

# Animal Sciences



## Breeding Soundness Examinations of Rams and Bucks

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For optimal farm productivity, producers should select rams or bucks that have the ability to settle a large portion of females early in the breeding season and sire offspring with the genetic potential for rapid, efficient growth. To help identify males that are capable or not capable of settling females, producers can perform breeding soundness examinations (BSEs). Up to 10 to 15 percent of rams and bucks are of unsatisfactory reproductive breeding quality. Utilizing a BSE to identify fertile males and eliminate males with sub-par (or inferior) fertility prior to the breeding season can improve economic returns to a flock or herd.

To ensure maximal reproductive efficiency, each year, every breeding male should receive a BSE by a veterinarian or trained individual. The BSE consists of 1) a physical examination, 2) inspection of the reproductive organs, and 3) semen collection and evaluation of sperm. The BSE should be performed at least one month before the start of the breeding season to allow time for the ram or buck to recover from any disease identified during the exam and have a second BSE if he fails the initial test or is considered unsatisfactory for breeding and must be replaced.

### Physical Examination

To assess the ability of a male to locate, move to, and physically mount a female in heat, a physical examination is conducted. It is critical to observe all conditions that might affect breeding ability. The two main criteria assessed are: 1) body condition of the male and 2) structural soundness. In addition to these parameters, producers are encouraged to consider the

history of the ram or buck and to review the records of past breeding performance, such as length of lambing or kidding period. They should review the medical records to see if the ram or buck has been recently treated for a disease condition, especially fever. Recent disease exposure may cause the male to become temporarily infertile for up to 60 days, if the testicular temperature was elevated due to fever. Also, the age of the ram or buck should be considered: the optimal breeding age is over 6 months and up to 4 years.

To begin a physical examination, producers should assess the body condition score (BCS) of the male. Body condition scoring is an assessment of percent of body fat the male has and is determined by feeling the ribs and spine of the ram or buck as well as a visual assessment. Ideally, rams and bucks should enter the breeding season with a BCS of 3 to 3.5 on a scale of 1 to 5 (1 being very thin and 5 being overweight). If the animal is too thin, breeding stamina will be affected. This can result in a longer lambing and kidding period because some females will cycle more than once before conception occurs. On the other hand, overweight animals may lack vigor to breed large numbers of ewes. For more information on body condition scoring, refer to Purdue Extension publication AS-550-W, *Body Condition Scoring in Farm Animals*.

Structural soundness of the feet and legs is important for rams and bucks as they have to be able to move to ewes or does in heat. Animals should be able to move pain-free without limping. Make sure that hooves are free of foot rot, and trim them if needed. Check the teeth for a sound bite and for wear on the incisors. Look for any

defects, such as impaired vision, which may limit the ram's or buck's ability to locate and mate ewes or does in heat. Other diseases or conditions to check for include abscesses, pink eye, pneumonia, and internal or external parasites.

### Assessment of Reproductive Organs

To assess the ability of the male to copulate and inseminate the female and to identify any potential reproductive tract abnormalities that may limit the male's reproductive ability, the reproductive tract should be evaluated during the BSE. This portion of the BSE includes observation and palpation of the penis, prepuce, sheath, testicles, and epididymis, as well as measuring the scrotal circumference.

The scrotum and testicles should be examined and palpated for their tone and size. The testicles should be firm (but not contain any areas of increased firmness or abscesses), movable within the scrotum, and of similar size. Pronounced differences in size may indicate fertility problems. Swelling of the testicles or epididymis indicates injury or infection.

While palpating the testicles, also evaluate the epididymis. One disease producers should be aware of is epididymitis, a disease caused by *Brucella ovis*, and a common reason for culling rams and bucks. This condition causes swelling and hardening of the epididymis. It is transmitted during sexual activity, either ram to ram (or buck to buck), or through the ewe or doe. Ewes and does can be carriers, and those that are bred by infected rams may have abortions, stillbirths, or weak lambs and kids. Rams or bucks infected with epididymitis should be culled.

An important measurement taken during the BSE is the scrotal circumference of the buck or ram. This measurement is strongly related to the semen production capacity of the ram or buck. There is evidence that rams or bucks with large scrotal circumferences will produce more semen of greater viability. Also, female progeny from rams and bucks with larger scrotal circumferences reach puberty earlier than progeny from males with smaller scrotal circumferences.

Scrotal circumference should be measured at the greatest circumference of the scrotum. Scrotal circumference can vary by season and with body condition. It is usually larger during the fall breeding season (September to November), and can decrease 2 to 3 cm during the off-season. It is recommended that mature rams that are used for breeding have a minimum scrotal circumference of 33

cm, while 30 cm is acceptable for ram lambs. Rams and bucks failing to meet these criteria should be culled, as they are likely incapable of producing enough semen to service multiple females during the breeding season.



Figure 1: This picture demonstrates measurement of scrotal circumference in a ram.

Table 1: Minimum Scrotal Circumference in Sheep

| Age (months) | Minimum Circumference (cm) |
|--------------|----------------------------|
| 5 to 6       | 29                         |
| 6 to 8       | 30                         |
| 8 to 10      | 31                         |
| 10 to 12     | 32                         |
| 12 to 18     | 33                         |
| 18+          | 34                         |

### Semen Evaluation

If, following the physical examination and assessment of the reproductive organs, it has been established that the ram or buck is capable of breeding females, it is important to determine if the semen he produces is of adequate quality. This is ascertained by collecting a semen sample and microscopically evaluating the motility and morphology of the sperm cells as well as identifying if the semen sample contains any foreign debris.

Two methods exist to collect a semen sample: 1) utilizing an artificial vagina or 2) using an electro-ejaculator. Using an artificial vagina to collect semen usually yields a higher quality sample. However, for this method to be effective, it is necessary to have a ewe or doe in heat at the time of the BSE. An electro-ejaculator is often more practical since it is not necessary to have a ewe in heat nearby. This process encourages ejaculation by stimulating and massaging the seminal vesicles, the accessory sex glands that produce seminal fluid. The animal is restrained, and the lubricated electrode probe is inserted into the rectum. A slight electrical charge is applied for 4 to 8 seconds, halted briefly while massaging the seminal vesicles with the probe, and then repeated two to four times until extension of the penis and ejaculation occurs. With either method, it is important to remember that, when handling semen, all storage vessels, dilution solutions, and glass slides that come into contact with the semen should be warmed to 37°C to prevent cold shock, which will kill sperm cells and reduce motility estimates.



Figure 2: This picture illustrates utilization of an artificial vagina in semen collection.

During the semen collection process, producers should make sure that the penis can be fully extended. The penis should also be checked for sores and scar tissue from old shearing injuries or fly-strike wounds. If they are severe enough, these scars could make protrusion of the penis impossible. Other conditions to look for include warts and pizzle rot, which is an infection of the sheath area. Pizzle rot is believed to be caused by excessive protein in the diet, resulting in the ram or buck excreting excessive amounts of nitrogen in the urine.

Upon collection, semen can be evaluated grossly for volume, color, and contamination. Ejaculate is usually 1 to 2 ml in volume, and milky in color. It should be free of contamination, such as urine, blood, pus, and dirt. Next, a sample of semen should be examined under the microscope to determine sperm motility and morphology, and the presence of white blood cells. White blood cells indicate infection, often by *Brucella ovis*, which causes epididymitis. Other conditions that can reduce fertility and can be detected by the presence of white blood cells are caseous lymphadenitis and spermatic granulomata. Assessing sperm motility determines the proportion of sperm cells that exhibit normal “swimming” characteristics. Sperm motility is influenced by several factors, especially cold shock that may occur during the collection and evaluation process. Hence, the motility threshold to pass a BSE is quite low. Typically both gross and individual motility is measured. Gross motility is measured by microscopically evaluating non-diluted semen at a low magnification power. The semen sample is then characterized as having either 1) very good, with a vigorous swirling motion of the sample, 2) good, with a slower swirling motion of the sample, 3) fair, with general oscillation of the semen sample, or 4) poor, with sporadic oscillation of the semen sample.

Next individual motility is measured. To measure individual sperm cell motility, a drop of semen is mixed with diluent (sodium citrate, ringers lactate, or physiological saline) so that individual cells can be identified, and placed on a warmed glass slide to be viewed under a microscope. One hundred sperm cells should be counted to determine the number of sperm that are progressively moving forward (motile sperm) and the number that are not moving, only twitching, or swimming in circles (non-motile). An acceptable standard for progressive forward motility is 30 percent. Normal sperm morphology (shape) is also important for sperm to be viable. To assess sperm morphology, sperm cells are stained with commercially available stains that assist in viewing individual sperm cells. It is typical to count 100 sperm cells and classify them as normal or abnormal. An acceptable standard for normal morphology is 70 percent.

### Classifying Rams and Bucks

Rams and bucks can be classified as excellent, satisfactory, or questionable based on the results of their breeding soundness examination. Rams or bucks that are found to be questionable should be rechecked in 4 to 8 weeks. The following chart can be used as a reference for rams or bucks over 14 months.

**Table 2: Reference Chart for Rams**

| Class        | Scrotal Circumference (<14 months) | Scrotal Circumference (>14 months) | Motility | Morphology | Debris                     |
|--------------|------------------------------------|------------------------------------|----------|------------|----------------------------|
| Excellent    | > 33 cm                            | > 35 cm                            | > 50 %   | > 90%      | no white blood cells       |
| Satisfactory | > 30 cm                            | > 33 cm                            | > 30 %   | > 70 %     | no white blood cells       |
| Questionable | < 30 cm                            | < 33 cm                            | < 30 %   | < 70 %     | may have white blood cells |

**Table 3: Reference Chart for Bucks**

| Class        | Scrotal Circumference (<14 months) | Scrotal Circumference (>14 months) | Motility | Morphology | Debris                     |
|--------------|------------------------------------|------------------------------------|----------|------------|----------------------------|
| Excellent    |                                    | > 25 cm                            | > 50 %   | > 90%      | no white blood cells       |
| Satisfactory | (Information not available)        |                                    | > 30 %   | > 70 %     | no white blood cells       |
| Questionable |                                    |                                    | < 30 %   | < 70 %     | may have white blood cells |

## Summary

Utilizing a BSE can improve profitability of a flock or herd. Infertile rams or bucks and rams or bucks with a reduced capacity to breed multiple females should not be used. Males failing the BSE can be rechecked after 4 to 8 weeks to see if fertility has improved or if they have recovered from any existing conditions. By determining ram and buck fertility and only using those that are of satisfactory fertility, producers can expect a shorter lambing or kidding season and fewer open ewes or does, resulting in a higher percent lamb or kid crop.

## References

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