



Repro Tracks

► by **Bill Beal**, beef cattle reproductive physiologist, Virginia Tech

Technical questions about cryptorchids

Cryptorchidism is a condition that occurs when one or both testicles fail to descend into the scrotum of a bull. Testes retained in the body cavity secrete testosterone but do not produce fertile sperm. Therefore, technical questions exist about growth of cryptorchids vs. intact bulls and about the fertility of a unilateral cryptorchid, where one testis descends into the scrotum, but the other is retained in the body cavity.

Breeder's question:

We are trying to determine the correct contemporary grouping for bulls with bilateral cryptorchidism. In particular, should bulls with cryptorchidism be contemporary grouped separately from normal bulls with both testicles descended?

Response:

The testes of a bull normally develop and migrate into the scrotum during the fetal period. Testicular descent is usually complete at birth or shortly after birth. If one (unilateral) or both (bilateral) testes is retained in the body cavity, the bull is referred to as a "cryptorchid."

The general belief is that cryptorchid bulls have normal (or near normal) levels of testosterone and sex drive, but they are infertile because the sperm-producing cells of the testes do not develop when held at body temperature.

Testosterone is thought to be at normal levels in cryptorchid bulls because testosterone production is controlled by luteinizing hormone (LH) secretion from the pituitary gland. The amount of LH released is regulated by the level of testosterone through a negative feedback system. It has been noted that cryptorchid testes secrete less testosterone per gram of tissue when compared to testicular tissue from a normal, intact bull. However, the level of LH secretion in the cryptorchid bull is elevated. Therefore, cryptorchids respond to the greater LH stimulation and have blood testosterone levels similar to those of normal, intact bulls.

This relationship has been characterized in an experiment reported by Bruce Schanbacher (*J. Reprod. Fertil. Suppl.* 1981, Vol. 30:67-73). That report stated, "Cryptorchid bull testes have a reduced capacity to secrete testosterone and the near-normal serum testosterone concentrations

are maintained in the presence of increased serum gonadotrophins." Schanbacher's results are slightly different than those reported by an Australian group in 1976 (*Australian Veterinary Journal*, 1976, Vol. 52:517-518). That group surgically created bilaterally cryptorchid bulls and reported "testosterone recorded in cryptorchid bulls was lower [1.62 nanograms (ng) per milliliter (mL)] than levels found in 12-month-old intact bulls (3.5 ng per mL), but considerably higher than testosterone levels of steers."

A Swiss group investigated testosterone production in "short scrotum" bulls (surgically altered to hold testes against the body wall). This created a cryptorchid-like animal. They reported (*Biol. of Reprod.* 1980, Vol. 22:765-771) that testosterone in the cryptorchid-like bulls was similar to that in normal, intact bulls, but the timing of puberty (testosterone elevation) was delayed in the cryptorchid-like bulls.

Bottom line, both cryptorchid and intact bulls should have at least some circulating testosterone that would affect secondary sex characteristics and enhance their growth. However, it is unlikely that the levels of testosterone would be *exactly* the same as in intact bulls, and it is likely that one effect of cryptorchidism may be to delay the timing of puberty. Given this evidence, it is probably unjustified to group cryptorchid bulls and intact bulls in the same contemporary group, especially when weight (and gain) is being measured at an age-constant end point.

Breeder's question:

One of the best weanling bulls we have is a unilateral cryptorchid. Would it be "unethical" to raise this bull with our others and sell him as a breeder to a commercial producer, providing we explain his condition prior to the sale?

Response:

Bad Idea! Unilateral cryptorchid bulls are

fertile. However, their daily sperm output is reduced. Hence, their ability to breed large numbers of females would be compromised. As you point out, you could explain this to a potential buyer, but there are other factors that make selling a unilateral cryptorchid bull unwise.

For openers, male dogs, boars, bulls and humans that retain a testis in the body cavity have been reported to be more likely to develop testicular cancer. Obviously, testicular cancer could reduce the useful life of the unilaterally cryptorchid bull.

It is accepted that there are both genetic and environmental causes of cryptorchidism. The genetic component involves recessive alleles of several genes. Unfortunately, an accurate estimate of the heritability of cryptorchidism in cattle has not been derived. No planned studies of cryptorchids have been done with bulls.

Retrospective studies of cryptorchid humans and horses may provide the most accurate genetic information. In those species, the estimated heritability of cryptorchidism is high, reportedly between 65% and 86%. Therefore, even though exact estimates of the heritability of unilateral cryptorchidism in bulls is unavailable, it is logical to assume that a unilateral cryptorchid bull has a higher likelihood of siring cryptorchid sons or daughters with a higher gene frequency for cryptorchidism (to be passed to their sons). This is probably the most compelling reason why unilateral cryptorchid bulls are castrated and sent to a feedlot and not used for breeding.

Editor's Note: Bill Beal is a beef cattle reproductive physiologist at Virginia Tech. He conducts research involving estrus synchronization, artificial insemination (AI), embryo transfer (ET) and the use of ultrasound technology. This column is designed to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. If you have questions or comments related to the reproductive management of cows or bulls, e-mail them to him at wbeal@vt.edu or mail them to him at the Dept. of Animal & Poultry Sciences, Virginia Tech, Blacksburg, VA 24061-0306.