

Intromission failure in a stallion

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Abstract

Determining the cause of poor libido in stallions can be challenging. Many factors can cause disturbance in libido (e.g., lameness or physical pain, hormonal, age, experience, and handling). Identifying the cause of poor libido is important to determine the best treatment approach. A 6-year Thoroughbred stallion was presented for failure of intromission when attempting to breed mares. Stallion was recently retired from racing. Stallion was placed on hormonal therapy that did not change stallion's aberrant reproductive behavior. On presentation no obvious physical causes were identified and the stallion displayed masturbation behavior. Through the review of video recordings of the breeding sessions, modifications were made that eventually resulted in the stallion successfully breeding mares without hormonal intervention. This case illustrated how video recordings of breeding activity can help in determining cause of reproductive dysfunction. Furthermore, interpretation of peripheral steroid hormone concentrations needs to be carried out with caution.

Keywords: Stallion, reproductive behavior, hormone therapy, video recording

Background

A common problem for stallions during first introduction to breeding is inadequate sexual interest or response.^{1,2} They may be slow to achieve and/or maintain erection, act confused, conflicted, and are easily distracted by ordinary environmental sounds, activities or reactions of the mare.³ Some stallions may initially appear interested but quickly lose interest whereas others achieve erection but then not proceed normally to mount or may mount and appear confused about how to proceed.¹ Lack of libido can contribute to these aberrant reproductive behaviors. Primary lack of libido, defined as a lack of sexual drive after maturity, is rare in stallions.⁴ Many factors can cause disturbance in libido (e.g., musculoskeletal problems, physical trauma, hormonal causes, age, experience, and handling).^{4,5}

After ruling out physical causes of poor libido, typically hormonal causes are examined via measuring serum testosterone concentrations. In men, low libido was considered to be caused by lower testosterone concentrations;^{6,7} however, an epidemiological study⁸ in men concluded that poor libido should not be interpreted as evidence of lower testosterone concentrations. One must interpret hormonal data cautiously as testosterone therapy in normal stallions does not necessarily enhance libido, but does alter sperm production.⁸ Interestingly, stallions with normal libido had testosterone concentrations < 1,000 pg/ml (personal communication, Molgorzata Pozor, May 6, 2022) and bachelor stallions had lower testosterone concentrations than harem stallions de-

spite having similar masturbation patterns.⁹ It is important to rule out physical and hormonal causes to determine if there is a behavioral component associated with failed intromission. We determined the cause of failed intromission in a stallion and had the problem corrected.

Case presentation

A 6-year Thoroughbred stallion was presented on May 5, 2022, for failure of intromission when attempting to breed mares. Stallion was purchased for a stud farm off the racetrack in late January of 2022. Stallion had neither bred a mare nor had semen collected before. Stallion failed to obtain erection when exposed to tease mares; however, he mounted several mares. In February, stallion's testosterone concentrations were tested and was given intravenously 80 mg of testosterone every other day.

In March 2022, the stallion was sent to a referral veterinary hospital. During this time, he was exposed to ovariectomized tease mares, treated with diazepam (0.1 mg/kg; Hospira, Lake Forest, IL) once, 5 to 10 minutes prior to the second breeding session, and GnRH (Cystorelin®, Merial, Duluth, GA) 50 µg intravenously 1 hour prior to and a second dose (50 µg) immediately before fourth breeding session, but failed to mount any mares. Testosterone concentrations on days 4, 6, 8, and 9 after admission were 1,080, 780, 240, and 440 pg/ml, respectively. In addition, 80 mg of testosterone cypionate was given intramuscularly thrice (on days 5, 7, and 9) during this period.

On presentation in our facility, stallion appeared normal during physical examination. During first 3 days, stallion was taken out of the stall, hand walked, introduced to the breeding shed, and allowed to be penned with tease mares. He displayed little interest in mares and never obtained erection. It was noted on the third day, while being groomed, stallion extended his penis and began masturbating. This behavior was repeated several times while being groomed in subsequent grooming sessions.

Treatment

Based on testosterone concentrations (341.6 pg/ml) estimation (sample collected on May 9), stallion was given intravenously 5,000 IU of hCG (Choulon, Intervet, Summit, NJ). All sessions in the breeding shed were video recorded and analyzed later. On entering the shed, stallion had erection and was allowed to mount the mare; however, intromission was not achieved. An attempt was made to collect the stallion using an artificial vagina but was unsuccessful. After the sessions the video recordings were analyzed, and 3 features were noted. First, after mounting, stallion failed to remain centered behind the mare, his hips moving laterally to both sides of the mare's hips. Stallion primarily placed his hips to mare's right side. Second, stallion turned his head counterclockwise on the longitudinal plane of his neck and gripped mare's mane for stability. Lastly, mare's excess movement appeared to disrupt the stallion.

On the next day, stallion was brought into the breeding shed and exposed to the same estrous mare from the previous day. Based on the video input from the previous session, several adjustments were made. To minimize mare's movement, mare was hobbled and sedated with 2 mg of intravenous detomidine hydrochloride (Dormosedan®, Orion Pharmaceuticals, Finland, distributed by Zoetis Animal Health, Kalamazoo, MI). A breeding shroud was placed on mare's withers with the idea that this would allow him to grip the shroud without turning his head and enable him to stay more centered behind the mare. An artificial vagina was prepared, and stallion was brought into the breeding shed. Stallion obtained erection, and an attempt was made to wash the penis with warm water and rolled cotton.¹⁰ Stallion allowed his penis to be washed and maintained erection. Next, stallion was allowed to mount the mare and semen collection was attempted that was successful at second attempt. Semen was then analyzed. Similar procedure was repeated on May 11, 12, 13, and 15 and each time an ejaculate was obtained to reinforce the behavior prior to transitioning to live covering a mare.¹¹ No drugs or medications were given to the stallion during this time.

On May 16, peripheral testosterone concentrations were 988.1 pg/ml. Acupuncture examination revealed no abnormalities. Later, stallion was brought into the breeding shed and exposed to a mare (sedated, restrained in breeding hobbles with a breeding shroud on and tail wrapped) in estrus. Stallion obtained erection, and penis was washed with warm water and rolled cotton. After several unsuccessful attempts to live cover the mare, 10 IU of oxytocin (Oxytocin, Bimeda, MTC Animal Health, Cambridge, Ontario, Canada) was given intravenously. Intromission was not achieved after 2 more attempts and 5 mg of dinoprost (Lutalyse®, Zoetis Animal

Health), was given intramuscularly. Our group has observed pelvic thrust movements in stallions, after prostaglandin F_{2α} treatment, presumably in response to smooth muscle contractions.¹² Since the stallion would mount the mare but failed to produce pelvic thrusts, prostaglandin F_{2α} was given to induce these movements in the stallion. After several more attempts the stallion had intromission and ejaculation. A sample was aspirated from the mare's vagina using a sterile pipette and viewed under a microscope for confirmation of ejaculation. After covering the mare, the stallion was sedated with 3 mg of intravenous detomidine hydrochloride. Internal reproductive organs were palpated and examined via transrectal ultrasonography that revealed no abnormalities. Testes, epididymides, and spermatic cords were then palpated and examined via ultrasonography. This examination was not performed earlier to minimize stress to stallion that could potentially affect behavior. No testicular, epididymal or spermatic cord abnormalities were detected.

On May 17, stallion was brought into the breeding shed and exposed to an estrous mare that was sedated, restrained in breeding hobbles with a breeding shroud and tail wrap. Stallion obtained erection, and the penis was washed with warm water and rolled cotton. Several mounting attempts were made to allow the stallion to achieve intromission without pharmacological intervention; however, these were unsuccessful. Dinoprost (5 mg) was then given intramuscularly and after several more mounting attempts, intromission and ejaculation were achieved. A sample was aspirated from the mare's vagina using a sterile pipette and viewed under a microscope for confirmation of ejaculation.

From May 18 to June 2, the stallion was brought into the breeding shed and exposed to a sedated and restrained estrous mare 5 times. During each exposure, the stallion obtained erection, and penis was washed with warm water and rolled cotton. Stallion had intromission and ejaculation between second to fourth jump. Each time, a sample was aspirated from the mare's vagina using a sterile pipette and viewed under a microscope for ejaculation confirmation. It was observed that mares displaying a standing strong estrus were bred much faster (typically 2 - 3 mounts to achieve intromission and ejaculation) compared to mares that displayed a weak standing estrus (typically 3 - 5 mounts to achieve intromission and ejaculation).

Outcome

After 9 sessions in the breeding shed, stallion successfully bred mares (erection, intromission, and ejaculation) without pharmacological intervention. During this time, stallion was regularly used to tease mares moved into a large pen, once daily. Teasing was performed due to owner's request to determine if stallion would learn to tease mares. Only once he had erection with a mare while teasing mares. Interestingly, we used this mare as a mount mare, to collect semen from this stallion.

Discussion

There are many potential causes (e.g., physical, hormonal, and behavioral) for a stallion not able to breed.^{1,4} Physical

examination on presentation did not reveal any potential physical causes. It must be noted that physical and lameness examinations can fail to detect physical causes of failure to breed mares and thus observing the mounting behavior can potentially yield more information than traditional physical examination. Video review of mounting behavior suggested no physical issues, also an acupuncture scan did not reveal any sensitivities of trigger points indicative of musculoskeletal pain or anxiety. Behavior cause was diagnosed, and further diagnostics determined a physical cause was deemed unlikely for stallion's intromission failure. Stallion's positive clinical response enabled intromission and ejaculation possible and eventually leading to semen collection using a mount mare.

Prior to presentation to our facility, stallion was receiving testosterone supplementation, perhaps due to low serum testosterone concentrations or to increase libido. Testosterone concentrations of 1,000 pg/ml are considered normal (personal communication, Sue McDonnell, May 9, 2022) in stallions.¹³ This stallion historically had testosterone concentrations higher than these concentrations and failed to mount mares. Additionally, since the stallion began to display masturbation behavior low libido seemed unlikely, and a behavioral component appeared most probable.¹⁴

Libido is defined as sexual arousal and response.¹⁵ It has been suggested that the occurrence of masturbation in stallions with poor or absence of libido in the presence of mares is due to psychological causes as opposed to physical causes.¹⁴ During first week, 1 dose of hCG was given. This was for 2 reasons. First, the owner failed to bring testosterone medication and it was unavailable at the clinic at the time. Second, since stallion had been receiving testosterone prior to arrival, we were concerned that abrupt discontinuation of testosterone treatment could have a negative effect on libido.¹⁶

Video recordings of stallion behavior allows for repeated views of a situation and has been utilized in research settings¹⁶ with tie stalls and 3.05 x 3.05 m pens. A high intra- and inter-observer reliability existed between live and recorded behavior.¹⁶ Thus, video recording in a clinical setting is a valuable source of information to determine the cause of stallions' reproductive dysfunction. Recorded video allows individuals to focus on safety in the breeding shed without missing observing potentially valuable physical or behavioral signs. For example, a mare initially was used with only breeding hobbles (for stallion safety) to try to have as natural circumstance as possible to facilitate stallion interest. On video review, it was noticed how stallion gripped mare's mane with his mouth contributed to his lateral hip movement and thus a breeding shroud was added in future sessions. This allowed stallion to grip the shroud more ergonomically and improved alignment of the stallion's hips with the mare's hips. This example highlights the use of video review to identify the cause of a problem and make effective changes. In our experience the ideal angle of a video would be lateral to the stallion with the entire animal in the video frame. If room allows in the breeding shed, a video from the opposite side of the handler can be advantageous as to avoid the handler obscuring the horse. It must be noted that there are 2 potential disadvantages of video recording from the opposite side of the handler. First, the handler may not see the person recording the video and could result in stal-

lion injuring the person recording. Second, the video does not record what may be occurring with the person using the AV or manipulating penis into a mare. For these reasons we prefer to record from the same side of stallion the handler is located.

Lastly, allowing stallion several days to adjust to the facility was important in this case. This not only allowed the stallion time to adjust to the surroundings but also allowed us time to observe his behavior. Stallion was shy and cautious. Stallion introduction to the breeding shed combined with positive experiences (e.g., grooming) allowed him to become more comfortable with his new surroundings and with personnel working with him. This is most evident by eventual masturbation behavior he displayed when being groomed. With shy stallions, the handling environment can greatly influence the outcome.² If the environment is not relaxed and positive, stallion may never become comfortable, and progress toward becoming a breeding stallion may not be possible.

Learning points

- Video sessions in the breeding shed can be helpful in determining a physical or lameness cause of reproductive dysfunction and provide information to adjust the breeding process thereby increasing the chance of a successful outcome.
- Determining the cause of poor libido can be challenging. A patient and methodical approach is required to determine the cause and thus the best actions to treat the stallion.
- Interpretation of peripheral steroid hormone concentrations needs to be carried out with caution as libido and behavior do not necessarily result in cause and effect.

Conflict of interest

None to declare.

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