: The EMA EBV (cm2) estimates genetic differences in eye muscle area at the 12/13th rib site of a 300kg dressed carcase. More positive EBVs indicate better muscling.

Rib Fat: The Rib Fat EBV (mm) estimates the genetic differences in fat depth at the 12/13th rib in a 300kg dressed carcase. More positive EBVs indicate more subcutaneous fat and earlier maturity.

Rump Fat: The Rump Fat EBV (mm) estimates the genetic differences in fat depth at the P8 site of a 300kg dressed carcase. More positive EBVs indicate more subcutaneous fat and earlier maturity.

Retail Beef Yield Percent: The RBY EBV (%) represents total (boned out) meat yield as a percentage of a 300kg dressed carcase. A more positive EBV indicates higher percentage yield for the 300kg carcase size.

Intramuscular Fat Percent: The IMF EBV (%) is an estimate of the genetic difference in the percentage of intra-muscular fat at the 12/13th rib site in a 300kg carcase. Depending on market targets, larger more positive values are generally more favourable.

Temperament

Flight Time: The flight Time estimates of the genetic differences between animals in temperament. Trial Flight Time EBVs are expressed as differences in the number of seconds taken for an animal to travel approximately 2.0 metres after leaving the crush. That is, higher EBVs indicate a longer time taken to exit the crush and hence better temperament.

Docility: Docility EBVs are estimates of genetic differences between animals in temperament. Docility EBVs are expressed as differences in the percentage of progeny that will be scored with acceptable temperament (ie. either "docile" or "restless") and are calculated from temperament scores recorded on animals using either a crush or yard test when the animals are between 60 and 400 days of age (preferably at weaning).

Other

Trial Net Feed Intake (NFI): Estimates of the genetic differences in feed intake for animals adjusted to the same growth rate and weight base.

Selection Indexes

What are Selection Indexes?

BREEDPLAN calculates Estimated Breeding Values (EBVs) for a range of economically importantly traits. While this provides cattle producers with a comprehensive range of information regarding the genetic merit of an animal, it can result in a dilemma when trying to select animals for use in a particular breeding program. In an ideal situation, it would be desirable to select animals that excel in all traits, but rarely will an animal be superior for all the available EBVs. So which traits should

producers put most emphasis on? How much emphasis should be placed on each trait? Selection indexes are a tool that can help solve this dilemma. Selection indexes combine BREEDPLAN EBVs for an animal with an economic weighting (based on costs of production and returns on outputs), to produce a single value, expressed as dollars per cow mated. They reflect both the short term profit generated by a sire through the sale of his progeny, and the longer term profit generated by his daughters in a self-replacing cow herd.

A separate selection index can be produced for any particular production scenario and market, and majority of breeds have selection indexes available to assist commercial producers in their bull selection decisions To access detailed descriptions of the selection indexes currently available visit 'Breed Specific Documents' in the Technical section of the BREEDPLAN website, and click on the relevant breed, or contact the relevant breed society.

Using Selection Indexes in Practice

As a guide to using Selection Indexes, it is recommended that producers complete the following steps:

1. Identify the Selection Index of most relevance to your production system
2. Rank animals on the Selection Index
3. Consider the individual EBVs of importance
4. Consider other traits of importance that may not be accounted for in the selection index (eg. temperament, structural soundness)

For more information about Estimated Breeding Values, selection indexes and bull selection, please visit the SBTS (http://sbts.une.edu.au) or TBTS (http://tbts.une.edu.au) websites.