



INTRODUCTION	3
<hr/>	
BREEDING	5
<hr/>	
- The Importance of using KFPS Stallions	6
- Insight into the fertility of Friesian Mares	9
- Managing the breeding mare	10
<hr/>	
STALLION INFORMATION	14
<hr/>	
- Stallion choice	15
- Stallion information	17
- Recommended stallions	19
- Stallion Stations	20
<hr/>	
HANDLING	
<hr/>	
- Using fresh semen provides good results	21
- Always check Semen Quality	22
<hr/>	
VETERINARIAN	27
<hr/>	
- Fertility Study of Friesian Mare	28
- Information specifically pertaining to Friesian mares	34
<hr/>	
REGISTRATION OF FOALS	35
<hr/>	
- Registration of Foals	36



INTRODUCTION

INTRODUCTION

The Friesian horse is capturing the hearts of people everywhere in the world. This can be seen not only in the number of horses being exported from the Netherlands – and now from other countries as well – but also in the number of foals being born in other countries. Breeders in other countries are determined to produce the best horses possible, and this determination is needed, too, considering that breeding in other countries often demands more talent for organizing things than it does in the Netherlands. After all, the Netherlands has several stud stations. All it takes is a telephone call to place an order, and the mare can be inseminated that very day with fresh semen.

In other countries, things are somewhat more complicated. If you live in another country and want to make use of a KFPS studbook stallion to maximize the quality of your breeding efforts, you will have to rely on stallions of EU stations. Using these stallions is more complicated because of the distance. When using fresh semen, the most important factor is the period of time between ejaculation and insemination.

The procedures involved in using frozen semen are much more complicated. Consider, for instance, the regulations imposed in each country: there are strict health regulations for stallions and semen. Another important factor is that the quality and/or quantity of semen declines due to the processes of freezing and thawing. This means that these processes have to be carried out very carefully. Ovulation also has to be determined very accurately in order to increase the chances of fertilization. For a successful fertilization, the stallion manager, mare manager and veterinarian have to have a very good understanding of everything involved.

This brochure includes several articles aimed at assisting you in the use of fresh and frozen semen. Attention is devoted to regulations, aspects affecting the quality of semen, mare management and special veterinary details regarding Friesian horses. This brochure contains information for both the mare manager and the veterinarian. With this acquired knowledge, you should be able to be even more successful in using fresh or frozen semen.

BREEDING

- The Importance of using KFPS Stallions
- Insight into the fertility of Friesian Mares
- Managing the breeding mare

The value of the horse depends on the book in which it is registered

THE IMPORTANCE OF USING KFPS STUDBOOK STALLIONS

The Koninklijke Vereniging "Het Friesch Paarden-Stamboek" registers Friesian horses worldwide. The Studbook register consists of a main section. This main section is divided into a number of categories: KFPS book (the main category), KFPS D Book, B-Book I, and B-Book II. Depending on the status of the mare and the stallion the offspring is registered in one of the categories.

Text: Marja Teekens, Photo's: Bart van der Hoek, Translated by: Anneke van den IJssel, Bron Phryso

The Koninklijke Vereniging 'Het Friesch Paarden-Stamboek' (KFPS) registers in its main section all purebred Friesian horses of which both parents are registered with KFPS. Friesian horses with an unknown pedigree, which cannot be retrieved or confirmed by DNA, cannot be registered in the studbook register of KFPS. KFPS therefore has a closed studbook. This means that only offspring from parents known to KFPS can be registered. This is why KFPS uses only a main section.

Yet it is not the case that every Friesian horse is registered in the same category. This registration quality, the book (category), and the register in which the horse is registered depends on the category and register of both the dam and the sire of the horse. Within the main section in accordance with EU regulations there is a separation of categories; the KFPS book (main category), KFPS D book, B-book I and B-book II. This is a complicated subject matter that will be explained in this article.

KFPS-book

The KFPS book is the main book/category in the main section: it is the category with the highest registration value. In the KFPS book all Friesian horses are registered that are offspring of a mare from the KFPS book and a—at the time of breeding—KFPS approved breeding stallion.

How can you recognize a KFPS approved breeding stallion? These stallions are given a studbook number behind their name upon approval, e.g., Eibert 419 or Harmen 424. Important detail is that the stallion at the time of breeding him to your mare has to have a breeding permit. At the time of approval for breeding the stallions receive a temporary permit. In order to make that a lifetime permit the stallion has to pass his offspring testing. The testing on offspring consists of:

- 1) Evaluation on exterior of at least 40 offspring.
- 2) Performance testing (sport aptitude) of at least 20 offspring.

If the offspring provide positive results the breeding stallion will be approved for life. If the tested offspring do not provide positive results then the stallion is disapproved for breeding, however, the stallion will keep his studbook number after disapproval! So it is not the case that by definition a stallion with a studbook number actually has a valid KFPS breeding permit. Please note: some stallion owners do still offer their on offspring disapproved studbook stallions for breeding!

Now you may ask yourself how to then check the status of a stallion so that when you use a stallion you can be sure it has a valid KFPS breeding permit. On the KFPS website annually a list is published with recommended stallions/'aanbevolen hengsten.' This list may be found at: www.kfps.nl/fokkerijinformatie/lijst-kfps-stamboekhengsten.

So when you want to use a studbook stallion you can always check the status of the stallions. If you use a stallion that based on his offspring test does no longer have a breeding permit then the offspring will not be registered in the KFPS book category but in B-book II.

Should you be buying a horse then you can tell in one glance by the color of the studbook paper if the horse is registered in the KFPS book: the proof of registration in the KFPS book is printed in the colors yellow, yellow-green, and light grey.

Should you be in doubt when purchasing a horse or when making a stallion choice then do contact the association in your country or contact KFPS to check the status.



The proof of registration in the KFPS book category is printed in the colors yellow, yellow-green, and light grey.

The KFPS-D book

In addition to the mother studbook KFPS there are daughter studbooks in various EU states that have EU recognition for their own studbook for the Friesian horse in the country in question. All daughter studbooks adhere to the KFPS breeding policies and breeding program. The KFPS therefore takes care of the breeding and selection policies for these daughter studbooks. At this time only the German EU daughter studbooks do not adhere to the KFP policies: they have their own stallion-selection policy. The registration regulations of the KFPS calls these stallions 'approved stallions of KFPS daughter studbooks.'

The only exception in Germany is the breeding association DFZ: this largest association for Friesian enthusiasts and Friesian breeders in Germany does comply with the KFPS policies.

Offspring of stallions approved by a daughter studbook are registered in the 'second' book of the main section; the KFPS-D book. Also here the registration status of the mare comes into play: here it concerns only offspring of which the dam of the foals is registered in the KFPS book or in the KFPS-D book.

The foals from above-mentioned stallions can be reported to the studbook that provided the stallion its breeding permit but they can also be reported to the KFPS. That brings us to a difficult topic: some German EU daughter studbooks have their own breeding policies in place and with that also their own criteria for stallion selection. These criteria deviate in certain areas from the KFPS criteria, which results in the fact that KFPS does not just standard accepts the breeding status of all stallions.

We can divide these stallions in three categories:

- Former studbook stallions of the KFPS
- Stallions that passed the exterior inspection by the EU studbook with positive result
- Stallions that passed the exterior and sport requirements of the EU studbook

Former KFPS Studbook stallions

When stallions based on their offspring do not get their breeding permit extended by KFPS it happens that the stallion does receive a breeding permit from one of the other EU studbooks. The offspring will, however, not be registered in the KFPS-D book by KFPS but in B-Book II, because the KFPS disapproved the stallion for well-founded reasons and put the breeding status of the disapproved studbook stallions at 'foalbook stallion without a breeding permit.' The offspring are therefore registered in the lowest category of the main section; B-book II.

Other by an EU daughter studbook approved stallions

The EU daughter studbooks use a two-prong test: the stallion has to score sufficient for the exterior and movement characteristics and in addition the stallion has to also meet certain performance requirements, however, the two evaluations are not connected to each other (in time frame). Example: a stallion met the exterior and movement requirements but not yet the performance requirements. The stallion namely has still a year's time to prove that he does possess sufficient performance aptitude. The stallion is temporarily registered in a 'sub-book' of the EU daughter studbook in question. In Germany such a stallion is registered in stallion book II. If the stallion subsequently does meet the performance requirements he will be promoted to, following this example, stallion book I. The KFPS accepts in the KFPS-D book only offspring of stallions that have met all the requirements of the EU daughter studbook, with the exception of the by the KFPS disapproved studbook stallions based on founded reasons. This means the following, assuming the dam is registered in the KFPS book or the KFPS-D book:

- An offspring by on-offspring-disapproved KFPS Studbook stallion is registered in B-book II.
- An offspring by a stallion with breeding permit based on partially-met requirements (stallion book II) of the EU daughter studbook is registered in B-book II.
- An offspring by a stallion with breeding permit based on all requirements (stallion book I) of the EU daughter studbook is registered in the KFPS-D book.

The KFPS always has up-to-date information on these stallions. In addition the stallion owner is also informed on the breeding status of the stallion. A Friesian horse that is registered in the KFPS-D book has proof of registration that is printed in the colors yellow, grey, and light grey.

Breeding a B-book mare

When a mare in B-book I or B-book II is bred to a stallion approved by an EU member state the offspring will in principle be registered in B-book I, assuming a stallion is used that meets all requirements of that EU studbook.



Proof of registration in the KFPS-D book

B-book I

The KFPS recognizes in addition to KFPS studbook stallions also foalbook stallions with a breeding permit. This concerns stallions that, in order to stimulate the breeding abroad, receive a limited and temporary breeding permit for the country in question. Suppose that a mare from the main section is bred by a foalbook stallion with breeding permit: the offspring is then registered in B-book I. Please note: the limited breeding permit is awarded annually by the KFPS Inspection and is only valid for the country in question.



When purchasing a horse the proof of registration for B-book I can be recognized by the colors: the document is printed in the colors orange, reddish brown, and light grey.

Example: in South Africa the stallion Reinoud fan 'e Homar has a breeding permit for 2009. The foals that are bred in South Africa (maximally 20 breedings) are in principle registered in B-book I, however, suppose that the stallion breeds in a neighboring country, then that foal is registered in B-book II. An up-to-date list with foalbook stallions with breeding permit may be found at www.kfps.nl/fokkerijinformatie/lijst_KFPS_stamboekhengsten.

B-book II

The lowest category in the main section is B-book II. In this book all horses are registered that have a dam that is registered in the main section and a sire that is registered in the foalbook register (and that at the time of breeding did not have a KFPS breeding permit). Also horses that are sired by studbook stallions that at the time of breeding did not have a valid KFPS breeding permit are registered in B-book II. As an exception the FHANA (Friesian Horse Association of North America) does not register horses in B-book II.



Red, blue, and light grey are the colors of the proof of registration in B-book II.

Promotion regulations

A mare that is not registered in the KFPS book can produce offspring that have a higher registration quality than herself. To this end a stallion needs to be used that has a higher registration status than the mare.

When using a KFPS studbook stallion the promotion will take place the fastest. In addition the registration status in the pedigree will also be taken into account. Some examples:

- A KFPS-D mare bred by a KFPS studbook stallion results in an offspring that is immediately registered in the KFPS book.
- The offspring of a B-book I mare can after two generations of using a KFPS studbook stallion already be registered in the KFPS book. Registration in the KFPS book can take place in one generation if including the sire of the offspring in question three of the four previous generations were produced by KFPS approved studbook stallions.
- Also the offspring of a B-book II mare can be promoted. As soon as a KFPS studbook stallion is used once the offspring will already be registered in B-book I. This promotion can also take place by use of an EU studbook approved stallion or a foalbook stallion with a breeding permit, however, the promotion will then take place in two generations, and that of course means losing time.

Registration overview

You have just read through a lot of information. All this information is summarized in the illustration below with which you can determine the registration quality of future offspring. With the possibility to obtain promotion from a lower status to a higher status it is, therefore, always interesting to use stallions with the highest possible registration status.

The use of KFPS studbook stallions is the fastest way to give your breeding efforts a boost in quality.

Illustration of registration procedures:

Stallion	KFPS studbook	Approved stallions of KFPS daughter studbook***	Foalbook with breeding permit	Foalbook/ Bb I/ Bb II
Mare				
KFPS book	KFPS book	KFPS-D/BbII***	Bb I	Bb II
KFPS-D	KFPS book	KFPS-D/ BbII***	Bb I	Bb II
Bb I	Bb I*	Bb I/ BbII***	Bb I	Bb II
Bb II**	Bb I	BbI**/ BbII***	Bb II/ BbI**	Bb II

* after use of 3 KFPS studbook stallions in the last 4 consecutive generations in the mare line the offspring out of a BbI mare are registered in the KFPS main book.
 ** dam BbII is bred to a foalbook stallion with breeding permit; promotion to BbI takes place in 2 generations. If dam BbII is bred to a KFPS studbook stallion then the offspring is promoted to BbI in 1 generation.
 *** or stallions approved by another EU recognized daughter studbook: grounds of approval by (EU) daughter studbook are reviewed by KFPS. If the approval requirement does not meet the KFPS regulations the offspring will be registered in BbII.

The value of the horse

The value of the horse is on the one hand dependent on its own individual characteristics and on the other hand the category (book) in which it is registered. Based on individual characteristics a mare can after all obtain the predicate studbook, ster, crown or model. Every Friesian horse independent from its category can when of sufficient quality receive one of these predicates.

The value of a horse is also determined by the category in which the horse is registered. The higher the registration value, the more the horse is worth. As soon as the number of horses in a country increases and the breeding popularity increases the registration value will play a more and more important role. It is therefore always interesting for a breeder to strive for the highest possible registration value. The KFPS therefore also advises: when breeding make use as much as possible of KFPS studbook stallions.

KFPS stallion selection guards quality

The KFPS has a stringent selection procedure in place for the selection of studbook stallions. In this procedure a young stallion is evaluated three times for exterior and movement characteristics. In addition the stallion is vet checked various times and there are also strict requirements for semen quality. The

stallion has to pass a testing on x-rays and his pedigree and bloodlines are evaluated as well.

Should a young stallion meet all the requirements he is then invited to participate in a ten week performance test. In the test the stallion is trained in three disciplines: dressage, driving, and show driving. If the stallion shows sufficient aptitude he will be allowed to breed. It is, therefore, quite a process. With this procedure the KFPS aims to select the best stallions from the population. During the selection many data are collected on the stallions: a breeder can use all these data for his/her choice of stallion. After approval of the young stallion the KFPS Inspection will monitor the breeding results. First a foal report is drawn up of the first year of foals produced. Then the stallion comes up for the testing on offspring. The first adult offspring are evaluated on exterior characteristics and performance aptitude. Based on all data collected the KFPS puts the breeding values of the breeding stallions together. With this a breeder can get a good insight into what a stallion passes on and make a fitting choice for his/her mare.

This procedure is very thorough: it provides the breeder with much information for a good choice and the quality of the breeding efforts is this way strictly guarded by KFPS.

INSIGHT INTO THE FERTILITY OF FRIESIAN MARES

The steps below will provide more insight into the fertility of Friesian mares. Take a moment to carefully read through the list of questions. With the answers the mare owner can map out a good breeding strategy.

1. What is the history of the mare?
 - a. First pregnancy
 - b. Mare kept open last season
 - c. Mare did not take last season
What measures were taken at that time to still try to get the mare pregnant?
2. What is the age of the mare? Mares over 14 years old are part of the category 'older brood mares.' Take a good look at the position of the vulva. The top of the vulva should not come up over the pelvic basin. If that is the case then the mare could be 'sucking air' with the consequence that dirt enters the uterus, which may prevent the mare from conceiving. The only option here is to ask the veterinarian to put in a caslick up to two centimeters under the pelvic basin.
3. What is the condition of the mare?

In a skinny mare the anus will draw inward, which positions the vulva more horizontally (when the vulva needs to have a vertical position). When the vulva has a more horizontal position the mare will be more prone to sucking in air, which can have dirt enter into the uterus. Therefore make sure that the mare is in good condition!
4. How does the mare cycle?

If the cycle lasts longer than normal, longer than 23 days, this is usually an indication that the mare is not clean inside.
A mare can also have a short cycle, shorter than 23 days. This can point to a tumor on the ovaries. Often a mare with a tumor on the ovaries will show 'stallion behavior.' Teasing is still an important aid. It will tell you a great deal about the cycle of the mare.
5. Check on the uterus and the ovaries! Have your veterinarian scan the mare, so he/she can check the uterus and ovaries for fluid, cysts, and other abnormalities. The veterinarian can then put together a treatment plan to bring the uterus to its best condition.

Managing of the breedingmare

An upset breeder let the stallion owner know that he did not have faith in his stallion anymore as his semen was absolutely no good. His mare did not take from him. The somewhat surprised stallion owner suggested to inseminate the mare at his facility, under the guidance of an experienced veterinarian. Not necessary, said the mare owner. She was already pregnant from another stallion. At the Central Mare Show the breeder and stallion owner were by chance lined up next to each other. The latter asked with interest by which stallion the mare was pregnant. The mare owner glanced over with a cantankerous look on his face but did not answer. His wife scooted by and softly whispered: 'She cannot get pregnant. Something is not quite right inside or so.'

Text and photos: Bart van der Hoek. Translation: Anneke van den IJssel



A mare at 23 years old and pregnant!

Breeding Special 2009!

The topic brood mares has been featured in detail before in Phryso (March 2009). In that article accredited equine veterinarian Ben Horsmans also covers the technicalities of the various tests for brood mares. Although there is an overlap of coverage in topics to aid in clarity, both this article and that of Dr. Horsmans together cover with great detail and depth all possible issues pertaining to getting brood mares pregnant and the management of brood mares. In the next issue we will print the second part in this series.



An ultrasound can, among other things, determine how much fluid there is in the uterus.

The story is partially true. Only the location and persons involved have been changed a bit. The contents is true, however, and that will not be surprising to many of you. After all it happens often that a mare does not want to get pregnant and then the stallion, his semen, breeding station or the inseminator are blamed; more often than we know or perhaps want to know. Also a mare can be at fault and that can also be her reproductive system. A good mare is fertile. Especially within a closed studbook like KFPS with the subsequent issues regarding inbreeding and kinship, fertility is an important topic. It is not for nothing that we have the regulation for model candidates that the mare has to have proven its fertility before it can permanently be awarded the predicate. In order to provide even better information and get a better grip on fertility issues the studbook took the initiative to institute a work group that, among other things, focuses on education for mare owners. Part of the work group is, among others, board member and veterinarian Pascale Drijfhout. She went into great detail

what types of mares there are and what the most important advantages and disadvantages of these types are. Below you will read about her experiences from her practice.

Less is more

To properly explain the various topics in this article the reader and/or breeder has to take one fact into account: anything that is put into the uterus will result in a natural defensive response. This includes semen. This reaction is not just caused by the semen extender used by stallion owners. Semen moves up into the oviduct in six hours. Everything that stays behind-loose fluid- in a healthy uterus will automatically be removed or absorbed and broken down by the body through lymph and blood vessels. So every time something enters the uterus, the uterus will have a stress response. It is, therefore, important to put as little in as possible. The story that the more often and more quickly timed you inseminate the sooner the mare is pregnant is for that reason fiction. The motto is: less is more.

Procedures and choices

Those who would like to have their mare bred will go look for the right partner and a stallion is chosen. Then comes the moment to determine when the mare is in heat and when she needs to be bred. Detecting the heat can be a problem. A good aid that is not used enough is teasing the mare with a stallion. Teasing stimulates the mare and a mare in heat will really show where she is in her cycle with a stallion nearby. A gelding in the vicinity can also do wonders. In order not to distract the stallion too much it is good to let him tease in a quiet and familiar setting. This also goes for the mare but since not everyone has a suitable stallion or other effective horse in the barn of the mare the advice is to take the mare to the stallion. A good tease with a good determination of the heat can save much in bills, because the procedure for a successful insemination then only needs to be performed once. There are a number of differences between warmbloods and Friesians. Friesians, e.g., have a longer heat with often

more edema, one of the items a veterinarian will have to pay extra attention to when ultrasounding the mare. In earlier days one could only feel up a mare to see how it was going. Depending on the softness of the cervix and the size and softness of the follicle, because the follicle has to be soft, it was determined where the mare was at. Now we do that by means of ultrasounding so that also the degree of edema can be observed.

Edema is a physiological response influenced by hormones and can be described as 'fluid in the uterine wall. It is, therefore, not 'loose fluid,' which occurs when there is a defensive response. Only when there is no more edema production can one inseminate. When the uterus is wet from edema and an follicle of six centimeters—which is in itself favorable—one can still not inseminate. Many breeders have a hard time with that and do let the mare get bred. In the end without result. Edema production has three stages: round and wet, round, dry. Not until between round and dry does the mare ovulate. It is therefore useless to inseminate before that time. The advice for a Friesian is to inseminate the day after the second stage, the round stage is determined. Many hasty breedings are based on the size of the follicle. This determination means nothing since Friesians quickly have follicles of 55 millimeters or larger. For warmbloods the max is around forty millimeters. Once the insemination has taken place we have to check for pregnancy, usually at 18 days later. For those who worry about twins have the mare checked at fourteen days. Should there be two follicles then the veterinarian can still pinch one off. Day 18 offers an advantage. Should the mare not be pregnant then the start of the new heat will already be visible. After day 35 of the pregnancy the chance of absorption goes down significantly.

Maiden

Maiden mares have never been bred and have, therefore, never had a foal. This is technically the easiest group as you can assume there have never been any procedures performed inside the mare. The uterus should, therefore, be clean.

Normally horses in this category are pregnant from one to two breedings. There is, however, always a chance of physical deviations that can prevent a mare from becoming pregnant or carrying a foal to term. An example is if the connection between ovary and oviduct is missing. Only with an internal exam with a scope, with which the veterinarian enters the uterine horn, can this physical problem be determined. Another, less problematic item is the fact that there is a group of mares that at the moment of insemination, e.g., in the year they turn three, are too young. Many of these horses do take a year later. Young mares in general show their heat less easily.

When the environment is familiar and there is no stress a mare will show heat better. When purchasing a mare it is important that a buyer always checks if the mare has had a foal before or if she was bred to have one. The potential buyer is advised to see if the vulva of the mare is nicely vertical and tight. With three year olds the buyer, seller or owner can other than that not observe much else.

Open on purpose

Mares that are open on purpose have had a foal before but are for one reason or another, such as sports activities, not being bred. In that case the uterus has had over a year to 'clean up' i.e. recover from the last pregnancy. Often these are mares that can, therefore, become pregnant again quickly.

Open in spite of breeding

This is a mare that can or does not want to get pregnant. In the context of this article we are talking about the largest problem group for which we need to ask ourselves three main questions:

- Has the mare ever had a foal? Or has this been attempted for years and she just does not take or aborts? Especially when a mare aborted is important.
- How long has the mare been open?
- What has happened the past year? Has she been treated with antibiotics, flushed or was she cultured or a biopsy done?

As described above a clean uterus is a must for a healthy pregnancy. Regularly older mares, we talk about horses from fourteen years of age here, have difficulty with the independent, natural cleansing of the uterus. This cleansing happens by working out matter through the vulva. Flushing will easily solve this problem. Cleansing issues can be the cause that (older) mares do not want to take but a hormonal or age-related cause is also possible. A large group of older mares becomes skinnier. Their back starts to sway and the anus draws in. This makes it that the vulva is more horizontal and sinks while at the same time the uterus sinks below the vulva. This makes it harder for the mare to expel loose fluid from the uterus. Because the anus draws in the vulva is drawn in too. This puts it above the pelvic basin, which gives her room to suck in air and filth such as bacteria. To get these mares pregnant the air sucking has to be prevented. For that reasons these mares have to be 'sown up.' The nutritional condition is of great importance, because if the mare gains weight the anus and vulva will also be pushed out again and nothing will have to be sown up. The problem is that these brood mares often don't gain good weight until during the pregnancy. Cysts in the uterus, a problem often seen in older mares, can also be an obstacle for pregnancy. In three-year-old mares such cysts are rarely seen. When the follicle, which swims through the whole uterus during the first 18 days, continuously bumps into cysts it will die. This also happens when the follicle nestles against cysts, because then too little nutrients can be absorbed. In the case of twins the same problem occurs; when the follicles are loose from each other they usually survive. If they are right next to each other, however, they lack part of the contact with the uterine wall and thus part of the nutrient intake. Cysts can, in the uterus, be burnt off. As mentioned before, there can be more reasons for a mare staying open in spite of breeding. It would go into too much detail to cover all causes in this article, but one has to be mentioned: lacking yellow body (corpus luteum).

Foal on the side

The group of mares with a foal on the side is for both breeders and veterinarians a beautiful group of horses. They have (recently) proven to be able of pregnancy and were able to carry to term. Many breeders inseminate during the foal heat, the first heat ten days after the foal is born. Mares will become pregnant but the follicle will often be absorbed six weeks later. The clear visibility of the foal heat is usually a reason to inseminate the mares anyway.

Shortly after the birth the uterus is, logically, out of proportion. It is obvious that it first needs to recover to be able to carry the next pregnancy. Especially if the mare retained the placenta it is not recommended to inseminate her during the foal heat. In addition it needs to be noted that a mare that was hooked up to an i.v. has an advantage over a horse that was cleaned up and flushed. In the breeding of warmbloods it is meanwhile reasonably normal to give the mares a shot to bring them into heat on day 20 after the birth of their foal. Around day 26/27 you can then with reasonable security safely inseminate. One of the arguments to take this approach is the fact that mares with a foal show their heat less well and it is more difficult to tease them with a stallion.

Early in the season

Some breeders swear that foals need to be born early in the year. Others don't want that at all. The former raises some questions. A horse is a grazer and moves around. For him or her it is important that right from the start it can develop well with much exercise and fresh air. Early foals often have to stay in their stall due to winter weather and wet pastures. This increases the chance of OC/OCD, lung problems and diarrhea. The best part of the year for foals to be born is the months of April and May. Mares will then have to be bred in May or June.

Biopsy

A biopsy is a bit of tissue taken from the uterine wall from which the veterinarian can study the pattern of lymph and blood vessels and cellular structure. In short: if the structure of the uterine wall is normal.

Flushing with salt solution

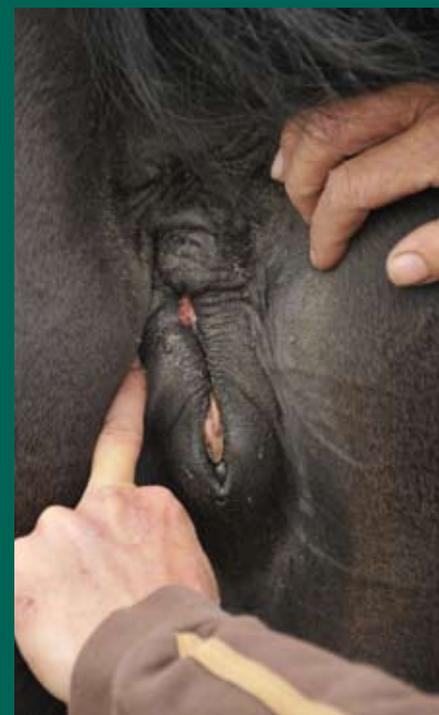
Flushing means that the uterus is completely filled with a physiological salt solution by the veterinarian. Especially older mares often have problems with the self-cleansing of the uterus. The salt solution makes for it that the cleansing process is better started up. Flushing takes place six hours after the insemination, because the semen has then swam up into the oviduct and there is not yet a natural defense response in the uterus. Objective is that the veterinarian flushes out the remaining fluids. Especially in the case of a sunken uterus self-cleansing is difficult and flushing will help.

Flushing with antibiotics

This is a cleansing of the uterus by injecting antibiotics. Before the veterinarian applies the treatment he has to be sure that the follicle is gone.

Sowing up/Caslick procedure

A veterinarian will only then sow up the vagina if the vulva is situated above the pelvic basin. If a mare has been sown up then this will have to be repeated every year after the birth of a foal and possibly for the next year if there will be another insemination. A veterinarian will only then again sow up a mare when the follicle is gone, because otherwise the wound will tear back open when within a few days you have to inseminate again. A seller needs to mention when a mare has been sown up and a buyer who lifts the tail will be able to observe this. In any case it is always important to ask when purchasing a brood mare.



Left the sown-up vulva of a 21-year-old Friesian mare. On the right a not-sown-up vulva of a 23-year-old mare. At the height of the finger is the pelvic base.

STALLION INFORMATION

- Stallion choice
- Stallion information
- Recommended stallions
- Stallion Stations

Stallion Choice

Search for the Ultimate Combination

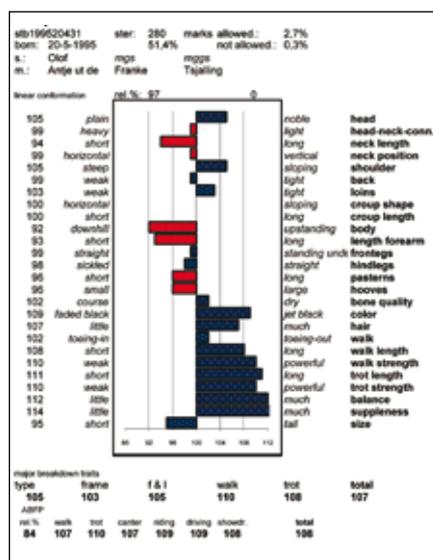
For horse breeders the stallion choice for their mare is always a fun puzzle. The starting point is of course the mare with her qualities and things to improve on. It is important to select a stallion with which you can produce a foal that is better than the foal's dam. It does not sound very difficult but there are many factors to take into account to be able to produce the best result from the combination.

Text: Marja Teekens • Translation: Anneke van den IJssel.

How does the mare owner make the best possible decision between all the KFPS studbook stallions? The offering of stallions is after all very large. Some of the breeding stallions are often seen in the limelight, e.g., the champion of the Stallion Show or the winners of the Pavo KFPS Stallion Competition. Some stallions breed many mares. The offspring presented at the inspections give a good overview of the breeding qualities of the stallions that are used often. Other stallions, however, remain more in the background but a responsible breeder, of course, also wants to include those stallions in the stallion selection. It is, after all, all about the most suitable combination: which stallion can most improve on the mare?

Evaluation of the mare

In order to make a good stallion choice the breeder has to first of all know his or her mare. When breeding for quality the good characteristics of the mare in question are after all anchored and the less desirable characteristics are improved on. Important aid in the evaluation of the mare is the linear score form. The linear score form provides an overview of 25 linear characteristics that have been evaluated by the judges at the time of inspection for studbook registration. If the mare is a bit older and has she already had a few foals then the owner already knows a bit more about her breeding qualities. Also important is knowledge of the dam line of the mare.



By applying the different colors the breeder can quickly see if a characteristic belongs to the optimum or maximum characteristics. Breeding values for the maximum characteristics are dark blue (favorable) or red (unfavorable). The optimum characteristics are light blue.

When subsequently the most important characteristics have been determined that need to be taken into consideration in the stallion selection, the search for a suitable stallion can start. All (breeding) information of the KFPS studbook stallions are maintained by the studbook office. Because it is impossible to have all this information completely up-to-date in print, this information is available through the studbook website, www.kfps.nl. This information is free for

members. Breeders can to their heart's delight browse the data of both their own horses as well as KFPS studbook stallions.

Website

How can the data be reviewed? First log on to the website and click on the button 'leden/members' in the menu on the left-hand side. Then enter the member R-number and password. Once logged in you may use all the options in the menu on the left-hand side. Click under 'Fokkerij informatie/Breeding Information' on 'KFPS stamboekhengsten info/KFPS studbook stallion info.' Then click on 'Selecteren uit alle stamboekhengsten met dekverguning, op basis van naam en/of fokwaarden/Select from all studbook stallions with breeding permit based on name and/or breeding values.'



After filling out the selection criteria an overview is produced of the stallions that meet the selection criteria.

How to request

There are different ways to consult the data base.

Select from all studbook stallions

Select from all studbook stallions with breeding permit, based on name and/or breeding values.

When selecting from all studbook stallions a list is shown with all known studbook stallions. Part of this list are also stallions that are no longer breeding, e.g., because they are deceased. When selecting on all studbook stallions with breeding permit based on name and/or breeding values, horse owners can fill out the name of the stallion or based on desired breeding values they can make a list of studbook stallions that meet the criteria selected.

Breeding values in a glance

The linear characteristics, which a breeder can select on are divided in two kinds.

Optimum characteristics: an average score (25) or breeding value (100) is most desired. Examples are: shape of the back, conformation of the front legs and hind legs.

Maximum characteristics: the higher the better, such as, e.g., expression of the face and expression in movement. Also characteristics for which the desired score is clearly above the average, such as slope of the shoulder and shape of the croup, are part of the maximum characteristics. When selecting for a maximum characteristic the desired lowest value is filled out. For selection on optimum characteristics the highest value is filled out. Please note: it concerns breeding values. They range between 80 and 120.

How does the mare owner know if it concerns an optimum or a maximum characteristic? The breeding values for the maximum characteristics are indicated in dark blue (favorable) or red (unfavorable). Breeding values for optimum characteristics are indicated in light blue.

Filling out criteria

When determining the selection criteria the mare owner needs to make sure that he or she does not include too

many characteristics. When you select on just a small number of characteristics the result is often bigger. As an example we take 16 year old ster mare Danique. Danique is a mare with a strong trot with length in the trot. Attention needs to be paid with Danique to her front: she could have a more uphill conformation. Her neck is nicely vertical but the head/neck connection could be a bit lighter. Conclusion: the strong movement of the mare needs to be anchored. The stallion has to have a high breeding value for direction of the forehead: the head/neck connection needs to be light. All selected characteristics are maximum characteristics. We need to, therefore, find a stallion with a breeding value greater than 100 for all three characteristics.

How to fill out: in order to find a stallion with the desired traits fill out the value 105 for trot and direction of the forehead. For head-neck connection 103 is filled out. Now the database can process the request. After filling out the selection criteria an overview of stallions that meet the criteria will appear.



photo: Bart van der Hoek

A good stallion choice needs to lead to a foal in which the good characteristics of the dam(line) are anchored and lead to an improvement on the less good characteristics of the dam.

Stallion information

It turns out there are six stallion that meet the criteria entered for Danique. Now the breeding results of the six stallions will be further looked into. To this end we click on the link 'Hengsteninformatie/Stallion Information.' The stallion information includes pedigree, number of breedings, breeding values, results Central Performance Testing, data birth registration, foal data, inspection results of the offspring, breeding values exterior, average scores ABFP, and breeding values for sport aptitude. With the pedigree of the stallion you can see the quality of the dam line, a very important piece of information for the stallion choice. By comparing this stallion information and comparing it with your own preferences it will already be a bit easier to make a choice between the six stallions that meet the criteria for Danique.

Making the final choice

The choice can be finalized by setting additional criteria: for what purpose will the foal be used in the future? The aptitude for riding or driving horse can be included in the decision. Or is it a preference to use a breeding stallion approved on offspring? Of the stallions that then remain the inbreeding percentage can be calculated. That is a free service through the KFPS website. The kinship percentage also plays a role and of course above all it is important to avoid risky combinations. That means that in the combination breeding stallion-mare stallions with known hereditary issues in the pedigree need to be avoided on both the sire's and dam's side. Known stallions that carry a risk for both the dwarfism gene as well as the hydrocephalus gene are Jarich, Wessel, and Oege. In addition a selection can be made in the stallion information on the topics 'aftekeningen/markings' or 'premies van de veulens/premies of the foal crop.' And last but not least: how does the mare owner like the stallion? In the end you have a stallion choice for which the breeder made as much use as possible of all available information. And then we have to see what the result will be, because breeding is of course never completely predictable. •

This 2009 Stallion Information is being presented to you as an aid in choosing a stallion. When choosing a stallion it is not just important to use the best-quality stallions but it is even more important to make the correct combinations. The KFPS strives to make as many breeding data on its stallions available as possible.

Which stallions?

The stallions included in this edition are stallions that have been approved on offspring. Also the stallions have to be alive or be available by means of frozen semen.

Which characteristics?

The following characteristics of the stallions are included.

1. Number/percentage of mares with the star predicate.
2. Breeding value linear exterior characteristics.
3. Breeding values for sport aptitude.

Breeding values exterior and sport aptitude

Given the complexity of the breeding-value estimation for the exterior characteristics and sport aptitude an explanation of the origins and the interpretation of the numbers is necessary. In this explanation we also touch upon how the numbers can be used for choosing a stallion.

The linear characteristics

The breeding values for the exterior characteristics are based on the linear scores, which since 1993 are documented for every studbook registration of the horses. Of the 25 exterior characteristics a score is given between 5 and 45, with as the average 25. In this edition for the first time the breeding values of the "new" linear characteristics are included: length of the neck, body (uphill/downhill), and the trot characteristics balance and suppleness. For the linear characteristics it specifically concerns an observation and not a rating. The characteristics have been chosen such that the linear report provides a picture of the horse's exterior that is as complete as possible. The breeding value estimation of the rated exterior numbers (breed type, build legs, walk, and trot) is currently being worked on. The linear characteristics can be divided in two categories.

1. The optimal characteristics: the characteristics for which the average score (25) or breeding value (100) is most desired. Examples of such characteristics are: shape of the back, conformation of the front legs, and shape of the hind legs.
2. Maximum characteristics: the characteristics for which goes the higher the better (example: expression of the face, expression of movement, etc.) or characteristics of which the optimum lies clearly above average, such as slope of the shoulder and shape of the croup.

The difference has been visualized by depicting the breeding values for the maximum characteristics with dark-blue bars (favorable) and red bars (unfavorable), and the breeding values for the optimum characteristics with light-blue bars. In addition to the 25 linear characteristics the overview consists of a measured characteristic: the height at the withers.

The rated characteristics

In addition to the 25 linear exterior characteristics also five rated characteristics are scored: breed type, build, legs, walk, and trot. For the linear charac-

teristics it concerns a descriptive value, for the rated characteristics it concerns a rating. When evaluating the rated exterior characteristics the related linear characteristics play an important role. In addition non-linear scored segments can play a role. The characteristic trot, e.g., consists in addition to the linear characteristics length of the trot, strength of the trot, balance, and suppleness also of, e.g., rhythm/regularity of the trot. The rated characteristics are scored from 3 through 10.

Sport aptitude

The breeding values are based on the ABFP results as these have been gathered by KFPS over the years, also as part of the testing on offspring. The reason that this particular data is used for the breeding-value estimation instead of, e.g. sport results, is the following.

1. ABFP information is available much earlier than sport data.
2. ABFP data is for a larger part hereditary (higher h^2) than sport data. That is thanks to the uniform training, presentation, and evaluation.
3. Number of offspring per stallion in sport is in general (still) too low.
4. The ABFP data gives information on segments (basic gaits, suitability as show-driving horses, riding horses, and driving horses).

The estimation model

The breeding values, estimated by the Nederlands Rundvee Syndicaat (NRS)/Dutch Cattle Syndicate, are estimated with a so-called estimation model. This estimation model indicates for which influences the differences between (in this case) stallions are corrected. The exterior scores are corrected for the following effects: breeding value of the dam of the offspring, age at the time of inspection, gender, linear evaluator, and inspection. This correction takes place to get as pure an insight as possible in to what degree the differences in offspring groups are caused by difference in genetic aptitude of the stallions. With these correction factors it basically does not matter in what area or on what mares a certain stallion is used. The kind of evaluation model that is being used is the so-called animal model. With an animal model in addition to data on offspring also information of family members is included. The contribution of this information declines as more information on the offspring becomes available.

Interpretation of the breeding values

The breeding values are indicated in an average of 100 with a spread of 4 points. This basis was determined based on 2001. The average breeding values of all horses born in 2001 is for each characteristic set at 100 and the spread (standard deviation) of these breeding values is set at 4. Breeding values with a deviation compared to 100 of one time the spread (between 96 and 104) have to be considered as average. Over two thirds of the breeding values are in this margin. It goes without saying that the larger the deviation is compared to 100, the larger the expected effect is. A stallion with a breeding value of 109 or higher for, e.g., strength of movement, belongs to the 2% best stallions of the population. For a breeding value higher than 112 this is 0.1%. For the most recently published index the basis has been changed from 1991 to 2001. Given the fact that for most characteristics in this period of ten years the horses have improved genetically the stallions that already had breeding values have gone down a few index points. This decrease is equal for all stallions so that the ranking set forth by the base adjustment does not change.

Depiction of the breeding values

The breeding values are indicated per characteristic with “bars.” As mentioned the maximum characteristics are indicated by dark-blue bars (favourable) and red bars (unfavourable) and the optimal characteristics by light-blue bars. For the maximum characteristics goes that results to the left are unfavourable (red) and results to the right are favourable (dark-blue). For the optimal characteristics goes that (extreme) results to both the left and right are unfavourable; 100 is optimal here.

Reliability

The degree to which the breeding value provides a precise image of the actual genetic aptitude of a stallion is expressed in the reliability (betrouwbaarheid / btbh.). The reliability is especially influenced by the number of inspected offspring. With a low reliability the breeding values can still change considerably when more offspring are inspected. The reliability can be interpreted as follows.

Reliability	Interpretation
Less than 70%	moderately reliable
70-80%	reasonably reliable
80-90%	reliable
Over 90%	very reliable

Use of the exterior breeding values

The exterior breeding values are an excellent aid for making a correct mare-stallion combination. This can be done by looking at the mare’s linear score form for the items that can be considered for correction. If the characteristic that needs to be corrected is a maximum characteristic then a stallion needs to be selected that has a (clearly) positive hereditary effect on this characteristic (bar to the right). If it concerns an optimal characteristic then the best choice is a stallion with an average breeding value or a slight deviation in the opposite direction, depending on the score of the mare. A common misunderstanding is that when a mare scores, e.g., a 5 for the shape of the hind leg, is combined with a stallion that is rated 112 for this characteristic the offspring would have an average shape of the hind leg. For optimal characteristics stallions with a breeding value around 100 are recommended.

Use of the breeding values for sport aptitude

As you can see breeding values have been estimated for the basic gaits in the exterior bar and in the sport aptitude bar. The former is based on the evalua-

tion of the basic gaits in the inspection ring (in hand), while the latter is based on the evaluation of the basic gaits in use (ABFP test). For most of the stallions these breeding values largely match. There are, however, stallions that have a breeding value for the basic gaits in the sport index that is quite a bit lower than the breeding value for the basic gaits in the exterior bar. Given the fact that the breeding goal indicates that we want to breed horses that have good gaits in especially their use the breeding values for sport aptitude should weigh more heavily in your evaluation of the stallions.

Kinship percentage

The kinship percentage of the studbook stallions is listed. This number indicates the relationship of a stallion with the population. The lower the number, the higher the contribution is that such a stallion can make to blood distribution. The average percentage of the studbook stallions is approximately 17.5%. The kinship percentage is calculated by calculating the inbreeding of fictitious foals of the combination of all individual stallions with the mare population. The mare population is in this defined as all fillies born in the year 2006, in total over 3000 horses. Included in the inbreeding calculation are all known generations (so not just the first five generations). The kinship percentage is influenced by the level in which the lineage matches or deviates from the population. As a stallion is used more the kinship percentage will increase. The kinship percentage is one of the characteristics that is part of the selection of young stallions with as the goal to limit the increase in inbreeding. For the first time a correction has been made for missing pedigree information in the calculations of the kinship percentage in this publication. As a result the kinship percentage for stallions with a “short dam line” has been adjusted upward.

STALLION INFORMATION ONLINE

On the KFPS website (www.fps-studbook.com) a free digital version of the Stallion Information has been included in the member section. Here you will find even more detailed information about the stallions. Moreover, you may make stallion selections by indicating selection criteria. In the digital version of the Stallion Information are also included the stallions that have not yet participated in the testing on offspring.

RECOMMENDED STALLIONS

The KFPS annually publishes a list of recommended stallions. In this list you will find the KFPS Studbook stallions with a breeding permit for the calendar year in question. The stallions are listed by country.

In addition this list also includes foalbook stallions with breeding permit. These stallions have a breeding permit for a limited number of mares. Also this breeding permit is only valid for the country in which they stand at stud.

The KFPS Studbook stallions have a worldwide breeding permit. To be able to use these Studbook stallions the stallions have to, however, be available through an EU recognized stallion station as only the EU recognized stallion stations are allowed to export semen abroad.

On the list of recommended stallions the status of the breeding station is clearly listed:

- Live cover / 'natuurlijke dekking:' this means that the stallions are only used by means of live cover.
- Insemination on site / 'Bedrijfs-K.I.': for insemination the mare has to be transported to the stallion station, because the semen of the stallion is not allowed to be shipped.
- Fresh shipped semen / 'S.W.S.': stallions with this breeding classification have semen of sufficient quality to be shipped fresh within The Netherlands. They have to meet the certification requirements set

forth by the 'Productschap' agency of the Dutch Agriculture Department.

- E.U.: this classification indicates that the semen produced meets the health status requirement as set forth for export within the European Union (EU) countries. Please note: EU without certification by the Dutch Livestock Agency PVE does not give any guarantees for semen quality. Therefore acquire semen from a SWS/EU station so you have guarantees regarding the semen quality and semen health. It is recommended to with purchase of frozen semen request a certificate for each frozen batch.

The classifications immediately show the availability of the stallions. Stallions with the mention 'live cover/natuurlijke dekking,' insemination on site/'Bedrijfs-K.I.,' is only available in The Netherlands as exporting of this semen is not allowed per the regulations of the Dutch agency RVV. Only frozen and fresh semen of EU stud stallions may be exported. These stallions are available at the EU rated stations.

The list with recommended stallions may be found at : www.kfps.nl/fokkerijinformatie/lijstKFPSstamboekhengsten



STALLION STATIONS

A few years ago an American couple decided to inseminate their ster mare with frozen semen of a Friesian breeding stallion. It was not the first time and previous attempts had always been always unsuccessful. The stallion in question was standing at stud in The Netherlands at the beginning of both his breeding and his show-driving career and about the quality of his frozen semen little was known. The stallion owner therefore offered to deliver the semen based on 'no cure, no pay.' In spite of the doubts and criticism of the breeders couple about the steep veterinary cost a specialized equine clinic in California set up an extensive management program. The mare was pregnant in no time.

text: Bart van der Hoek

As you may understand this was an a-ha moment: the complete management of the mare is at least as important as the quality of the semen! In addition it does not matter whether it concerns fresh or frozen semen. In spite of that the quality of (frozen) semen is determining for getting a mare pregnant; a successful, full-term pregnancy, and the birth of a healthy, living foal. Important is, therefore, that semen is prepared properly for shipment. When it concerns frozen semen there is a number of specialized breeding stations in The Netherlands that is fully educated about the tremendous amount of government-prescribed rules and regulations.

History

The Netherlands has where it concerns offering breeding stallions at stud a government-driven history. Already in 1939, the so-called Equine Law/'Paardenwet' was put in place that made it mandatory for stallion owners to among other things have a permit for offering stallions at stud but in which it was also arranged for that the businesses with breeding stallions could not be too close together. Also for equine businesses in general this law provided for extensive regulations. We say past tense, because in the beginning of the 1990s the Equine law was repealed by the government to give way to the more uniform regulations, which the European Union wanted to put in place within the various member states with as the goal to prevent that the requirements of one country would be more stringent than those of another. It is, however, a fact that in spite of striving for uniformity there are still regulations in various countries that completely contradict each other. In The Netherlands the repeal of the Equine Law had as a result that also the (stringent) management program for stallion stations became part of the past. These days for stallion stations within the EU there are two European guidelines that are important: the regulations regarding the recognition of studbooks and the regulations regarding conditions that are set forth for semen export from one country to another. The attentive reader will correctly read into this that for the quality of stallion stations at national level there are no European guidelines. This is why in The Netherlands, in part because of the repeal of the Equine law, the profession of stallion owner has become an unregulated profession. The latter means that anyone can put his or her stud stallion up for stud service by means of artificial insemination or live cover without any approval, permit or certificate being needed. Of course this all led to an increase in the number of stallion stations in The Netherlands, which led to more competition and which threatened to put the quality of the companies involved in question. Reason for the Dutch government to in 1996 put into place the voluntarily to be requested certification of stallion stations, which still provides for quality guarantees to be available for mare owners.

Inspections

A certified stallion owner in The Netherlands has to deal with an extensive package of regulations and conditions. For certification requests the government differentiates between five different forms of businesses: stallion stations with

only artificial insemination, stallion owners with artificial insemination and live cover, stallion stations with only live cover, insemination stations, and EU semen-collection stations. Annually, under the auspices of the Dutch Ministry of Agriculture, Nature Conservation, and Food Quality, agencies perform inspections to see if certified businesses still meet the stipulations that go with the certification. This concerns, among other things, hygiene, expertise of the staff, location of the stallion barn and possible quarantine stalls, and the procedures that are in use for collecting and processing semen. The stallion owner has to pay for these inspections. In addition he has to annually pay a certain amount per stud kept at the stallion station. If he/she does not meet the requirements he/she will lose his certification. Breeders can even report possible mistakes such as a breeding administration that is incorrect. A professional stallion owner will not hesitate to get certified and thus will also make sure that a usable quality of semen is sent out. When in doubt a breeder can of course always have the semen checked by, e.g., a specialized veterinarian, something that in the case of frozen semen is almost always necessary.

Guarantee

An EU semen station/'EU spermawinstation' meets all requirements that are in place internationally in connection with the collecting and processing of semen for international use. This means that the stallions of which semen is frozen are disease free and have been tested for, e.g., CEM (and declared free from it). For certification and the export of semen abroad a mandatory CEM testing needs to take place on the stallion. CEM stands for Contagious Equine Metritis, which is a fancy name for the less fancy and contagious uterine infection that can cause, among other things, abortion. In addition to the right facilities, health of the stallion, and the quality of the semen an EU station knows how to handle matters administratively. They will provide the doses of semen with the correct paperwork and protocols in which, among other things, is listed the quantity, quality, and thawing procedure (this differs per stallion). If such a form is missing then a mare owner can (and we should almost say 'must') request this information from the stallion owner. In all reality these documents are a sort of merit certificate that give mare owners the guarantee that what they will be using is what they ordered and how to handle the order. It is not the case that only an EU station can or is allowed to offer frozen semen. Also the 'regular' certified stallion owner has the possibility to have his stallion, if he meets all the requirements, be collected at an EU station. The frozen semen can be stored by the stallion owner in question in a nitrogen tank and be offered to customers abroad. If the collection and freezing of the semen met the correct requirements, the semen may be shipped internationally and is usable semen.

So as you can see: before you put the straw of semen in your mare the stallion and his certified owner have gone through a whole process to guarantee the quality of the semen. When also the mare is in ship shape and is managed the right way the chance of the birth of a foal increases. Now all we need is that first premie . . .

HANDLING

- Using fresh semen provides good results
- Always check Semen Quality

USING FRESH SEMEN PROVIDES GOOD RESULTS

The wish of every breeder of Friesian horses is to see a healthy foal frisking about in the pasture. For mare managers outside the Netherlands who want to start breeding, the road to a successful pregnancy might be a little longer but the goal is definitely within reach.

A healthy foal starts with choosing a suitable stallion for your mare. At the KFPS website (www.kfps.nl) you can calculate the inbreeding and kinship coefficients for mares registered in your name should they be bred with any of the available studbook stallions. A studbook stallion can be recognized by the three-figure number behind its name. The studbook advises keeping to an inbreeding coefficient of less than 5%. The site also provides a list of the studbook stallions stationed in the Netherlands as well as the addresses of the stud stations. Mentioned on this list under the heading 'Breeding Value' are the abbreviations 'SWS' and 'EU'. Breeders outside of the Netherlands should order semen from a EU station that has been collected from these Friesian stallions according to current regulations.

SWS

SWS stands for sperma win station (semen collection station). Most SWS facilities are certified by the responsible government agency (the PVE: the Product Boards for Livestock, Meat and Eggs). The PVE logo is allocated only to stud stations that meet certain requirements for quality. An important element in this certification involves the supervision of semen quality. Before the start of the breeding season, the KFPS orders the testing of each stallion's semen. Semen collected from AI (artificial insemination) stallions is thoroughly tested for sperm quality in terms of motility; this is reported as TNB (total number of normally moving sperm cells stated in millions). If the stallion is being used for stud station AI (the mare is brought to the stallion's own stud station and inseminated there), the minimum TNB for the semen being used is 300. If the stallion is certified as an SWS stallion – in which case, the stallion's semen will be sent to a mare manager, veterinarian or other stallion manager/inseminator in the Netherlands – the TNB must be at least 600. In any event, the semen should have 300 TNB at the time when insemination is conducted.

Besides testing for TNB, a sample to test for CEM (contagious equine metritis) is collected from stallions being used for both natural cover and AI to prevent this bacterial infection from being transferred to the mare at the time of natural cover or insemination. CEM is a venereal disease that can infect the mare's uterus and result in her inability to conceive. Stallions should not be carriers of this disease. A sample of the insemination dose also undergoes general bacterial testing to ensure a minimum bacterial level in the dose itself. The last condition is that the stallion manager has to meet various strict requirements with regard to hygiene and recordkeeping.

EU

Being certified as an EU stud station involves other requirements. The most important of these concerns preventing the transfer of infectious equine diseases: CEM, EVA (equine viral arteritis) and EIA (equine infectious anemia). Equine viral arteritis is a viral infection that can lead to an infection of the respiratory tract and abortion among horses. The disease is spread by stallions whose semen contains the virus. This is why stallions are quarantined and blood samples are taken at regular intervals to test for this virus. The frequency

of this testing depends on how often the stallion is taken to events/competitions. If the stallion leaves the stud station (for competitions, inspections, etc.), blood samples from this stallion will be taken and tested more often. The semen collected from an EU stallion is not tested for its quality; the norm of at least 600 TNB for an insemination dose that will be transported does not apply. The mare manager, however, can require a certain quality norm. This is usually 300 TNB per insemination.

Export of semen

Fresh (chilled) semen can be transported within the European Union. A courier delivers the semen to the desired address or a mare manager can pick it up it from the stud station in the Netherlands.

The export of semen has to be monitored by the Food and Consumer Product Safety Board (VWA).

The semen has to be accompanied by a Health Certificate issued by the VWA. This certificate indicates that the semen is free of a number of diseases. The customs authorities in the country to which the semen is being imported will accept semen only when it is accompanied by the proper forms. When the semen is being picked up from the stallion manager, the stallion manager will provide the necessary forms.

Frozen semen is also available for use in countries outside the European Union. Sending frozen semen also has to be accompanied by the proper documents including a thawing protocol and a Health Certificate. Frozen semen is transported in "dry shippers" (containers used for the transport of bio-material) in which the semen can be stored for about 10 days (depending on the inner dimensions the container). After receipt, the dry shipper is returned to the sender and the frozen semen is stored in a liquid nitrogen container until use.

Insemination doses

After collection, semen to be processed into insemination doses for AI is diluted with a suitable semen extender and then centrifuged. Centrifuging separates the sperm cells from the seminal plasma and prolongs the keeping quality of the semen. After centrifuging, the semen is further diluted with semen extender to arrive at the proper insemination doses.

Cooled semen retains its viability for about 48 hours after the mare has been artificially inseminated; exactly how long depends on the quality of the insemination dose and the stallion itself.

Frozen semen does not remain viable for as long as fresh chilled semen. This is why, when using frozen semen, it is important to time insemination as closely as possible to ovulation (no more than 12 hours away from expected ovulation). To attain the highest possible pregnancy percentage, an insemination dose should contain a minimum of 300 TNB.

Some sperm cells will deteriorate in motility and/or morphology or die during shipment. It is for this reason that the Certification of Stud Managers (run by the PVE) requires the shipping of 600 TNB. This minimum takes the loss of quality into account and guarantees that the mare will be inseminated with

at least 300 TNB.

Breeders outside of the Netherlands should consider the fact that not all courier services operate on a 24/7 basis. This is why it is important to order semen far enough in advance. Insemination doses are kept at 7 °C (44.6 °F) in Styrofoam shipment boxes. It is important not to place the semen directly onto the cooling element since crystallization will have a very adverse effect on its quality. When the insemination dose is received, a veterinarian or inseminator can verify its quality by assessing a drop under a microscope.

The mare

In most cases, the insemination of the mare outside of the Netherlands will be done by a veterinarian. The most reliable way to determine the best time to do this is by conducting an ultrasound scan. This allows the veterinarian to look

at the mare's uterus and ovaries to see if the mare is on heat and if the follicle has reached the desired size. For a successful fertilization, it is essential that a veterinarian confirms the mare's ovulation after the mare has been inseminated. The chance of success is greatest when the mare is inseminated with fresh chilled semen at the right time, which would be fewer than 48 hours before ovulation in the Netherlands or fewer than 24 hours before ovulation in other EU countries.

Author: Ageeth van der Lee

With the assistance of Karin Hendriks, a European specialist in equine reproduction (a graduate of the European College of Animal Reproduction) at the Equine Health Department, Faculty of Veterinary Medicine, Utrecht University, and Hengstenhouderij Toonen, an EU-certified stud station.

ALWAYS CHECK SEMEN QUALITY

Sometimes a mare gets pregnant from just one insemination with frozen semen but in other cases it can take several cycles before the mares gets pregnant. In this brochure you will find information on the management of the mare. However, also the quality of the semen plays a role. In this article we focus on the quality and health aspects of semen and the responsibilities of the stallion owner and breeder.

Text: Marja Teekens, Photos: Bart van der Hoek, Translation: Anneke van den IJssel

The KFPS sets forth regulations for young stallions to be able to participate in the second viewings of the stallion selection process. The requirements, as outlines in the Regulations for the Stallion Inspection / Reglement Hengstenkeuring are:

- Stallions that turn three years old in the calendar year of the second viewing:
600 x 106 total number of normal moving spermatozoa (TNB), morphology: minimally 50.0%, motility: minimally 50%
or
800 x 106 total number of normal moving spermatozoa, morphology: minimally 45.0%, motility: minimally 50%
- Stallions that are four years or older in the calendar year of the second viewing:
1000 x 106 total number of normal moving spermatozoa, morphology: minimally 50.0%, motility: minimally 50%
or
1200 x 106 total number of normal moving spermatozoa, morphology: minimally 45.0%, motility: minimally 50%

After these requirements the genitals of the stallion will be checked: the stallions will be vet checked by the KFPS veterinary team after selection from the first viewing. Stallions with deviating genitals are barred from the second viewing.

The KFPS uses these requirements to as much as possible limit lower fertility in stallions. The validity of the semen testing is not for life. Many external factors are of influence on the quality of semen. Therefore a one-time test is never a guarantee for the semen quality of the next collection and a semen testing has to be repeated at least once a year.



Friesian stallion on the phantom.

Determination of frozen-semen quality

The timing of the insemination is of great importance, especially when using frozen semen. En then it is especially important that the semen used is of good quality. The follicle has a life span of 6 to 24 hours. Frozen spermatozoa have a restricted life span after thawing of up to 12 hours. Fresh semen has a life span of at least 48 hours. The whole process is also rather costly. In order to improve the chances of a successful breeding, in addition to the mare management as described before in this brochure, the semen quality also is of great importan-

ce. Therefore as a breeder always ask for a certificate of quality for the frozen batch. A certificate of quality indicates the quality of the thawed semen. It will guarantee that the material you start with has the right quality.

The determination of the semen quality can be performed by the Health Inspection / Gezondheidsdienst (GD) in the town of Wolvega but also at the University of Animal Medicine / Universiteit voor Diergeneeskunde in Utrecht at the semen diagnostics center. The testing of the semen quality consists of:

- Evaluation of motility of the spermatozoa
- Longevity
- Concentration
- Morphology
- Live and dead cell testing
- Determination of TNB value (total number of normal moving spermatozoa)

The testing is performed based on minimally two straws provided from one collection. The straws are handed in frozen and will be thawed by the laboratory according to a standard thawing protocol. It is known that the semen of some stallions requires a more specific thawing protocol; this will be indicated by the stallion owner.

After the thawing process the analyst will look for:

- **Motility:** a percentage of minimally 20% is necessary; the Health Inspection/Gezondheidsdienst even advises to strive towards 35%. A lower percentage than 20% gives too little chance of pregnancy, which is derived from the following. A stallion can be approved while he has a motility of 50%. When freezing you often use already half of the motility, which lowers the number to 25%. The motility is heavily influenced by the whole process of freezing and thawing. It is important that the semen has an optimal motility before the freezing process, preferably 70%.
- **Morphology:** the morphology of a stallion barely changes during his life. In principle the semen report that is written up during the stallion-selection process is therefore a good gauge. In addition the morphology is to a lesser degree influenced by the freezing process. Of course an illness (combined with fever) does temporarily influence morphology but in principle it can be said that the morphology percentage holds for the long term.
- Also the concentration is looked into. In general we see the most variation here between the collections. This variation is in part caused by the management of the stallion.
- Subsequently these separate parameters are reflected in the TNB number. In order to obtain an acceptable fertility result the concentration of the semen has to be at least 300 TNB at the time of insemination. The TNB number per insemination dosis has to be at least 600 TNB at the time of getting the fresh semen ready and for frozen semen this number needs to be at least 1200 TNB to come to the necessary dosis (300 TNB) at the time of insemination. The loss of viable spermatozoa is for the process of freezing and thawing therefore considerably higher compared to fresh shipped semen or insemination on site. Depending on the concentration per frozen straw the number of straws per insemination can be determined, e.g., for a stallion with a TNB of 50 per straw six straw are needed for an insemination of 300 TNB. Rule of thumb: a mare needs to always receive 300 TNB per insemination.



An example of a certificate of quality by the Health Inspection for Animals/ Gezondheidsdienst voor Dieren is depicted in the above image. With the certificate an overview of the tested parameters is provided and also as the result and conclusion/recommendation is given based on comparison to the standards in use.

Requesting a testing of semen quality

Always ask the stallion owner to provide a certificate of quality per semen batch purchased. If this is not possible then request a testing from one of the agencies below.

Health Inspection for Animals/Gezondheidsdienst voor Dieren

When sending in a semen sample a form needs to be sent in with it. This form may be found at [www.gddeventer.com/GD Paard/inzendformulieren/spermamonsterpaard](http://www.gddeventer.com/GD_Paard/inzendformulieren/spermamonsterpaard)

- Locatie Wolvega
- Margriet van der Lei, 0561 – 689476
- Cost: from € 30,-
- Duration of testing: minimally three days

Faculty Animal Medicine Utrecht/ Faculteit Diergeneeskunde Utrecht- Semen Diagnostics Laboratory/ Spermadiagnostisch Laboratorium

Semen samples are only tested per the request of a veterinarian. For more information:

- Tel: +31 (0)30 – 253 1248
- Fax: +31 (0)30 – 252 1887
- E-mail: secretariaat_DGL@uu.nl
- Cost: from € 30,-
- Duration of testing: ca. one to two weeks for a complete testing. The report is only sent to the person who requested it.

Make a thought-out and timely planning

Because much needs to be arranged for—among other things certificates, transport and the like—it is important to start early on good planning. Therefore order frozen semen early in the season so that you actually have the (quality guaranteed) semen available for the right moment.

Transporting and storing frozen semen

With a shipment of frozen semen the EU station has to include an insert with on it among other things: date of shipment, identification number of the stallion, number of doses of semen, address of the recipient, and the number of the health certificate for the batch. This certificate is mandatory for EU certification and is part of the regulations for horse semen. Of course much can still happen with semen, also when the quality at the time of freezing is sufficient. The manner of storing, both during transport as at the storing facility for the purchaser, plays an important role. Best is to transport and store the frozen semen in a specially designed liquid nitrogen tank. The nitrogen level of the container has to regularly be checked and added to. Depending on the volume of the container it is advisable to regularly check the tank for its nitrogen level. The larger the container, the less often it needs to be replenished. The frozen semen always has to be in storage below the nitrogen level. For transport often a dry shipper is used. It stores not as long but also that depends on the size of the shipper.



It is very important to closely guard the quality of the nitrogen tank.

When you make agreements about the shipment of the product do also discuss the quality of the transport container. This of course also goes for when you want to store the purchased semen for some time at home!

Transferring semen from one tank to another has to take place within eight seconds. If it takes longer the spermatozoa can be damaged.

Transport expensive?

Transport cost is often high. There is a large network of good and reliable couriers, such as TNT and UPS. Many stallion owners have meanwhile also built up their 'own' alternative transportation network. Regularly trucker acquaintances are used for transport agreements.

It can of course be interesting to agree that both parties share in the transport with the buyer coming to pick up the product at an agreed-upon location. There are therefore various options to keep the transport cost as low as possible.

Follow the thawing protocol to the letter

Thawing the frozen semen will have to take place according to a strict protocol. A general protocol you will find below but on the certificate the specific protocol for the purchased frozen semen in question will be printed. By strictly adhering to the directions on the certificate you will have the most chance of a pregnancy with the frozen semen used.

Pay close attention therefore to ordering frozen semen from a certified EU station and follow the accompanying list of recommended procedures for handling the semen. This way the chance that your mare conceives will be the greatest.

In the enclosed text box you will find a general thawing protocol. Please note: the specific protocol provided by the stallion owner will always take precedence over the general protocol.

Have your veterinarian also always check the motility after thawing!

THAWING PROTOCOL FOR STALLION SEMEN FROZEN IN 0.5 ML STRAWS MATERIALS:

What do you need?

- Thermos flask or other vessel with a wide neck filled with water at 37-38°C. Or, water-bath with a measuring cylinder filled with water (all at 37-38°C).
- Thermometer
- Stop-watch
- Scissors
- Long forceps, protective clothing (e.g. gloves, visor).
- Liquid nitrogen container within which insemination doses are packaged individually within plastic tubes, that are themselves grouped in goblets and held in canisters.
 - 1) For large numbers of straws (>8): 15 ml tubes, 20 ml syringes and conventional A.I. pipettes.
 - 2) For small numbers of straws: A.I. pipettes with stylets that remove the straw from the pipette after emptying.

THAWING PROCEDURE:

Bring the liquid nitrogen container as close as possible to the water bath or the thermos flask. If possible check semen i.d.

Take 1 straw out of the plastic tube and transfer it very quick into the cylinder or thermos flask (with thermometer), upright with the sealed end upwards. Check i.d. if this was not previously possible. Transfer the straws one by one into the cylinder or thermos flask (not all at the same time!). Start the stopwatch after the last straw. Take the straws out after 30-40 seconds. Dry them well. Cut off the sealed end and:

- 1) For large numbers of straws: hold the straws upside down in a pre-warmed (37°C), 15 ml tube, cut off the other end of the straw – it will empty itself. Empty all the straws in the same way. Before insemination, examine a drop of the semen using a microscope with a heated stage. Assuming adequate semen quality, inseminate the mare immediately.
- 2) For small numbers of straws: examine a drop of semen from one straw for quality (in case of doubts over quality, examine drops from other straws). Keep the straws warm/protected – introduce into mare via suitable AI pipette one by one, as soon as possible after thawing.

WARNING: DO NOT HOLD A STRAW, OR EMPTY (NO NITROGEN) CANISTER LONGER THAN 8 SECONDS ABOVE THE LIQUID NITROGEN!

Please note; Check the certificate for the quality of the semen at the time of freezing, the number of doses to be used for one insemination, and a detailed description of how to handle this specific semen.

Source: Prof. Dr. T. Stout, University of Utrecht, Animal Medicine/Diergeneeskunde Faculty

Make clear agreements

Before you actually order semen from one of the EU stations be sure to make clear agreements about the following:

- How many insemination doses will you receive for the breeding fee paid? If the mare is not pregnant in one cycle for how many cycles will you have semen?
- Have the stallion owner provide you with a certificate of quality per frozen batch with the frozen semen.
- Who arranges the transport and who is therefore also responsible for storage during transport.

Inspection for contagious diseases

The European and Dutch government (Ministry of Agriculture, Nature and Food Quality/LNV) set strict health requirements for semen. The responsibility has been delegated by the LNV to the Agency for Livestock, Meat, and Eggs/Productschap voor vee, vlees, en eieren (PVE). The Food and Commodity Agency/Voedsel en Warenautoriteit (VWA) takes care of the export inspection and provides the health certificates. What checks are performed? For EU certification the semen is checked for contagious diseases such as:

- Contagious Equine Metritis (CEM) is an infectious uterine infection in horses, caused by a bacterium. The horse does not fall ill. A possi-

ble infection is, however, shortly after the breeding visible: the mare shows a heavy discharge, which is of a white-greyish to pinkish color. This discharge can last some two weeks. Abortion and lower fertility are the result. The stallion is the largest source of infection, especially with live cover. The stallion himself does not show any symptoms of the infection. The alarm bells will only go off if the mare after the breeding shows the symptoms mentioned. If the mare is not treated the bacterium remains present to later on cause the same problem.

In The Netherlands all stallions owned by certified stallion owners are tested before each breeding season for the presence of the bacterium.

- Equine Viral Arteritis (EVA): EVA is a contagious viral disease in horses and is present in many countries. The majority of horses do not show any disease symptoms but still some symptoms such as fever, odema, and abortion can occur. The disease is spread through the air and is also sexually transmitted. In almost all cases the infected animals recover completely within a month. Stallions can after an infection spread the virus for quite some time. The virus is located in the sexual glands and is passed on through semen. Mares can be infected by means of infected semen. In general the infected mare will easily rid herself of the virus but a pregnant mare infected with EVA can transfer the virus to her unborn fetus; the fetus gets infected, dies, and is aborted. If the infected foal is born alive it will only live for a few days. An export ban is in place for EVA-infected semen.
- Equine Infectious Anemia (EIA): EIA is a viral infectious disease that causes anemia and recurring bouts of fever. The disease is found in horses, mules, and donkeys and is spread by blood-feeding insects. In pregnant animals the fetus can also become infected. The Netherlands is officially free from this virus.

In addition to the listed contagious diseases some countries have specific requirements that the semen also needs to meet.

In one of the other articles in this brochure you may read more about the ins and outs of the EU certification of breeding stations.

Definitions

- Morphology: the morphology concerns the shape, i.e. the structure of the spermatozoa. The spermatozoon has to have a correctly structured tail to be able to swim in the right direction and a correctly shaped head to have fertilization take place.
- Motility: the motility or movement says something about the possibility that a spermatozoon has the capacity to swim to the follicle.
- TNB: Totaal aantal Normaal gebouwde goed Bewegende zaadcellen/ total number of normally formed and well moving spermatozoa. It is a multiplication of the number of spermatozoa, form, and motility.

This article is important for those breeders who use frozen semen. Information for breeders which have access to fresh semen, the article 'Using fresh semen provides good results' is more interesting.

VETERINARIAN

- Fertility Study of Friesian Mare
- Information specifically pertaining to Friesian mares

How, What, and Why?

Fertility Study of Friesian Mares

After the birth of a foal the same question always comes up for breeders: When and with what stallion do we have the mare inseminated for the next pregnancy? The timing of the 'new' insemination always is a topic of discussion. Should the insemination take place during the foal heat, do we give the mare with the very young foal by her side a shot to come into heat or is it advisable to wait longer? In this article we go over the pros and cons of every possibility and Phryso will also cover a number of fertility studies for (problem) mares.

Text and Photos: Ben Horsmans Bron: Phryso





A recent study in the United States shows that mares that are too heavy (photo) have more chance of producing a stud colt and mares that are too skinny have more chance of producing fillies. If this also applies to The Netherlands is unknown.

If the birth of a foal went well and the afterbirth quickly and completely was expelled then insemination during the first foal heat is an option, especially if it is already later in the season and the next foal cannot be born too late the next year. A second advantage of insemination on the foal heat is the duration of the heat. Normally a mare is in heat for six to nine days but with a young foal on her side that period is only two to four days. Especially during the foal heat there is almost always an ovulation. Even if the mare shows few signs of heat the chance of taking is reasonably big. The disadvantage of insemination during the foal heat is the larger chance of absorption, because the uterus is still recovering and has to return to its original shape. In other words: insemination during the foal heat produces in general a quick pregnancy but the risks of absorption are a bit larger than normal. Breeders who



The reproductive organs of a mare as seen from above. Clockwise from the top left: Ovary left, follicle, ovary right, uterine horn, uterus, oviduct.



With a rectal exam the size and blood flow of the uterus and ovaries are felt up.

choose for this timing for insemination are therefore advised to have additional pregnancy check-ups performed.

Short cycling.

If the breeder opts for a next pregnancy and the mare still has a young foal by its side short cycling a mare turns out to be an often selected method. Usually the injection is administered 20 days after the birth of the foal. After five to seven days the mare will come into heat. The symptoms are clearly visible. When short cycling at a predetermined time the uterus will in general get more time off than insemination on the first foal heat. Because the breeder is now actively involved the heat will usually be followed closely and will not be forgotten.

Breeders can, of course, also choose to let nature take its course. Usually the foal heat is then skipped. The mare will be offered for insemination at the second heat cycle. For a Friesian mare



Large ovary of a mare with a ripe follicle that is about to ovulate.



A normal, well closing vagina of a mare.



Vagina of a mare in which we see quite a bit of undesired fluid.



The older the mare is the bigger the chance of sucking in air through the vagina.

the foal heat normally starts around the eleventh day (nine to thirteen days) after the delivery. The second heat cycle takes place around 30 days after the birth of the foal.



A scan of a follicle on an ovary, about two hours before ovulation.



Ultrasound of a mare's uterus. Cervix, vagina with loose fluid/urine, bladder with urine.



Bladder, vagina, and cervix with undesired loose fluid in the uterus.

Fertility study

Breeders relatively invest much in the offspring of Friesian horses. Stud fees but also the maintenance of the mare cost much money. In order to control possible financial losses it is advised to have the chances for success for the mare(s) in question evaluated the best possible. The best person for that job is an accredited veterinarian. The following fertility tests are possible:

1. Anamnesis of the mare.
2. Inspection of the sex organs.
3. Rectal exam of the mare.

4. Ultrasound of the mare.
5. Culture of the uterus or vagina.
6. Biopsy (tissue) test of the uterus.
7. Hysteroscopy (endoscopic examination of the uterus)
8. Blood/urine test of the mare.
9. Other additional testing.

Anamnesis

In an anamnesis the (gynaecological) history of the mare is described.

Besides age, current constitution of health, use, nutritional state, etc., the foaling history is also important. Has the mare recently or long ago foaled or has it never had a foal? How did the last birth go? Was the afterbirth expelled quickly and completely? Has the mare/uterus often been treated and if so with what, for how long, for what reason, etc.? In other words: have there been any problems in the past. With this information the veterinarian tries to see if the mare is easy or difficult to breed. Based on the information the veterinarian will plan his strategy. It will be clear that there is not always an explanation for certain problems. A detailed analysis can, however, often offer much information which allows a better evaluation of the chances for success. Also the current health and nutritional state of the mare often has an influence on the chances for success. Mares that are too heavy in general do not take as easily. Too much show stress often is also not favorable. A recent study in the United States showed that mares that are too heavy have more chance of producing stud colts and mares that are too thin have more chance of producing fillies. If this also applies to The Netherlands is unknown.



The uterus of a mare on a ultrasound. Quite a bit of undesired and black fluid can be seen.

An antibiogram or sensitivity test with which can be tested which antibiotics for which pathogens have to be used. The large circles indicate the sensitive bacteria; the very small circles the immune bacteria.

Inspection of the sex organs

External and internal inspection of the sex organs of the mare are an essential part of the testing. What is normal and what is not? If the vagina runs tightly closed and straight from top to bottom we speak of a normal situation. A vagina that is partially open, sucks in air and/or shows flow is of course not desirable. When the vagina is briefly opened between the thumb and index finger and immediately is released it needs to immediately resume the normal position with tightness and a quick closing. If the vagina is opened the interior of the vagina and the entry of the uterus should not be visible for long. The interior of the vagina has to be reasonably well to well connected. If it sucks in air when opened then this could mean a strongly disadvantageous influence on the future pregnancy. Loose fluid and/or urine in the vagina are also a bad sign. The chance of serious infections of the vagina and uterus are strongly increased by it. A



Normally winding oviduct of a mare. This is where the fertilization takes place.



Inside of the uterus (pleated) of a mare in heat.



The amnions in a mare's uterus with embryo.

good examination of the entry into the uterus (cervix) is for problem cases part of the mandatory examination list. The sphincter of the cervix has a very important function for a pregnant mare and performs this task solely on the basis of hormones. During the pregnancy the tension on the cervix increases. In spite of this increasing tension this muscle remains, under normal conditions, closed. Only during the heat cycle and during the birthing process does the sphincter open up! If during a birth the cervix is damaged and with that hampers a normal closing then pregnancy is in most cases no longer possible. Normally the cervix is not visible, which makes it difficult to diagnose a poorly functioning sphincter as a possible infertility cause.

Rectal exam

With a rectal exam is investigated if and to what degree a normal uterus is present by means of palpation through the large intestine. The thickness, size, and placement of the uterus are evaluated by the veterinarian. Older mares have more chance of a partial prolapse of the uterus, especially if they have already had many foals. Not only the insemination but also the natural cleansing function and fluid discharge from the uterus can be a problem with this displacement. From the thickness of the uterine wall the veterinarian can get an impression of the degree of blood flow and can estimate the chances of pregnancy. The size of the ovaries can also be felt. The size of the ovaries can give a good impression of the total (breeding) activities of the mare. The breeder can estimate with this information if it is at all useful to breed. Also the size and the sensitivity of the ovaries are

evaluated by the veterinarian. If the mare only just ovulated (within two hours) the veterinarian can recognize this by a slightly painful reaction when touching the ovulated ovary.

Ultrasounding

A scan test (ultrasound) has become an essential test over the past years of the mare to be inseminated. In the beginning of the season the veterinarian can evaluate the activity of the ovaries well with an ultrasound. At first the scanner was especially used for measuring and evaluating the follicles and possible ovulation. Nowadays it is also essential to especially with Friesian mares look at the uterus and its possible contents. A veterinarian can very well evaluate with a scan if the uterus is in the right shape to be inseminated, if this fits with the situation of the ovaries and if the uterus is dry. For Friesian mares there often is more or less loose fluid in the uterus. This is in most cases unfavorable for a pregnancy. The color of the uterine contents (grey/black/with or without deposits) will tell if there is possibly an infection or just loose fluid. Important is that by ultrasounding not only the ovaries and thus the follicle size can be evaluated but especially if the findings match with the uterus. Often a mare will show light heat symptoms caused by one or more follicles on the ovary but if the uterus is not parallel with this supposed heat then there is no use in inseminating the mare. Better yet: an insemination will in such a case almost certainly not lead to a pregnancy but will have a big chance of causing a big uterine infection. The veterinarian will, if there is loose fluid in the uterus, usually do some more tests by, e.g., taking a culture. An



Image during an endoscopic examination of the uterus. In the middle the cervix is visible.



Image during an endoscopic examination of the uterus. In the middle the entry of the oviduct, in papilla form, is clearly visible.

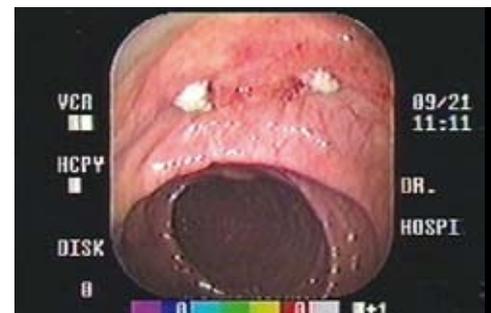


Image during an endoscopic examination of the uterus. In the upper wall of the uterus we see small abscesses.

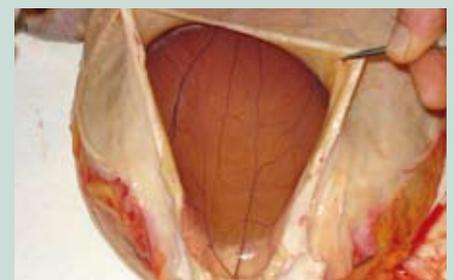
ultrasound offers both the veterinarian and the breeder many advantages. Not only the size of the ovaries, the size of the follicles, the number of follicles, and the kinds of follicles can be seen



The uterus of a mare with an embryo of about two months old.



Foal embryo of about eight weeks old.



The uterus of a mare with amnions and an embryo of about two months old.



The result of a successful pregnancy: the wish of every breeder!

but also deviating follicles and, e.g., tumors, can be spotted well. By evaluating the size and shape of the follicle it can be assessed when the mare will ovulate. Also after the ovulation an ultrasound can determine on which side and possibly with how many follicles the mare ovulated.

Culture

With a culture of the uterus or cervix a veterinarian can see if there are bacteria in the uterus and if so, what kind. It is known that a uterus is not 100 percent

sterile. A number of notorious bacteria, such as E Coli, should, however, not be found. During a normal heat the uterus has a strong, natural cleansing function. Outside of the heat cycle that is much less. Normally breeders of mares that are bred by live cover, must have a culture performed in the months preceding the breeding. This culture is not just important for the mare but also for the breeding stallion, because an infection through the mare has to, of course, be prevented. Also for open mares, mares that were bred/insemi-

nated but did not take, it is good to do a culture at the beginning of the new breeding season.

In practice we go by: if a mare does not take in three or more cycles, thus has been inseminated for three or more cycles in the same breeding season without success—a culture has to be further investigated.

A culture has to always be taken during the heat cycle. Besides the fact that it is much harder for the veterinarian to enter the uterus outside the heat cycle the risk for a uterine infection is very



Amnions of a mare. The foal embryo was about two months old.

Normal afterbirth—complete and not torn—of a mare.



big outside the heat cycle. The culture will be studied in a laboratory. If the owner has a culture taken in the beginning of the heat cycle the result will be known within a few days, still within the same heat cycle. There will be differences in speed of processing between laboratories.

If an infection is observed an antibiogram or sensitivity test will be ordered. This will test which antibiotics will work against the bacteria found and which ones will not. An antibiogram will help determine the best treatment. Not only bacteria can be a problem. With real problem cases tests will also have to be performed for yeasts and fungi. These tests go beyond the standard procedures. Ask the veterinarian what all will be checked for in the mare in question. Excessive use of antibiotics in the uterus of a horse can after some time lead to strong infections by yeasts and/or fungi that in turn are very hard to get rid of. Purposeful and effective use of antibiotics is desired.

Biopsy (tissue testing)

A biopsy in connection with a fertility test usually consists of taking a tiny piece of the uterine wall. This is performed with a special, small instrument. The sample is then tested in a laboratory. Evaluated will be the various tissue components and cells. This allows for a good prognosis regarding the future expectations of a 'problem mare.' A biopsy is not standard procedure. Only if there are real problems is it performed. The result of a biopsy has one disadvantage: not always does the sample tell the story of the whole uterus. A biopsy only offers a prognosis and is not 100 percent iron clad.

Hysteroscopy (endoscopic examination of the uterus)

This examination of the uterus is performed with an endoscope. This is a type of pipe or tube with which the veterinarian can internally look at, e.g., organs. Up front in the endoscope is a miniscule video camera. The veterinarian evaluates the uterus with the footage. After inserting the endoscope some air is blown in so the inside is easy to see. Especially the color of the

uterine mucous membrane and the presence of deposits and/or fluid are important criteria for the prognosis of a possible pregnancy. Damages to the uterine wall can easily be traced with a hysteroscopy. This also goes for the entries into the oviducts (papillae). Sometimes after a strong uterine infection the entry into the oviduct can be stopped up. Only with a hysteroscopy can such stopped-up oviducts be detected. A second important reason for a hysteroscopy is the observance of (the number of) cysts in the uterus. Uterine cysts are so to speak stopped-up glands in the uterine wall. When they block up, e.g. by infections or age, small bulges are formed, blisters that 'hang' in the uterine wall. When these blisters are small and low in number this does not have to have immediate consequences for a pregnancy. But if the size of the cysts and the number is too large they can definitely hamper pregnancy. With an endoscope cysts can be removed. They are burnt off with an electric wire attached by the endoscope and removed. Once removed this does not mean the cysts will stay gone. Sometimes the next year another treatment will be necessary. Additional advantage is that during an endoscopic examination images can be documented. With a possible follow-up examination the images can be compared. Lastly: with an endoscopic examination damages to the cervix can be well traced. In other words: if the mare is a so-called problem mare and she still does not want to get pregnant do not hesitate to

request a hysteroscopy. A hysteroscopy is not part of the routine examinations. The owner has to take the mare in to the veterinary clinic but for problem mares it is absolutely worth the effort. The treatment is much cheaper than continuing on with inseminations time after time.

Blood and urine tests

Some mares have issues with the normal, natural hormonal balance and can because of that not become pregnant and/or hang on to the embryo. With a blood and/or urine test it is possible to trace down possible deviations. Also if the mare is in poor health it can be useful to run an extensive blood panel before the breeding season. By means of an extensive organ profile possible deviations can be traced down. Poor diet, a lacking in trace elements, vitamins, and minerals can be a reason as to why a mare cannot get pregnant. Also for a mare about to be inseminated goes that the mare has to be healthy before one invests in a pregnancy.

Additional testing

When thinking of other, additional testing one has to think of, e.g., hypersensitivity for the extender of the semen used or genetic incompatibility of the mare with the semen of certain stallions. Many stories go around on this topic. If they are based on reality is hard to say. Scientific evidence is not always easy to provide. But sometimes there are definitely strong indications for the existence of these problems.

The author

'In this article I tried to describe a number of testing methods with regard to fertility of the mare. A number is standard and easy to perform. Other examinations have to, if there is cause for them, take place at a veterinary clinic. Fact is that if a breeder experiences problems with pregnancy in one of his/her mares there are various options to track down the reason for the problems. For 'problem mares' it is also advisable that a breeder tries to get a diagnosis before the first time semen is order (and paid for) so he/she knows where the problem stems from. Trying for a season long, with multiple inseminations and treatments without understanding what is going on often leads to no results; it is a waste of time, money and often only leads to unnecessary frustrations. Of course, there are many other (non-mare related) factors that can be the cause of lower fertility. This will be covered next time. For now I wish you much success. For more information visit www.horsmans.com.

INFORMATION SPECIFICALLY PERTAINING TO FRIESIAN MARES

Below you will find several pointers for your veterinarian. Friesian mares have some specific characteristics that are important to be aware of.

First a veterinarian will of course start with the medical history:

1. *What is the history of the mare?*
 - a. First pregnancy
 - b. Mare kept open last season
 - c. Mare did not take last season

What measures were taken at that time to still try to get the mare pregnant?

2. *What is the age of the mare?* Mares over 14 years old are part of the category 'older brood mares.' Take a good look at the position of the vulva. The top of the vulva should not come up over the pelvic basin. If that is the case then the mare could be 'sucking air' with the consequence that dirt enters the uterus, which may prevent the mare from conceiving. The only option here is to ask the veterinarian to put in a caslick up to two centimeters under the pelvic basin.
3. *What is the condition of the mare?*
In a skinny mare the anus will draw inward, which positions the vulva more horizontally (when the vulva needs to have a vertical position).

When the vulva has a more horizontal position the mare will be more prone to sucking in air, which can have dirt enter into the uterus. Therefore make sure that the mare is in good condition!

4. *Scanning of the uterus and ovaries*
 - Friesian mares are in general in heat longer than mares of other breeds.
 - Friesian mares have more odema in the uterine wall and the odema also lasts longer. Note: do not inseminate until the uterus is almost dry (this thus takes longer compared to other breeds)
 - The size of the follicle is not all-telling; in Friesian mares a follicle of 50 to 60 mm is very normal.
5. Friesian mares in general respond relatively poorly to forcing them to ovulate by means of an injection. It is also important not to administer the shot too early.
6. Always check the semen before insemination! Advise the breeder to only use semen that comes with a certificate of quality.
7. Always strictly adhere to the (included) thawing protocol.

REGISTRATION OF FOALS

- Registration of Foals

PROTOCOL REGISTRATION OF FOALS

- Report the breeding to KFPS:
 - o For a breeding to a KFPS Studbook stallion / stallion approved by a daughter studbook / Foalbook stallion with breeding permit: stallion owner will report the breeding.
 - o In case another stallion other than as mentioned above is used the mare owner will need to report the breeding in writing to KFPS.

The breeding needs to be reported with the following information:

- o Data of the mare: name, chip number, life/registration number, current owner.
- o Data of the stallion: name, chip number, life/registration number.
- o Breeding data (report all data).
- The KFPS processes the breeding data in its administration system. To finalize this breeding administration the mare owner will receive an invoice ('dekafdracht'/breeding charge).
- After the KFPS has received payment for the invoice 'dekafdracht'/breeding charge, a birth announcement ('geboortebericht') will be generated (December).
 - o If a registered stallion or a stallion with breeding permit has been used the birth announcement will be mailed to the owner of the stallion.
 - o If a stallion without a breeding permit has been used the birth announcement will be mailed directly to the mare owner.
- Within two weeks after birth of the foal, the foal has to be reported to KFPS with the birth announcement filled out with all information.
- The owner of the foal receives a birth acknowledgement ('blue paper') from KFPS.
- The owner of the foal returns the birth acknowledgement as soon as the foal is chipped. The chipping of the foal needs to take place while the foal is nursing with the dam; within six weeks to six months after the birth of the foal. If the dam passes away the foal has to be chipped within one week (if not, DNA verification of the pedigree is mandatory). The foal can be chipped at its studbook inspection but can also be chipped by the owner's veterinarian. The veterinarian fills out the studbook's chipping-protocol form and sends that in with the bar-code stickers.

A foal by a stallion without a breeding permit has to always first have a

DNA testing performed on it. The necessary information about the DNA testing is already sent out to the foal's owner with the birth acknowledgement.

- When the KFPS receives the chip number the foal will be registered in the respective register, e.g., the foal book. The proof of registration, and if applicable, is sent to the respective association of the country of residence. This association will then take care of sending the documents to the foal owner.

Reporting a foal without the breeding having been reported.

Should a breeding not have been reported to KFPS but there is a foal born then KFPS will contact the owner of the stallion in question. Also the foal will have to be DNA tested to verify its pedigree.

Other information.

For participation in the foal inspection by KFPS the dam of the foal has to be vaccinated against influenza. The influenza vaccination is valid with:

- A. A basic vaccination, consisting of two vaccinations of which the second vaccination is administered minimally three weeks and maximally 13 weeks after the first vaccination.
- B. Then an annual booster vaccination is administered, no later than maximally 12 months after the last vaccination was administered.
- C. The last vaccination has to have been administered no later than one week before the inspection.

This needs to be certified with a signature/initials and a stamp of the veterinarian who administered the vaccination. It is advised that foals as of the age of four months are vaccinated (no sooner due to immunity from the mare's colostrum). The proof of vaccination (passport) has to be shown to the KFPS secretariat for verification before the inspection. Horses that have not had the necessary vaccinations will not be allowed on the inspection premises and therefore also not inspected.

Please note: in addition vaccinations required in accordance with the law of the country in question will be mandatory.

Translation by: Anneke van den IJssel.



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