

Horses scored with two judging systems; a comparison of results

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1. Introduction

Every year a large number of young warmblood horses in Sweden, as well as in many other European countries, are tested to show their qualities and to be judged and measured for future performance. Results from these performance tests and competitions of young horses are used by major European warmblood horse breeding associations for genetic evaluations. (Thorén Hellsten et al., 2006) The methods for how the young horses are being tested are different in each country and also the qualifications for the people that are judging the horses and setting the scores are different in the different countries.

Both the Netherlands and Sweden are believed to be amongst the leading countries in breeding of performance horses. In order to be able to keep this position it is important to keep on moving forward and to continue to evaluate and develop the selection systems. One way to evaluate and develop is to learn from each other, it has therefore been interesting both from a Swedish and a Dutch point of view to compare the Swedish methods of testing 3-year-old horses with the Dutch.

The purpose with this research will be to compare the Dutch way of judging 3-year old horses with the Swedish system to see;

- if there are differences in the traits that are being judged/scored
- If the judgments/scores result in different quality order of the horses
- if possible points of improvement can be formulated for future judging in Sweden (ASVH) and Holland (KWPN).

1.1 Background

Young horse tests in both show-jumping and dressage are very popular in Sweden, both horse owners as well as breeders find it important that their horses score good and talented riders are often hired to train and show the horses at their best. Young horse tests serve several purposes. One of the most important is to provide data for genetic evaluation of young horses as well as their parents, primarily by applying the BLUP animal model. Another important purpose is to use these tests as means to find talented horses for the sport. The outcome of the tests says something about the genetic ability of the horse which is an early

predictor important to the breeder. Furthermore the 3-year old tests are important within the framework of a breeding program because of the fact that 1) the generation interval is small 2) large groups can be expected so the horses the studbook sees are relatively unselected.

1.2 Problem definition

The relevance of testing young horses in a breeding program is maximized if large proportions of unselected young horses are routinely tested. (Ducro et al., 2006). Thorén-Hellsten et al. (2006) recommend that test results are encouraged to be used across countries for genetic evaluation of imported stallions and semen. To do so would be a lot easier and more reliable if the same forms and system of scoring young horses were used in more countries.

The most important European warmblood studbooks score different sets of traits at their studbook entry tests (Thorén Hellsten et al., 2008). It is likely that not only the set of traits that are scored are different but also that the definition of a similar trait (e.g. conformation) is defined differently within different studbooks. In general, two different types of traits can be distinguished: valuing traits that say something about the quality and descriptive traits that describe the appearance of a certain trait without a quality statement attached to it. Some studbooks only use valuing traits at studbook entry tests, other use a combination of both types. It is assumed that descriptive traits produce a higher level of objectiveness as the judges do not have to make a quality judgment and can focus only on what they see.

KWPN is an example of a warmblood studbook that uses a combination of valuing and descriptive traits at studbook entry. Their group of descriptive traits contains a total of 36 traits that describe various elements of conformation, movement as well as free jumping. The assumption is that the high level of detail enables a clear definition of each individual trait which enhances objectivity of scoring. This objectivity is assumed to be further enhanced by the absence of a quality judgment attached to each trait as stated earlier. KWPN holds the opinion that the complete set of 36 descriptive traits, describes in a fairly complete way all relevant aspects of the conformation, movement and free jumping of modern sport horses (van Tartwijk, 2010).

Today eleven different valuing traits are being scored in Sweden for both dressage and show jumping horses while in the Netherlands 6 valuing traits and 36 descriptive traits are being scored for show jumping horses. For dressage horses within KWPN these numbers are respectively 6 valuing traits and 28 descriptive traits.

By using more traits and thus more detailed BLUP indexes it is assumed that breeders as well as studbooks can make better choices.

Another assumption is that a bigger amount of horse owners and breeders will be interested in having their horses scored if the scoring will be more objective.

1.3 Research objective

To compare the results of 3-year old horses scored both according to the Swedish system (3-year-old test) and the Dutch system of scoring 3 – year old horses (studbook entry).

1.4 Research questions

Main question

1. Are there any benefits or disadvantages of the Dutch scoring system for 3-year old horses compared to the Swedish system?

Sub questions

2. What is the predictive power of both scoring systems/tests for the breeding goal?
3. What are the similarities and differences between both scoring systems?
4. Do the different scoring systems result in different quality judgments?

2. Literature Review

Desk research

Background information has been collected by reviewing scientific articles from Science Direct and by using other research articles, internet and books. Finding more information about different ways of testing the young horses in the different countries have given me the bigger knowledge I needed to carry out the research. Both in Sweden as well as in the Netherlands earlier research has been carried out to investigate the correlations between young horse performance tests and results in dressage and show-jumping competitions.

2.1 Breeding goals and selection standards KWPN and ASVH

2.1.1 Breeding goal and selection standards KWPN

General breeding goal

- Is focused on a performance horse.
- With a constitution to stimulate a long durability.
- A character that supports the will and possibilities for high performance and friendliness in the relationship to humans.
- A functional conformation and a correct movement that enables a high performance.
- A conformation that by preference is appealing with consideration of species, nobility and quality.

Breeding goal, breeding direction dressage

Dressage horses are selected for their dressage talent, which encompasses the following traits: a pure, rhythmic and regular walk; and a trot and canter that demonstrate good stride length, suppleness, power, carriage and carrying power. Conformation, health, and temperament also weigh heavily in the selection of quality prospective breeding stallions.

The breeding goal is aimed on a dressage horse that can perform on Gran Prix level.

To reach this the dressage horse should have a long lined, noble and correct model with proportional relations and charisma. On top of this it moves correctly, light footed, in balance with lithesomeness, with power and carries it self in a good way. The dressage horse is nice to handle, rideable, intelligent and have a co-operative and zealous character.

Breeding goal, breeding direction jumping

Jumping horses are selected for conformation, health, temperament, and natural jumping talent. As part of jumping talent, a stallion must possess a good canter, reflexes, technique, and scope. Attitude and the will to perform are considered to be important traits for a jumper.

The breeding goal is aimed on a jumping horse that can perform on Gran Prix level.

To reach this the jumping horse should have a long lined, noble and correct model with proportional relations and charisma. On top of this it moves correct, light footed, in balance with lithesomeness, with power and carries it self in a good way. The jumping horse is nice to handle, rideable, intelligent and have a co-operative and zealous character. The jumping horse is brave and jumps with fast reflexes, is carefull, have a good technique and possesses high capability.

Selection Standard

The KWPN has drafted selection standards for jumping horses as well as for dressage horses describing the physical appearance, movement, and jumping style of the ideal KWPN horse. In the scoring process, inspectors compare each horse against the selection standards to determine how the horse measures up to those standards.

Selection standard for dressage horses

Conformation

Dressage horses should demonstrate the following conformation traits:

- A "rectangular-shaped" body that is long-lined and well-proportioned
- An uphill build body (i.e., withers higher than the croup) with long legs
- A light head-neck connection
- A long, upwardly arching neck and a muscled topline
- A strong and well-muscled back/hindquarters
- Correct and clean legs
- Presence

Movement

Dressage horses should demonstrate the following movement qualities:

- A pure, four-beat walk with activity, suppleness, and push.
- A pure, two-beat trot with activity, suppleness, push, balance, and carriage
- A pure, three-beat canter with activity, suppleness, push, balance, and carriage
- The ability to lengthen and shorten its stride easily without losing rhythm, regularity, balance, or carriage
- An elevated forehand and good self-carriage
- Light-footed movement and articulation of the joints, allowing the hind legs to step under the body and the front legs to extend far from the shoulder with a slight elevation of the knees

Temperament

Dressage horses should demonstrate the following temperament traits:

- A cooperative, keen, and honest temperament
- Intelligence and the will to perform
- Easy to handle
- Respond quickly to aids

Selection standards for jumping horses

Conformation

Jumpers should demonstrate the following conformation traits:

- A rectangular-shaped body that is long-lined and well-proportioned
- A horizontal body direction; a long, arched neck with a slight upward orientation; and a muscled topline
- A strong and well-muscled back/hindquarters
- Correct and clean legs
- Presence

Movement

Jumpers should demonstrate the following movement qualities:

- A pure, four-beat walk with activity, suppleness, and push
- A pure, light-footed, two-beat trot with activity, suppleness, push, balance, and carriage
- A pure, light-footed, three-beat canter with activity, suppleness, push, balance, and carriage
- The ability to lengthen and shorten the canter stride easily without losing rhythm, regularity, balance or carriage
- A balanced, light-footed canter without excessive activity in the forehand
- The ability to maintain a relatively horizontal body position

Jumping

Jumpers should demonstrate the following jumping qualities:

- The ability to collect greatly in the last canter stride before an obstacle and place the hind legs far under the body to facilitate a powerful push-off
- Jump quickly and powerfully off the ground
- Jump with the withers elevated, reaching their highest point in the middle of the jump phase

- Lift the forearms above the horizontal and fold the cannon bones under the forearms
- Bascule, lowering the neck over the jump, allowing the body to follow the direction of the neck and opening the hindquarters
- Athletic ability, suppleness, development of forward propulsion over the jump; and a light-footed landing, cantering off easily after the jump
- Care, efficiency, and abundant scope

Temperament

Jumpers should demonstrate the following temperament traits:

- A courageous, cooperative, keen, and honest temperament
- Intelligence (looks at the jump and evaluates it)
- The will to perform
- Easy to manage
- Respond quickly to aids

(KWPN (Royal Dutch Sport Horse) 2010)

2.1.2 Breeding goals ASVH

General breeding goal

The ASVH breeding goal strives after a noble, correct and sound horse that through its competitive temperament, its rideability and excellent movement and/or jumping ability is a horse of international quality.

The Swedish Warmblood should be built to naturally carry itself in a correct way under the rider and easily perform the work that is asked from it. It should be light, uphill and longlined, have a beautiful and expressive head, a correct placed neck, a well developed withers, a sloping shoulder and a slightly sloping croup, a strong back with a good position for the saddle, satisfyingly correct legs and hoofs with good quality. Desirable is a size of 164-170cm for stallions and 162-168cm for mares.

The Swedish Warmblood should be a healthy and durable horse, free from faults that can be inherited or have effects on the usability or welfare of the horse. The Swedish Warmblood should be easy to handle, secure and have a good temperament. The temperament should be distinguished by a will to co-operate and keenness. The Swedish Warmblood should also be distinguished by high fertility and be early developed.

Breeding goal dressage

The Swedish Warmblood should move with ease, elasticity, good rhythm, schwing and good power in all gaits. The horse should be beautiful to look at in movement, have a natural ability for collection as well as extension, be co-operative, have a high rideability and be both sensitive and relaxed.

Breeding goal jumping

The Swedish Warmblood should, what concerns jumping, be fencesmart, willing to jump and have a big scope. It should also be able to measure the distance to the fence and have a good technique for both front- and hindlegs and make good use of the back during the jump. The jumping horse should have a high rideability and a well balanced and adjustable canter. The jumping horse should jump with a lot of power, be elastic, have fast reflexes and be brave and careful.

(ASVH, www.asvh.se June 2010)

2.2 Young horse performance tests of KWPN and ASVH

2.2.1 The importance of young horse performance tests

Tests for 3-year olds are important within the framework of a breeding program because of the fact that 1) the generation interval is small 2) large groups can be expected so the horses the studbook sees are relatively unselected.

If the predictive power for the breeding goal of the traits scored in these tests is high (that means: high heritability's of the traits in combination with high genetic correlation with the breeding goal (performance in sport)) then these tests are of importance for creating good genetic progress. The traits within most European young horse performance tests show high

heritability and high genetic correlations with later competition results. (Thorén Hellsten et al., 2006)

2.2.2. Young horse performance tests of KWPN

Studbook entry

Purpose

Inspections provide breeders with a professional assessment of their mares and the opportunity to compare their horses with others of the same age. Mares are evaluated on conformation, movement, and jumping (if applicable) and are presented both in-hand and moving freely. Deficiencies and/or abnormalities, if evident, are noted.

Layout

The KWPN organises its mare inspections every summer. The inspections are open to mares the year they turn three. Older mares previously recorded in the Foal Book or Register A may also be presented for Studbook acceptance.

At the inspection the mares are measured. To qualify for Studbook acceptance, mares must stand at least 1.58m and to qualify for the *ster* predicate, they must measure no less than 1.60m. The mares receive valuing marks as well as a number of descriptive scores: the linear scores.

Linear scoring

KWPN uses a system called “linear scoring”. Judges will fill in a form with different traits to explain in a descriptive way what the horse looks like and which qualities it has. This scoring process yields a detailed description of the traits of each horse relative to the KWPN population. In sum, linear scoring provides information about body build and functionality, which in turn provides information about the quality of the horse. (KWPN (Royal Dutch Sport Horse) 2010)

Linear traits scored

The linear score form lists various traits of conformation, movement, and jumping

separately. Descriptive terms, representing the extremes of each trait (for example, long and short; uphill and downhill) appear by each trait evaluated. The descriptive terms are separated by nine check-boxes representing the degrees between the two extremes. Specifically, the middle three boxes represent a trait as it appears in the average horse. The three boxes left of the middle (for example, uphill) and the three right of the middle (for example, downhill) represent a trait that is clearly evident in the horse, depending where along the continuum the box is checked. Inspectors must check one of the nine boxes to indicate the degree to which the specific trait is evident in the horse.

Additional boxes may be checked if a horse demonstrates a fault or abnormality, or if a comment is required for evaluating a specific trait. Examples of faults and abnormalities include an underbite, dissimilar hoofs, and a Roman nose.

Description of all the different traits being judged as well as the linear scoring sheets can be found as appendices.

Valuing traits or overall scores

After inspectors have marked the horse's traits on the linear score form, they determine the valuing traits or overall scores. Scores are awarded for the primary traits of conformation, movement, and jumping. The score for movement has two components: a total score and individual scores for the walk, trot, canter, and selfcarriage. The scoring scale used for this purpose ranges from 40 to 100 points, marked in five-point increments.

Dressage horses are scored on conformation and movement. The score for movement is the average of scores for the walk, trot, canter, and self carriage. To be accepted into the Studbook, a mare must earn at least 50 points for conformation and free-movement.

Mares that score at least 70 points for conformation and 75 points for free-movement are awarded the *ster* predicate and may participate in the Central Inspection.

Jumping horses receive scores for conformation and jumping. The score for jumping is the average of the scores for canter, reflexes, style, and scope. To be accepted in the Studbook, a mare must earn at least 50 points for conformation and free-jumping. The average scores for the walk and trot must be no less than 50 points.

To receive the *ster* predicate, a mare must score at least 70 points for conformation, 75 points for jumping, and an average of 60 points for the walk and trot, upon which she qualifies for the Central Inspection. (KWPN (Royal Dutch Sport Horse) 2010)

How the studbook entry procedure is carried out

The horse is brought in and lined up on hard ground (stone or asphalt) in front of the judges. It should stand with the weight evenly distributed over all four feet, and all four legs must be visible to the judges. The judges will then ask for the horse to be walked back and forth over approximately 20-30 meters to allow them to assess leg conformation and movement. After that, they will request the horse to be trotted back and forth in an unhurried tempo over at least a 30-meter distance to properly evaluate the movement.

Finally, the horse is lined up again before the judges, but this time showing the other side. This procedure avoids the judges disturbing horses by walking around them. Once the horse is lined up, the judges will evaluate the conformation again and record their observations on the linear score form.

In the next phase, the horse is brought into the indoor arena to demonstrate the movement (walk, trot, canter) freely, and jumping horses show their free-jumping talent. (Horses may wear protective boots on their front legs during this phase.) Upon entering the arena, the horse should be walked around the perimeter to let them acclimate to the unfamiliar surroundings. The judges will signal when the horse should be let loose, tracking to the right. The dressage horses will show their movement freely and when the judges have seen enough to evaluate the horse, it is caught and walked around the ring once more before exiting. The judges use this period to evaluate the walk and then describe the horses performance to the horse owner and spectators, using the public address system.

The free-jumping evaluations are carried out by a dedicated management team to ensure that each horse is shown to its fullest potential. First, the judges evaluate the trot and canter, in both directions. After several rounds, the jumping horse is directed through a line with three jumps. The first is a vertical placed six meters from the short side of the ring, with a trot pole before it. The second jump, another vertical, is placed 6.60 meters after the first, and the last jump is placed 7.10 - 7.65 meters after the second. The last jump is initially set

up as a vertical and later expanded into an oxer, the height of which depends on the age of the horse in the ring. As soon as the judges have seen enough to evaluate the horse, it is caught and walked around the ring once more before exiting. The judges use this period to evaluate the walk and then describe the horse's performance to the horse owner and spectators.

2.2.3. Young horse performance tests of ASVH

3-year old test

Purpose

The 3 year old tests are arranged by the regional breeding societies in Sweden during the month of May. The test is designed to be an allround evaluation of the 3-year old with judging of the conformation, canter in freedom, loose jumping and a simple riding test.

The 3 year old test is meant to be a goal for the breaking in of the young horse, an important selection for mares to the breeding and a search for talented horses for the sport as well as a meeting place for sellers and buyers.

Layout

The horse will first be shown in free canter around the arena, both to the left and to the right. When the judges have seen enough the horse will be stopped on one long side while the fences are built up on the other long side. To start with the horse will jump two verticals with a distance of 6,8 – 7,5m between them (owners choice). The second fence will thereafter be made an oxer that will be highened up to a maximum of 1.30m. After the jumping the horse will be showned by hand on the centerline of the arena, first on stand and then in walk and trot. The horse will then be showed by hand one lap around the arena in trot before it is lined up on the long side while the judges will give their evaluation of the horse to the owners and the audience.

Evaluation

The horses receive 8 different scores for type, head-neck-body, legs, walk, trot, canter,

jumping technique and overall impression jumping. For the total score as a jumping horse all the scores except from the scores for walk and trot are counted together. For the total score as a dressage horse all the scores are counted together except from the two jumping scores.

Horses with a minimum as 45 points in jumping or dressage are classified as class I horses in jumping or dressage.

To get a Diploma the horse needs to have:

- A minimum of 47 points, no score under 7
- Minimum 8 in two of the scores for the gaits as a dressage horse and minimum 8 in the both jumping scores as a jumping horse
- An approved riding test

Admission to the studbook

To be taken up in the studbook the mare should have green papers, be shown at the 3-year old test or the quality test with no score under 6, be no less than 1.56m high and have shown an approved riding test either at the 3-year old test or the quality testing.

Mares that are classified as class I or get a Diploma are recommended for breeding.

With the goal to get the best 3-year old mares covered ASVH started a special program in 1999. This program gives benefits like free studbook registration for the foal and the mare as well as the possibility to participate for free with the mare in the championships for 5-7 year old horses. Mares that have a foal also gets an extra year and can compete as a 5 year old against 4 year olds and so on.

To be welcome in the program the mare should have received a Diploma either at the 3 year old test or at the Quality testing (4 or 5 year old).

2.3 Predictive power of young horse performance tests for the breeding goal

2.3.1 The importance of heritability and genetic correlations

To achieve genetic progress, both heritabilities of the traits recorded at young horse performance tests and the selection intensity have to be reasonable high. Since results at advanced level of competitions are emphasized in the breeding goals both for KWPN and for ASVH, it is also important that tests at young age show high positive genetic correlations with later competition results. (Thorén Hellsten et al., 2006)

2.3.2 Heritabilities and genetic correlations of YHPT of KWPN and ASVH

Gelinder et al. (2002) estimated heritabilities for traits judged at the Swedish performance test for 3-year old horses and found that the heritabilities for both test were moderate, 0.21 – 0.41. Wallin et al. (2003) estimated the genetic correlations between individual gait traits, i.e. trot and canter and competition performance in dressage. These showed similar high values (around 0.75) to the genetic correlations between the average gait score and performance in dressage. Genetic correlations between jumping traits and results in show jumping were in the range 0.83–0.93. In the Netherlands Koenen et al. (1995) estimated herabilities of 26 linear scored conformation traits, the herabilities were estimated in the range 0.09-0.28. Several conformation traits had high up to very high mutual genetic correlations. The subjective traits conformation and movement showed high favourable correlations with performance in dressage (about 0.68) and moderate with performance in show-jumping (about 0.26). The correlation of movement with show-jumping is mainly due to the favourable contribution of the canter traits, since trot and walk had low (–0.14 to –0.04) correlations to show-jumping. A low genetic correlation of trot and walk to showjumping was found by Uphaus (1993) and Lührs-Behnke et al. (2006). The genetic correlations of walk and trot with performance in dressage agree with estimates of Wallin et

al. (2003) and of Lührs-Behnke et al. (2006), except for correctness of walk. Correctness of walk, although heritable, apparently has no linear relationship to performance in sport. The correlations of walk and trot traits with dressage as estimated by Koenen et al. (1995) were much lower, although their heritabilities were comparable to the results of the current study. Ducro et al. (2006)

Table 1. Genetic (rg) and phenotypic (rp) correlations* and herabilities of descriptive and subjective traits of studbook entry (KWPN) with dressage and show-jumping.**

	Dressage		Show-Jumping		h ²
	rg*	rp	rg	rp	
Walk					
– Correctness	0.05	0.00	0.06	–0.00	0.25
– Stride	0.53	0.12	0.04	–0.00	0.16
– Elasticity	0.50	0.12	0.14	0.01	0.15
Trot					
– Stride	0.65	0.19	0.11	0.02	0.32
– Elasticity	0.67	0.18	0.13	0.02	0.29
– Impulsion	0.59	0.18	0.11	0.02	0.27
– Carriage	0.65	0.19	0.14	0.01	0.28
Canter					
– Stride	0.49	0.14	0.33	0.05	0.25
– Impulsion	0.40	0.13	0.43	0.07	0.20
– Carriage	0.50	0.14	0.28	0.03	0.19
Free-jumping					
– Take-off: direction	–0.34	–0.03	0.88	0.16	0.30
– Take-off: speed	–0.27	–0.02	0.53	0.10	0.22
– Technique: foreleg	–0.20	0.02	0.67	0.11	0.22
– Technique: back	–0.19	0.02	0.52	0.11	0.31
– Technique: haunches	–0.27	0.05	0.80	0.13	0.27
– Scope	–0.24	–0.03	0.82	0.14	0.37
– Elasticity	–0.09	0.01	0.64	0.11	0.24
– Care	–0.29	–0.00	0.80	0.14	0.32
Subjective traits					
– Conformation	0.67	0.19	0.29	0.04	0.33
– Movement	0.69	0.21	0.23	0.03	0.34
– Jumping	–0.24	–0.01	0.87	0.16	0.40

* Standard errors ranged from 0.03 to 0.09 for the genetic correlations and 0.01 to 0.04 for the phenotypic correlations.

**Standard errors of the heritability estimates were all below 0.04.

Ducro et al. (2006)

Table 2. Herabilities* for subjective scores of 3-year old test (SWB).

Trait	h ²
Conformation & gaits at hand	
Type	0.46
Head-neck-body	0.30
Correctness of legs	0.08
Walk at hand	0.37
Trot at hand	0.45
Free canter	0.37
Total conformation**	0.58
Average for gait scores***	0.53
Jumping traits	
Jumping, technique & ability****	0.33
Jumping, temperament****	0.23
Average for jumping scores	0.30
Overall traits	
Dressage index	0.59
Jumping index	0.40
Dressageclass/dressage quartile	0.48
Jumpingclass/jumping quartile	0.27
Withers height	0.84

*Standard errors for heritabilities were 0.03 to 0.05

**The sum of type, head-neck-body, correctness of legs, walk at hand and trot at hand.

***Gaits (walk, trot and canter) judged at hand and free

****Free jumping

Table 3. Genetic correlations with their standard errors (above the diagonal; standard errors shown as subscripts) and phenotypic correlations with their standard errors (below the diagonal; standard errors shown as subscripts) for 3-year old test from 1999 to 2003.

Trait*	1	2	3	4	5	6	7	8	9	10	11	12	13
1		0.94 _{0.04}	0.29 _{0.17}	0.32 _{0.10}	0.57 _{0.07}	0.51 _{0.09}	0.02 _{0.11}	-0.07 _{0.12}	0.77 _{0.05}	0.45 _{0.09}	-0.79 _{0.05}	-0.38 _{0.09}	0.81 _{0.05}
2	0.43		0.38 _{0.17}	0.28 _{0.11}	0.53 _{0.08}	0.51 _{0.09}	0.18 _{0.11}	0.12 _{0.12}	0.76 _{0.05}	0.57 _{0.08}	-0.78 _{0.05}	-0.53 _{0.09}	0.62 _{0.08}
3	0.10	0.10		0.19 _{0.16}	0.22 _{0.14}	0.12 _{0.16}	0.27 _{0.16}	0.26 _{0.16}	0.37 _{0.14}	0.43 _{0.15}	-0.34 _{0.14}	-0.40 _{0.15}	0.06 _{0.17}
4	0.18	0.15	0.05		0.68 _{0.06}	0.43 _{0.09}	-0.05 _{0.10}	-0.01 _{0.11}	0.73 _{0.05}	0.22 _{0.10}	-0.72 _{0.05}	-0.23 _{0.10}	0.17 _{0.09}
5	0.33	0.32	0.12	0.37		0.64 _{0.06}	0.03 _{0.10}	-0.04 _{0.11}	0.89 _{0.02}	0.38 _{0.08}	-0.89 _{0.02}	-0.34 _{0.09}	0.27 _{0.09}
6	0.34	0.30	0.07	0.28	0.44		0.33 _{0.09}	0.32 _{0.10}	0.78 _{0.04}	0.67 _{0.06}	-0.77 _{0.05}	-0.64 _{0.07}	0.35 _{0.09}
7	0.11	0.11	0.04	0.05	0.08	0.30		0.97 _{0.01}	0.16 _{0.09}	0.86 _{0.03}	-0.11 _{0.10}	-0.90 _{0.02}	0.13 _{0.10}
8	0.09	0.10	0.04	0.06	0.06	0.27	0.81		0.13 _{0.10}	0.84 _{0.03}	-0.08 _{0.11}	-0.88 _{0.03}	0.03 _{0.11}
9	0.64	0.59	0.36	0.59	0.74	0.70	0.20	0.18		0.61 _{0.06}	-1.00 ₀	-0.58 _{0.07}	0.50 _{0.07}
10	0.45	0.43	0.28	0.18	0.31	0.59	0.82	0.82	0.62		-0.58 _{0.07}	-1.00 ₀	0.40 _{0.09}
11	-0.60	-0.55	-0.35	-0.56	-0.70	-0.67	-0.19	-0.17	-0.95	-0.59		0.54 _{0.07}	-0.51 _{0.07}
12	-0.40	-0.38	-0.26	-0.17	-0.27	-0.54	-0.79	-0.79	-0.56	-0.94	0.54		-0.36 _{0.09}
13	0.45	0.21	0.01	0.08	0.15	0.14	0.05	0.03	0.28	0.19	-0.26	-0.18	

*1. Type; 2. Head-neck-body; 3. Correctness of legs; 4. Walk at hand; 5. Trot at hand; 6. Free canter; 7. Jumping, technique and ability; 8. 8. Jumping,temperament; 9. Dressage index; 10. Jumping index; 11. Dressage class; 12. Jumping class; 13. Withers height.

3. Methodology field research

3.1 Introduction

The experimental trial, described below, has been carried out with the intention to answer the sub questions 3 and 4, stated by the author in co-operation with the Swedish studbook, ASVH.

3. What are the similarities and differences between both scoring systems?
4. Do the different scoring systems result in different quality judgments?

Together with sub question number 2, dealt with in the literature section, these sub questions will be used to answer the main question: are there any benefits or disadvantages of the Dutch scoring system for 3-year old horses compared to the Swedish system?

3.2 Research design

Experimental trial

The experimental trial of the research was carried out at the Swedish national breeding center and stud, Flyinge, located in south Sweden.

The collection of data took place during the Swedish 3-year old test during three days (30 April and 1-2 May 2010). In total a number of 86 horses were being used for the experiment.

The horses were judged and scored according to the Dutch studbook entry system by former KWPN judge Mr. Jacques Verkerk. At the same time all the horses were being judged according to the Swedish system by two Swedish level A judges, Mr. Mikael Nolin, jumping, and Mr. Jan-Ove Olsson, conformation and movement.

Since KWPN uses two selection standards: one for dressage horses and one for jumping horses, the group of horses were divided into two subgroups. The division of the horses has

been made by Mr. Verkerk based on the pedigrees of the horses. Point of departure in this decision was the expected breeding value of the horse for either dressage or show jumping. If the expected breeding value for dressage of a particular horse was higher than the expected breeding value for jumping, the horse was judged according the KWPN selection standard for dressage and vice versa. Both KWPN and ASVH breeding values were used for this. In cases of doubt, Mr. Verkerk chose the group the horse should be placed in. Out of the total number of 86 tested horses 50 were being judged as show jumpers and 36 as dressage horses.

The Swedish judges scored all horses for both dressage and jumping quality as ASVH uses one selection standard for all warmblood horses.

3.3 Data processing

The collected data have been processed using SPSS 15.0.

A comparison has been made between the Dutch descriptive linear scoring marks and the comments given by the Swedish judges regarding the same 36 traits in the horses by using descriptive statistics in the form of graphs. The data have also been tested for correlations between the different valuing scores given by the Swedish and the Dutch judges using a Pearson test.

4. Results field research

4.1 The horses

The horses being used for the field research are a number of 86 3-year olds showed at the 3-year old testing at Swedish National Stud Flyinge during the weekend of 30 April till 2 May 2010.

4.1.1 Means and standard deviations of the valuing scores

In the tables below (table 1 and 2) the means and standard deviations both for the Dutch scores and the Swedish can be found.

Table 4. Means and standard deviations for the Dutch scores.

Jumping horses			Dressage horses		
	Means	Standard deviations		Means	Standard deviations
Conformation	68,16	8,52	Conformation	72,50	7,71
Walk	68,76	6,76	Walk	78,06	7,80
Trot	67,86	7,00	Trot	77,22	7,31
Canter	71,02	8,48	Canter	75,83	7,67
Avarage gait scores	70,17	7,44	Avarage gait scores	74,95	7,58
Reflexes	73,06	7,63	Self carriage	73,47	6,76
Technique	72,45	7,71	Movement	76,94	6,72
Scope	72,04	10,30			
Jumping	72,76	7,57			
Overall score	70,46	7,44	Overall score	74,17	6,60

*Jumping horses n=50 Dressage horses n=36

Table 5. Means and standard deviations for the Swedish scores

Swedish scores, non divided			Dressage horses		Jumping horses	
	Means	Standard deviations	Means	Standard deviations	Means	Standard deviations
Type	7,79 (+0,11)	0,83 (+0,17)	8,08	0,72	7,57	0,84
Head-neck-body	7,48 (-0,10)	0,63 (+0,05)	7,70	0,62	7,31	0,59
Legs	7,09 (-0,27)	0,78 (+0,13)	7,32	0,67	6,92	0,81
Walk	7,35 (+0,18)	0,72 (-0,05)	7,60	0,73	7,16	0,66
Trot	7,13 (+0,27)	0,99 (+0,17)	7,87	0,82	6,57	0,71
Canter	7,35 (+0,27)	0,96 (+0,13)	7,73	0,84	7,06	0,94
Avarage gait scores	7,28 (+0,24)	0,90 (+0,29)	7,73	0,80	6,93	0,82
Jumping technique	6,45 (-0,25)	1,66 (+0,37)	5,35	1,40	7,37	1,32
Jumping o.a impression/temprament	6,34 (-0,40)	1,65 (+0,27)	5,43	1,48	7,10	1,43
Avarage jumping scores	6,40 (-0,32)	1,65 (+0,37)	5,39	1,43	7,24	1,38
Jumping talent	42,50 (-0,63)	3,96 (+0,55)	41,65	3,47	43,33	4,28
Dressage talent	44,16 (+0,43)	3,31 (+0,69)	46,27	2,62	42,55	2,85

*(x) The difference from the numbers calculated by Viklund et al. (2008)

**Number of horses, non divided n=86, jumping horses n=50, dressage horses n=36

Comparison of sample group with Swedish horse population: the non splitted material.

In order to compare the sample group of this research with the Swedish average, the sample group of Viklund et al. (2008) is used. The scores are printed in the table below (table 3).

Table 6. Scores from Viklund et al. (2008)

	Means	Standard deviations
Type	7,68	0,66
Head–neck–body	7,58	0,58
Correctness of legs	7,36	0,65
Walk at hand	7,17	0,77
Trot at hand	6,86	0,82
Free canter	7,08	0,83
Average gait scores	7,04	0,61
Jumping, technique & ability	6,70	1,29
Jumping, temperament	6,74	1,38
Average jumping scores	6,72	1,28
Jumping index	43,13	3,44
Dressage index	43,73	2,62

*(Number of horses n=4110)

The scores from Viklund et al. (2008) are gathered at the same event, the Swedish 3-year-old test, but under a much longer period of time and therefore also for a much bigger number of horses (n=4110). The sample group of this research is 86 horses when undivided from which 50 has been divided as jumping horses and 36 as dressage horses.

The means and standard deviations of the twelve traits are in the same range in both research populations. The means of the population in this research compared to the population in the reserach of Viklund are a little higher for " type" (+0,11), a little lower for "head-neck-body" (-0,10) and "legs" (-0,27). The means in this research population were higher for the four movement traits (+0,18 - +0,27) and lower means for the three jumping traits (-0,25 - -0,40). These differences are also reflected in the means for jumping talent and dressage talent that are resp. lower (-0,63) and higher (+ 0,43).

The Dutch scores: splitted material

For the KWPN judging system, the groups was split in two: dressage horses and jumping horses. This was done according to the criteria mentioned earlier (4.1).

When comparing the dressage horses with the jumping horses scored in the Swedish system, the following can be found. The means for the three conformation traits are higher in the dressage group compared to the jumping group (+0,39 - +0,51). The means for the four movement traits are higher in the dressage group compared to the jumping group (+0,44 - +1,30) and the means of the three jumping traits are lower: -1,67 - -2,02. The mean of the trait jumping talent is lower in the dressage group (-1,68) and the mean of dressage talent is higher in the dressage group (+3,72).

When comparing the dressage horses with the jumping horses scored in the Dutch system, a similar picture evolves. For comparable traits, the jumper horses score lower on conformation (-4,34) and lower on movement traits (-4,78 - -9,36).

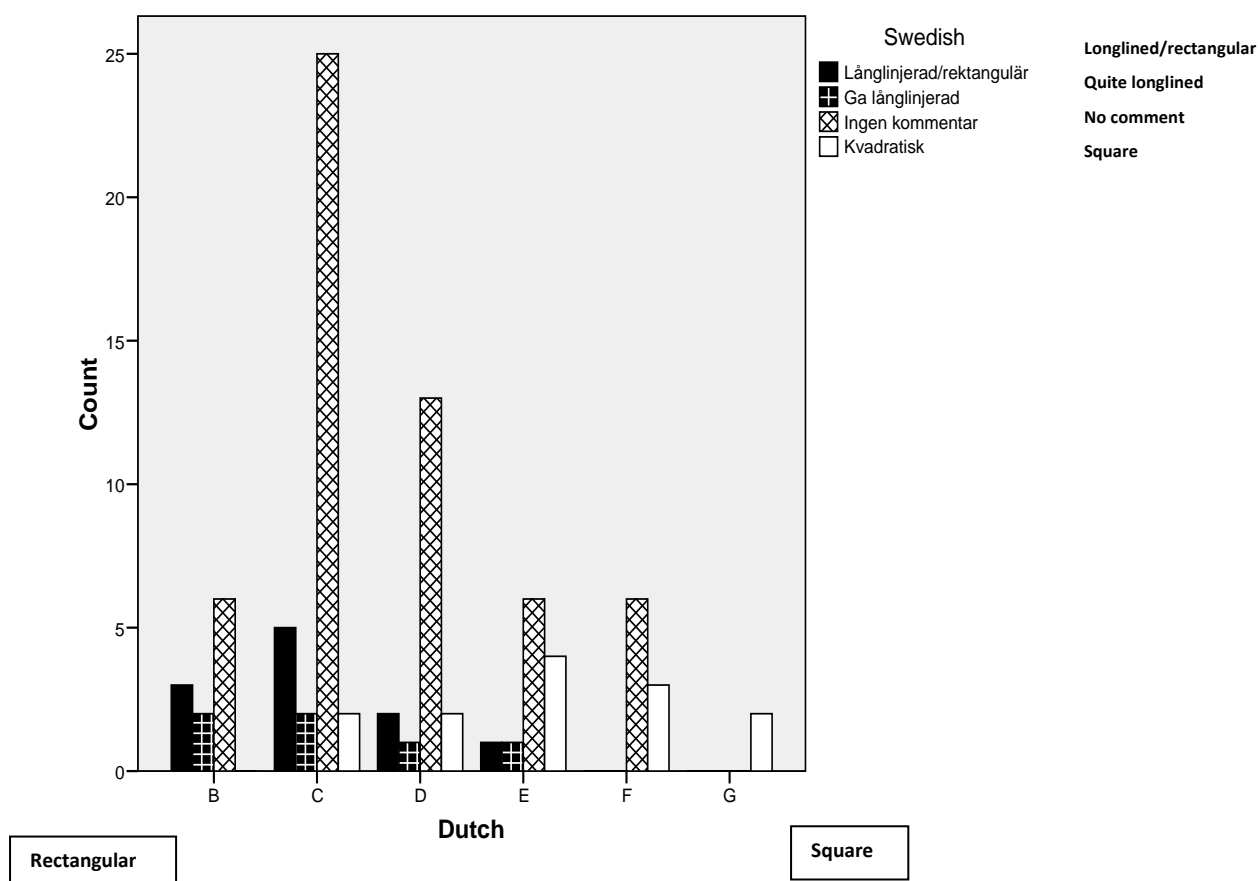
4.2 Comparison of descriptive (linear scored) traits (KWPN) with comments ASVH

In this part of the results the descriptive scores of the KWPN system are compared with the comments given on the same traits by the Swedish judges. This is done in order to be able to distinguish the differences between the Dutch linear scoring system and the Swedish system.

In the graphs displayed below the Swedish comments are being compared with the Dutch scores, A till I, for some of the traits being scored in the linear scoring system. It proved to be not possible to compare all traits since all the traits scored in the linear scoring system haven't been commented in the Swedish judging.

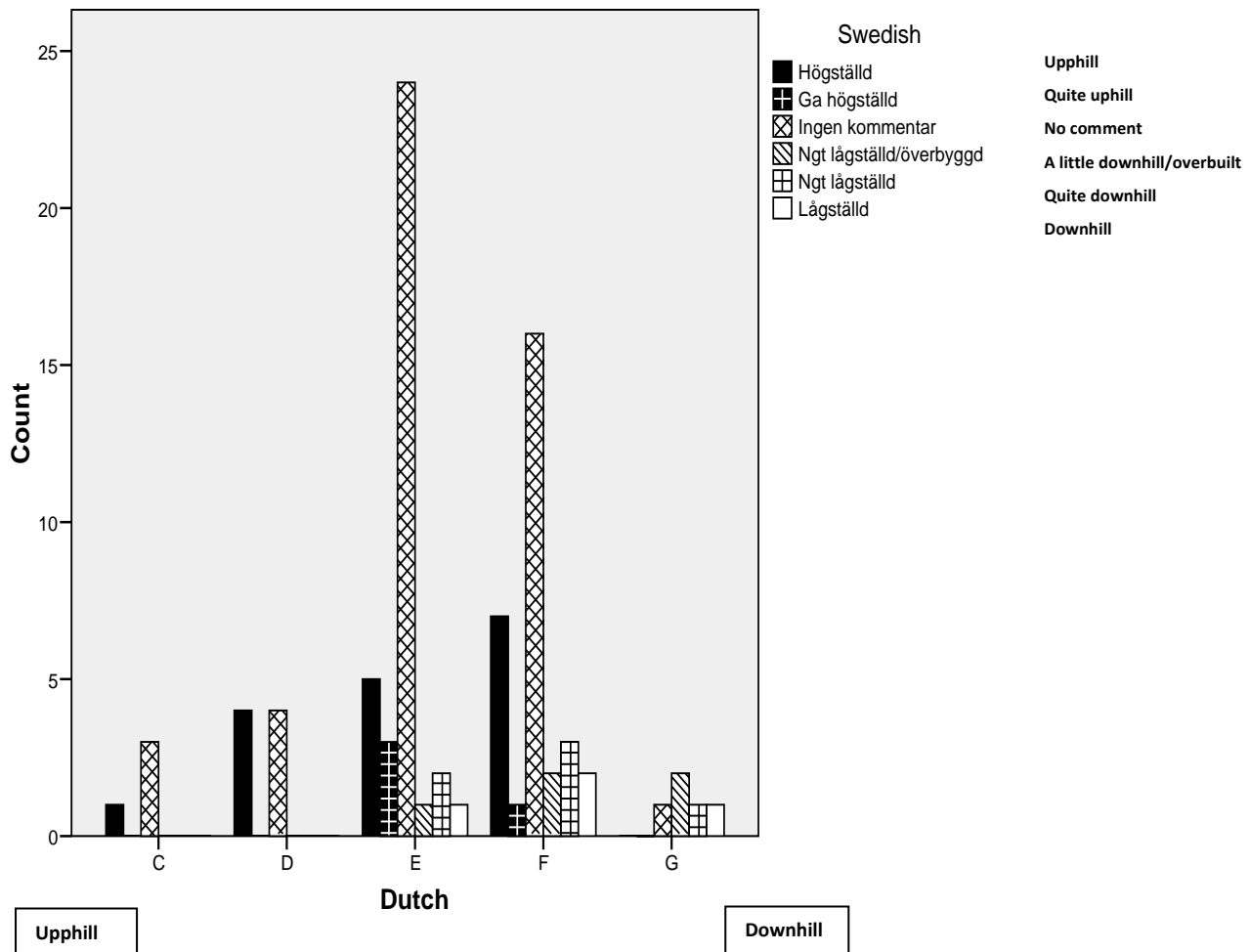
The graphs below shows the number of times a certain Swedish comment has been given for a certain score on the Dutch form. It also pictures how many times the different scores in the Dutch system has been left without any comment in the Swedish system.

Body: shape



Comparing the Dutch scores for the linear scoring trait body shape it shows that the Dutch scores correspond rather well with the Swedish comments given about the body type of the horses. On the left side of the Dutch x-axis we have rectangular and on the right side square. When comparing with the Swedish comments it can be seen that square are over represented on the right side and longlined/rectangular is over represented on the left side as well. Remarkable is the number of times no comment about the body type is given in the Swedish system, this especially applies for horses that are rather far from the standard population according to the Dutch system.

Body: direction

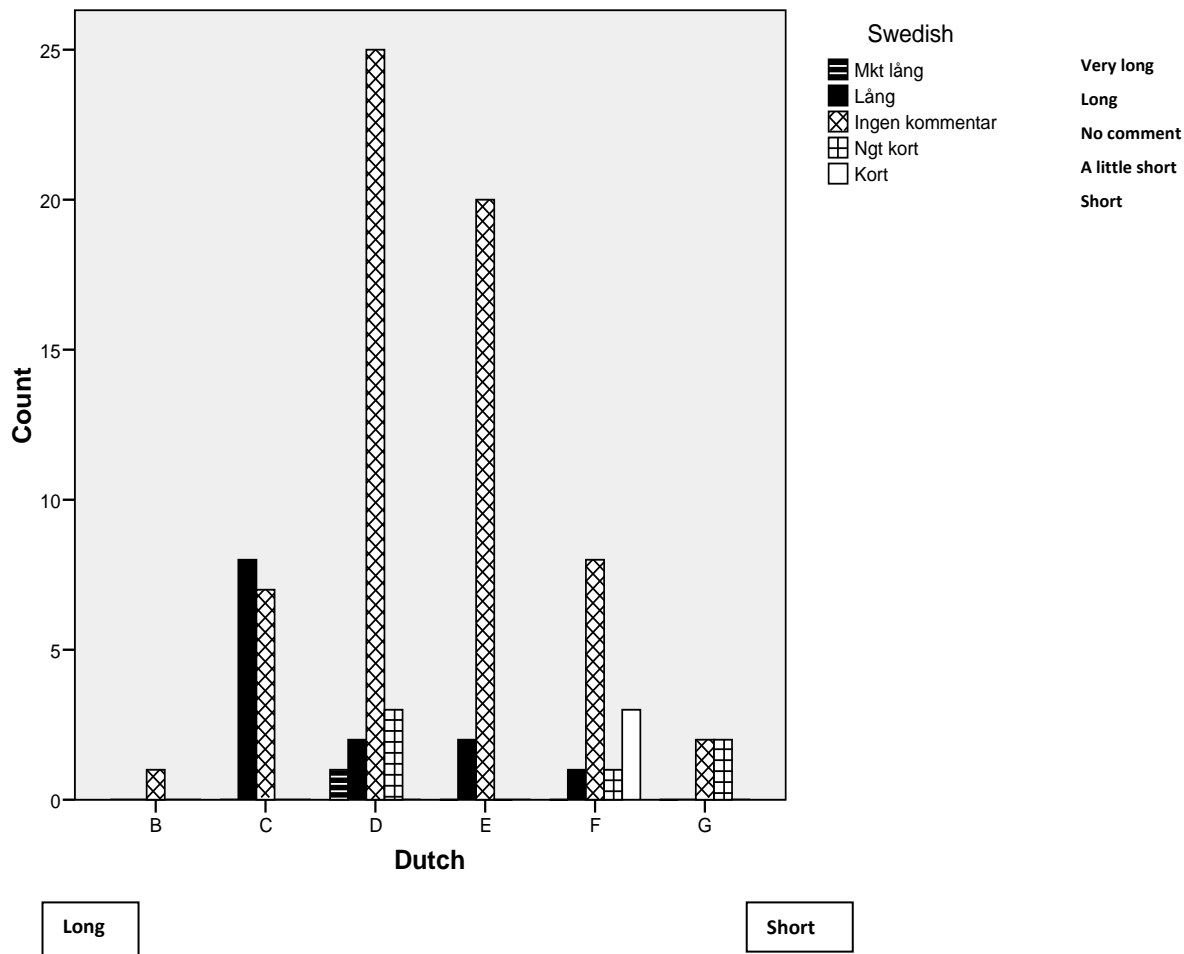


Comparing the Dutch scores for the linear scoring trait body direction with the Swedish comments given about the body direction of the horses we can see that the comments doesn't really agree. Many of the horses that scored an F, one time towards downhill, on the Dutch scale have been scored uphill in the Swedish scale. Remarkable also here is the big number of horses without a comment.

Head-neck connection

Going through the Swedish scoring sheets only one could be found where a comment about the head-neck connection had been given. From this we can conclude that the Swedish judges pay very little or no attention to the trait head-neck connection.

Length of neck

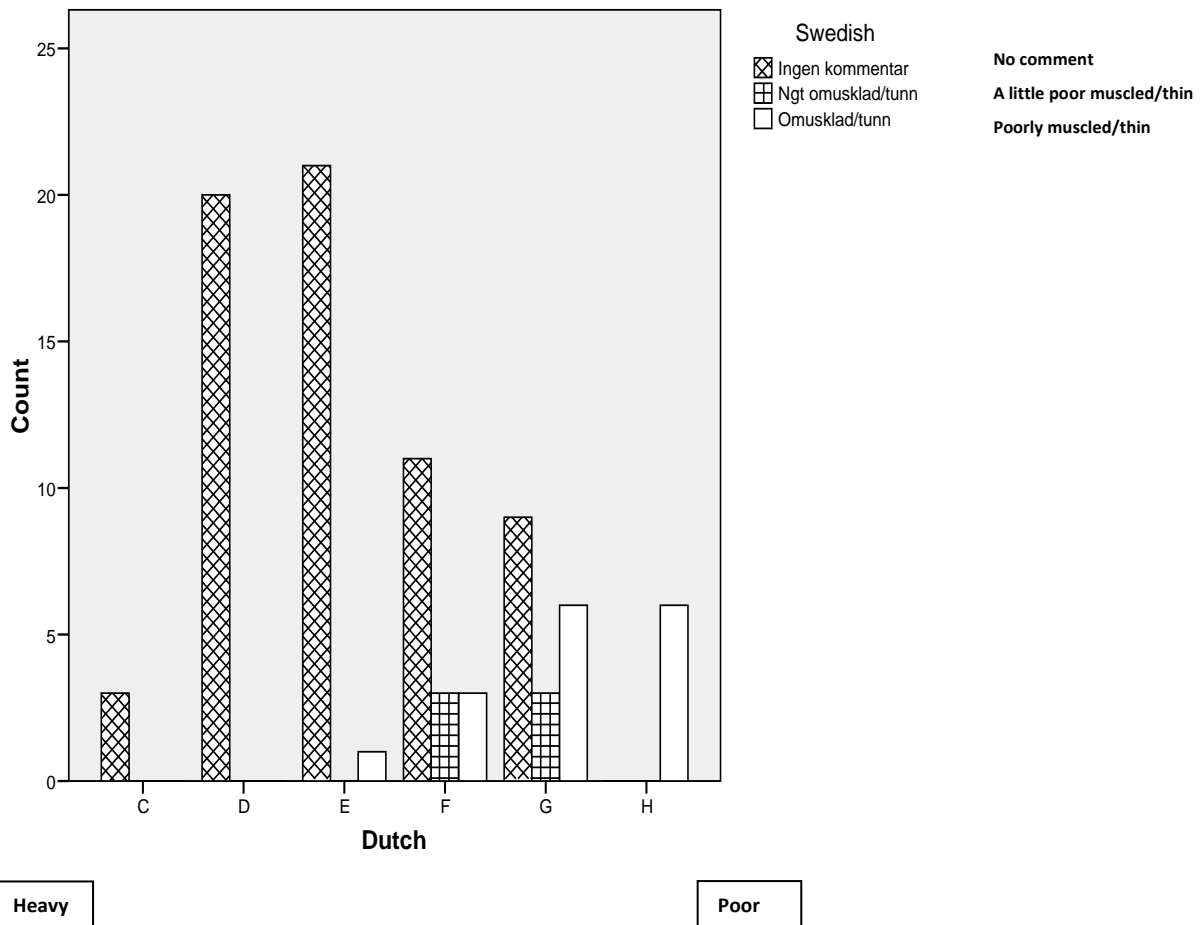


Comparing the Dutch scores for the linear scoring trait length of neck with the Swedish comments about the length of the neck it can be seen that the scores agree rather well. However a few horses that have been scored towards long (D) in the Dutch system have been scored “A little short in the Swedish system”. Remarkable here as well is the big number of horses left without a comment.

Position of neck

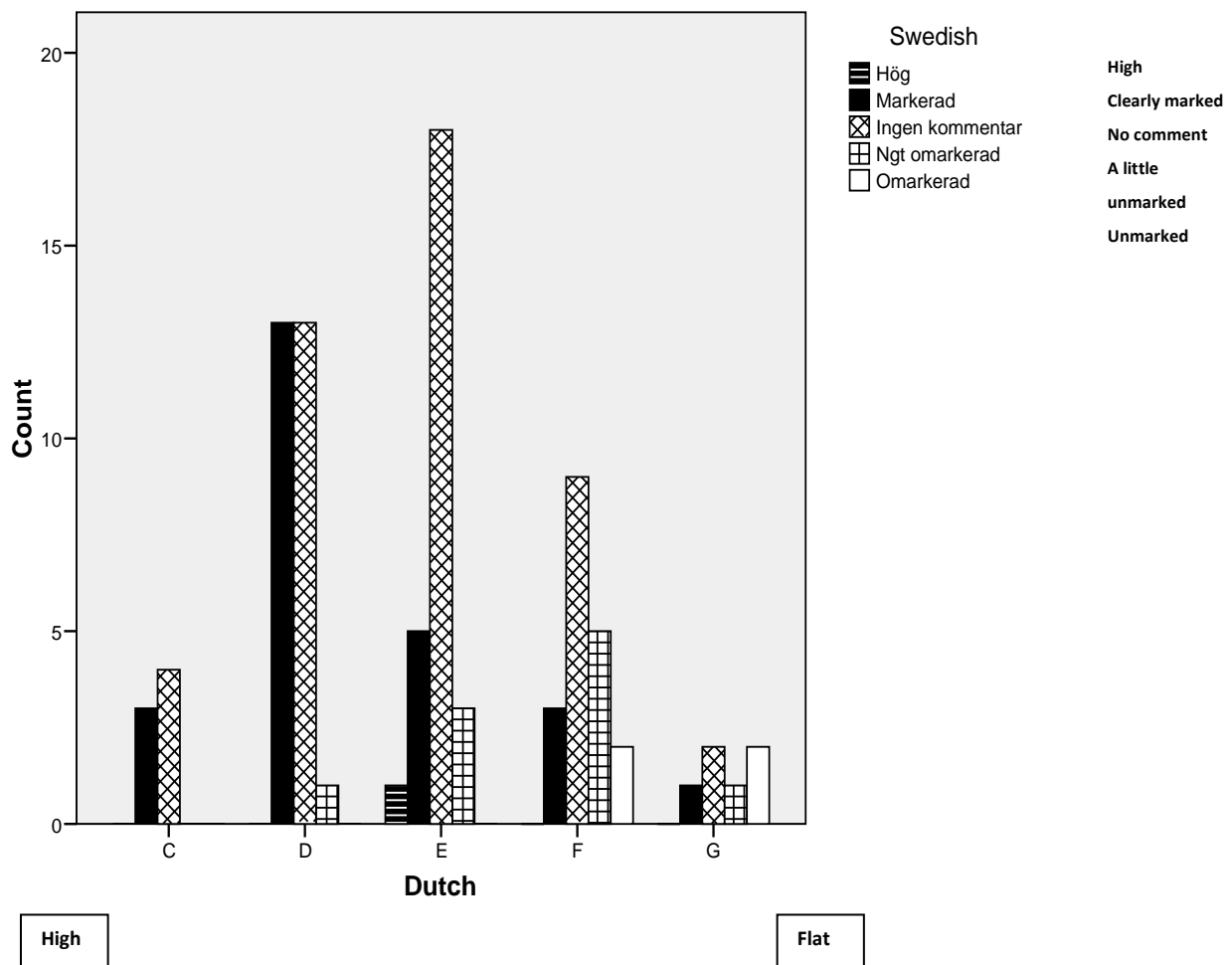
Regarding the position of the neck that in the Dutch linear scoring system is being scored from vertical to horizontal no such comments could be found at all in the Swedish comments.

Muscling of neck



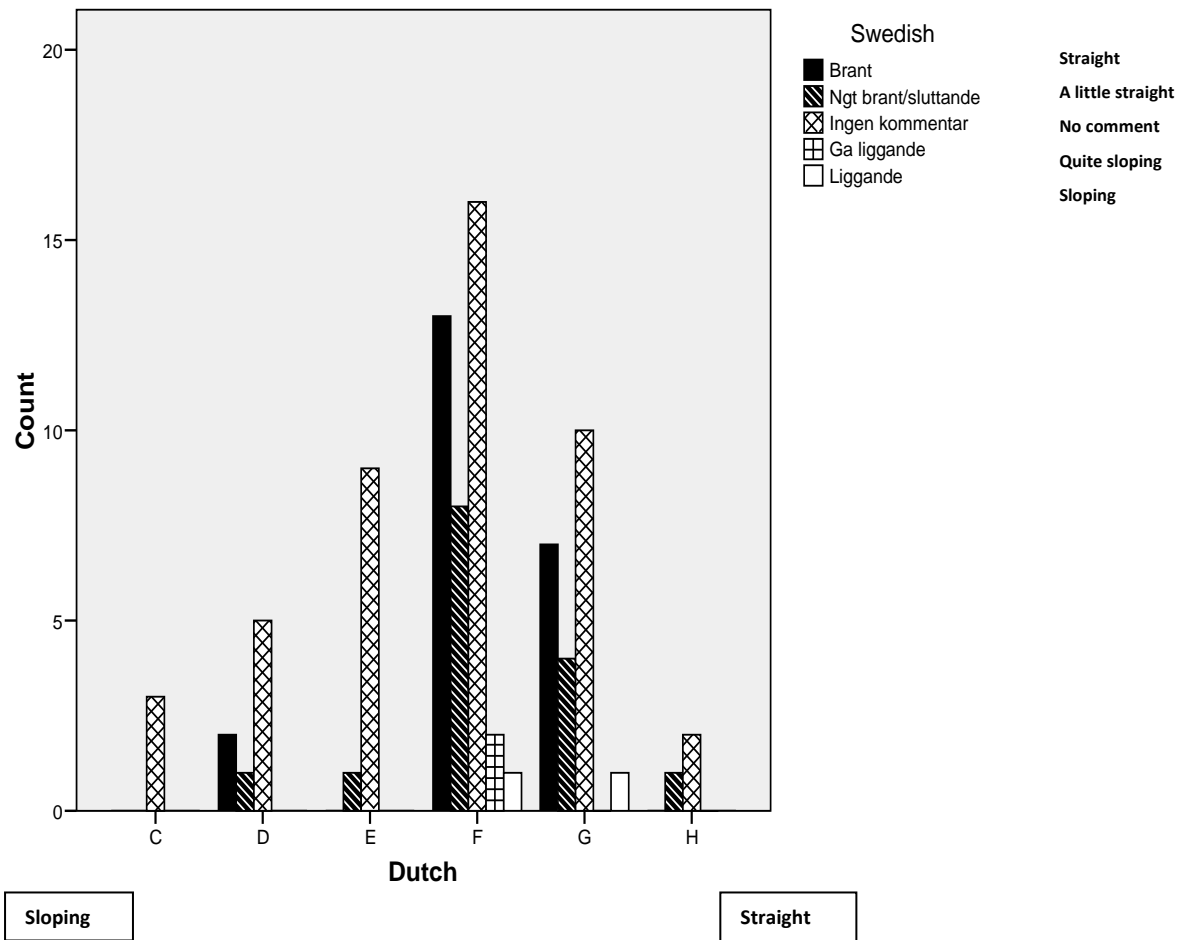
Comparing the Dutch scores of the linear scoring trait muscling of neck with the Swedish comments it can be found that also here a very few comments are given in the Swedish system. It is also noticeable that comments only are given for poor muscled or thin and never for well muscled.

Height of withers



Comparing the Dutch scores for the linear scoring trait height of withers with the Swedish comments about the withers it shows that the scores are rather disagreeing. Horses scored towards high, towards the right side in the diagram, in the Dutch system as well as horses scored towards flat have been given the comment clearly marked in the Swedish system. Also remarkable are that the only horse that were commented high in the Swedish system were a horse that according the Dutch system were within the standard population. This result gives the question if the height of withers is measured differently in the two systems. Once again it is also remarkable with the big number of not commented horses.

Position of shoulder



A comparison of the Dutch scores for the linear scoring trait position of shoulder with the Swedish comments for the same trait shows some interesting results. Almost none of the horses that are scored towards sloping in the Dutch system have been commented on in the Swedish system. Instead a number of horses that are scored towards straight in the Dutch system been commented as sloping in the Swedish system. Questionable here is if the Dutch and the Swedish judges look at the trait in a different way, measuring different angles for example. It is also remarkable that almost all the comments that have been given in the Swedish system has been regarding a sloping shoulder, only a few comments have been given regarding straight shoulders and very many horses has once again been left without any comment. Another interesting aspect is that very many horses in the Swedish system has been left with subjective comments like “nice lying shoulder”.

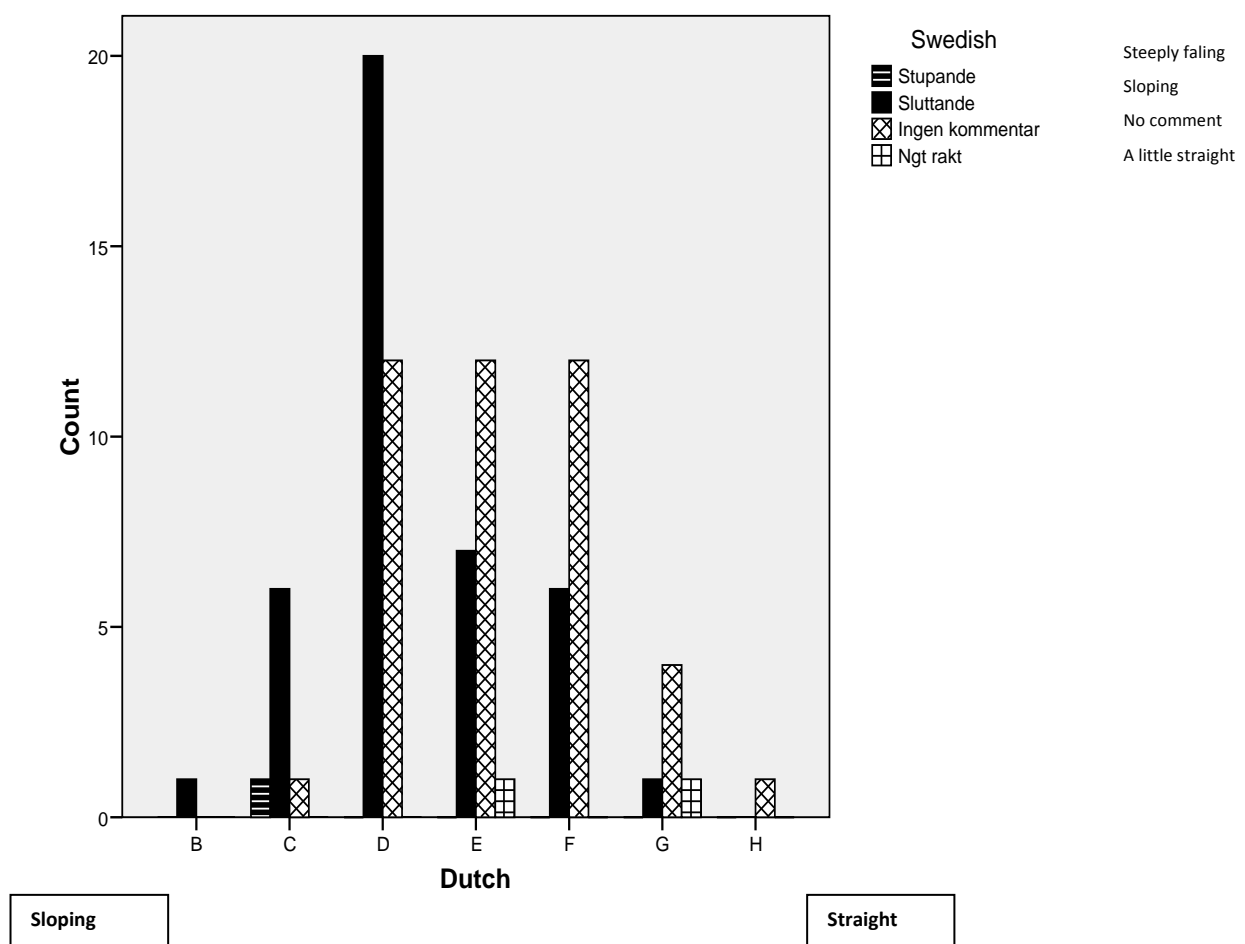
Line of back

Regarding the linear scoring trait line of back no similar comments have been given in the Swedish system. The only comments that have been given regarding the back of the horses are comments about the length of the back.

Line of loins

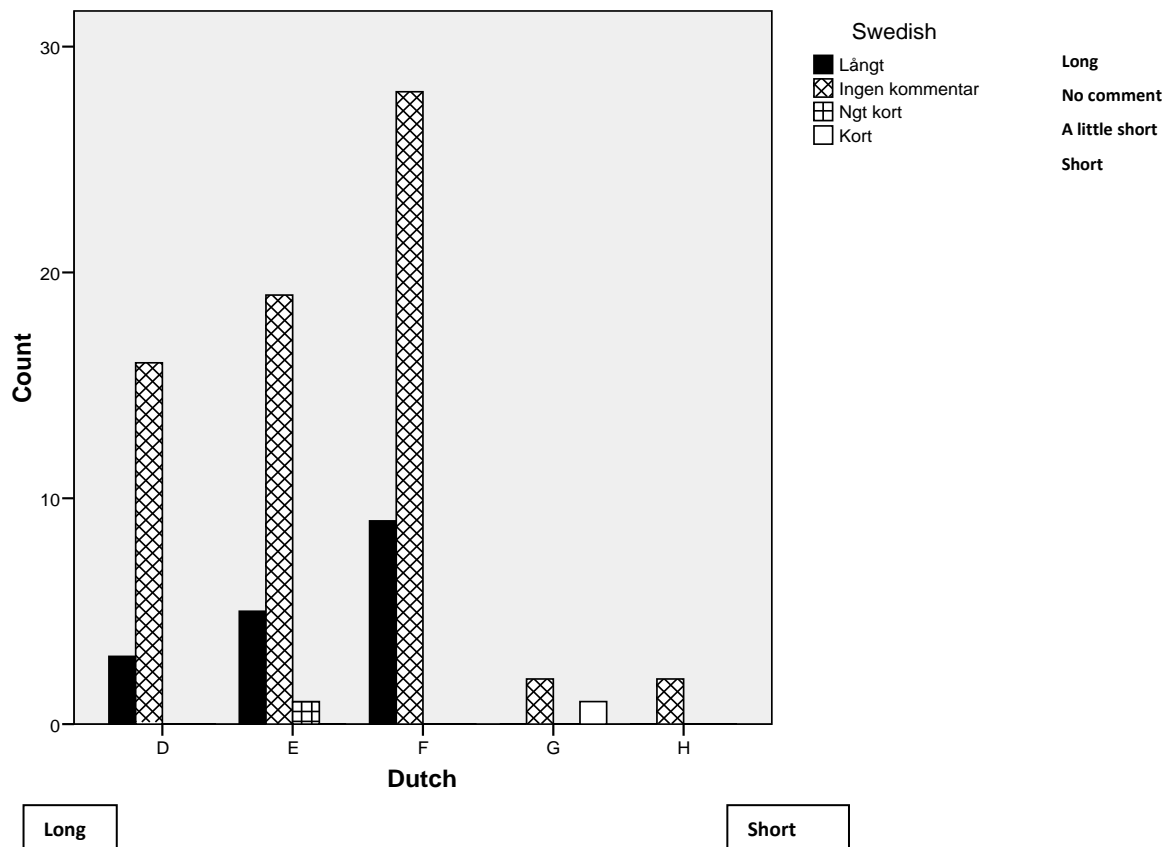
Regarding the linear scoring trait line of loins no similar comments at all have been given in the Swedish system.

Shape of croup



Comparing the Dutch scores for the linear scoring trait shape of croup with the Swedish comments for the same traits it can be found that with 3 exceptions the only comment given by the Swedish judges are sloping. Furthermore it is interesting that this comment have been given for horses that scored everything from a B till a G on the Dutch scale.

Length of croup



When comparing the Dutch scores for the linear scoring trait length of croup with the Swedish comments for the same trait it is clear that also here very many horses are left without a comment in the Swedish system, so even a horse that according to the Dutch system has an obvious featured short croup. It is also shown that the Swedish judges find that horses that are scored one time towards short in the Dutch system has a long croup.

Legs

Stance of forelegs

When reading the Swedish comments on the forelegs of the horses only subjective comments can be found, so as “well-legged” or satisfyingly correct.

Stance of hindlegs

When reading the Swedish comments on the hindlegs of the horses only subjective comments can be found, so as “well-legged” or satisfyingly correct.

Stance of pastern

No comparable comments can be found in the Swedish system. The comments given are regarding the length of the pastern and subjective comments about the elasticity like “could be a little more elastic”.

Shape of feet

Only 8 comments out of 86 horses are given in the Swedish system. The comments are also changing between concerning the front hoofs and the hoofs of the hindlegs while the Dutch scores always are given for the front hoofs, this makes the results hard to compare.

Heels

Only 4 comments out of 86 horses are given in the Swedish system, therefore it is not possible to compare.

Quality of legs

No comments that are comparable with the Dutch scores of the linear scoring trait quality of legs are given in the Swedish system.

Substance of legs

No comments that are comparable with the Dutch scored of the linear scoring trait substance of legs are given in the Swedish system.

Movement

Walk: length of stride

No comments are given in the Swedish system regarding the length of the stride in walk.

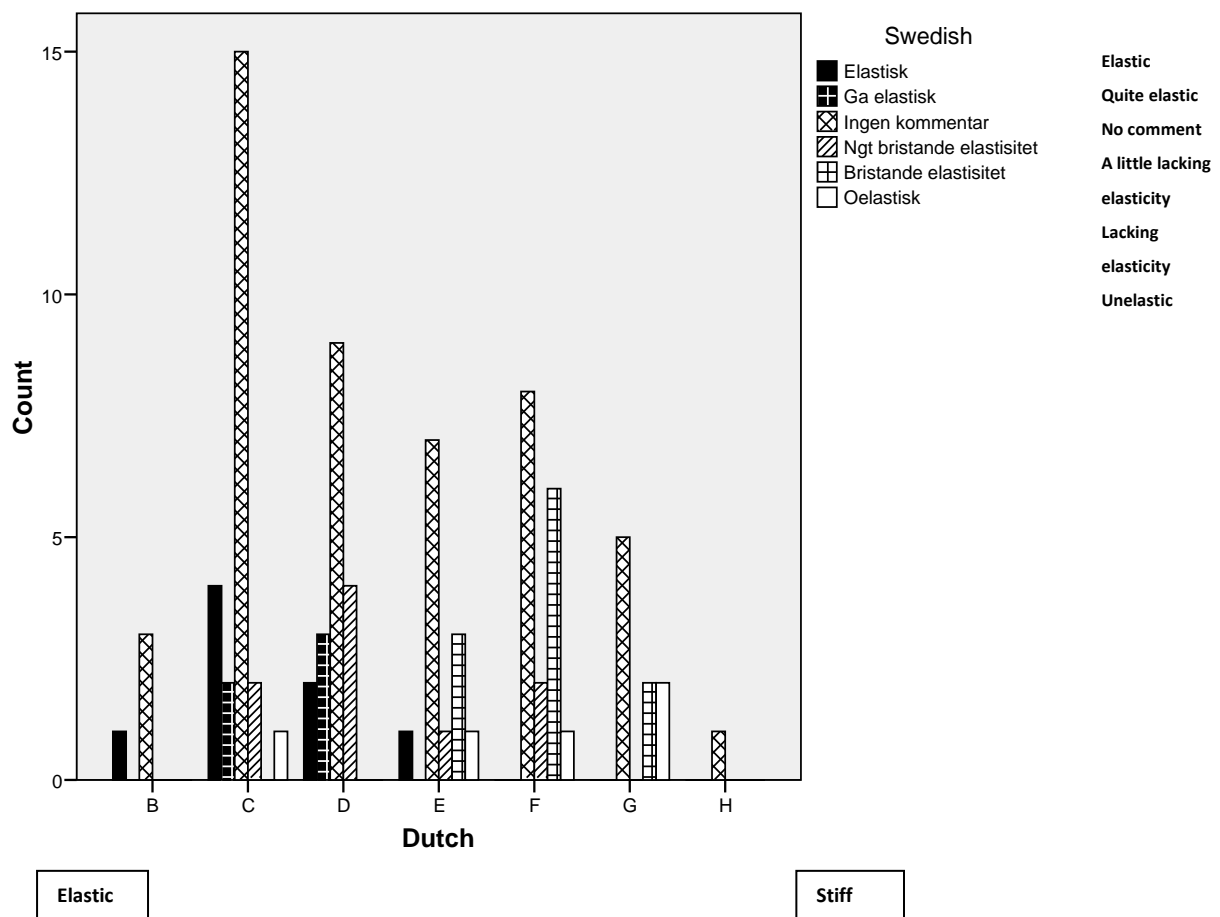
Walk: correctness

No comments on the correctness of the walk seen from in front of the horse like it being judged in the linear system is been given in the Swedish system. Comments are only given regarding the rhythm and the correctness of the walk seen from the side.

Trot: length of stride

No comments are given in the Swedish system regarding the length of the stride in trot.

Trot: elasticity



When comparing the Dutch scores for the linear scoring trait trot elasticity it can be found that the both the systems agree on almost all of the horses that has been commented as unelastic or lacking elasticity in the Swedish system. However it is remarkable a number of horses that has been scored towards elastic in the Dutch system are commented as “a little lacking elasticity” in the Swedish system. Once again it is also remarkable that a high number of horses that scored everything from very elastic till very unelastic on the Dutch scale are left without a comment in the Swedish system.

Trot: impulsion

When it comes to impulsion the Swedish judges are using a very big number of different words to describe the quality of the trot in an inconsequent way. It is therefore not possible to compare the comments with the Dutch scores for the linear scoring trait trot impulsion.

Trot: balance

Regarding the linear scoring trait for trot balance only a few horses have been commented in the Swedish system. The horses that have been commented have with the exception of on been commented towards carrying. When comparing the comments with the Dutch scores it shows that even horses that are considered as being obviously pushing instead of carrying has been commented as being carrying in the Swedish system.

Canter: length of stride

No comments are given in the Swedish system regarding the length of stride in canter.

Canter: impulsion

When it comes to impulsion the Swedish judges are using a very big number of different words to describe the quality of the canter in an inconsequent way. It is therefore not possible to compare these comments with the Dutch scores for the linear scoring trait canter impulsion.

Canter: balance

Comparing the Dutch scores given for the linear scoring traits canter balance with the Swedish comments it is remarkable that many horses that are scored clearly towards pushing in the Dutch system get comments about being carrying. This is the same tendency that could be seen in the scores for trot balance.

Jumping**Take off: direction**

No comments are given in the Swedish system regarding the take off direction in the jumping.

Take off: quickness

Only 5 comments given in the Swedish system out of the 50 tested jumping horses.

Technique: foreleg

In the Swedish system only subjective comments about the foreleg technique are given, these are therefore not comparable with the Dutch scores.

Technique: back

In the Swedish system only subjective comments about the technique of the back are given, these are therefore not comparable with the Dutch scores.

Technique: haunches

In the Swedish system only subjective comments about the technique of the haunches are given, these are therefore not comparable with the Dutch scores.

Scope

Only 5 comments out of 50 horses are given in the Swedish system, therefore it is not possible to compare.

Elasticity

Taking a closer look at the Dutch scores for the linear scoring trait elasticity (jumping) compared to the Swedish comments about the same trait it once again can be seen that many horses are being left without comments. Furthermore it can be seen that in the Swedish system both horses scored very supple as well as horses scored rather stiff in the Dutch system have been given the comment “elastic” or “very elastic”.

Care

Comparing the Dutch scores for the linear scoring trait carefulness with the Swedish comments for the same trait it can be seen that in the Swedish system both horses scored very careful as well as horses scored uncared in the Dutch system have been given the comment “careful”.

4.3 Comparison of the valuing traits of KWPN and ASVH

Correlation tables

In the tables below the correlations between the valuing scores of the Dutch system and the Swedish system can be found. Correlations lower than 0.3 have been left white while correlations > 0.3 have been marked yellow and correlations > 0.6 have been marked red. In the horizontal the Swedish traits are represented, in the vertical, the Dutch traits.

Table 7. Correlations jumping horses.

Jumping horses									
	Type	Head-neck body	Legs	Walk	Trot	Canter	Jumping technique	Overall jumping impression	Jumping talent
Conformation	0,629	0,617	0,113	0,390	0,299	0,493	0,469	0,545	0,665
Walk	0,293	0,436	0,137	0,656	0,349	0,427	0,121	0,161	0,329
Trot	0,545	0,370	0,006	0,304	0,500	0,436	0,227	0,323	0,433
Canter	0,617	0,398	- 0,003	0,381	0,422	0,656	0,479	0,540	0,648
Reflexes	0,517	0,299	- 0,009	0,314	0,171	0,480	0,373	0,457	0,515
Technique	0,582	0,362	- 0,017	0,269	0,196	0,408	0,565	0,656	0,644
Scope	0,547	0,396	0,033	0,242	0,323	0,522	0,764	0,769	0,776
Jumping	0,663	0,417	-0,013	0,348	0,322	0,588	0,669	0,732	0,766
Overall score	0,697	0,566	0,058	0,400	0,335	0,830	0,581	0,609	0,684

The table above (table 4) shows that the Dutch mark for conformation correlates the strongest with the Swedish mark for type, but it also correlates quite high with the Swedish mark for head-neck-body. Also the Dutch marks for walk and canter correlate quite strong with the Swedish marks for walk and canter, while the mark for the trot doesn't show such a strong correlation. Interesting also is that the Swedish marks for jumping correlates the strongest with the Dutch marks for scope and jumping and that the Swedish marks for legs doesn't correlate with any of the Dutch marks.

Table 8. Correlations dressage horses

Dressage horses							
	Type	Head-neck body	Legs	Walk	Trot	Canter	Dressage talent
Conformation	0,485	0,051	0,111	0,033	0,282	0,327	0,362
Walk	0,233	- 0,142	0,019	0,463	0,562	0,401	0,490
Trot	0,551	0,040	- 0,066	0,299	0,766	0,595	0,672
Canter	0,595	0,097	0,106	0,283	0,678	0,703	0,735
Self carriage	0,430	0,042	-0,048	0,155	0,587	0,539	0,534
Movement	0,489	0,057	0,041	0,331	0,751	0,635	0,696
Overall score	0,542	0,059	0,088	0,187	0,551	0,519	0,572

The table above (table 5) shows the Dutch score for conformation has a medium correlation with the Swedish score for type, but in difference from the jumping horses, it shows no correlation to with the Swedish head-neck-body score. Regarding the Swedish scores for the legs it is the same as for the jumping horses, no correlations are being found with any of the Dutch scores. The Swedish marks for trot and canter show a high correlation with the Dutch scores for trot and canter, as well as a high correlation for the Dutch movement score. The Swedish score for overall dressage talent shows the biggest correlations with the Dutch scores for canter and movement.

For both jumping horses as well as for dressage horses the Swedish and the Dutch overall scores show a high correlation, 0.717 for jumping horses and 0.641 for dressage horses. This can also be seen on the rather straight line formed by the dots in the scatter-dot diagrams displayed below. (Table 6 and 7)

Table 9. Jumping horses

Scatter-dot diagram showing the correlation between the Dutch and the Swedish average scores for jumping horses.

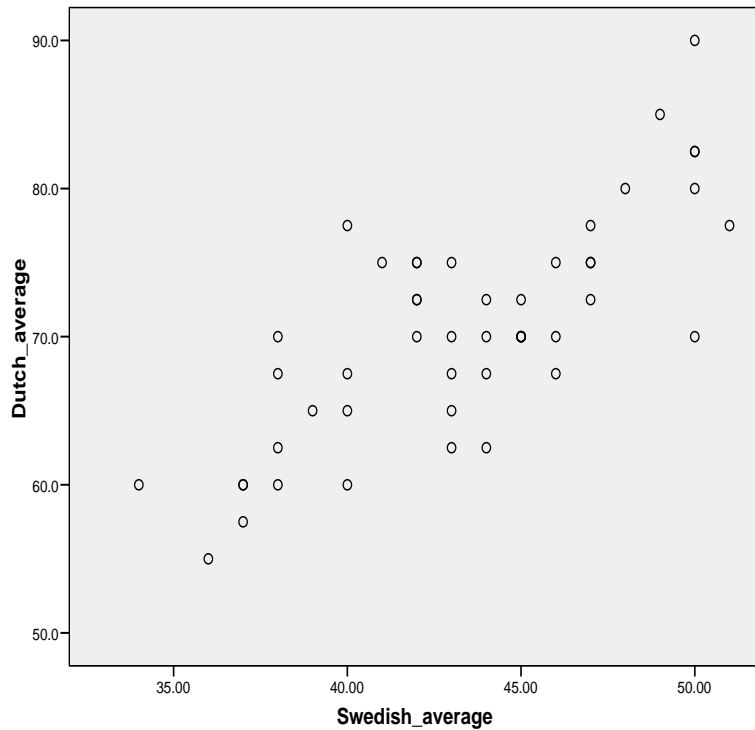
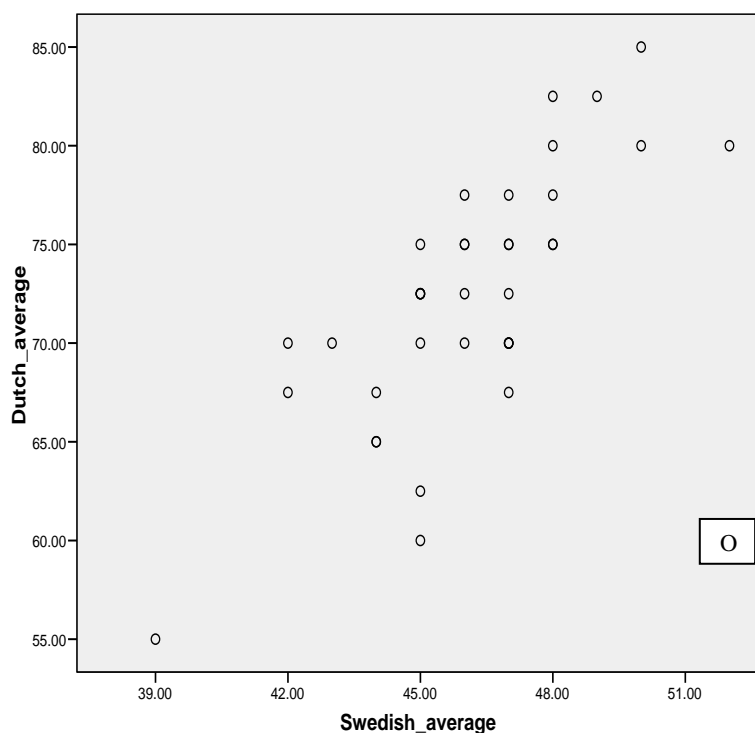


Table 10. Dressage horses

Scatter-dot diagram showing the correlation between the Dutch and the Swedish average scores for dressage horses.



O

Comment can be found in the discussion

5. Discussion

5.1 Error sources

When discussing the results of this research as stated in this report the following error sources should be taken into consideration.

Limited number of horses

This research has been carried out with a limited number of horses due to practical and economical reasons. This influences the reliability of the result. To increase the reliability of the research the test should be repeated on a bigger number of horses.

The number of horses used in this research has been 86 horses, but since the horses have been divided in two groups, dressage respectively jumping horses, the number of horses that the results are based on is even smaller, 50 jumping horses and 36 dressage horses.

When comparing the sample group with a bigger sample taken by Viklund (2008) the means and standard deviations of the twelve traits were in the same range however. The sample group in this research was a little less talented in jumping and a bit more talented in dressage comparing both populations. All in all it can be said that the sample group is a fairly representative sample of the Swedish horse population.

Limited number of judges

The next thing to take into account is the limited number of judges that have been involved in the testing. For the Dutch scoring only one judge has been giving all the scores, both for jumping and for dressage. For the Swedish judging two judges has been used, one for scoring jumping and one for scoring exterior and movement. The limited number of judges influences the reliability of the results since any differences being found between the two systems could be a consequence of the different judges as well as of the different systems. To increase the reliability of the results the test should be repeated with other judges and preferably using a bigger number of judges.

Personal interpretation

What also is important to take into consideration is that all the Swedish comments have had to be translated and interpreted by the author of the report in order to compare them with the Dutch scores. This decreases the reliability of the results but it also shows an important weakness of the Swedish system. Comments given to score horses are always going to be personally interpreted by the reader.

5.2 Similarities and differences of both scoring systems

Similarities

The high correlation between the Dutch and the Swedish overall scores both for jumping and dressage horses, displayed both in the correlation table as well as in the scatter-dot diagram in the result chapter, shows that there is a big similarity in what the Dutch and the Swedish judges consider to be a good horse. This is an expected result since the breeding goal of both the studbooks, KWPN and ASVH, are very similar to each other. The main goal for both the studbooks is to breed horses that can perform at a high international level.

Also the basic layout of the two tests, the Swedish 3-year old test and the Dutch studbook approval, are similar.

Both in the Swedish as well as in the Dutch system predicates are given as a reward to the best horses to stimulate breeders to enter the young horse performance tests.

In both the Netherlands and Sweden the judges give a verbal presentation of the horse to the audience after the judging session.

Differences

When comparing the Dutch studbook entry test with the Swedish 3-year old tests minor differences are found in the layout of the tests. The most important differences found in the layout is that in the Netherlands the horses are only tested for the sport that they are meant to perform in later, therefore the dressage horses do not jump. Another difference regarding

the jumping is that the jumping horses in the Netherlands jump over three fences instead of two in Sweden, in that way they get help with coming on the right distance from the fence. Because of the system with three fences instead of two the horses are brought to the fences in a lower speed which gives the horse a chance to have time to look at the fences. This is especially beneficial for horses that otherwise has a tendency of running too fast into the series of fences and therefore jump with a less good technique.

A difference between the Dutch test and the Swedish test are the clearly outspoken breeding standards that are made for every trait judged on the linear scoring. This gives a clear instruction to the judges which traits to look at and what to look in every trait. In the Swedish system it is left open for the judges to decide what to look at within every score, this leaves a space for personal interpretation of which are the most important traits.

The results of this research show that the different forms that are being used during the scoring makes a big difference. With the linear scoring forms the judge get a clear mail on what he or she should look at. This leads to that all the 36 traits, that the linear scoring system consists of, are being scored for all the horses. This regardless of the fact if a trait is obvious or average in a horse and regardless of if it is shown in a more or less desirable way in a horse. In the Swedish forms on the other hand many of the traits are often left without any comment. Commenting on all the traits will give the reader of the form a clearer picture of the horse. Another consequence of the linear scoring is that all the judges pay the same attention to all the 36 traits, personal interpretations of which traits that are more or less important in a horse is therefore put aside.

The clearly expressed instructions that has been made for how to judge the 36 linear scoring traits, which angels that should be looked at and in which way the traits should be judged, plays an important role in getting the judging as uniform as possible.

The maybe biggest difference with the linear scoring is that the scoring of the 36 traits is done in a descriptive way, it is only meant to give a clear picture of the horse, not to judge the quality of it. In the Swedish system the body traits are scored in a valuing way only. Satisfyingly or good can be interpolated different by different persons. Especially satisfyingly

is a hard word to interpret, that a trait is satisfyingly but not good tells the reader that something is not good enough but he or she can't know what. If for example it is written that the legs are satisfyingly correct it is likely that some part is not completely correct but the reader can't know which part. This could be a disadvantage when breeders are looking for a stallion to match with their mare for example.

Another difference between the systems is the different scales being used. In the Netherlands a scale from 0 (40) -100 are being used in steps of five. In Sweden a scale from 1-10 in steps of one is used.

The disadvantage of the linear scoring forms is if the horse has other extreme traits than the ones listed on the form, since there is no space left for marking this.

Body traits

The different graphs displayed in the result chapter show that the Dutch linear scoring is more consequent than the Swedish system and it also gives the judging a bigger focus. Especially remarkable is all the times a horse are granted with no comment about the different traits in the Swedish system. At first one can be fooled to think that the horses granted with no comment in the Swedish system are the horses without obvious traits, but when compared to the Dutch system this seems not to be the case. In fact horses with traits scored all the way from B to H in the Dutch system have been granted with no comment in the Swedish system.

Another remarkable finding is that some traits scored in the Dutch linear scoring forms are not mentioned in the Swedish comments. How must this fact be interpreted? It could be that these traits are considered less important by the Swedish judges or it could be that they have been forgotten.

The traits listed below are the ones not being mentioned in the Swedish comments;

1. Head-neck connection
2. Position of neck
3. Line of back (only comments regarding muscling and length of back)

4. Line of loins
5. Walk: correctness (commented only regarding if it has an correct 4-beat)
6. Walk: length of stride
7. Trot: length of stride

Legs

When it comes to the scoring of the legs there are a few big differences between the two systems;

In the Dutch system the following seven different traits are being judged;

- | | |
|-----------------------|--|
| 1. Stance of forelegs | - Only subjective comments in the Swedish system |
| 2. Stance of hindlegs | - Only subjective comments in the Swedish system |
| 3. Stance of pastern | - Long, short, a little inelastic, could be more elastic |
| 4. Shape of feet | - 8 comments in the Swedish system |
| 5. Heels | - 4 comments in the Swedish system |
| 6. Quality of legs | - No comments in the Swedish system |
| 7. Substance of legs | -No comments in the Swedish system |

In the Swedish way of commenting comments are often given of all four legs and all their traits at the same time and very generally in one comment. Some examples of comments: “well legged” and “satisfyingly correct”. When these kind of subjective comments are given it is hard for non judges to know what is meant. What for example does “well legged” tell to breeders, is it about the stance of the legs, the quality of the legs or possible other features? When comparing the horses that got the comment “well legged” in the Swedish system with their scores in the Dutch system it is clear that a “well legged” horse can mean many different things. Even harder to know what the judges mean is it with the comment “satisfyingly correct”. Do all the judges have the same standard for what is satisfyingly? Furthermore the statement “satisfyingly correct” fails to provide descriptive information about the legs of the horse to the person the reads the judging sheet.

Position of shoulder

In the diagram in the result chapter it can be seen that the Swedish and the Dutch judges have a very different opinion on when a shoulder is sloping or when it is straight. This is something that could be interesting to discuss why. Do they look at the same angles or are they judging the same thing? Remarkable is also that the shoulder very often is commented in a subjective way in the Swedish system, “nice lying shoulder” is a comment that are frequently given. When comparing this comment with the Dutch scores it can be seen that this comment has been given to horses that scored everything from a C till a G on the Dutch scale. This shows how hard it is to interpret a subjective comment, both for the reader of the scoring sheet as well as for the judges.

Shape of croup

Also regarding the shape of croup the same tendency with subjective comments can be seen. A “wellformed croup” is a frequently given comment that also is given for horses with a lot of different scores in the Dutch system. In the diagram in the result chapter it is also shown that shape of croup also belongs to the traits where the Swedish and the Dutch judges often score different. Also here it could be interesting to discuss what angles are being looked at and how the croup can be described to the reader of a scoring form in an understandable way.

Movement

Walk: length of stride	- No comments
Trot: length of stride	- No comments
Canter: length of stride	- Only two comments
Trot: impulsion	- Commented inconsequent with different words
Canter: impulsion	- Commented inconsequent with different words

Jumping

Take off: direction	- No comments
Technique: foreleg	- No comments
Technique: back	- No comments
Technique: haunches	- No comments

Comparison of the subjective marks given in the Dutch linear scoring system and in the Swedish system

When comparing the subjective marks given in the Dutch and the Swedish system the correlations for the overall scores are high (0.717 for jumping and 0.641 for dressage). This gives the expected picture that the Dutch and the Swedish studbooks and also their judges are looking for the same qualities in their horses and agree on which is best.

A few things however are interesting and relevant to discuss. When comparing the correlation table for the jumping horses with the one for the dressage horses a few differences can be found. For the jumping horses both the Swedish marks for type and head-neck-body are correlated to the Dutch mark for conformation while for the dressage horses only the mark for type is correlated to the Dutch conformation mark.

Another interesting result to discuss is the fact that none of the Dutch marks are correlated to the Swedish mark for legs. Instead of having separate marks for legs and head-neck-body the Dutch system only has one mark for conformation. This can be a limiting circumstance. During the test in Flyinge there was one horse with a good conformation and topline with a big defeat on the legs. (This horse is marked in the scatter-dot diagram in the result chapter). In the Swedish system this can be clearly shown by giving high marks for type and head-neck-body and a low score for the legs. In the Dutch system on the other hand the judge has no other choice than to give a low mark for conformation. For someone who hasn't been at the test and seen the horse, this can give an unfair picture of the horse. Especially regarding the subjective scores given in the linear scoring system and the scores for conformation in particular it could be interesting to discuss if it would be beneficially to add one more score for the legs.

5.3 Possible benefits and disadvantages of the Dutch system compared to the Swedish system

The possible benefits of the Dutch system compared to the Swedish system as they can be found in the results of this research are the following;

- A more consequent judging, all the horses get judged at the same 36 traits, no matter how obvious the trait is displayed in the horse.
- A more uniform judging since all the judges will have to give all the same 36 traits the same attention regardless of what they think are more or less important traits in a horse.
- A description of the horse that is easier to interpret for the reader of the scoring sheet.
- More information about every scored horse that can be used to make a more detailed BLUP-index.
- A more objective judging since the horses will be judged based on a comparison with the average of the population.

The possible disadvantages of the Dutch system compared to the Swedish system as they can be found in the results of this research are the following;

- No separate mark for the legs. Instead the legs are being considered in the conformation mark.
- No space to mark or comment other extreme traits that might occur than the ones being listed on the linear scoring forms.

6. Conclusions

6.1 Differences and similarities of both scoring systems

Differences

Descriptive scoring of 36 traits in the linear scoring system compared to only valuing scoring in the Swedish system.

Clearly described selection standards for all 36 traits in the Dutch system.

Different scales for scoring the horses.

A slightly different set up of the testing, 3 fences instead of 2 for jumping horses. Dressage horses do not jump during the Dutch test.

Similarities

The total rankings of both jumping horses as well as dressage horses shows a high correlation between the both systems; this tells us that the Dutch and the Swedish judges agree on which horses that are the best ones. However differences can be found in the way of describing the horses.

6.2 Possible benefits and disadvantages of the Dutch system compared to the Swedish system

Possible benefits

The total horse is being scored in the same way. More uniform scoring between the judges because of the clear instructions on how to look at and score each trait. All the horses are scored on all 36 traits which gives a clearer picture since no traits are being forgotten.

The linear scoring model is more consequent, all the horses are judged on the same traits. It gives a more standardized way of judging and minimizes the chance that different judges look at different traits and give them different importance.

The linear scoring gives a bigger focus on which traits that are being scored and how they are scored. The linear scoring gives a clearer picture of the scored horses, a blueprint, which makes it easier for a person that hasn't seen the horse but knows the system to know what the horse looks like. The linear scoring brings more information about the horse to the BLUP index.

Possible disadvantages

No separate mark for scoring the legs, instead the legs have to be into consideration scoring the conformation.

No space to score or comment other extreme traits that might occur than the ones being listed on the linear scoring forms.

Recommendations

The recommendation to the Swedish studbook, ASVH, will be to repeat the research in an extended way to increase the reliability, using a bigger number of horses and different judges. Based on the results stated in this report the recommendation would be to introduce the descriptive part of the linear scoring system in Sweden after doing a careful examination of which traits ASVH think would be suitable to have in their forms. In this examination it would be recommended to pay extra attention to the traits that today are judged on the Dutch forms but not in the Swedish forms and the different ways of scoring conformation and legs.

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Appendices

Other young horse performance tests

KWPN

IBOP

Purpose

The IBOP (Individueel Bruikbaarheid Onderzoek Paarden, eng Individual Usefulness Examination Horses) for mares is meant to gain insight in a horse's natural talent for the sport. The IBOP is a one-day test, in which the mare is ridden on by its own rider. From the age of 32 months, a mare can participate in the IBOP. By taking a performance test, a breeder receives more information about his mare's qualities. The comments of the jury help the breeder to form a complete picture of his mare's talent for the sport.

A performance test is most important for horses that do not participate in the sport. The horses that do participate can show sports' results, which form a good picture of the horse's level of success.

Layout

During the IBOP-test, the dressage horses are required to ride an individual dressage-test, followed by a presentation under the saddle in a group of two to four pairs. This entails showing the basic gaits as well as a number of pace changes. Four-year-olds are required to do some leg-yield, and five-year-olds and elder must show the shoulder in.

Jumping horses are required to show the basic gaits and to jump over a number of obstacles. The obstacles are jumped in trot and canter. For three-year-olds, the obstacles are 80 to 90 cm high, for four-year-olds 90 to 100 cm and for five-year-olds 100 to 110 cm. If the mare is more than five years old it is up to the jury's decision, depending on the mare's level of training, if the mare needs to jump over more than 110 cm.

Evaluation

With dressage horses, the mare is judged on her gaits: walk, trot and canter. In addition, the mare is judged on limberness, posture and balance, ability to ride, manageability and talent as a dressage horse. The marks for walk, trot and canter count double in the final decision.

Jumping mares are judged on walk, trot and canter. In addition, the mare is judged on posture and balance, reflexes, technique, strength, attitude, ability to ride, manageability and talent as a jumping horse. The marks for walk, trot and posture and balance do not count for the total score. The rest of the marks do count, and the marks for canter, reflexes and technique count double. Overall, a maximum of 100 points can be obtained, with 75 points a mare has passed the test.

Admission to the studbook and predicates

If a riding mare does obtain at least 75 points, and she is registered at the KWPN, she will receive the predicate IBOP (jumping) or IBOP (dressage). A mare that has not been evaluated yet can immediately after the IBOP be offered for admission to the studbook and be declared Ster as well (if she obtained enough points). During this studbook inspection, it is possible to offer mares that have already been admitted to the studbook a higher predicate after their IBOP. If a mare obtain 70 points for conformation when she was admitted to the studbook, but she failed to obtain the 75 points for ster predicate needed in free jumping or free movement, then she will become ster after passing her IBOP. A mare that is preliminary keur will become keur after a successful completion of the IBOP.

EPTM

Purpose

The idea with the EPTM is to give the breeder a detailed description of the mare's strong and weak points that can be used in the decision whether to use her for the breeding program. The thought is that choosing a stallion also becomes easier if the breeder has more information about the (jumping) qualities of his mare.

After the EPTM, the owner will get home a mare that is well started under saddle. Besides that there is a possibility to have the mare admitted to the studbook after the talent test. The studbook receives reliable information via the EPTM-tests, which is used as a basis for estimating the breeding values and informing the breeders.

Layout

Mares with a minimum age of 32 months can participate in the five-week EPTM-test. A mare may be brought to the testing site two weeks prior to the five-week test so that she can be started under saddle. The mare will then stay at the EPTM-station for a total of seven weeks. To participate in the two-week test, the mare must be at least four years old. The training and care of the horses is in the hands of professional training-supervisors, who are assisted by a group of horsemen and grooms. The mares participating in the EPTM-test are clinically tested by a veterinary surgeon upon arrival to check if they are healthy, if they do not pose a threat to other horses (with respect to health) and if they are testable.

The training for the horses focuses on movement or jumping, in such a way that the jury can form a good picture of the horse's talent. The training-supervisors carefully adjust the training to the level of the horses.

Evaluation

In a five-week test the mares appear four times before the jury and in a two-week test three times. During the last verdict the final score is determined; the verdicts made in between are weighed in of course.

By the end of the second week the jury will come for the first verdict. The mares are judged on their basic gaits under the saddle and jumpers are judged on free jumping as well. During the following verdicts the jury only reviews the horses under the saddle. Besides the two regular jury members, the training-supervisor is also part jury. His experience with the horse's development during the training is also count for the final verdict. In the last three weeks there is a total of three days of judging. This allows the owners to see the progression of their mare. After the third judgment there is a possibility to discuss the horse's progression with the jury.

More advanced ridden mares or mares which have been brought into the sport can continue to their two-week test in the last two weeks of their test. They will be judged directly at their arrival and then twice again by the end of the weeks. On the last day the mares are judged once again. A total of 100 points can be obtained, with 75 points a mare has passed the test.

Admission to the studbook and predicates

If a mare does obtain at least 75 points and she is registered at the KWPN, then she will receive the predicate EPTM (jumping or dressage). A mare that has not been evaluated yet can immediately after the EPTM be offered for admission to the studbook and be declared ster as well (if she obtained enough points). During this studbook inspection, it is possible to offer mares that have already been admitted to the studbook a higher predicate after their EPTM. If the mare obtain 70 points for conformation when she was admitted to the studbook, but she failed to obtain the 75 points needed for the ster predicate in free jumping or free movement, then she will become ster after passing her EPTM. A mare that is preliminary keur will become keur after a successful completion of the EPTM.

ASVH

Riding Horse Qualitytest (4-year olds and 5-year old mares with foal)

Purpose

The quality test is meant to be an education goal and a check-point for the young horse after the first years of education. The young horses are shown and judged veterinary, exterior, in gaiths under rider and in jumping, either loose jumping or under rider. Also the rideability and the temperament are being judged.

At the quality test advice is given for the continued training by the judges and the veterinarian and it is also a chance to show the horse for buyers in the audience and to qualify for the 4-year old championships in jumping or dressage.

Layout

The qualitytests are arranged by the regional breeding societies in Sweden during August

and September. The testing time is one day. The first station is a control of passport and chipping together with measuring of the height. After this the mare will be showed under the saddle for a judge that will be looking at and give marks for walk, trot, canter, rideability and over all impression. When the first judge is satisfied the saddle will be taken off and the mare will be shown in hand for a second judge who will give marks for conformation, head-neck-body, legs and correctness of the gaits. After these evaluations the mare will be given some time to rest before the jumping.

At the jumping station the mare can either be shown under rider on a small course of five fences on the height between 90cm and 1m or in loose jumping. However the mare needs to be shown under rider to be able to receive a diploma as a promising jumping horse. The judges at the jumping will be giving two scores, one for technic and capacity and one for attitude and temperament/rideability (if shown under saddle).

Evaluation

The mares presented at the quality test will be given in total five scores. They will all be given the scores 1-3 and then 4a, 5a or 4b, 5b depending on how they are presented at the jumping station.

1. Conformation (Conformation + Head-neck-body + Legs) / 3
2. Gaits (Walk + Trot + Canter) / 3
3. Temperament/rideability, gaits

- 4a. Jumping
- 5a. Temperament/rideability, jumping under rider

- 4b. Loose jumping
- 5b. Temperament and attitude, loose jumping

The points will then be summed up as following;

Points for dressage talent:

$(E + 2G + TG) / 4 = \text{Total, max 10,0 points}$

Points for jumping talent:

$(E + 2LH + TLH) / 4 = \text{Total, max 10,0 points}$

or $(E + 2H + TH) / 4 = \text{Total, max 10,0 points}$

To receive a diploma at the quality test the mare need to score a total of 8.0 for jumping talent or 7.8 for dressage talent and with no mark under 7 on conformation or in the own discipline. All mares are however shown in both disciplines, regardless of their pedigree. To become a class 1 mare (the level under diploma) the mare needs to receive a total of 7.5 for jumping talent or 7.4 for dressage talent.

Mares that reach diploma quality will be recommended to be used for breeding and there are special benefits and subsidies given to breeders with diploma mares.

Explanation of the Dutch predicate system

At the studbook inspection a mare can be offered for a registration in the studbook. If she complies with the preconditions according to the jury, the mare will be registered in the studbook. By meeting certain requirements for conformation or performance, a mare can be acknowledged with a predicate. Predicates are important indicators for a breeder concerning the quality of their mare.

For the jumping- and dressage-bred mares we have the following predicates: Ster, Keur, PROK, IBOP, EPTM, elite, sport, preferent and Prestatie. If a mare has a predicate, this predicate is mentioned on the registration paper.

Ster

A mare with the predicate ster has proven that she has a correct and functional conformation and a proper manner of movement and/or jumping. During the studbook inspection a mare can receive the predicate Ster directly, if she is awarded with enough points. Jumping bred mares must at least obtain 70 points for conformation, a minimum of 75 points for jumping and on average 60 points for the walk and trot to be awarded with the Ster predicate.

Dressage-bred mares must at least obtain 70 points for conformation and at least 75 points for the movements.

If the mare does obtain 70 points for her conformation, but not the required 75 points for jumping, then it is possible to offer a mare for a performance test; the IBOP test or the EPTM. During this test, the mare has another chance to show her performance in dressage or jumping. If she does obtain the required 75 points in this test, then she is awarded with the ster predicate after all. Mares that have obtained 70 points as a jumper for conformation, but not the required 75 points for jumping or free movement, can also become a ster mare if she obtains the predicate sport (jumping) or sport (dressage) later on in the sports. KWPN-horses of all breeding sorts must comply with the rule that they have a minimum height at withers of 1,60 meter to be considered for the ster predicate.

Keur

The Keur predicate informs the breeder that he has a full-quality mare. The conformation of the mare and her talent for the sport are above average. Studbook mares with the predicate ster can be offered at the Central Inspection to be considered for the predicate 'preliminary keur'.

At the Central Inspection, the mares are judged and placed in order of quality. Depending on the quality, the jury decides which and how many mares become preliminary keur. To become keur, they have shown in the sport or in a performance test that they have enough talent as a sporthorse. If a mare with the predicate preliminary keur passes the performance test, she will receive the predicate keur. Another option for such a mare to receive the predicate keur is to show in the sport that she has enough qualities as a sport-horse. A jumper must be M-jumping (1.20m) or M-eventing (cross 1.00m, Jumping Course 1.05m) and

have five winning points. Dressage mares must be Z1-dressage with one winning point or M-eventing with five winning points.

PROK

PROK means Project Röntgenologisch Onderzoek KWPN (Project Radiographical Research KWPN). The breeding purpose of the KWPN states among other things that it wants to breed healthy horses. The predicate PROK is awarded to mares that comply with the radiographic conditions of the studbook. For the breeder this entails that his mare has good bone quality and is therefore able to pass on a good basis to her offspring. The studbook has acknowledged veterinary surgeons throughout the country who can make X-rays. When the X-rays have been judged and approved of by an independent KWPN-committee, the PROK-certificate can be given. The Veterinary Regulation describes the requirements to be met by the mares.

IBOP

The IBOP (Individueel Bruikbaarheids Onderzoek Paarden) is a one-day performance test in which a jury will judge mares under the saddle. The test includes the estimation of her talent for the sport. Dressage horses are evaluated in a dressage test. Afterwards, the jury will ask to repeat a number of elements by direction of the jury. Jumpers must jump a number of obstacles by direction of the jury. A maximum of 100 points can be obtained, and with 75 points a mare has passed the test she will receive the predicate of IBOP.

EPTM

The EPTM (Eigen Prestatie Toets Merries) (Own Performance Test Mares) is a talent test in which the owner of a mare farms out the daily care and the training to an EPTM-teststation. Depending on the level of training of the horse, either a five- or two-week test is possible. The training for the dressage horses focuses on showing pace gaits, in such a way that the jury can form a good picture of the horse's talent. The training for jumpers focuses on jumping over a number of obstacles, again in such a way that the jury can form a good picture of the horse's talent. The horses are judged multiple times during the EPTM. A maximum of 100 points can be obtained, and with 75 points a mare has passed the test she will receive the predicate EPTM-jumping or dressage.

Elite

Mares with the Keur-predicate receive the predicate 'elite' if they have the PROK-predicate as well and therefore comply with the radiographical conditions of the KWPN. The predicate elite is the highest predicate that a mare can obtain in the area of conformation and health. A mare with this predicate is part of an exclusive group of very full-quality mares. A breeder with an elite mare has a healthy mare, with an above average conformation and a talent for the sport.

Sport

In order to deserve the predicate sport, a mare must comply with the requirements drawn up in the sport. Riding mares receive the predicate sport with a performance of Z2 dressage with one winning point (obtained when scoring 60% or higher), Z-jumping with six winning points (3 clear rounds) or Z-eventing with five winning points.

Preferent

When a mare has achieved the predicate preferent, this means that her offspring has performed well at the inspection. This is an important predicate for a broodmare, because a preferent mare has proven to deliver offspring with a good conformation and the necessary talent for a jumper. If at least three members of her offspring have achieved the predicate ster, keur or elite at an inspection or if they are appointed for a second review during a KWPN-Stallion Show, the mare has deserved the preferent predicate. A descendant registered as an approved stallion in a studbook acknowledged by the KWPN does also count for the preferent status of his mother.

Prestatie

The predicate Prestatie indicates the power of inheritance of a mare with respect to sport. This predicate is also of great value to a broodmare. It means that her offspring performs well in the sport. To achieve this predicate, a mare with a maximum of three descendants must achieve a minimum of five points according to the system explained on the page score for Prestatie predicate. A mare with, for example, two descendants at Z-jumping with winning points and one having five winning points in M-jumping, has exactly five points and is therefore eligible for the Prestatie predicate.

Judging form for linear scoring of jumping horses

EVALUATION		CONFORMATION:										JUMPING:	
												Center: Reflexes: Technique: Scope:	
												Walk: Trot:	
11. Shape of croup	sloping	a	b	c	d	e	f	g	h	i	Flat		
12. Length of croup	Long										short		
13. Stance of forelegs	over at knee										back at knee	<input type="checkbox"/> tied in <input type="checkbox"/> standing under	
14. Stance of hind legs	sickle										straight	<input type="checkbox"/> cow hocked <input type="checkbox"/> tied in <input type="checkbox"/> abnormal hook <input type="checkbox"/> abnormal stifle	
15. Stance of pastern	weak										upright		
16. Shape of feet	wide										narrow	<input type="checkbox"/> different	
17. Heels	high										Low		
18. Quality of legs	lean										blurred		
19. Substance of legs	heavy										Fine		
MOVEMENT/TRAIT		evident		average		evident					Fault/defect		
20. Walk: length of stride	long										short	<input type="checkbox"/> irregular	
21. Walk: correctness	toed in										Toed out	<input type="checkbox"/> on co-ordinated	
22. Trot: length of stride	long										short		
23. Trot: elasticity	elastic										Stiff	<input type="checkbox"/> irregular	
24. Trot: impulsion	powerful										weak	<input type="checkbox"/> on co-ordinated	
25. Trot: balance	carrying										pushing		
26. Canter: length of stride	long										short		
27. Canter: impulsion	powerful										weak		
28. Canter: balance	carrying										pushing		
JUMPING/TRAIT		evident		average		evident					Fault/defect		
29. Take off: direction	upwards										forwards		
30. Take off: quickness	quick										Slow		
31. Technique: foreleg	bent										stretched	<input type="checkbox"/> under the body	
32. Technique: back	rounded										hollow		
33. Technique: haunches	open										tight		
34. Scope	much										little		
35. Elasticity	supple										stiff		
36. Care	careful										not careful		
Attitude (subject of research)													little

Judging form for linear scoring of dressage horses

EVALUATION	CONFORMATION:					
JUMPING: Canter: Reflexes: Technique: Scope:						
Walk: Trot:	a	b	c	d	e	f g h i
11. Shape of croup	sloping	O O O O O O	Fat			
12. Length of croup	Long	O O O O O O	short			
13. Stance of forelegs	over at knee	O O O O O O	back at knee			
14. Stance of hind legs	sickle	O O O O O O	straight			
15. Stance of pastern	weak	O O O O O O	upright			
16. Shape of feet	wide	O O O O O O	narrow			
17. Heels	high	O O O O O O	Low			
18. Quality of legs	lean	O O O O O O	blurred			
19. Substance of legs	heavy	O O O O O O	Fine			
MOVEMENT/TRAIT	evident	average	evident			Fault/dielect
20. Walk: length of stride	long	O O O O O O	short			O irregular
21. Walk: correctness	toed in	O O O O O O	Toed out			O on co-ordinated
22. Trot: length of stride	long	O O O O O O	short			
23. Trot: elasticity	elastic	O O O O O O	Stiff			O irregular
24. Trot: impulsion	powerful	O O O O O O	weak			O on co-ordinated
25. Trot: balance	carrying	O O O O O O	pushing			
26. Canter: length of stride	long	O O O O O O	short			
27. Canter: impulsion	powerful	O O O O O O	weak			
28. Canter: balance	carrying	O O O O O O	pushing			
JUMPING / TRAIT	evident	average	evident			Fault/dielect
29. Take off: direction	upwards	O O O O O O	towards			
30. Take off: quickness	quick	O O O O O O	Slow			
31. Technique: foreleg	bent	O O O O O O	stretched			O under the body
32. Technique: back	rounded	O O O O O O	hollow			
33. Technique: haunches	open	O O O O O O	tight			
34. Scope	much	O O O O O O	little			
35. Elasticity	supple	O O O O O O	stiff			
36. Care	careful	O O O O O O	not careful			
Altitude (subject of research)	much	O O O O O O	little			

Linear Scoring Traits

Conformation Traits

(Evaluated with the horse standing square on level ground.)

1. Body: Shape (rectangular-square)

A horse's shape is considered square when the length of its body is equal to the height of its withers.

In contrast, a horse's shape is deemed rectangular when its body length is greater than its height.

2. Body: Direction (uphill-downhill)

The horse's body direction relative to an imaginary horizontal line drawn through its topline.

3. Head-Neck Connection (light - heavy)

Assessment of this trait involves two components: the length of the neck and the conformation of the throatlatch area.

A horse with a light head-neck connection has a long neck and a relatively short distance between its poll and throat.

A horse with a heavy head-neck connection has a short neck and a relatively large distance between its poll and throat.

4. Neck Length (long-short)

The distance from the poll to the peak of the withers, relative to the rest of the topline.

5. Neck Direction (vertical-horizontal)

The angle of the neck relative to an imaginary horizontal line drawn through the body, viewing the horse in a natural stance from the side.

6. Neck Muscling (heavy-poor)

The degree of muscling in the neck, especially its topline. A well-muscled neck has a topline with a slight upward arch that is nicely filled out.

7. Withers Height (high-flat)

The height of the withers as measured between two imaginary horizontal lines: one at the peak of the withers, the other at the base of the withers.

8. Shoulder Position (sloping-straight)

The angle of the shoulder blade relative to an imaginary horizontal line drawn from the point of the shoulder to the rump.

9. Line of Back (roached-weak)

The area of the topline between the withers and the hindquarters.

10. Line of Loins (roached-weak)

The area of the topline from the end of the back to the croup.

11. Croup Angle (sloping - flat)

The angle from the point of the hip to the point of the buttock, relative to an imaginary horizontal line drawn through the horse's hindquarters.

12. Croup Length (long-short)

The length from the point of the hip to the point of the buttock.

13. Front Leg Stance (over at the knee-back at the knee)

Viewing the horse from the side, the angle of an imaginary bisecting vertical line drawn from the top of the forearm to bottom of the cannon bone.

14. Hind Leg Stance (sickle - straight)

Viewing the horse from the side, the angle between the gaskin and the cannon bone.

15. Pastern Angle (weak and upright)

The angle of the front leg pasterns relative to the ground.

16. Hoof Shape (wide-narrow)

Viewing the hoofs from the front, the relationship between the coronet band and the weight-bearing surface of the hoofs. Note: With horses whose hoofs are dissimilar in shape, the narrow hoof is considered abnormal.

17. Heels (high-low)

The height of the heels of the front feet relative to the distance between the ground and the coronet band.

18. Leg Condition (lean-blurred)

The extent to which the hind legs are free from blemish.

19. Leg Circumference (heavy-fine)

The circumference of the legs, including the size of the joints, relative to the horse's body build.

Movement Traits

20. Walk: Length of Stride (long–short)

The length of the stride.

21. Walk: Correctness (toe-in–toe-out)

Evaluated from the front of the horse. Toe-in: a conformational fault, originating from the pastern, in which the toe(s) points slightly inward. Toe-out: a conformational fault, originating from the pastern, in which the toe(s) points slightly outward.

22. Trot: Length of Stride (long–short)

The length of the stride.

23. Trot: Suppleness (elastic–stiff)

The degree to which movement flows elastically through the body and is absorbed by the limbs.

24. Trot: Impulsion (strong–weak)

The degree to which the horse pushes off the ground with its hind legs.

25. Trot: Balance (carrying–pushing)

The combination of body position and the degree to which the hind legs carry the horse.

26. Canter: Length of Stride (long–short)

The length of the stride.

27. Canter: Push (powerful–weak)

The degree to which the horse pushes off the ground with its hind legs.

28. Canter: Balance (carrying–pushing)

The combination of body position and the degree to which the hind legs carry the horse.

Jumping Traits

29. Push: Direction (upward–forward)

The degree to which the horse is able to elevate its withers in the take-off phase.

30. Push: Quickness (quick–slow)

In the last canter stride before a jump, the time between the landing of the front legs, the landing of the

hind legs, and the moment the horse leaves the ground.

31. Technique: Front Legs (bent - stretched)

The degree to which the shoulder, together with the humerus, forearm, and cannon bone are tucked up.

32. Technique: Back (round–hollow)

The degree to which the neck and back follow a parabola over the jump.

33. Technique: Hindquarters (open–tucked)

The degree to which the angles of the hindquarters are able to open during the landing phase of a jump.

34. Scope (much–little)

The ability of the horse to jump powerfully both in an upward and forward direction.

35. Elasticity (much–little)

The degree to which the horse's total jump (including the landing) demonstrates fluidity because of elasticity in the body.

36. Carefulness (careful–careless)

The horse's natural ability to jump without making mistakes.

The BLUP (Best Linear Unbiased Prediction) index

(Thorén Hellsten et al., 2006) BLUP stands for "Best Linear Unbiased Prediction", which hints at providing the most accurate and real compilation of all the information with which the individual's breeding value is computed. In breeding for sport horses the BLUP is utilized in Germany, France, Denmark, the Netherlands, Belgium and Ireland. In Sweden we have an very extensive data base with results from horses of many generations available in the ASVH (Swedish Warmblood Association) data base. However in Sweden scores are given only for 11 different traits today while in the Netherlands 36 different traits are being scored in the linear score forms and used for creating the BLUP indexes.

The BLUP-indexes are so constructed that 100 is the equivalent to the mean index of horses of today. This so called reference group for current index consists of all horses that have been tested (three year old test, quality test and competition) and that are between the ages of 4 and 18 the year of evaluation (2007) which means horses born 1989-2003.

Breeding stallions however, is a heavily selected group and as such has a significantly higher index than the reference group. Today's stallions that are born the same year as the horse in the reference group therefore has a mean index for the various traits of 105-115.

The reliability of an index

The reliability of an index is depending on the type of information that forms the basis of each individual's index. More information on the individual itself, offspring, sire, dam and other relatives presents an index with a higher reliability. Other information like the amount of evaluated horses and heritability affects the reliability as well. The measure used is called standard deviation and is on the same scale as the index. The standard deviation indicates in which interval the horse's index most likely would be in, should a new calculation of the breeding value be performed. In other words, a low value for the standard deviation is the equivalent to an index with a high reliability. Sometimes an index will change even though the amount of inspected offspring is the same. This is often due to the fact that the amount of inspected relatives has increased, for example offspring to a son of the stallion. If a stallion has many offspring inspected the standard deviation will be relatively low. If the offspring still are too young to compete, the standard deviation for competition traits (dressage and jumping) will be higher. The reliability will also vary due to the amount of

horses that have competed in respective discipline. Also, a higher heritability has a positive influence on the reliability of the indexes. (www.asvh.se)