# Soundness of Testicles in Beef Bulls

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**Reviewed:**

**Whether or not a cow on heat will conceive depends mainly on the number of normal sperm cells which are deposited in her reproductive tract. The factors determining this are:**

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- The serving capacity of the bull and hence the number of times the cow is served.
- The number of normal sperm in each service, which depends on the size and condition of the bull's testicles.

Detailed examination of large numbers of beef bulls in Victoria has shown that about 5.5% of yearling bulls and 3% of mature bulls have abnormalities of the testicles which depress their fertility.

In this Agriculture Note the importance of testicle size, consistency, and freedom from abnormalities is discussed, and the procedure for examining a bull's testicles is described.

## Testicle size

### Importance

Each time a bull serves a cow, he deposits in the vagina an average of 500 million sperm. The main factor determining the number of sperm in each service is testicle size. The bigger a bull's testicles the more sperm-producing tissue he has and the greater the number of sperm that can be produced. Consequently bulls with large testicles can achieve higher conception rates than bulls with small testicles.

Testicular development in bulls is a highly heritable characteristic (heritability about 70%). Bulls with above average testicular development for their age and breed produce sons that also have larger testicles when compared with the breed average. Conversely, bulls with small testicles are likely to pass on this fault to their sons. It is therefore important that bull breeders, in particular, carefully monitor the testicular development of all bulls used in their herd. Both the sons and daughters of bulls with large testicles tend to reach puberty earlier than the progeny of bulls with smaller testicles.

#### *Measurements*

Figure 1. Measuring scrotal circumference

Scrotal circumference is the most accurate indicator of testicle size, and can be easily measured with a self-releasing metal tape. After restraining the bull in a head- bail, stand behind and pat him about the rump and hind legs until he stands quietly.

The testicles are then pulled down firmly into the lower part of the scrotum, by grasping the neck of the scrotum with one hand, squeezing and pulling down. The thumb and forefingers should be located on the side of the scrotum, not between the testicles (see Figure 1).

#### *Method of measuring scrotal circumference*

In cold weather bulls retract their testicles, making it difficult to take accurate measurements. Care must be taken to ensure that the testicles are positioned in the bottom of the scrotum, and that as many wrinkles in the scrotal skin are eliminated as possible.

The scrotal tape is prepared for use by forming it into a loop. While holding the testicles down in position with one hand, slip the loop over the scrotum with the other hand. Pull the tape firmly around the greatest circumference of the scrotum. For accurate and repeatable measurements, the operator must standardise, as far as possible, the firmness with which the tape is pulled.

Although the shape of the scrotum varies considerably between bulls, scrotal circumference is a reliable indicator of testicle size. Differences in scrotal shape are due mainly to the muscles which control movement of the testicles for temperature regulation. Actual testicle shape does not vary greatly.

***Factors affecting testicle size***

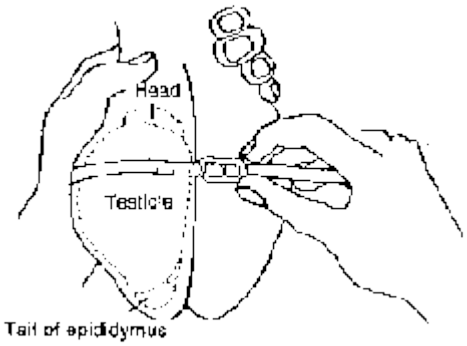
The main factors determining the testicle size of bulls is age, breed and level of nutrition. In practice, age is by far the most important.

Differences among beef breeds are relatively small. As with most other characteristics, differences in testicle size within pure breeds are far greater than differences between breed averages. The average testicle size of particular breeds bears little or no relationship to the average mature bodyweight of that breed.

Nutritional stress can cause retarded testicular development in young bulls, particularly if it occurs between 9-15 months of age when testicular development is at a critical stage. However, young bulls kept as potential stud or commercial sires are rarely allowed to suffer nutritional stress. In the vast majority of bulls found to have inadequate testicular development for their age, genetic makeup is at fault, not poor nutrition.

***Minimum standards***

A recommended minimum scrotal circumference for bulls of various ages, based on research conducted both in Australia and overseas, has been established (Table 1). This provides breeders with a guide that will enable them to select bulls with a higher probability of producing large numbers of normal sperm cells. However, it by no means guarantees that a bull exceeding these limits will be satisfactory. Similarly, a bull that fails to meet these standards will probably still sire some calves, but will achieve a lower conception rate than could normally be expected.




These are minimum standards that apply to young beef bulls in good condition, irrespective of their breed.

Table 1. Recommended minimum scrotal circumference

| **Age *(Months)*** | **Scrotal Circumference *(mm)*** |
|---|---|
| 15 | 300 |
| 18 | 320 |
| 24 | 340 |

Bulls of any age with a scrotal circumference of 340 mm or more can be expected to have satisfactory sperm production. However, in bulls 15 months or older with a scrotal circumference of less than 300 mm, sperm output will be seriously reduced.

Bulls older than 15 months with a scrotal circumference in the 300 - 340 mm range must be regarded as doubtful. In these cases the background history of the bull, the consistency of the testicles and the results of a semen examination will help to determine whether testicle function is abnormal or not.

# Testicular consistency

***Importance***

Testicular consistency refers to the firmness and resilience, or springiness, of the testicles, and is a good indicator of testicle function and semen quality.

Firmness is judged by the distance the tissue can be depressed when squeezed. Resilience is judged by the pressure felt when squeezing, that is, the natural tendency of the tissue to return to its normal shape.

Soft testicles with low resilience are associated with a high percentage of abnormal sperm, and a low conception rate. Normal testicle function and good semen quality are indicated by firm testicles with high resilience.

***Measurement***
Manual palpation is the most convenient method of assessing the consistency of a bull's testicles, and this can be done when scrotal circumference is measured. Each testicle is assessed independently, using the scoring system shown in Table 2.

Bulls with testicle consistency scores of 2 or 3 almost always produce good quality semen. However, bulls with soft, flabby testicles with low resilience (scores 4 or 5) are likely to produce poor quality semen and should either be culled or subjected to a semen examination.

Table 2. Testicle consistency score

| | **Score** |
|---|---|
| 1 | Very Firm |
| 2 | Firm |
| 3 | Moderate |
| 4 | Soft |
| 5 | Very Soft |

A very low proportion of bulls have very hard testicles (score 1) without resilience; these have probably suffered fibrosis and should also be culled or subjected to a semen examination.

# The epididymis

The epididymis is the duct through which sperm moves away from the testicle. It is long and coiled, and forms a distinct "head", at the top of the testicle, a ridge going down the back and a 'tail' at the bottom of the testicle (see Figure 1). The "tail" is a storage organ for sperm awaiting ejaculation. It can be easily identified on palpation. In a small proportion of bulls the tail, and sometimes the head, of the epididymis becomes very hard and enlarged. This can be caused by infection or a congenital defect, and results in a blockage which prevents the passage of sperm from the affected testicle. Bulls with such abnormalities should be culled.

# Effect of over-feeding

Canadian research provides strong evidence that high- energy diets reduce the fertility of young bulls. In one experiment the fertility of two-year-old Hereford bulls in fat condition was compared with that of similar bulls in lean condition. The fat bulls had a backfat thickness of 10 mm (which is considerably less than that of many young bulls at the Melbourne Royal Show) while the lean bulls had a backfat thickness of 4 mm. Not only did the fat bulls produce 60% fewer sperm cells than the lean bulls, but they also had poorer quality semen. They had a much higher percentage of inactive abnormal sperm cells than the leaner bulls.

The detrimental effects of overfeeding are believed to be related to excessive fat deposits in the scrotum, which interfere with normal temperature regulation, causing overheating and possibly testicular degeneration.

There are still many unanswered questions relating to the damage that can be done to young bulls by over-feeding and further research is needed. In the meantime, both bull buyers and breeders should be aware of the problem. Recommendations on feeding bulls appear in the agnote, *Feeding of beef bulls.*

# Acknowledgements

This Information Note was originally developed by Geoff Kroker, Bendigo