

Understanding Milk EBVs

The weight of a calf at 200 days is influenced by many factors. Research has shown that 70% of the variation between the weight of calves at 200 days can be attributed to non-genetic factors (eg. nutrition, disease), 20% to differences between the calf's genetics for growth and the remaining 10% to differences in the maternal contribution made by the mother.

The maternal contribution of the mother is consequently an important consideration for beef enterprises. Differences in the contribution of the dam to the 200 day weight of the calf are influenced by such things as the amount of milk the calf receives, the quality of the milk received and the mothering ability of the dam.

Interpreting Milk EBVs

Milk EBVs provide an estimate of the maternal contribution of a dam to the 200 day weight of her calf. In the case of sires, this estimates the maternal contribution that his daughters will make to the 200 day weight of their progeny.

The Milk EBV is expressed in kilograms and indicate the expected difference in the weight of the calf at 200 days due to the maternal contribution of the cow.

Larger, more positive, 200 Day Milk EBVs are generally more favourable, depending on the environment. For example, a bull with a 200 Day Milk EBV of +15 kg would be expected to sire daughters with higher milk production than a bull with 200 Day Milk EBV of +5 kg. This higher milk production potential should be reflected through higher weaning weights among the daughter's calves.

It is important to note that the optimum level of Milk EBV will be dependent upon the production system and environment in which the cows are run. Selection for increased milk production may be warranted when cows are run under good nutritional conditions and calves are sold as weaners. However, some environments may not support high milking cows. For example, high milking cows may not get back in calf as easily as lower milking cows in the following year.

How is the Milk EBV calculated?

The Milk EBV is calculated by partitioning the difference in the 200 day weight of calves into growth and milk components. The following explanation provides a simplistic demonstration of how the BREEDPLAN analysis uses the 200 day weight of a calf to calculate its Milk EBV.

1. Initial Calculation of an EBV

Before the Milk EBV can be considered, it is necessary to outline the basic calculation of an EBV. In a simple situation, the calculation of an EBV is a very straight forward process. The only information that is needed is the animal's own performance, the

performance of its peers and the heritability of the trait (nb. heritability is defined as the proportion of the genetic superiority or inferiority of an animal that is passed on to its progeny).

Once this information is available, the EBV can be defined as :

$$\text{EBV} = (\text{Animal's Performance} - \text{Average Performance of Peers}) \times \text{Heritability}$$

For example, if a bull weighed say 60 kg above the average of its peers at 400 days, its EBV would be calculated as follows:

$$\begin{aligned} 400 \text{ Day Weight EBV} &= 60 \text{ kg} \times 0.30 \\ &= +9 \text{ kgs} \end{aligned}$$

Of course, in real life the calculations become far more complicated. In a GROUP BREEDPLAN evaluation, the calculation of EBVs for an animal include :

- ❑ the animal's own performance
- ❑ the performance of all known relatives in all herds
- ❑ the relationship between the different traits
- ❑ the performance of all herds over all years of recording

2. Calculation of Milk EBV

Having looked at a simple EBV calculation, let's consider the calculation of the Milk EBV. In this scenario, the calf has an adjusted 200 day weight of 300 kg compared to the group average of 260 kg. That is, the calf is 40 kg heavier than the average weight of his peers.

As stated previously, research has shown that 70% of the variation between the weight of calves at 200 days can be attributed to non-genetic factors (eg. nutrition, disease), 20% to differences between the calf's genetics for growth and the remaining 10% to differences in the maternal contribution made by the mother. In technical terms, this means the heritability of the Milk EBV is 10% and the heritability of growth to 200 days (ie. 200 Day Growth EBV) is 20%.

With all the required information known, the BREEDPLAN analysis can partition the 40 kg superiority of the above calf into growth and milk components:

$$\begin{aligned} \text{Milk EBV} &= (\text{Animal's Performance} - \text{Performance of Peers}) \times \text{Heritability} \\ &= 40 \text{ kg} \times 0.1 \\ &= +4 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{200 Day Growth EBV} &= (\text{Animal's Performance} - \text{Performance of Peers}) \times \text{Heritability} \\ &= 40 \text{ kg} \times 0.2 \\ &= +8 \text{ kg} \end{aligned}$$

In contrast to the 200 Day Growth EBV, the extra weight of the calf due to milk reflects the cow's genetic potential, so only half of the EBV is inherited by the calf.

Therefore, the cow's Milk EBV will be +4 kg and the calf's Milk EBV will be +2 kg. The calf's 200 Day Growth EBV will remain at +8 kg.

As stated previously, the calculations in the BREEDPLAN analysis become far more complicated than in this simplistic example. In a GROUP BREEDPLAN evaluation, the calculation of Milk EBVs for an animal can also be influenced by:

- ❑ the later weight performance of the animal
- ❑ the other calves from the dam of the calf
- ❑ the performance of all known relatives in all herds

That is, there are literally thousands of calculations that go into producing an EBV for every animal in a large performance recorded population. You can't do these calculations "on the back of an envelope".

Recording Information for Milk

As the Milk EBV is calculated by partitioning the difference in the 200 day weight of calves into growth and milk components, the live weight of calves at 200 days needs to be recorded for the calculation of Milk EBVs.

While most stud producers will be reasonably comfortable with how to record the live weights of their animals, there are a number of important considerations that should be made in order to maximise the effectiveness of the 200 day weights that are recorded.

- ❑ Weights should be recorded when animals are between 80 and 300 days of age.
- ❑ Weights should be recorded to the nearest kilogram.
- ❑ A management group should be entered for any calf or group of calves that have either been treated differently or exposed to significant non-genetic influences since the previous weighing. For example, calves given a supplement should be recorded in a different group to those without a supplement. Consideration should also be given to variations in pasture quality, stocking rates, water quality, etc. Note that blank is a unique management group.
- ❑ To ensure the maximum number of calves are analysed in the same management group, you should try to weigh all the animals from one management group on the same day. BREEDPLAN will automatically split your management groups if you weigh on different days.
- ❑ Ideally, calves should be weighed when they are in as large a group as possible. Consequently, try to weigh calves before any of the calves in the management group are treated differently. For example, weigh before you castrate some of your bull calves or before the show team is separated out from the rest of the group.
- ❑ BREEDPLAN can analyse up to two 200 day weights on each animal. Generally speaking, it is only necessary to record one weight, however in some circumstances, recording more than one 200 day weight may improve the accuracy of the EBVs.

In addition, breeders particularly looking to optimise the quality of the Milk EBVs that are generated for their calves should also consider:

- ❑ The weights of calves should be recorded at or before weaning.
- ❑ If you are concerned that a significant number of cows are weaning calves naturally before the calves are “physically” weaned, then it may be beneficial to consider taking an early weight on all calves. That is, if you aren’t weaning calves until they are 200 days of age but some cows start to “dry off” at 150 days of age, it may improve the accuracy of your Milk EBVs if you weigh all calves when they are around 150 days of age.
- ❑ BREEDPLAN will also use the 400 day weight recorded for a calf as a repeat measure in the calculation of its Milk EBV. Therefore, recording 400 day weight will further enhance the accuracy of your Milk EBVs.

Live weight information should be submitted directly to the BREEDPLAN office at ABRI.

The main method of submitting live weight information is by completing the BREEDPLAN “performance recording forms”. Performance recording forms will be sent to you shortly after you record your calves with your Breed Society/Association or can be requested by contacting staff at BREEDPLAN.

Alternatively, live weight information can be submitted electronically via either:

- ❑ a BREEDPLAN compatible herd recording computer program
- ❑ the performance submission facility offered on some Breed Society/Association websites
- ❑ the BREEDPLAN compatible Microsoft Excel template.

For more information regarding Milk EBVs, please contact staff at BREEDPLAN.