

Scrotal Circumference in Bulls Linked to Puberty in Replacement Heifers

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Reproductive efficiency certainly plays a major role in determining profit potential for beef herds. Since most heifers are now bred as yearlings, age at puberty is of critical importance to reproductive efficiency. Nutrition (more correctly, target weight) plays a large role in determining age at puberty. However, cattle with inherent ability to reach puberty at earlier ages will most likely reach puberty with less investment of feed dollars and management effort than cattle with a later inherent age at puberty. Puberty in heifers is a heritable trait (probably 30 to 40% heritable) that can and should be selected for directly.

For a long time now, we have "preached" about scrotal circumference in bulls and relationships between scrotal circumference and measures of male fertility. Overwhelmingly, data indicate bulls with larger testicles produce more semen, and all measures of semen quality improve as scrotal circumference increases. Additionally, scrotal circumference appears to be a more accurate predictor of when a bull reaches puberty than either age or weight. In a study from the Meat Animal Research Center in Nebraska, bulls reached puberty at a fairly consistent 28 cm scrotal circumference, regardless of breed or breed influence. In fact, age at puberty and scrotal circumference are essentially the same trait. Therefore, if we increase scrotal circumference, more bulls will reach puberty by the time they are yearlings. Fortunately, scrotal circumference is a very heritable trait (probably 50 to 60% heritable). Again, scrotal circumference (puberty) in bulls can and should be selected for directly.

How do these two thoughts - puberty in heifers and scrotal circumference - relate? In the early 1970's, studies reported in both sheep and mice indicated that as testicular size of a sire increased, his daughters ovulated more eggs and both twinning rates in sheep and litter size in mice were higher. This really should not be surprising, since the gonads (ovaries in female and testicles in male) are stimulated by the same hormones and appear to be under the same genetic control.

These studies prompted researchers in Montana, Colorado and North Carolina to look at relationships between scrotal circumference in bulls and reproduction in sisters and/or daughters. While the North Carolina group did not look at puberty directly, they did look at which replacement heifers became pregnant when placed with bulls during the normal breeding season as heifers neared yearling ages. They found a correlation of $-.39$ between scrotal circumference and age at first breeding (correlations range between 1.0 and -1.0). In this case, a "negative correlation" is favorable since it indicates that as scrotal circumference in bulls increases, age at first breeding in their sisters and/or daughters decreases. Colorado and Montana researchers actually measured age at puberty directly and reported correlations of $-.71$ to -1.0 , respectively. Again, the negative correlation is favorable in this situation.

What does all of this mean to you as a beef producer? I will not bore you with calculations of formulas involved with statistics, but here is what you can expect to occur. If you buy a bull with a scrotal circumference 4 cm larger than average, his sons will have a 1 cm larger scrotal circumference and his daughters will reach puberty 15 days earlier. Buying a bull with 4 cm larger scrotal circumference is a pretty easy way to select for heifers which reach puberty earlier. We are now also beginning to see very strong positive.

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