

New breeding values online

Understanding breeding values

The member survey shows that the breeding values are appreciated, but that many breeders have questions about how the breeding values come about and the application of the genetic profile. KWPN Breeding specialist Daniëlle Arts answers frequently asked questions about the recently published breeding values.

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Breeding values express in figures how a stallion inherits certain traits compared to the total population. They can give an indication of what you could expect with a certain choice of stallion. The breeding values are built up from various information sources. These are sports ratings, from both national and international competitions, and the results of KWPN events, such as inspections and aptitude tests. The KWPN has three different types of breeding values. The sport breeding value is calculated for jumping, dressage and harness horse sport. Then there is a breeding value for conformation and a breeding value for health, calculated for the riding horses (genomic breeding value D-OC).

How are breeding values calculated?

In the calculation of the breeding values, we measure to what extent a stallion deviates from the average. We know, for example, that an average horse scores 68 points on the studbook inspection. So when a stallion has offspring that achieves an average of 70 points on the studbook inspection, the difference with the population is two points. The same is done with the results of the aptitude tests, such as the performance test, IBOP or EPTM. In the aptitude tests, the average score is 71 points, so one could examine to what extent the offspring of a stallion scores higher or lower on average.

Leading role for sports performance

In the calculation of breeding values of older stallions, the sports performance of their offspring plays the biggest role. The sports data is divided into seven age categories (four, five, six, seven, eight, nine-year-old and ten years and older). According to regulations, four-year-old horses can't compete at a higher level than 'L' at the competitions and the same applies for five-year-olds in 'M' and six-year-olds in 'Z', and so on. To make a fair comparison, it is examined how offspring of a stallion performs at a certain age and how this deviates from the average. For an eight-year-old horse that competed L2 dressage at the age of four, the score counts as a four-year-old horse; because we look at the highest sports position ever achieved. The points are then attached to those sports results. For example, a B classification yields 1 point and Grand Prix is good for more than 200 points, depending on the discipline. This scale has been set up in consultation with scientists and the Breeding Council. Most points can be earned in the upper

level classes, where the score goes up considerably from the Small Tour or the 1.40m level. Many Grand Prix offspring increases the breeding value considerably.

It is not just the performance of the stallion himself and the offspring that is examined, the performance of his family is also included. Descent can play a role, especially with young stallions. If the sire of a young stallion increases in breeding value, this has a positive effect on the breeding value of the young stallion. This effect is later inherited by his offspring.



Joop TC (by Ravel) has, based on his own performance, the highest breeding value in combination with a low relationship and is therefore an interesting stallion for breeding.

Do inspection results count more heavily than sports performance in the calculation of breeding values?

A frequently heard comment is that the sports performance of offspring has too little influence. This is not the case with older stallions with sufficient offspring in the sport. For stallions with a breeding value with a high reliability, the sports results of their offspring form the largest share in his breeding value. This does not mean that the other characteristics, such as the aptitude tests and the inspections, no longer count. These predictive traits are included in the breeding value calculation, but have much less influence on the ultimate breeding value.

Amount of sports data predominates

As mentioned, the data comes from various information sources. Every data point, whether it comes from the sport or the EPTM, provides information that is carefully weighed and included in the breeding values. Sport is the most important thing here, because this is the breeding goal trait. Fortunately, most of the data usually comes from sports information sources. Although it differs whether it concerns older stallions, who have many offspring in the sport, or with young stallions who do not yet have one. When

stallions are young, information from the studbook inspections and tests prevail earlier and at that time also have a considerable influence on the total. This differs between jumping and dressage.

Gelders horses

Breeding values for dressage, jumping and conformation are also calculated for Gelders breeding. Although the principle is the same, these breeding values cannot be compared one on one with those of the riding horses. It is a separate population, in which the Gelders horse is more of a purebred than the riding horses. The characteristics of the Gelders horse go further than just dressage or jumping talent. Gelders breeding requires versatile, rideable horses that have a good exterior and a Gelders type. The conformation breeding values are a useful aid for the Gelders type, they can be found in the KWPN Database.



Despite the young age of his internationally performing KWPN offspring, Eldorado van de Zeshoek (by Clinton) is able to position himself firmly in the list of jumping stallions with high reliability.

Figure 1 shows that for the jumping stallions with a reliability higher than 80%, the data for the breeding value comes mostly from sport performance of the offspring (60%). The remaining share comes mainly from the studbook inspections. For jumping stallions with a reliability lower than 80%, this applies to 53% (figure 2). This means that the amount of sports data predominates in the breeding value calculations. For dressage, the influence from the sport is slightly less big, especially with the stallions with a lower reliability. Much more dressage horses are presented at the inspections and in the aptitude tests at a young age. There will probably also be a longer delay before young dressage horses are competed officially. For stallions with a reliability higher than 80%, the sport makes up for almost half the data (figure 3). With a reliability lower than 80% (figure 4), the data from the studbook inspections form the largest share in the breeding values, because there are still few offspring competing.

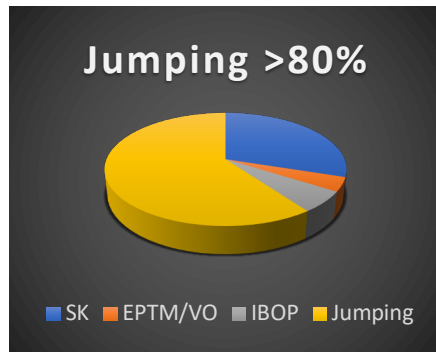


Figure 1¹: Among the stallions with reliability higher than 80%, the data for the breeding value comes mostly from sports results (60%). The remaining share comes mainly from the studbook inspections (SK).

Jumping 60%
EPTM / VO 4%
IBOP 6%
SK 30%

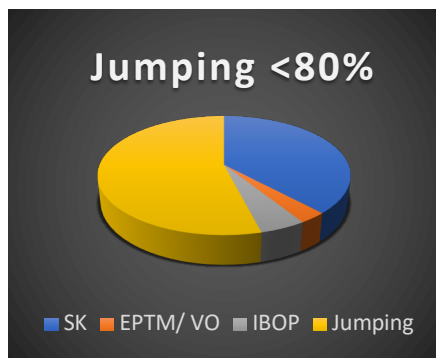


Figure 2: For the jumping stallions with a reliability lower than 80%, the data for breeding value comes for 54% from the sport.

Jumping 54%
EPTM / VO 3%
IBOP 5%
SK 38%

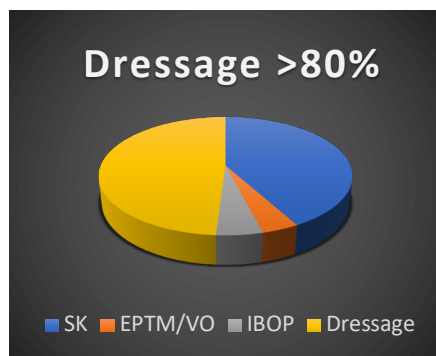


Figure 3: For dressage stallions with a reliability higher than 80%, the sport makes up almost half of the data.

Dressage 49%
EPTM / VO 4%
IBOP 5%
SK 42%

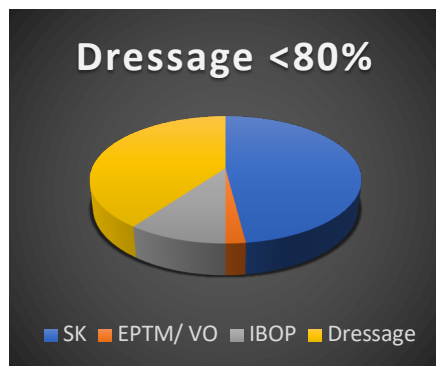


Figure 4: With a reliability lower than 80%, the data from the studbook inspections and sport form the largest share in the breeding values.

Dressage 40%
EPTM / VO 2%
IBOP 10%
SK 48%

¹ VO = 'Verrichtingsonderzoek' meaning performance test, SK= 'Stamboekkeuring' meaning studbook inspections.

How is the breeding value of younger stallions calculated?

Young stallions have little or no offspring on the show grounds. It is therefore necessary to look for characteristics that predict something about sports aptitude. These are results of the inspections and in the aptitude tests. The figures show that the results in the IBOP or EPTM have a strong genetic relationship with eventual sports performance. In many cases, high points in the mare test also mean a high sport classification, or at least offspring that does well in the sport. So they are good predictors. Ultimately, stallions have to prove themselves through the sport performance of their offspring; if that falls short, this will certainly affect the level of his breeding value. Therefore the data of stallions with fewer offspring in the sport is less reliable. All younger stallions with few sports progeny are in the same boat, which is why we can compare this group very well.

Are breeding values reliable?

The true genetic predisposition cannot yet be accurately measured. Fortunately, we can estimate it correctly, but then it is important to attach a reliability to it. This way, you can take into account what to expect in the interpretation. Reliability increases as more data becomes available: the more data, the higher the reliability percentage. When a stallion is approved, the reliability of his sport breeding value is around 40%. This is based on the performance in his pedigree and of course his own performance in the inspection and performance test. The reliability of the sport breeding value increases slightly when the stallion enters the sport himself, because then of course, information is added. The offspring ultimately provides the largest increase in reliability. Only then can be said with certainty whether a stallion is breeding well or not.

TOP 5 Jumper stallions with the highest breeding value

Reliability >=90%			Reliability 80-90%			Reliability <80%		
1.	Heartbreaker	166	1.	Untouchable	163	1.	Bacardi VDL	151
2.	Padinus	152	2.	Falaise de Muze	156	2.	Elton John	148
3.	Berlin	151	3.	Bernini	146	3.	Whitaker	147
4.	Eldorado vd Zeshoek	151	4.	Alicante HBC	141	4.	Dantos HBC	145
5.	Harley VDL	151	5.	Etoulon VDL	140	5.	Everglade VDL	143

TOP 5 Dressage stallions with the highest breeding value

Reliability >90%			Reliability 80-90%			Reliability <80%		
1.	Jazz	186	1.	Westpoint	163	1.	Chagall D&R	178
2.	Olivi	179	2.	Bordeaux	154	2.	Son de Niro	159
3.	Painted Black	176	3.	Bretton Woods	153	3.	Vic	159
4.	Vivaldi	166	4.	Tolando	146	4.	Governor	156
5.	Wynton	160	5.	Dream Boy	145	5.	All at Once	156

TOP 5 Harness stallions with the highest breeding value

Reliability >=80%			Reliability <80%		
1.	Cizandro	181	1.	Eebert	175
2.	Atleet	172	2.	Colonist	175
3.	Patijn	160	3.	Dylano	168
4.	Waldemar	153	4.	Plain's Liberator	168
5.	Manno	152	5.	Fantijn	166

TOP 3 Dressage stallions with a low kinship percentage* and a high breeding value

Based on offspring				Based on own performance			
		Kinship %	Breeding value			Kinship %	Breeding Value
1.	Feel Good	1.0%	161	1.	Joop TC	1.5%	164
2.	Ferguson	1.0%	152	2.	Kilian	1.5%	153
3.	George Clooney	1.5%	151	3.	Lantanas	1.1%	146

*The average kinship percentage in the dressage breeding direction is 2.1%

TOP 3 Harness stallions with a low kinship percentage* and a high breeding value

Based on offspring				Based on own performance			
		Kinship %	Breeding value			Kinship %	Breeding Value
1.	Dylano	8.9%	168	1.	Kane BFT	8.6%	165
2.	Plain's Liberator	5.1%	166	2.	Icellie	9.2%	159
3.	Stuurboord	8.6%	149	3.	Jesse James	8.9%	153

*The average kinship percentage in the dressage breeding direction is 10.4%



Stuurboord combines a low kinship percentage with a high sport aptitude and that makes the Jonker son, with his good offspring on the competition fields, a stallion that is certainly very interesting for harness horse breeding.

Why does the reliability increase after the linear scoring of the first foals of a stallion?

The reliability of a stallion's conformation breeding value increases when the first foals are scored linearly. Is that reliable information? The functional exterior is important for every discipline, because those characteristics are related to the way a horse moves or jumps. We also know that there is a strong link between foal and three-year-old conformation. Scoring a group of foals gives a first indication of the conformation, otherwise you have to wait until the first crop is three years old. Scoring them as foals therefore makes it possible to estimate the conformation breeding qualities of young stallions earlier.

Can numbers actually predict something 'sentimental' like breeding

"Breeding is an emotional matter that should be viewed from a practical point of view", is a frequently heard argument when it comes to (not) using the breeding values. A feeling for breeding, experience and vision are indeed the most important 'traits' of breeders. According to some breeders, a numerical foundation does not fit in with this. We think this requires some nuance. Breeding values are built up on data about all horses in the population. There are only a few breeders that can really attend all the possible events and are able to paint a similar detailed picture of the offspring of a stallion as the breeding values do. Everyone has the best performing offspring in mind, but breeding values concern all offspring. Also the less performing ones, because perhaps there are much more of those than is initially thought. That gives a more complete picture of the actual inheritance than just the best offspring.



The conformation breeding values are a useful aid for the Gelders horse. The breeding values of Danser (v. Sander) can also be found in the KWPN Database.

Can we determine the course of breeding entirely on breeding values?

The horse itself always remains the most important starting position. Breeding values can be seen as an aid to make a better stallion choice. A tool that takes into account all characteristics and all offspring. Moreover, it can help to rationally substantiate the good feeling about a stallion with figures. But ultimately, it is all about the best combination between stallion and mare.

Do foreign registered offspring count in the breeding value of a stallion?

There are KWPN stallions with well-performing offspring that are registered with a foreign studbook. These offspring do not count in the breeding value calculation. Why not? Breeding values are averages of the entire population. If we add one sport horse from another studbook, this makes the data less reliable. In fact, all descendants of that stallion from that studbook must then be added, including those that perform below average. Else we would portray it better than it actually is. In addition, the sports performance of a single horse only ensures a minimal increase in breeding value. Every stallion has his better and lesser offspring, but how many good ones are there compared to the lesser ones? It is important to know this for a fair breeding value calculation. Especially with a stallion that has already registered many offspring with the KWPN, there is a very complete picture of his inheritance capacities.

Is a stallion with a breeding value of 158 significantly better than a stallion with a breeding value of 156?

The danger with the breeding values is that they are very quickly seen as a ranking. It's better to look at the stallions in groups. It is estimated that a stallion with a breeding value higher than 120 will inherit above average. A breeding value higher than 140 means that we are dealing with a more than above average stallion. So, to answer the question: stallions with breeding values of 156 or 158 both inherit very strongly and their offspring is better than average. It is not without reason that the value of 140 is the lowest limit for a predicate stallion. In short: do not look at the breeding values too 'picky'.

It is always best to see if the stallion in more particular traits is a suitable candidate for the mare. Jazz and Heartbreaker have the highest breeding values in their discipline (see tables on page 5), but that does not mean that these stallions will fit every mare. For example, when you want to make a stallion choice for a mare with a somewhat weak topline, the breeding values of the stallion provide insight into the inheritance of the topline. A stallion who seems to inherit a weaker topline may not be the best choice for this mare, no matter how high the sport breeding value of the stallion is.

Genomic breeding value OC

Since 2016, so-called 'genomic breeding values for osteochondrosis (OCD)' have also been calculated. Using the DNA, an estimate is made of the genetic quality of the horse and then compared with the average of the population. Concretely: a horse has a higher or lower chance than average to pass OC on to his or her offspring. The result of the DNA test is up to three times more reliable for breeding purposes than the PROK test for OC components. That is because the DNA test says more about the inheritance of a horse and not so much whether a horse itself has OC or not.

Is a stallion with a genomic breeding value for OC lower than 96 a risk in breeding?

A genomic breeding value OC between 96 and 104 stands for average. Horses with this score are therefore not demonstrably better or worse than the population. Above 104 is clearly better, these horses can be expected to transmit less OC. Below 96, the opposite is true, the chance of OC is simply greater. You can take this into account in breeding. A stallion with extremely good sport inheritance, but a low genomic breeding value OC, can still fit on a mare with a higher genomic breeding value OC. It continues to be most

important to look at several factors in breeding; this mainly means that in a stallion with a low genomic breeding value for OC the risks are known.

How many horses receive the D-OC predicate?

About 70% of the horses in which the test is taken receive the D-OC predicate and therefore have a genomic breeding value of 96 or higher. What is that based on? At the time, the Breeding Council indicated that selection should not be stricter than was previously the case with PROK. Based on this fact, the limit of 96 has been reached.

Has the X-ray examination become redundant?

The X-ray inspection is especially important for trading. Is the horse healthy enough to keep up its sports career? OCD can certainly also be caused by non-genetic influences, such as nutrition or external trauma. As a breeder you are engaged in breeding and hereditary predisposition is important. In a horse that suffers from OCD due to trauma, there is a good chance that the offspring will not be bothered by anything. We like to keep these stallions or mares for breeding, especially if they perform excellently on a sporting level. In the past there have been stallions that did not qualify for the PROK predicate and nevertheless brought a lot of good to breeding. We would not have wanted to miss those stallions in breeding, while in the PROK era these stallions automatically dropped out. This is possible with the genome breeding value OC. That's because we look purely at the genetic predisposition to OC.

How do we take inbreeding and kinship into account in breeding?

Inbreeding and kinship have been a topic of discussion mainly in Harness horse breeding for many years, but certainly is also a point of attention in dressage horse breeding. The Harness horse population is currently at the greatest risk in the context of inbreeding, something must certainly be done there. Because the highly related horses perform well, they are popular with breeders, resulting in many offspring of these stallions. In recent years, kinship has certainly already received attention in the stallion selection. Stallions that combine a high breeding value with a low kinship percentage are shown for dressage and Harness horses in the tables on page 6. It is a challenge for both the breeder and the studbook to give high-performing low-related stallions a chance in breeding.

We developed an inbreeding tool for breeders to more easily take into account the bloodlines and inbreeding. This tool is for members of the KWPN and can be found in 'MY KWPN'. In combination with a stallion from the relevant breeding direction, the inbreeding and kinship percentage of the future foal can be viewed here. As a breeder you can take advantage of this. •

HOW DOES THE GENETIC PROFILE WORK?

In the KWPN Database you will find the 'Genetic profile' for an individual stallion or mare. The breeding values for dressage or jumping, exterior, free movement or free jumping, health (genomic breeding value OC) and height are shown there. The genetic profile thus provides a summary of the genetic quality of the most important traits in the relevant breeding direction. In addition, the detailed characteristics of the exterior are also expressed in a breeding value. This is based on the linear scores of the studbook admissions and the scoring of the foals. Are you looking for a stallion that improves the neck? In these detail characteristics you can see to what extent an individual stallion breeds in terms of neck length, neck direction or neck muscling. The same can be done for the detailed characteristics of the free movement or the free jump.

More information about breeding values?
[https://www.kwpn.org/kwpn-horse/selection-and-breedingprogram/breeding/breeding-values.](https://www.kwpn.org/kwpn-horse/selection-and-breedingprogram/breeding/breeding-values)