

# How to use breeding values to select beef cattle

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***If you have only started to breed beef cattle, you might have found breeding values overwhelming. Some breeds receive up to 18 breeding values. What do they mean, and are some more important than others? Selecting animals on breeding values is in fact quite easy, once you know how. The key is to do your homework before you select animals.***

There is a saying, “Good feeding can hide bad breeding”, which is very true. You cannot look at an animal and decide what his genetics are. If he has been fed well, he will look good, but he can be genetically inferior. This implies that he – and his progeny – will need a lot of food and care to look good. It therefore makes more sense to buy an animal that is genetically superior, as it will be more profitable. Its superiority will also be transmitted to its progeny.

The general idea is to rather breed animals that are suitable for your environment, not to continually change the environment to suit the animal, as this can be a very costly exercise. Using adapted animals is also the right thing to do from an animal welfare point of view.

The reason why we need to look at breeding values to know how the bull will breed is because the effect of the environment, and feed, is so important. The only way to “get the environment out” is the scientific way, which entails performance measurements under controlled circumstances and complete pedigree recording. If you don’t do performance measuring properly, your animals will not get usable breeding values. So if you buy stud animals, it should be from a breeder who does

performance measurement on his animals, and knows and understands breeding values.

Another important factor is that genetic change is a long-term venture. The effect of the bull that you buy today will still be felt in the herd for years to come. If he is a good choice, his daughters will become your herd cows, and part of your profit and the future. So don’t buy a lucky packet bull – one you don’t know anything about, but you are hoping for the best. Even if the bull you buy is not perfect, if you know about his shortcomings, you can manage it by using him on suitable cows.

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## **Breeding values**

Breeding values are also expressed as indexes, which is very easy to interpret and use. The average breeding value index of live animals in the breed is set to 100. So above 100 means the animal is better than the breed average. For example, a value of 120 for weaning weight means a calf that has the genetic potential of 20% heavier than the average calf.

Breeding value indexes indicate genetic potential, and how heavy an animal will actually be, is determined by the amount of feed it gets. However, if you have two calves, one with an index of 120

and another with an index of 80 together on the same farm, the one with an index of 120 will definitely be the heaviest. A lower birth weight is generally more desirable, as birth weight is the most important cause of difficult births. So an index for birth weight of above 100 indicates a lighter calf.

Note that although above 100 indicates the more desirable direction, it does not imply that all breeding value indexes should be maximum. For some traits, e.g. birth weight and mature weight, average is in fact the most desirable.

Another fact that should be kept in mind is that traits are connected to one another, meaning you should not select on one trait only. Selecting only for maximum weaning weight, for example, will increase birth weight, which will cause difficult births, and mature weight, causing large-framed cows that can be inefficient under certain circumstances.

In *Table 1* the information of six bulls in a sales catalogue is shown. The breeding value indexes of the bulls (for example row A) and the accuracy of the breeding value (row C) are used in the selection of bulls. The accuracy indicates the amount of information available for breeding value estimation. If it is above 80%, the breeding value is based on lots of information, while below 30% it are not very reliable and may change a lot as new information is used for breeding value estimation.

Row B can also be used, but it indicates breeding values, which is not as easy to interpret as the breeding value indexes. The information in row D only indicates if the animal was measured for a specific trait. It can not be used for any selection whatsoever, as it reflects mainly the environmental effect and not the genetic effect.

## **How to use breeding values**

If, for example, you want to buy a breeding

# BREEDING PRACTICE

**Table 1: Example of six Bonsmara bulls for sale in a sales catalogue.**

Nr	DIRECT CALF TRAITS			DAUGHTER TRAITS			GROWTH		EFF.	REP	MEASUREMENTS			
	Progeny birth weight	Progeny wean weight		Ease of calving	Milk production	Mature weight	Post-wean weight	Daily gain	Feed conversion		Height and length			
	Breeding value indexes													
	Birth dir acc	Wean dir acc		Birth mat acc	Wean mat acc	Mature weight acc	Post-wean acc		ADG acc	FCR acc	SC acc	Hgt acc		Lgt acc
Wgt kg	Wgt kg	Ind	Kg	Kg	Kg	365d ind	540d ind	Ind	Ind	(mm)	(mm)	(mm)		
1	<b>94</b>	<b>105</b>		<b>99</b>	<b>84</b>	<b>85</b>	<b>103</b>		<b>88</b>	<b>87</b>	<b>101</b>	<b>86</b>	<b>92</b>	<b>A</b>
	1,24	12,8		0,08	-0,6	-10,0	17,8		29	-25	8,3	-7	4	<b>B</b>
	81	75		65	67	43	57		50	17	53	53	52	<b>C</b>
	37	224	100				112	107	-	-	-	-	-	<b>D</b>
2	<b>111</b>	<b>89</b>		<b>90</b>	<b>106</b>	<b>78</b>	<b>89</b>		<b>76</b>	<b>67</b>	<b>82</b>	<b>88</b>	<b>82</b>	
	-0,68	5,4		0,46	5,1	-17,0	8,0		-26	7	-2,5	-6	-6	
	80	73		62	63	23	47		33	8	36	37	36	
	31	181	91				98	97	-	-	-	-	-	
3	<b>86</b>	<b>109</b>		<b>94</b>	<b>111</b>	<b>110</b>	<b>110</b>		<b>110</b>	<b>104</b>	<b>107</b>	<b>106</b>	<b>117</b>	
	2,13	15,2		0,29	6,5	17,0	22,9		123	-51	11,7	6	27	
	81	74		54	65	38	58		45	17	49	50	46	
	40	229	108				98	97	-	-	-	-	-	
4	<b>97</b>	<b>110</b>		<b>91</b>	<b>110</b>	<b>104</b>	<b>113</b>		<b>116</b>	<b>111</b>	<b>107</b>	<b>123</b>	<b>112</b>	
	0,90	15,5		0,39	6,2	11,0	25,3		148	-63	11,9	18	23	
	80	70		62	61	38	50		45	23	40	40	48	
	36	238	108				108	109	-	-	-	-	-	
5	<b>97</b>	<b>100</b>		<b>106</b>	<b>107</b>	<b>105</b>	<b>100</b>		<b>107</b>	<b>104</b>	<b>108</b>	<b>110</b>	<b>109</b>	
	0,96	10,3		-0,22	5,3	12,0	15,9		110	-51	12,4	9	20	
	81	73		62	63	34	47		45	23	45	40	45	
	36	197	101				101	96	-	-	-	-	-	
6	<b>102</b>	<b>109</b>		<b>85</b>	<b>108</b>	<b>90</b>	<b>106</b>		<b>107</b>	<b>100</b>	<b>91</b>	<b>104</b>	<b>117</b>	
	0,34	14,8		0,64	5,8	-4,0	19,8		111	-46	2,3	5	28	
	81	74		55	65	43	55		45	17	43	48	47	
	35	258	108				91	106	-	-	-	-	-	

bull on breeding values, you need to follow a few simple steps. The first and most important is to know what you want. What you want is mainly determined by three factors: What do you want to do with the bull's calves, how much feed do you have and what is the genetics of your cows?

### What is your aim with the calves?

For example, you can sell some of the calves as weaners to a feedlot, or you can breed replacement cows for your older cows that are leaving the herd. If you intend to sell stud bulls, you should realise that it is a very specialised area, and you need to study performance measurement and breeding values in depth. Only the best bulls should become stud bulls. Having said that, as we will see, not all bulls need to be the same to be best.

### How much feed do you have?

The amount of feed determines the frame size that will do best. If you have lots of good quality feed at a reasonable price, larger-framed animals will probably be more profitable. If the animals are going to be extensively kept on the veld, medium-framed animals will probably be better. If conditions are very harsh, smaller-framed ones might be even better, but then rather choose a smaller-framed breed, so that selected animals are well adapted and strong and small-framed, not small-framed because they are poor.

### What is the genetics of your cows?

Are they perhaps the wrong frame size, or do not have enough milk (you can see this in their breeding values), or perhaps you are looking for a bull to use on your hei-

fers? Are they pedigree animals or crossbred cows? If they are pedigree animals, they will have breeding values and you will know with much more surety what their genetic abilities are.

### Set up a breeding goal

Use the above to decide what type of bull will be best on your farm. Let us say, for example, we need the following three bulls:

**Bull 1:** A bull with good growth to use on a group of crossbred cows that will be grazing the camp at the river with the good grass, as well as some crop rests. The calves will all be sold to a feedlot. A large-framed bull with good growth will therefore be best. Important breeding value indexes are weaning weight, average daily gain (ADG) and feed conversion ratio (FCR), which should all be as high as possible.

Post-wean weight, mature weight and height and length are also giving indications of the general frame size that the bull will breed.

On the genetic evaluation report, the growth value will summarise all these values into a single value, which makes selection easier. From *Table 1*, Bull 4 will be the best. Bull 3 is also suitable, but his birth weight breeding value index is too low. (A low birth weight index indicates a heavy calf at birth, which is undesirable). Bull 4's birth weight and weaning weight is much better than Bull 3's.

**Bull 2:** A bull to use on Bonsmara pedigree cows that do not have any particular problems. They will be on the veld all year. The heifers will be used as replacement cows in the herd or sold as such, while the bull calves from the superior cows will be sold as stud bulls. A bull with average or slightly above average growth will be ideal. Once again the growth breeding values are important, but should not be as high as possible, but closer to 100. It is now impor-

tant to also look at birth weight and milk, as well as the reproduction breeding value indexes AFC (age at first calving) and ICP (inter-calving period).

The cow value, which combines all the important breeding values into one value, will give a quick indication of how suitable the animal is to breed cows. (AFC, ICP and the cow value are not on the sales catalogue, only in the genetic evaluation report that all stud breeders receive once a year.) From *Table 1*, both Bulls 5 and 6 will be suitable, although Bull 6 will be the better choice, since birth weight, weaning weight and mature weight is a very favourable 102, 109, 90, indicating a curve bend-er, against Bull 5's 97, 100, 105, indicating a little bit too heavy at birth in relation to average at weaning and above average at maturity.

**Bull 3:** A bull to use on heifers that are to be mated to calve at two years. The bull should therefore not have a high breeding value for birth weight, in order to ensure easy calving. The calves should, however,

still be profitable, i.e. have enough growth to be either sold to the feedlot or to be used as replacement heifers.

A bull with breeding value indexes for both birth weight and weaning weight above 100 is ideal. In *Table 1*, for example, the best bull when selecting only on the best value on birth weight would be Bull 2, but he breeds small calves with little growth. Bull 6 will be a much better choice. Although birth weight index is above average (smaller), weaning weight is also above average (heavier), and this calf can be retained in the herd or sold.

### **In conclusion**

As can be seen from the above, different types of bulls are suitable for different types of cows and circumstances. It is also possible to find a custom bull for your cows, with the aim to improve the calves. As inbreeding should also be kept at a minimum, it is usually easier to use a mating programme to fit bulls to cows based on breeding values. <sup>SB</sup>

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