

Breeding - Is It Just A Lottery?

Chris Hector considers some startling new research from Germany...

If you breed a pretty headed horse to another with a beautiful visage, exactly what chances do you have of getting a stunning looker? Excellent, according to a recent analysis by assistant breeding manager of the Hanoverian Verband, Dr Ludwig Christmann, BUT if you select the very best conformation you may be reducing your chances of breeding a jumper!

Unlike most predictions of what will or will not happen in the complex business of breeding, these observations are in fact the result of a careful and scientific study, based on the scores of mare inspections and mare performance tests of 5,347 Hanoverian mares, tested from 1987 to 1993.

The investigation aimed to find out what characteristics are

heritable - and how likely they are to be heritable. A heritability factor of less than 20% is considered low, a heritability of 20 to 40% is considered average, and over 40% is strong.

As you can see from the following graph, about the strongest heritability factor is the horse's head (41%) and sadly for we breeders, the least heritable trait is correctness of gait (14%).

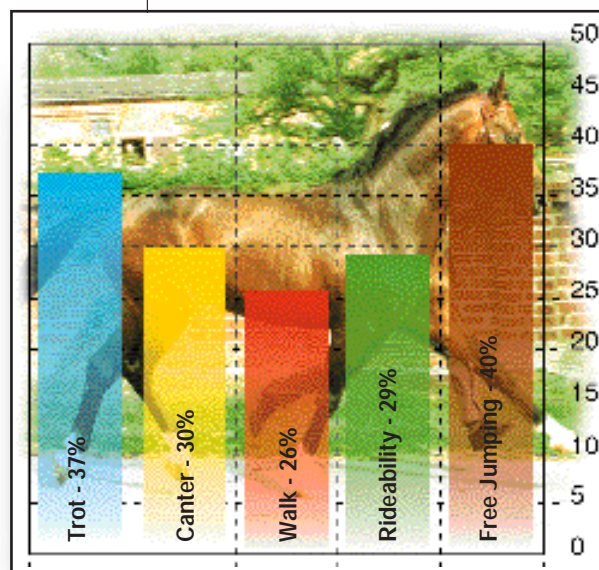
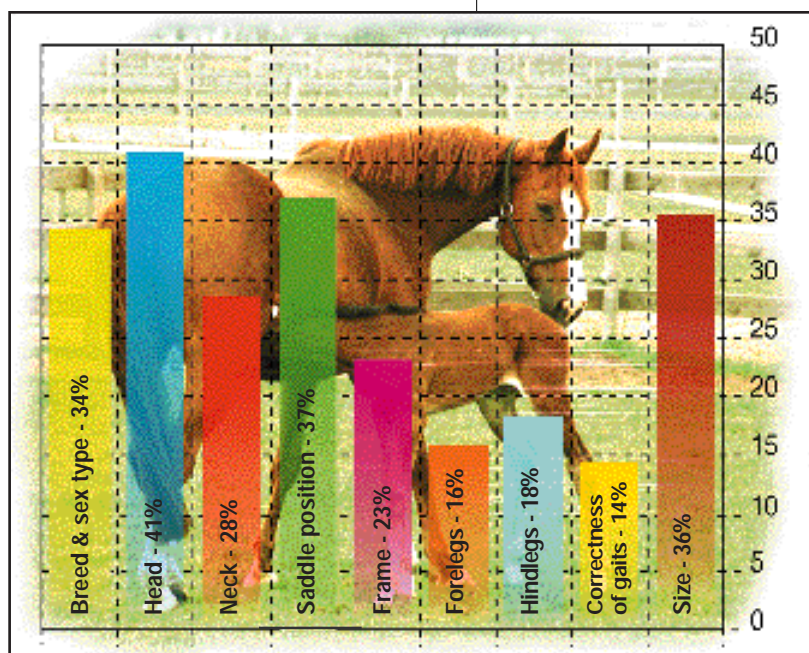
As Ludwig points out in his article in *'The Hanoverian'* this...

'conforms to the results of other authors, even with the results regarding other animal species, like cattle. We have to presume that the environment greatly influences the development of the limbs. I define the word 'environment' as the area where the horse grows up, starting at

first with the position in the womb, to hoof care, feeding and keeping.'

The second graph indicates that the two areas of greatest heritability of characteristics measured in the mare performance test, were free jumping (40%) and the trot, (37%). This high degree of heritability for free jumping has been observed in other studies, including the stallion performance test, and it means that a program designed to breed jumpers can meet its aims fairly quickly (Australian show jumping riders still waiting for 'freaks' please take note!)

The other issue Ludwig Christmann set out to investigate was the correlation between the various characteristics known as genetic correlation. Here we observe that breeding for one characteristic can also promote



Above - Degrees of heritability of characteristics scored at mare performance tests.

Left - Degrees of heritability of characteristics scored at mare inspections

another characteristic - while in other cases, selection for one characteristic may tend to

	Walk	Trot	Canter	Rideability	Free jump.
Walk		+ (0,52)	+ (0,60)	+ (0,68)	- (-0,10)
Trot			++ (0,82)	++ (0,83)	+/- (0,02)
Canter				+ (0,73)	+ (0,11)
Rideability					+/- (0,606)

Estimated values of genetic correlations between criteria of the mare performance test.

Characteristics mare inspection	Walk	Trot	Canter	Rideability	Free jump.
Head	+ (0,10)	+ (0,20)	+ (0,19)	+ (0,30)	+/- (0,00)
Neck	+ (0,27)	+ (0,27)	+ (0,40)	+ (0,29)	+/- (0,09)
Saddle Pos.	+ (0,26)	+ (0,28)	+ (0,33)	+ (0,32)	- (-0,27)
Frame	+ (0,48)	+ (0,60)	+ (0,60)	+ (0,67)	- (-0,20)
Type & gender.	+ (0,35)	+ (0,54)	+ (0,52)	+ (0,60)	- (-0,11)

Estimated values of genetic correlations between criteria of the mare inspection and criteria of the mare performance test.

reduce another. A genetic correlation of zero means that the characteristics involved are independent from one another. This table shows that all three basic gaits are positively connected with values of 0.52 to 0.82 - in other words, if the horse has a good walk it is likely to have a good trot and a good canter. Moreover there is - not surprisingly - also a relationship between the basic gaits and rideability.

As Ludwig points out: "the correlation between the basic gaits and the assessment of rideability is positive and high (0.68 to 0.83). This means that the assessment of the rideability depends greatly on the quality of the basic gaits. Of the three basic gaits, the trot has the largest influence on the rideability."

Again, Ludwig draws the conclusion: "The interplay between rideability and basic gaits indicates the importance of elasticity. A horse allows a rider to sit comfortably when he vigorously pushes off the ground and the movements swing through his entire body with a powerful but elastic and swinging back. This horse causes less problems with the contact, the activity in the mouth, and with the reactions on the rider's aids, than a horse

whose appearance of stiffness influences not only the quality of the basic gaits but also suppleness." However if the qualities of the gait and rideability go happily together, this is not the case with free jumping. A slightly positive relation (0.11) between the ability to jump and the canter, is balanced by a slightly negative (0.10) relationship between jumping ability and the walk. When we look at the next table, we see the relationship between conformation and performance. Not surprisingly there is a positive relationship between 'good' conformation (head, neck, saddle position and the frame) and dressage abilities. What is surprising is that **almost all** the conformational results have a negative relationship with

jumping ability. In fact, there is a negative correlation of 0.27 between good saddle position and jumping ability - perhaps a result of some of the better jumping sires. As Ludwig notes: "There are a number of first class jumper producers like Grannus, Wanderer or Calypso I I, who - as we all know - produce barely sufficient saddle positions. In general this means that the type will suffer if we select exclusively for jumping ability without considering other criteria." However Ludwig goes on to point out that there are also a number of good jumping stallions with good conformation, such as Espri, sire of ET, and Hanoverian Stallion of the Year, or his son, Escudo who represents 'almost the ideal type'.

To sum up: "The portrayed genetic relations between the three areas: type, dressage ability and jumping ability, clearly demonstrate that the predisposition for jumping and the predisposition for dressage are almost independent from one another... It appears unrealistic to strive for breeding only horses ideal in type, and with equal predisposition to be a top dressage horse, as well as a top jumper. It is however, realistic to breed an appealing horse with a significant predisposition for either dressage or jumping and an, at least, average talent for the other area."

