EBVs and EPDs – What’s the Difference?

Seedstock breeders that source genetics both domestically and internationally are exposed to different languages used to describe the results from the genetic evaluations of the different continents, namely EBVs from Australia and EPDs from North America. If this applies to you, do you know if there are differences between EBVs and EPDs and if so, what are the differences and how do they impact on your selection decisions? To answer these questions read on.

Australian Beef Cattle Breed Associations, including the Red Angus Society of Australia, generate Estimated Breeding Values (EBVs) from their genetic evaluation program known as BREEDPLAN. EBVs are defined as an estimate of an animal’s own genetic value for a particular trait.

North American Cattle Breed Associations generate Expected Progeny Differences (EPDs) from their genetic evaluations. An EPD is defined as an animal’s genetic value as a parent for a particular trait. As the parent contributes 50% of its genes to its progeny, an EPD is theoretically half an EBV (or 0.5 * EBV = EPD).

The question to ask at this point is how can North American EPDs be interpreted to be directly comparable with Australian EBVs? This could be the situation if you are sourcing genetics from North America for use in Australia.

In general it is difficult to compare EPDs with EBVs, even if the EPDs of an animal are simply multiplied by 2, due to significant differences in the analyses of the two continents. The differences include:

- **Different trait definitions:** There are subtle differences in some traits across continents such as Yearling Weight. Yearling Weight BREEDPLAN EBVs estimate genetic differences for weight at 400 days of age, whereas North American EPDs for yearling weight estimate weight differences in progeny at 365 days of age. There are also more significant differences in other traits, particularly the carcase traits. For example Eye Muscle Area (EMA) BREEDPLAN EBVs estimate genetic differences for EMA in a standard 300 kg steer carcase, whereas North American EPDs estimate EMA (known as REA) differences in progeny at 365 days of age.

- **Different units of measure:** The obvious differences between continents are the units of measure for weight. In Australia we use kilograms (kg) and in North America they use pounds (lb). EBVs or EPDs are reported in the unit of measure so BREEDPLAN EBVs for weight are reported in kgs and North American EPDs for weight in lbs. This also relates to the carcase traits with Australia recording EMA in cm² while in North America they use inches².

- **Selection index definitions:** At the time of writing this article the Red Angus Society of Australia was not producing selection indexes; however several were being produced by North American Breed Associations. Selection indexes are based on specific production systems and market endpoints therefore a selection index produced for use in North America may not suit the Australian production environment.

- **Single trait vs multi trait analysis:** BREEDPLAN is a full multi-trait analysis which basically means that all EBVs are calculated simultaneously in the one analysis so the relationship (known as correlations) between traits can be used to increase the accuracy of individual EBVs. For example a birth weight, 200 day weight, 400 day weight and EMA record for an individual is used in the calculation of a Yearling Weight EBV. The North American analyses are less sophisticated and
generally only analyse a limited number of traits in the one analysis. For example the analysis of Carcase EPDs is separate to the analysis of the Weight EPDs.

- **Different base group** – In genetic analysis terms the base is a group of animals (defined by a range of birth years) that is set to have the same EBV average from one run to the next. All animals are compared through genetic linkage to the base group for their EBV calculation. For the Red Angus BREEDPLAN analysis the base group is defined as the animals born from 1990 to 1995. This base group has no relationship to the base group in the genetic evaluations of other Breed Associations within or outside Australia. For this reason, EBVs from the Red Angus BREEDPLAN analysis cannot be compared to EBVs or EPDs from any other analysis including the North American Angus or Red Angus EPD analyses.

**How does the Red Angus BREEDPLAN analysis use North American EPDs?**
Even with the analysis differences explained above, EPDs from the American Angus Association, the American Red Angus Association and the Canadian Angus Association are effectively incorporated in the Red Angus BREEDPLAN analysis. They are used as a starting point and add to the EBV accuracy of imported animals and their progeny. The EPD traits that are potentially included are birth weight, weaning weight, yearling weight, mature cow size, milk, scrotal circumference, carcase weight, fat thickness, rib eye area, percent retail product and marbling score. As local (e.g Australian) progeny are performance recorded for these traits the EBVs of the imported sires will reflect this data with less influence from the EPDs.

**Is there any way of interpreting North American EPDs to be comparable with BREEDPLAN EBVs?**
As explained above this is near impossible to do, however as a very loose rule of thumb the following is suggested. For a particular trait (e.g Yearling Weight) note how Sire A ranks in the EPD analysis compared to a sire (Sire B) of similar age that has progeny analysed in Australian BREEDPLAN analysis. If Sire A ranks above Sire B for the particular trait you can expect, initially, that Sire A will have a higher starting EBV value. This may change as Sire A has local progeny performance recorded and analysed.

Further information on BREEDPLAN and genetic technologies in general can be accessed at the Southern Beef Technology Services (SBTS) website (http://sbts.une.edu.au) or by contacting Christian Duff, SBTS Technical Officer (Ph: (02) 6773 2472)

*Article compiled by Christian Duff for Red Angus Express, November 2007.*