

SCROTAL SIZE AND ITS IMPORTANCE TO THE LIMOUSIN BREED

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The Limousin breed has generally been used as a terminal sire breed where all progeny are sold for slaughter. However, first cross Limousin females are increasingly being retained for breeding.

In the temperate areas of Australia (below the Queensland border), many breeders join replacement heifers at 12-15 months of age in order that they calve first as two year olds. A common experience is that conception rates are much lower in Limousin cross females than British breed females. For example, on the same property 50-60% of Limousin cross heifers get in calf in a nine-week joining compared to 80-90% of British breed heifers. This is generally attributed to the relatively late puberty of the Limousin breed, which is also reflected in the first cross (50%) females.

In Northern Australia, the situation appears to be reversed when first cross Limousin heifers are compared with high grade Brahman heifers. In this case, the first cross Limousin heifers are generally more fertile than the Brahman heifers. This is because Brahman cattle are later to reach puberty than Limousin and the first cross female is exhibiting some hybrid vigour. The problem of late puberty in Limousin heifers need to be addressed by Limousin breeders if the breed is to be used other than as terminal sires in southern Australia.

Scrotal Size and Age of Puberty

The relationship between scrotal size in males and age of puberty in females is well established. The sisters and daughters of bulls with large testicles tend to reach puberty earlier. For practical purposes scrotal circumference in bulls and puberty in females are essentially the same trait. This is an important relationship because it means that age at puberty in heifers can be reduced by simply selecting for larger scrotal size in bulls.

How do Limousins Compare?

Table I: Breed Comparisons: Bull Testicular Size vs. Heifer Age at Puberty

BREED	HEIFER AGE AT PUBERTY (days)	S.C. OF YEARLING BULLS AVERAGE (cms)	RANGE (cm)
Gelbvieh	341	34.8	30-42
Brown Swiss	347	34.3	31-40
Red Poll	352	33.5	30-37
Angus	372	32.8	27-38
Simmental	372	32.8	37-39
Hereford	390	30.7	37-36
Charolais	398	30.5	25-38
Limousin	398	30.2	24-34
AVERAGE	368	32.3	

The table above shows how Limousins compare with other breeds for age at puberty and average scrotal size. This information is from research at the Meat Animal Research Centre in the USA conducted in the early 1980's. Selection by breeders has almost certainly increased the average scrotal size of Limousins since then.

Of the breeds listed this shows that on average Limousin have the smallest scrotal size and the latest age of puberty. Note that the breeds with large scrotal size also have early age of puberty.

Does scrotal size need to be large for fertility of Bulls?

For a bull to be fertile the "rule of thumb" is that he should have a minimum scrotal size of 32cm. This is based on research that shows that the incidence of poor semen in bulls with more than 32cm scrotal size is very low but increases in bulls below 32cm. However, bulls with less than 32cm can still be fertile.

In general, bulls with smaller testicles are:

Later to reach puberty

Have poorer semen quality

Have lower total sperm production

When bulls are joined to more than about 25 cows as usually occurs in commercial herds, it is important that they produce large quantities of good quality semen. The simplest way to ensure this is to select bulls with larger scrotal size.

How heritable is scrotal size?

Scrotal size is a highly heritable trait with a heritability of 50%. This means that with a concerted effort by breeders, the average scrotal size of the breed can be changed quite quickly. Based on this heritability, simply using a sire with two extra cm of scrotal size will increase the scrotal size of his progeny by 1cm. It would also decrease the age at puberty of the daughters by up to seven days depending on nutrition provided for the heifers.

How accurate is measurement of scrotal size?

The measurement of scrotal size is not a perfect measure. Two people may get slightly different measurements on the same bull because of a difference in technique. In general measurements by two different people should not differ by more than 1 cm which is accurate enough to achieve our objective of increasing scrotal size in the breed.

The effect of shape on the measurement:

Testicles do vary in shape and it is possible to have testicles with the same amount of tissue but a difference scrotal circumference. However, scrotal circumference has been shown to be a very good measure of the total amount of sperm tissue. Testicle shape in Limousin is not significantly different from the other breeds and should not be used as an excuse for keeping a bull with a small scrotal circumference.

Can bulls with small testicles at a young age have large testicles at an older age?

With very few exceptions bulls with below average scrotal size at a young age will have below average testicles at older ages and at maturity.

Under US conditions where young bulls are grown out at about 1.4kgs per day a young bull measuring less than 22cm at 205 days of age has a low probability of reaching 32cm at 365 days of age. Bulls with scrotal circumference of 22cm or above at 205 days of age will usually reach 32cm at 365 days of age. The differences tend to get bigger rather than smaller.

The effect of nutrition

Nutrition can have a major effect on scrotal size. Under good nutrition, scrotal size increases by about 1cm per month between 10 and 14 months of age. Under poor nutrition the growth may be very slow.

This means that the bulls simply take longer to reach their maximum scrotal size.

Under good nutrition, Limousin bulls are likely to reach close to their maximum scrotal size by two years of age. Good nutrition would be reflected by a weight of 600kg or more at two years.

Under poor nutrition, bulls may not reach maximum scrotal size until they are three years of age. Poor nutrition would be reflected by a weight of less than 500kg at two years of age.

Do we need EBVs for Scrotal size?

The advantage of EBVs is that they take out the effect of nutrition and allow direct comparison of sires used in different herds.

Some recent research in the USA has shown that the actual measurement of scrotal size is more useful in selecting bulls with superior breeding soundness. However, selection on the EBV for scrotal size was more effective than selection for actual scrotal size in reducing the age at puberty of the daughters.

One cm difference in scrotal size EBV is equivalent to about 15 days earlier average age at puberty in daughters.

EBVs

EBVs for scrotal size for many sires are published in the Limousin Sire and Dam Summary. EBVs for the female fertility trait Days to Calving are also published. As a general rule sire with positive EBVs for scrotal size breed daughters with negative (favourable) EBVs for Days to Calving.