

An insight into understanding the Cow Value

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SA Stud Book provides a variety of indices that are easier to interpret than standard estimated breeding values (EBVs). These involve all fertility, growth and performance-based traits that are measured and included in the monthly genetic evaluations. The wide range of traits and numerous indices can cause some confusion for breeders. Thus, certain index values have been created with the consolidation of specific traits into one easy to interpret value. One of these is the Cow Value, which will be discussed in detail below.

The Cow Value identifies the genetic potential of female animals that are highly fertile, have low maintenance requirements, calve easily, and wean a heavy calf every single year. The Cow Value is also indicative of bulls that have the genetic potential to breed the types of cows described above. So, which measurable traits (sub-values) are incorporated into the Cow Value and how do you use it to identify the ideal cow for the environment in which you are breeding. A breeder should always look at these sub-values, as there are diverse ways to get to the same Cow Value. Animals with the same Cow Value will have different sub-values that are indicative of individual strong characteristics the animal will inherently have.

Looking at Table 1, five values are combined and specifically weighted to accurately identify the best animals. However, the 'best' animal may be different for different environments or management practices. For example, see Table 1, where the breeding goals and selection constraints differ for Extensive (Average environment) and Intensive (Very good environment) as these require different management and breeding objectives. Breeding goals may be unique for each herd, and are determined by for example differences in environments, management, or markets, or simply the current genetic level of your cows.

Table 1: The sub-values incorporated into the Cow Value and a comparison of the ideal cow between Extensive (Average environment) and Intensive (Very good environment) production systems.

Sub-Values	Extensive Environment (Average Growth)		Intensive (Very Good) Environment (High Growth)	
Calving Ease	Average birth weight	90 - 110	Higher birth weight	>80
Calf Growth	Average wean weight	90 - 110	Heavy weaning weight	>110
Milk	Average milk	90 - 110	Average to high milk	>90
Maintenance	Average cow weight	90 - 110	Heavier cow weight	>80
Fertility	High fertility	>90	High fertility	>90

The Calving Ease Value, which is an indicator of the cow's genetic potential to calve a lighter or heavier calf, is a combination of the birth weight direct and maternal breeding values. Birth weight direct is the calf's ability to grow during gestation while the birth maternal value is cows' ability to restrict the growth of the foetus to prevent it becoming too big and causing calving difficulties. The Calf Growth Value only involves the weaning weight direct. This is the calf's ability to reach a higher weaning weight at the same age in comparison to his/her peers. In an ideal breeding situation, one would aim for a lower or average birth weight, to minimise calving difficulties, and an average to higher weaning

weight to acquire a heavy weaner calf. A very heavy calf will have a high birth weight, thus a lower calving ease value.

The Milk Value describes the complex relationship between a cow's mothering ability as well as her potential to provide sufficient milk to a suckling calf. This is a delicate balance as we do not want cow's that provide too little milk and thus stunt the growth potential of her calf as well as provide too much milk, causing her to unnecessarily waste energy reserves that would aid in her ability to cycle and become pregnant again within the desired period.

The Maintenance Value uses two traits. The first is the EBV Mature^{0.67}, which uses the Cow's weight that was measured at the weaning of her first three calves. This is an indication of firstly how large the animal is, which relates to minimum feed intake requirement. Larger cows will have a higher maintenance requirement which simply put means that they require eating more grass/feed to spend energy on production processes like becoming pregnant and weaning a heavy calf while producing sufficient milk. The Maintenance value is interpreted as follows; smaller cows with a lower maintenance requirement will be above an index value of 100, while larger cows with higher maintenance requirements will have values below 100. Cow size will vary across production systems, as extensive systems may require a medium framed cow (90 – 110 Maintenance Value) while breeders with availability to affordable feeds, such as crop residues, are able to support larger framed cows (>80 Maintenance Value). In systems where feed is affordable, breeders will select for larger cows as they will provide larger calves, and here birth weights will also be larger. Due to plentiful energy resources, these cows will have sufficient energy reserves that will allow for them to wean a heavy calf every year. Secondly is the Milk EBV, which was previously explained. A small fraction of the milk value (10%) is included in the maintenance value as high milk production increases the maintenance requirement of the cow.

Finally, we have the Fertility Value. This takes three separate values into account. The first is Heifer Fertility, which is based on the Age at First Calving (AFC) measurement. This identifies heifers that successfully conceive earlier within a breeder's mating season in comparison to other heifers within the same mating group. Secondly, we have Cow Fertility. This considers the first three Inter-Calving Periods (ICP) that a cow may have. Breeders may ask why we only use the first three ICPs, and looking at Table 2, the heritability of ICP decreases from 0.13 for ICP1, to 0.09 for ICP2 and 0.03 for ICP3. This is due to all the known and unknown managerial and environmental factors that play a role in a cow's ability to successfully conceive and wean a heavy calf every year. By ICP3, only fertile cows remain, and contemporary groups are mostly very small, making it difficult to pick up genetic and phenotypic variance. Lastly, we have the Longevity Value. This value takes into account the stayability of a cow within a herd. This value is dependent on cows and their family being retained in the breed and bulls with daughters that are culled or removed from the herd at a younger age may be negatively affected.

Table 2: Heritability's of specific trait (on the diagonal) as well as the genetic correlations between each trait (right hand side of the table), used in the Boran breed.

	Weaning weight	AFC	ICP1	ICP2	ICP3
Weaning weight	0.24	0.13	0.01	-0.28	0.10
AFC	-	0.22	0.17	0.13	0.28
ICP1	-	-	0.13	0.11	0.58
ICP2	-	-	-	0.09	0.52
ICP3	-	-	-	-	0.03

Conclusion

The Cow Value is indeed an in-depth value that looks at all the characteristics that will aid breeders in identifying highly fertile cows that conceive and wean heavy calves every year. It is also a useful selection tool in identifying bulls with the genetic potential of breeding these types of cows.