

Review Report

Review of surgical procedures for creating bovine estrus detector males

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Abstract

This article reviews the most common, effective, and currently recommended surgical techniques for preparing teaser bulls that maintain libido. It is the intent of this article to arm practitioners with a brief description of the surgical procedures and practices for the best surgical and long-term outcomes.

Keywords: Estrus detector males, teaser bulls, gomer, sidewinder

Introduction

Estrus detection plays a vital role in the success of any artificial insemination program. There are multiple methods of heat detection employed on beef and dairy operations. The intact bull that has been rendered sterile is often described as a teaser or gomer bull.¹ These animals are useful aids for detection of estrus in females that may not display strong external cues that they are ready for breeding. The teaser animal has demonstrated superior ability to detect estrus in comparison to human observation with reports of detection rates of 97–100 percent compared to 74 percent with commonly employed human detection schedules.² This article reviews the most common, effective, and currently recommended surgical techniques for preparing teaser bulls that maintain libido. The surgical options to that prevent penetration of the genital tract of the female are desirable to limit infectious disease transmission. The true venereal diseases *Campylobacter fetus* subspecies *venerealis* and *Tritrichomonas foetus* are of particular concern when considering a procedure to avoid intromission. The vast number of techniques described in the literature are evidence that there is no perfect procedure. The bull selected for these procedures should be young, healthy and have a strong libido, although the latter is not capable of being measured chute-side. It is also recommended that the candidate for procedures should exhibit docile behavior because of frequent human interactions.

Pre-anesthetic preparation

The bull should be fasted for 24–48 hours prior to deep sedation or general anesthesia to prevent bloat and the possibility

of regurgitation with subsequent aspiration of ruminal contents.³ Feed should be withheld for 48 hours, and water removed 12 hours prior to the procedure.⁴ Pre-operative antimicrobials are highly encouraged if the procedure is not performed in a sterile environment but may also be useful with more invasive procedures. The author prefers to utilize beta-lactam antibiotics because of the spectrum of activity and common pathogens discovered in the urogenital tract of the bull.⁵ These antimicrobials should be administered prior to surgery for optimal efficacy.⁶

For those procedures that require the bull to be in lateral recumbency for extended periods of time the surgeon must be mindful of providing adequate padding to prevent the development of peripheral neuropathies. Utilization of inflated innertubes of different sizes to pad the shoulder and protect the radial nerve can be useful.³

Surgical procedures

Epididymectomy

The bilateral caudal epididymectomy is a preferred procedure to render the bull sterile. This procedure has the advantage of being performed in the standing position. The distal one-third of scrotum is aseptically prepped and a local block is administered. The most prominent area of the cauda epididymis is identified, and the scrotum is incised over this area. The incision is extended through the scrotal fascia and tunica vaginalis. The cauda epididymis will protrude through the skin incision when the adequate depth has been achieved.

Apply towel clamps and gentle traction to further exteriorize the epididymal tissue. Hemostatic forceps are applied at the base of the cauda epididymis following exteriorization.⁵ The tissue is excised using a scalpel blade. The surgeon should be careful not to incise the tunica albuginea to avoid significant hemorrhage. The tissue is left to heal by second intention and the same procedure is performed on the contralateral testicle. The owner should wait 30 days to utilize this animal for estrus detection. It is the advice of the author to evaluate the ejaculate of the male for the observation of live spermatozoa prior to use. This will avoid any negative outcomes should the bull remain fertile after failure to render him sterile. This procedure does not prevent the bull from achieving intromission and other procedures are warranted in combination with removal of the cauda epididymis to prevent the possible transmission of infectious pathogens through coitus.

Vasectomy

The bull may also be rendered sterile by transection of the ductus deferens as an isolated procedure or in conjunction with an epididymectomy. The surgical approach to the ductus deferens is on the caudal aspect of the scrotal neck. The bull is placed in lateral recumbency under light sedation. The author prefers using xylazine hydrochloride intramuscularly approximately ten minutes prior to tabling the bull at a dose of 0.05 to 0.1 mg/kg.³ The area should be clipped and aseptically prepped. Local anesthetic is administered in the scrotal skin and extending into the spermatic cord proximal to the incision. The surgeon should make a 2 to 3 cm longitudinal incision through the skin and underlying tunica dartos muscle to expose the spermatic cord. A blunt instrument like a Kelly forcep is placed under the spermatic cord to allow for exteriorization through the incision. The vaginal tunic is sharply incised, and the surgeon should avoid the cremaster muscle to prevent excessive hemorrhage. The fibrous, cord like, ductus deferens are carefully isolated from the testicular artery and vein. Ligatures are placed proximally and distally 5 cm apart using absorbable suture.⁵ The tissue is transected and the tunica vaginalis is closed primarily. The dartos muscle and scrotal skin are then closed in a routine fashion. This procedure alone does not render the bull unable to achieve intromission and another procedure may be indicated to prevent intromission. The producer is advised to wait 30 days prior to utilizing this bull as described above. This procedure is most used in small ruminants to render the male sterile.

Penile translocation (Sidewinder technique)

This technique repositions the prepuce into a lateral orientation to prevent intromission with the female during estrus. The author as well as others prefer this method as it has been noted that teaser males made by this procedure have maintenance of libido following the procedure.^{1,7} A drawback to the procedure is that it requires the bull to be in lateral recumbency either under general anesthesia or deep sedation as it is more invasive than other procedures. The author prefers to relocate the prepuce into the fold of the flank. To prep the male for surgery the ventral abdomen is clipped and surgically prepared from the preputial orifice to the neck of the scrotum. The prepared area should extend two large hand widths dorsally to the fold of the flank. The preputial hairs should remain intact to provide urine egress and avoid urine scald in the flank region.

To begin a 7 cm circular incision is made in the fold of the flank extending through the skin and cutaneous trunci into the muscular layer located in the fold of the flank. The surgeon should achieve adequate hemostasis and place a moistened 4×4 sponge over the area once proper dissection and hemostasis have been obtained.⁸

Next, a marker suture is then placed on the dorsum of the external preputial orifice to give the surgeon orientation after translocation to the flank.^{7,8} This is followed by a circumferential incision through the skin 5 cm proximal to the external preputial orifice.⁸ Next, the surgeon should make a longitudinal incision that connects with the circumferential incision cranially and extends 40–50 cm caudally along the sheath. Blunt and sharp dissection is utilized to free the penis and prepuce away from the abdominal wall. It should be stressed that the surgical plane of dissection should remain close to abdominal wall to avoid large vessels in the elastic tissues. The dissection is complete when the penis and prepuce are free from the abdominal wall for the length of the longitudinal skin incision. This step is followed by blunt dissection through the tissue from the flank fold medially to form a tunnel for transposition of the penis and prepuce from abdominal midline to the flank. Blunt dissection can be accomplished by utilizing long cervical forceps. The author prefers to start the blunt dissection from the circular incision in the flank and extend medial to the abdomen rather than to start from the abdominal midline and work laterally towards the flank fold. Sterile obstetrical sleeves can be utilized to prevent contamination of the undermined tissue from the preputial hairs during the relocation process.⁸ Warm saline applied to the lumen of the sterile sleeve can aid in the translocation of the penis and prepuce through the sleeve to the new opening in the flank fold. The sterile sleeve should be removed following transposition of the penis and prepuce to the flank fold.

The marker suture previously placed allows the surgeon to position the external preputial orifice in the proper orientation in the flank. The subcutaneous tissue of the prepuce is then sutured in quadrants to the cutaneous trunci muscle. Interrupted sutures using #1 absorbable suture are placed in each quadrant to secure subcutaneous tissue to the cutaneous trunci muscle. The skin is closed primarily using #3 monofilament non-absorbable sutures in an interrupted pattern. Prophylactic antibiotics should be administered for 5 days post-operatively. Oral non-steroidal anti-inflammatory drugs should be administered for 7–10 days to prevent excessive swelling and discomfort associated with the surgery. The bull should not be used for 30 days following the procedure.

Induced corpus cavernosal thrombosis

The aim of this procedure is to prevent straightening of the sigmoid flexure by inciting a thrombus in the corpus cavernosum proximal to the sigmoid flexure which ultimately prevents ability of teaser animal to make intromission. Malleable dental acrylic is often utilized for this procedure to create an artificial thrombus that prevents the corpus cavernosum from filling and achieving an erection.^{4,8} This type of acrylic sets up slow (12–24 hours) and does not cause a high-temperature exothermic reaction.⁹ This procedure has the advantage of being performed in a standing position. The bull is restrained and a caudal epidural with 2% lidocaine is applied for regional analgesia. The area between the rectum and the scrotal neck is prepared aseptically. The surgeon should make a midline incision 15–20 cm in length that ends approximately 6–8 cm

proximal to base of scrotum. The underlying thick fascia is dissected sharply, followed by blunt dissection of the elastic layers surrounding the penis. A loop of penis is exteriorized and the distal sigmoid flexure is identified as the site of attachment of the retractor penis muscles. Following exteriorization and identification of the distal sigmoid flexure the surgeon should identify the ventral groove of the urethra as a landmark to avoid when placing the needle for insertion of the acrylic. A 14 gauge by 1.5-inch needle is placed into the dorsal aspect of the corpus cavernosum penis and 10–20 mL of saline is injected to ensure proper positioning of the needle prior to placement of the acrylic.^{4,8,9} The saline can be palpated as it is injected adjacent to the needle if in the proper position. It is a sign of improper placement of the needle if the solution is difficult to inject. The next step is to mix the dental acrylic and inject 5–10 mL through the needle that remains in the cavernous space.⁹ Following placement of the acrylic, a penile suture is placed with #3 non-absorbable sutures. Sutures are placed from the tunica albuginea on the lateral aspects of the penis at the level of the distal sigmoid flexure to the subcutaneous fascia.^{8,9} This will prevent penile prolapse when the bull is stimulated and relaxes the retractor penile muscles. The skin is closed with non-absorbable suture in routine fashion. Urination following the procedure should be noted to ensure that the acrylic is not impeding the urethra. Skin sutures can be removed at 10–14 days and the bull can return to use at this point. Retrospective data suggests this procedure is a good option for prevention of coitus with most bulls (15/18) maintaining libido yet unable to achieve intromission following this procedure.⁹

Penis tie-down technique

The objective of this surgery is to create a permanent adhesion between the tunica albuginea of the penis and the ventral body wall. The bull is placed in right lateral recumbency following heavy sedation and the lateral aspect of the sheath is aseptically prepared. Local anesthetic is injected halfway between the preputial orifice and the base of the scrotum on the lateral aspect of the sheath. A 15 cm skin incision is made midway between the preputial orifice and the scrotum, approximately 2 cm lateral to the midline.⁸ The incision is continued through the subcutaneous tissue, followed by blunt dissection that exposes the ventral abdominal wall and the tunica albuginea. Multiple interrupted sutures utilizing non-absorbable suture material are placed in the incision in order to appose the tunica albuginea to the ventral body wall. The dead space should be minimized to avoid seroma formation between the skin and deep subcutaneous tissues. This can be accomplished utilizing absorbable suture material in two

layers this is followed by closure of the skin in a routine manner with non-absorbable suture material. The bull should stay isolated and away from cycling females for 45 days to allow for fibrous adhesions to form between the body wall and the tunica albuginea.⁸ The bull should be observed by the owner for success or failure of the procedure prior to use for estrus detection.

Conflict of interest

None to declare.

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