Breeding soundness examination of the male ovine, caprine and cervidae species

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Summary

Breeding soundness examination (BSE) should be undertaken as a routine procedure to ensure that a fertile male is available to impregnate fertile females during the breeding season, to assess fertility prior to purchase, to diagnose non-pregnancy or return to estrus and to make sure the male is producing normal spermatozoa prior to cryopreservation.

Keywords: Breeding soundness examination, ram, buck, cervidae

The breeding soundness examination may consist of a variety of serological or other tests depending on species, a physical examination to make sure that the animal is in overall good health, and an in-depth examination of the reproductive tract and semen. A complete history that includes information about previous reproduction as well as purchase information, health and vaccination is also very important. Intended use and expectations for the male should also be discussed. The BSE is generally performed as part of a prepurchase examination for breeding animals to protect both buyer and seller. Scrotal circumference has been linked with age of puberty onset as well as fecundity of offspring and is an important part of the BSE. Pregnancy rates can be affected as well as length of parturition season, uniformity of offspring, ease of management due to similar ages of offspring and nutrition and vaccination programs. A prolonged parturition season may also affect the next breeding season due to uterine involution, lactation and decreased body condition score. This may severely impact the producer from an economic standpoint.

Most prebreeding BSE's are conducted 30 to 60 days prior to breeding season but due to seasonality issues in these species (especially cerivdae), it may be better to wait until just prior to the breeding season. However, if conducted too close to breeding season, it may be hard if not impossible to obtain a replacement male of similar quality if they do not pass the BSE or there may not be time for them to recover or improve to pass the BSE. In cervidae, especially whitetail and mule deer, restraint, capture and anesthesia issues all enter into the BSE conundrum. In cervidae, the BSE results may also change dramatically over the course of a few weeks, especially early in the breeding season.

Post-breeding season BSE's are generally indicative of a disaster where very low or no conceptions occurred, lambs, kids, calves or fawns failed to make their appearance or observant livestock managers notice return to estrus, lack of abdominal fill or lack of udder development. This kind of BSE may not tell you what you need or want to know due to seasonal changes in these animals (especially ceridae) and the fact that it may not be indicative of what was transpiring during the breeding season. The lost production may also be so much of a financial burden that the farm may not survive.

The steps that are typically followed in doing a BSE would include identification of the animal by some means that is permanent and unique. Tattoos, microchips, tamper-proof ear tags, electronic identification, photographs, nose prints, DNA and other methods may all be acceptable. A complete history of the animal is also important. Origin, age, vaccination status, deworming, etc., as well as past breeding history provide important clues in regard to tests to run (*Brucella ovis* on western origin rams for instance) or provide clinically relevant history.

A physical examination (PE) of the subject should also be done. This data set could include anything from an observation that the animal appears healthy to getting a complete data set of information up to and including blood work, radiographs, serological tests, other laboratory tests as appropriate for species, location, state and federal requirements and the wishes of purchaser or owner. This should be discussed so that all involved are comfortable with the testing and physical examination. Some animals may not be able to be handled except under anesthesia which may make a routine PE difficult.

As part of the PE, on all species that it can be done, a rectal examination of the internal genitalia should be attempted. Even if one cannot do a complete internal examination, a digital exammination may

reveal some alterations in the accessory sex glands and should be noted as such on the BSE form. External genitalia should be closely examined in a systematic manner so that nothing is missed. Scrotum, penis, testicles, head, body and tail of the epididymides as well as the prepuce and spermatic cord should all be palpated and visually inspected for lesions, swelling, symmetry or any other deformation.

Scrotal circumference should be measured by pushing the testicles into the distal part of the scrotum and measuring the greatest circumference. It is important that this be done with a slight amount of pressure that just indents the skin so that measurements by different individuals may be within agreement between evaluators. Cutoffs for scrotal size are in tables 1-3 for sheep and goats. There are no published measurements for cervidae, but yearling whitetail deer generally have scrotal circumference in the 15-18 cm category and older whitetails are generally in the 18-24 cm range. Wapiti are generally in the 24 cm range and, based on a limited number of measurements by the author, red stag appear to be about the same as wapiti.

Table 1. Recommended minimum scrotal circumference in rams 8-14 months of age.

Size	Rating
<24 cm	Questionable
28-36 cm	Satisfactory
>36 cm	Exceptional

Table 2. Recommended minimum scrotal circumference in rams >14 months of age.

Size	Rating
<32 cm	Questionable
32-40 cm	Satisfactory
>40 cm	Exceptional

Table 3. Recommended minimum scrotal circumference in bucks.

45 kg Dairy Breeds	25-28 cm
>45 kg Dairy Breeds	34-36 cm
45 kg 7 Month-old Kiko and Boer Goars	26-29 cm

The penis should be examined, especially on sheep and goats. The urethral process is commonly damaged or cut off due to urolithiasis and should be noted. For sheep, it is relatively easy to set them up on their dock and exteriorize the penis. Male goats tend to resist more than rams and may need sedation for examining the penis. Whitetail and mule deer bucks are usually anesthetized and the penis can be extruded from the prepuce with careful manipulation of the prepuce and penis. Grasping the glans with a gauze sponge is usually necessary as the penis is very difficult to hold without it. It is very important to note the anatomical differences in species, especially with sheep and goats, so that misdiagnosis of penile abnormalities are avoided.

Semen collection can be done with an artificial vagina (AV), an intravaginal condom or other device or on a “dummy” fitted with an AV depending on species. An AV generally requires training and a jump animal. Depending on the species, this can be a dangerous undertaking or the male may not perform due to temperament issues (wild). This does give a better evaluation of libido than does collection via electroejaculation (EEJ) however. It also allows the male to demonstrate erection, protrusion and intromission for evaluation. Most males have not been trained, there is no available “jump” animal or “dummy” around or the temperament and danger make it untenable for AV collection.

Most semen collection is done by EEJ using a variety of different machines that have been manufactured for bovine, sheep or goat use.

Electroejaculation for the ram generally consists of manual restraint with the animal standing in a chute or pushed up against a wall or gate. The rectum is cleared of feces and the internal sex glands massaged with the probe that has been properly lubricated. A series of short bursts from the EEJ consisting of 2-4 seconds on and 2-4 seconds off, generally result in ejaculation after 2-6 bursts. Some rams may require more stimulation. The ejaculate is small in volume (1-2 ml) but is very concentrated. A collection cone or "baggie" is generally placed over the prepuce and observed for successful ejaculation. Male goats may be collected in the same manner but using a lower power setting if possible. They also tend to vocalize to an extreme and as such, it may be appropriate to either warn the owner/buyer or ask them to wait in an appropriate area. Studies have been done that show the procedure is not detrimental to the animal's health or reproductive tract. In cold weather, appropriate care must be taken to control thermal effects on semen. The author usually collects semen into a container surrounded by a water jacket of the appropriate temperature. If collecting for semen freezing, the animal is usually laid in lateral recumbency and the penis exteriorized for a cleaner sample and maximum semen production. This may be facilitated by tranquilization or sedation.

Wapiti and red stag may be collected standing using an appropriate "squeeze" chute or box. Some may benefit from mild sedation during the process, usually a very low dose of xylazine as they may lay down if given too much (25-50 mg IM for a mature wapiti). They also may be collected under anesthesia if no restraint facilities are available. Almost all whitetail and mule deer bucks are collected under anesthesia. A variety of drugs are available that work well, ranging from masking them down in a chute with gas to drugs or combinations of drugs given via remote injection or hand injection while in a chute or restraint box. Telazol® (4.4 mg/kg); Telazol®(1.6 mg/kg-2.5 mg/kg) plus xylazine (2.2 mg/kg); xylazine (1-3 mg/kg) plus ketamine (2-3 mg/kg); meditomidine (0.1 mg/kg) plus ketamine (3 mg/kg). BAM (butorphanol + azaperone + meditomidine) is not appropriate for semen collection in the cervid because azaperone interferes with ejaculation. Electroejaculation in a chute has been done with whitetail deer under tranquilization with haloperidol (Murray Woodbury personal communication).

Semen should be evaluated for motility under a microscope. The author generally evaluates gross motility under 10x or 20x first without a cover slip and then with a cover slip. Most small ruminant semen is too concentrated to observe individual motility unless diluted with an extender or saline. Some operators rate the percent progressive as well as assign a "speed" rating of from 1-5 with 5 being the fastest. Many things may affect motility so temperature and concentration need to be taken into account. The author usually examines multiple areas (at least five) on the slide and computes the average motility. Morphology of the sperm cells also needs to be taken into account. Generally, sperm are divided into normal and abnormal classifications with primary and secondary abnormalities or major and minor defects. Generally speaking, a ram would be rated as an unsatisfactory breeder with less than 50% normal sperm and less than 30% motility. For a buck goat, less than 70% motility and less than 80% normal morphology would be unsatisfactory. For cervidae, the author generally ranks using goat/sheep parameters as guidelines noting that there is much seasonality to consider in these animals. Unsatisfactory ratings may also be given due to physical examination abnormalities such as scrotal, testicular or spermatic cord defects. Eyes, feet, legs and other abnormalities should also be taken into account and weighted accordingly.

Some animals may have their classification deferred or may be referred to as questionable breeders. This is especially difficult in the very seasonal cervidae group. Semen may also have been mishandled or exposed to agents that affect their motility. Reexamining these animals is important so that a breeding season is not lost. Reexamination these animals in one to two weeks may be appropriate but will subject them to another anesthesia and handling event that is very stressful.