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The Stallion: Breeding Soundness Examination & Reproductive Anatomy

Equine Section, Department of Animal Sciences

A breeding soundness exam of a stallion includes not only examination of various seminal characteristics, but also, the evaluation of the stallion's physical condition and his ability to perform in the breeding shed. The physical examination should include evaluation of the locomotor system, including muscular, skeletal and neurological factors, as well as the stallion's visual function.

The most reliable measure of fertility in a stallion is the pregnancy rate he obtains when bred to mares of normal fertility under ideal management. Most stallions selected for evaluation include those about to be, or recently, purchased, those about to enter the breeding season, those suspected of reduced fertility and young stallions being considered for their first breeding season. The evaluation of the stallion for potential breeding soundness consists of 4 parts:

1. general physical examination,
2. examination of external reproductive organs,
3. examination of internal reproductive organs,
4. semen collection and evaluation.

General Physical Examination

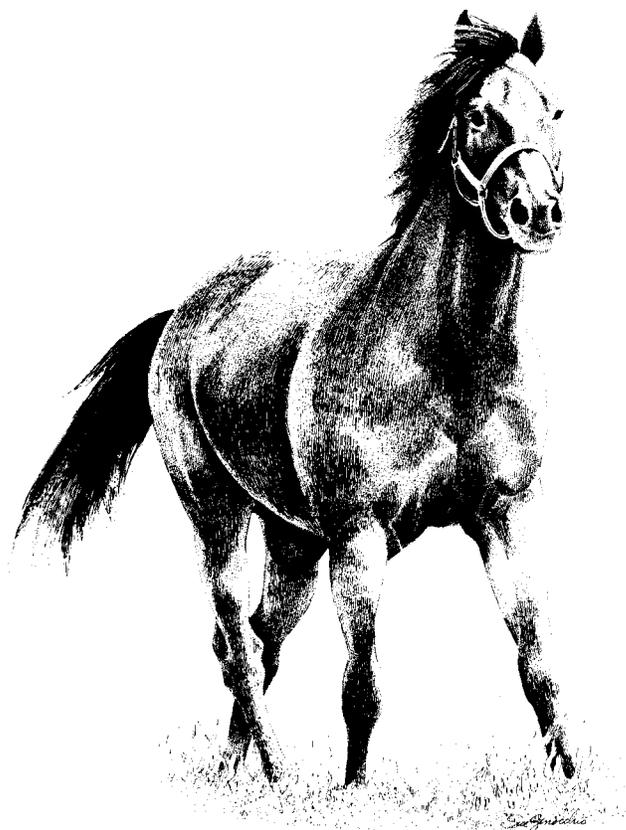
In evaluating a stallion's physical condition, pay close attention to his ability to approach and to successfully mount the mare. Any condition (conformational or otherwise) that adversely affects his ability to mount mares should be noted and corrected before he develops psychological problems and refrains from breeding.

Most of these conditions will involve the musculoskeletal system of the back and hind limbs. Chronic conditions like osteoarthritis of any of the hind limb joints, chronic laminitis and bursitis may hinder his ability to cover mares. If problems become acute and cause enough pain, the stallion may become uninterested in breeding.

If a stallion has poor body condition, that may indicate inadequate nutrition or improper management. Because poor body condition of stallions may have detrimental effects on semen quality, do not evaluate such stallions for breeding soundness until the condition has been corrected and at least 60 days have passed. This will allow for spermatogenesis and sperm transport to reflect the stallion's improved condition.

Examine the conformation of the stallion and note any conformation defects. Seriously consider whether stallions with severe conformation defaults should be allowed to breed.

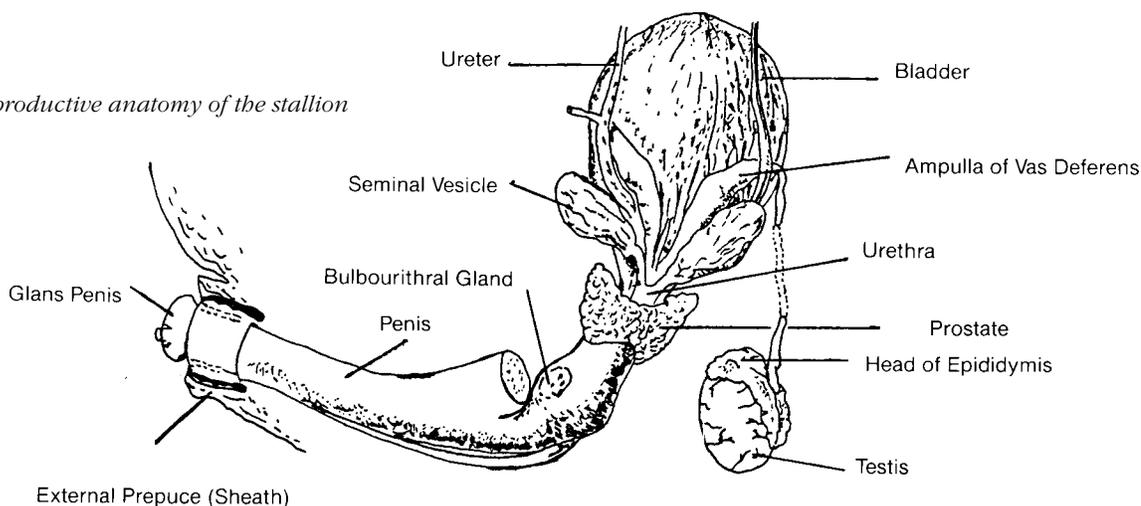
The Society for Theriogenology's manual for clinical evaluation of a stallion lists the following conditions as being genetically controlled:



cryptorchism, combined immunodeficiency, parrot mouth, hemophilia, cataracts and wobbler syndrome. Any stallion found to have any of these conditions should be considered ineligible as a sire.

Include an ophthalmologic examination in the physical examination. Close observation of the handling of a stallion may be necessary to differentiate between decreased libido and improper handling or mistreatment. Note any unsoundness in a stallion and consider its degree and severity when evaluating that stallion as a potential sire.

Figure 1. — Reproductive anatomy of the stallion



External Reproductive Organs

Penis and Prepuce. The stallion's penis consists of 3 parts: **(1)** the root or bulb, **(2)** the body or shaft, (the main part), and **(3)** the glans, the enlarged free end of the penis (Figure 1). When not erect, the penis is 50 cm long and 2.5 to 6 cm in diameter with the distal end 15 to 20 cm free in the prepuce. When erect, the penis doubles in length and thickness and the glans increases by 3 to 4 times.

The prepuce or sheath is a double invagination of the skin that covers the distal portion of the penis when not erect (Figure 1). Examination of the penis and prepuce is most conveniently done at the time of washing. Allow the stallion to approach the mare in order to be stimulated to let down, at which time the penis extends from the sheath.

Exercise caution because some stallions may be reluctant to be examined and cow kick or kick backwards at the examiner. Be careful to protect everyone involved.

Examine the penis and prepuce both manually and visually. Grasp the shaft of the penis just behind the glans. Examine the urethral process for lesions and the associated structures for debris or other foreign material. The examination continues up the shaft where any injuries, scars or other lesions are noted. With the penis exposed, examine the internal

and external portion of the prepuce. Usually a small amount of greasy smegma is found at the base of the penis.

Any trauma or injury to the penis or prepuce can be very detrimental to the stallion's ability to cover a mare and could result in long term psychological problems. This is particularly true if the stallion is kicked by the mare while attempting to breed her. Trauma can also occur by improper handling of artificial vaginas.

Scrotum. The scrotum is an out-pouching of skin in the inguinal area that encloses the testes. It has a longitudinal midline where the two sacs are fused. The scrotum may be examined at the time of washing or after ejaculation, which may be safer for everyone involved. The stallion's scrotum is not as pendulous as a bull's and is held closer to the abdomen. The scrotum's skin is soft and pliable with a greasy texture due to sebaceous glands. The scrotum is important in thermoregulation of the testicles.

Testicles and Epididymides. The testes are ovoid structures, measuring 8 to 12 cm long by 6 to 7 cm high by 5 cm wide (Figure 1). They consist of seminiferous tubules in which spermatogenesis occurs and interstitial tissues of which the Leydig cells produce testosterone. The testicles should be freely moveable within the scrotal sac.

The epididymides are divided into 3 parts: **(1)** head; **(2)** body and **(3)** tail (Figure 1). The head of the epididymis is closely attached to the testicle's anterior dorsal aspect. The body of the epididymis continues along the testicle's back side until it terminates at the rather large tail of the epididymis that is loosely attached to the testicle's tail.

The testes and epididymides are palpated through the scrotal wall to determine their presence, size, symmetry and consistency. The normal stallion has two testes. Palpation should reveal that they have the same consistency with no abnormalities of shape or texture. The right testis is normally slightly smaller than the left.

Determine testicular size by measuring scrotal width of both testicles. Measure scrotal width using calipers at the point of greatest width with a nonerect penis. Scrotal width is positively correlated with daily sperm production and output. Normal scrotal widths range from 9 to 13 cm. Stallions older than 7 years of age tend to have greater scrotal widths than younger stallions. Certain medications, particularly androgens, adversely affect testicular size.

Cryptorchidism is common in stallions and its genetic control is not fully understood. The left testicle is the one most commonly retained. Congenital cryptorchid stallions should not be considered for breeding.

Internal Reproductive Organs

The ductus deferens is the continuation of the epididymis and runs from the tail of the epididymis through the inguinal canal to the area of the neck of the bladder. The duct expands near the bladder to form the ampulla which acts as a sperm storage organ.

Accessory Sex Glands. The vesicular glands, prostate gland and bulbourethral glands are collectively called the accessory sex glands (Figure 1). They all provide a portion of the seminal fluid, but are not necessary for fertility. These glands are normally rectally palpated. The vesicular glands are usually the most difficult to palpate because before teasing they are essentially collapsed. However, after vigorous teasing, the vesicles enlarge due to the accumulation of the gels fraction and are easier to palpate. This is why it may be more desirable to palpate after teasing, but on the other hand, most stallions are more tractable following ejaculation. So, timing the rectal examination is mainly at the examiner's discretion.

Semen Collection

In collecting semen from a stallion, a jump mare or breeding phantom is commonly used. Stallions can be easily trained to mount a breeding phantom. Those trained to mount a phantom make collection much safer and more consistent. The phantom should be designed to be comfortable for the stallion and should mimic the same angle as the mare.

If a jump mare is used, she should be in good standing heat and have her tail wrapped and perineal area washed. Restrain the mare to prevent injury to the stallion or personnel assisting.

An artificial vagina is used to collect the semen for evaluation. Several artificial vaginas are available: the Colorado, Missouri and Japanese models. Selection of an artificial vagina (AV) is determined mainly by management and stallion preference.

To prepare the artificial vagina, fill it with water to obtain proper temperature and pressure. Some models use a combination of water and air to get the proper pressure. Because of stallions' individual natures, water temperature preference, pressure and lubrication will vary. Therefore, it is important to prepare the AV to the personal preference for the stallion being collected.

Water temperature for the AV is normally between 45 to 48°C. However, water temperature should be governed by the ideal collection temperature for an individual stallion. Avoid higher temperatures to prevent irritation to the stallion's penis and sperm damage.

Lubricate the AV with a sterile, non-spermicidal lubricant just before use. Do not use products detrimental to sperm cells. Use enough lubricant to allow easy penetration with little resistance. Warm the collection bottle and keep it warm during collection to avoid damaging sperm cells.

The stallion should be introduced to the mare and stimulated to let down. Upon stimulation, wash the stallion with clean warm water. Do not use soap or disinfectant to wash the stallion's penis. The collection area should be large enough to prevent injury to all those involved.

Once the stallion has reached full erection, allow him to mount the phantom or mare for collection. The stallion's penis should be deflected into the AV, not grasped, because some stallions take offense to being grasped. The AV should be held firmly for the stallion to thrust against and should be at the same angle as the mare's vagina. As the stallion ejaculates, the AV should be lowered to allow the semen to run into the collection bottle. Ejaculation can be determined by watching for the "flagging" motion of the stallion's tail or by the pulsation of semen passing through the urethra at the base of the penis.

Upon completion, drain the water to let the remaining semen drain into the collection bottle. Then keep the semen in an incubator until evaluated.

Semen Evaluation

Keep all equipment used in semen evaluation at 37°C and free of any spermicidal agents. Evaluate each ejaculate to assure the maximum number of normal, progressively motile spermatozoa. The following criteria are used to determine semen quality, total sperm output and insemination dose: volume, concentration, motility and morphology.

Volume is simply the total amount of gel-free semen in a single ejaculate and is usually measured in milliliters.

Concentration is determined by using a hemocytometer or spectrophotometer. Concentration is important because it influences total sperm output and insemination dose if artificially inseminating. Most stallions will ejaculate approximately 7 billion spermatozoa.

Motility should be determined as soon after collection as possible. To do so, put a drop of semen on a warm slide, covering it with a warm cover slip and estimating the percent of normal progressively motile spermatozoa using a microscope. Progressively motile spermatozoa is defined as those sperm cells that are swimming straight across the microscope screen and having normal morphology. Sixty percent progressively motile spermatozoa is considered good; anything below 60% is questionable.

Sperm morphology can be determined by microscopic evaluation of stained smears or, preferably, phase-contrast microscopy. Figure 2 shows a normal sperm cell. Note any abnormalities such as bent tails, no heads, no tails, macrocephalus, double heads and immature sperm cells and record the number.

Total sperm output is determined by multiplying volume and concentration. Calculate the total number of progressively motile spermatozoa by multiplying total sperm output by the percentage of progressively motile sperm cells.

If artificially inseminating, mares should be inseminated with 500 million normal progressively motile

sperm cells. All these characteristics combine to determine the quality of a stallion's semen.

Evaluating a stallion as a potential breeder encompasses many aspects of his conformation and anatomy. As stallion owners or potential owners, we must be critical of the stallions

we use for breeding, taking into account their physical conformation, reproductive anatomy and semen quality so that we continue to introduce and produce the highest quality horses. All of the examinations and parts mentioned may not be used or

examined by the person conducting the examination. This article provides information for the type of exams that could be conducted. The situation and circumstances of the purchase will dictate which ones you actually use.

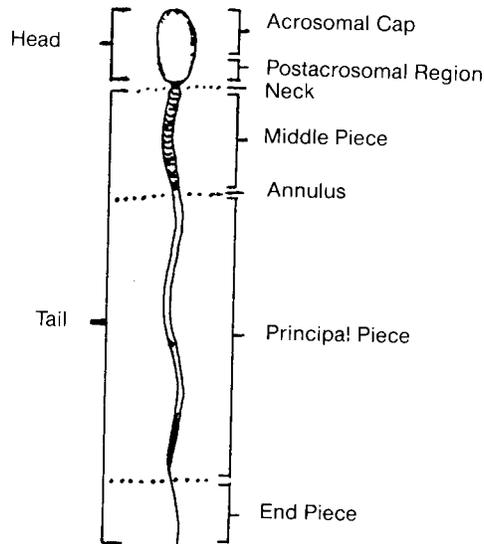


Figure 2. — Normal equine spermatazoa