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Review Article

Approaches to Breeding Soundness Examination and Interpretation of Results

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ABSTRACT

The best indicator of stallion fertility is per-cycle pregnancy rate following cover or artificial insemination of fertile mares under good management conditions. This process can be lengthy, cumbersome, and impractical. As such, a laboratory-based examination is oftentimes performed to predict the fertility of a given stallion. This communication summarizes the approach to examination of a stallion for breeding soundness.

1. Overview

Veterinary evaluation of stallions for breeding soundness can be an extensive and time-consuming process. The extent of the evaluation will be dependent on the criteria required by the party that retains the services the veterinarian. Requests received for this service are quite diverse and can vary from that of insurance companies contemplating issuance of first-year congenital infertility insurance for a stallion currently situated at a racetrack, to prepurchase evaluation of a stallion, with or without previous breeding experience, to preseason evaluation of mating ability and semen quality of breeding stallions. Regardless of the request, a fundamental aspect of the breeding soundness evaluation is attainment of an accurate history regarding any prior breeding results, previous breeding soundness examinations, prior use(s), dietary intake, vaccination status, medications, and illnesses. Acquisition of such information may seem mundane, but this information can become an invaluable aid when attempting to forecast the potential fertility of a stallion. In addition, the intended purpose of the breeding stallion should be determined. For instance, one should determine if the intended sire will be used for natural service or artificial insemination or whether dual hemisphere breeding is being contemplated. Expectations regarding size of mare book should also be provided, and any intentions to inseminate mares with cool-transported or frozen-thawed semen should be disclosed.

The extent of the examination process will be predicated on the intended purpose of the stallion, with limitations set by the stallion's location (such as a racetrack vs. a farm setting), the ability to transport the stallion to a well-equipped veterinary hospital, and financial constraints set by the owner/agent or potential buyer of the stallion. For instance, it is generally not possible to collect semen from a stallion situated at a racetrack, and restrictions set by insurance companies may disallow semen collection and evaluation before procurement of fertility-related insurance. In addition, some farms may have limited or unsuitable equipment for evaluation of semen, thereby necessitating transport of appropriate equipment to the farm or transport of the stallion to an appropriate facility to accomplish the examination process.

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The objective of a breeding soundness examination is to determine whether a stallion has the mental and physical faculties necessary to deliver semen, containing viable sperm and no infectious disease, to the mare's reproductive tract or artificial vagina. The examiner not only evaluates quality and quantity of ejaculated sperm (and potentially the ability of the sperm to withstand cooled or frozen storage), but also tests the libido and mating ability of a stallion, attempts to recognize congenital defects that may be transmissible to offspring and/or decrease a stallion's fertility, seeks infectious diseases that may be transmitted venereally, and searches for any other physical conditions that may reduce a stallion's longevity as a sire. Given the breadth of this objective, the owner/agent of the stallion and the veterinarian should engage in sufficient dialogue such that an agreement can be reached beforehand regarding the extent of the examination to be conducted, the potential cost of the examination, and any limitations of an abbreviated examination, as prescribed by the owner/agent of a stallion. Such channels of communication will lead to a common understanding of the examination being conducted and the expectations/limitations of the examination.

The breeding soundness examination generally has the following components: general physical examination, examination of the external and internal genitalia, assessment of libido and mating ability, examination for venereal diseases, and evaluation of sperm number and semen quality in ejaculates collected. Additional laboratory procedures may include analysis of karyotype or specific genetic testing. It is beyond the scope of this communication to describe the all procedural details of a stallion breeding soundness examination. Included here are a brief description of considerations for examination and a more in-depth discussion of semen analysis.

1.1. General Physical Examination

Although a breeding soundness examination focuses on the genital health of stallions, general physical condition cannot be ignored. Assessment of general body condition is first in order, followed by an appraisal of conformation. Particular attention should be given to defective traits that will affect mating ability (e.g., lameness or back problems) or that are potentially heritable (e.g., cryptorchidism, parrot mouth, wobbler syndrome). All abnormalities are recorded. Although the focus of the examination relates to breeding capability, cursory examinations of the various body systems (respiratory, cardiovascular, digestive, nervous, urinary) also are recommended as are ophthalmic and otic examinations. Common laboratory tests (Coggins test, hematology, serum chemistry, urinalysis, fecal egg counts) can support physical examination findings in determining the general health of a stallion.

1.2. Examination of the External and Internal Genitalia

The penis should be examined thoroughly when in a tumescent state, and any palpable or visual lesions should be recorded. Because the fossa glandis and urethral process are partially concealed, particular attention should be given to these areas. The fossa glandis contains a large dorsal recess (termed the urethral sinus) and two ventrolateral recesses. These recesses can develop proliferative or ulcerative lesions that can lead to hemospermia. Detection of such lesions can require intense scrutiny to detect. Common penile lesions include those of traumatic origin as well as vesicles/pustules of equine coital exanthema, habronema granulomas, squamous cell carcinomas, and papillomas. The scrotum of the stallion should be thin and elastic, with a distinct neck. The scrotum and its contents are normally pendulous but may be drawn toward the body wall during palpation because of voluntary contractions of the cremaster muscles. Both testes and attached epididymides should be freely movable within their respective scrotal pouches, and the testes should be oval, with a smooth regular outline and a slightly turgid resilient texture. The position of each testis within the scrotum can be determined accurately by palpation of the attached epididymis. The caudal ligament of the epididymis, a remnant of the gubernaculum, remains palpable during adult life as a small (1–2 cm) fibrous nodule adjacent to the epididymal tail which, itself, is attached to the caudal pole of the testis. Therefore, this remnant serves as a landmark for determining testicular orientation within the scrotum. Testicular size correlates highly with daily sperm production, so this measurement helps predict a stallion's breeding potential. Determination of testicular volume (TV) should be considered an essential part of a breeding soundness examination. Testicular volume is highly correlated with daily sperm output (DSO) in stallions and provides a more accurate reflection of DSO than measurement of total scrotal width. The formula for TV is as follows: $TV = 4/3(\pi abc)$, where $a =$ height/2, $b =$ width/2, $c =$ length/2, and where cm is the unit of measure; therefore, TV = 0.5236 (height × width × length). Predicted DSO is determined as follows: DSO ($\times 10^9$) $= 0.024x - 1.26$ [1], and DSO ($\times 10^9$) $= 0.024x - 0.76$ [2], where x = TV. These two values can give one an expected range of predicted DSO, based on testicular size. Spermatic cords should be of equal size and uniform diameter (2–3 cm). Acute pain in this area usually is associated with inguinal herniation or torsion of the spermatic cord. The internal genital organs can be examined by palpation and ultrasonography per rectum. Adequate restraint is of paramount importance with this procedure. Accumulation of sperm in the ampullae and seminal vesiculitis is the most common ailments of the accessory genital glands.

1.3. Assessment of Libido and Mating Ability

Excellent semen quality in a breeding prospect is inconsequential unless that stallion also has the desire and ability to deliver the semen to the mare's reproductive tract or an artificial vagina. Sexual behavior can be analyzed by bringing the stallion in contact with a mare in estrus. Typically, a stallion with good libido shows immediate and intense desire for the mare, manifested by restlessness, pawing, vocalization, intimate precopulatory activity, such as sniffing, licking, and nipping the mare, exhibition of the "Flehmen" reaction (curling of the upper lip; primarily a response to sniffing of the mare's genitalia or urine), and development of an erection. The ability of a stallion to copulate normally (develop an erection, mount without hesitation, insert the penis, provide intravaginal thrusts,