Development of Teaser Bulls Under Field Conditions

Gregor L. Morgan, BVSc, MS, PhD[a,*], Lionel J. Dawson, BVSc, MS[a,b]

KEYWORDS

• Sterilization • Surgery • Bulls • Teaser • Field conditions

A major contributing factor to the successful outcome of an artificial insemination program in cattle is accurate identification of ''in estrus'' female animals, which, in turn, facilitates accurate timing of insemination. In addition to visual observation, numerous aids are available to assist in heat detection. These include tail head paints or crayons, glue-on dye patches (KAMAR heat mount detectors), self-adhesive patches (Estrotect-Estrus Alert), and electronic pressure-sensitive mount detectors (Heat-Watch). Each of these aids has its advantages and disadvantages but all rely on the ''in estrus'' female animal to stand and be ridden by others in the herd.[1–3] A more natural situation is to use an intact but sterilized bull, often referred to as a teaser bull, to aid in heat detection. These animals are more likely to identify truly ''in estrus'' female animals and those with short and or weak estrus expression. If turned out before the breeding season, they may also be used to hasten the onset of cycling in peripubertal heifers and shorten the postcalving anestrus period in lactating beef cows.[3]

The three objectives in the surgical preparation of a teaser bull are first, to render him sterile, second, to prevent venereal disease transmission, and third, to avoid diminished libido so the bull will remain active for a long period of time.[4]

Two surgical procedures that will not prevent intromission, but will sterilize the bull are vasectomy and caudal epididymectomy. In some ''closed herds,'' either of these procedures is done to create a teaser bull but they provide no protection against venereal disease transmission. Creating teaser bulls from within the home herd does not protect against a neighborhood bull infected with a venereal disease breaking through boundary fences and infecting a naive herd. Therefore, it is strongly recommended that one of several surgical procedures be done which prevents intromission. Indeed, at this time, this recommendation is appropriate, given the increasing number of beef herds found to be infected with *Tritrichomonas fetus* in the United States.

[a] Center for Veterinary Health Sciences, Oklahoma State University, 1-BVMTH, Room 002, Stillwater, OK 74078, USA
[b] American Institute for Goat Research, Langston University, Langston, OK 73050, USA
* Corresponding author.
E-mail address: gregor.morgan@okstate.edu (G.L. Morgan).

Vet Clin Food Anim 24 (2008) 443–453
doi:10.1016/j.cvfa.2008.06.004 **vetfood.theclinics.com**
0749-0720/08/$ – see front matter

Surgical procedures that prevent intromission fall into one of two categories:

1. Those that allow protrusion but not intromission (penile-prepuce translocation [PPT])
2. Those that prevent penile protrusion, thereby preventing intromission (penopexy)

GUIDELINES FOR SELECTING AN APPROPRIATE BULL

Only intact bulls can be surgically modified to make a teaser animal, which stems from a past practice of using several growth implants in the ear or injections of long-acting testosterone products to steers, nonreplacement heifers, freemartins, or cull cows. This practice today is clearly a violation of the Animal Medicinal Drug Use Clarification Act (AMDUCA) and therefore is illegal. For the most part, these practices resulted in effective teaser animals and if female animals were used, surgical procedures to prevent intromission were not needed. However, because the practice is illegal, it will not be discussed further.

Bulls to be prepared as teasers should be selected well before the breeding season to allow time for healing and continued growth. They should be of mild temperament to facilitate handling, be of moderate adult size, and have strong libido. The last is difficult to predict in young bulls. Regardless of the surgical procedure chosen, all are more easily performed on bulls weighing less than 600 pounds. Large bulls are more difficult to manage physically, tend to hemorrhage more, take longer to complete the surgical procedure, and tend to have more postsurgical complications.

FIELD RESTRAINT FOR SURGERY

The required restraint depends on facilities available, size and demeanor of the bull, procedure to be performed, and available help. Numerous drug protocols can be used for sedation or general anesthesia (GA). For sterilization purposes, vasectomy and caudal epididymectomy may be performed with standing sedation and local lidocaine line block over the surgery site. A tail jack may be a useful additional restraint. Practitioners have their own preferences with respect to sedation or GA under field conditions. Nevertheless, **Table 1** presents several drug protocols for sedation or GA that have been used by the authors.

For sedation purposes, xylazine is commonly used at a dose range of 0.05 to 0.1 mg/kg intramuscularly or intravenously However, under most circumstances, a more invasive surgery is performed in addition to sterilization to prevent intromission, and the preferred procedures may require GA. Under field conditions, GA can be difficult and is not without risk to surgeon and patient. However, proper preparation will minimize complications. Bulls in the 600 lb or less range are preferred. Feed should be withheld from the bull 48 hours and water 12 hours before surgery.

PREFERRED SURGICAL PROCEDURES USED TO CREATE TEASER BULLS

Several techniques are described in the literature for preparing a teaser bull. This article discusses those more preferred by the authors and that may be done in a field situation.

Vasectomy

This procedure may be done standing in a chute with mild sedation and local anesthesia over the surgical site, or the animal may be restrained in right lateral or dorsal recumbency using heavy sedation and ropes. With the bull standing, the approach from

Table 1
Anesthetic protocols used successfully in bulls under field conditions

Standing sedation with mild analgesia			
Drug	Dosage	Route	Duration
Xylazine	0.05–0.10 mg/kg	IV or IM Lower dose IV	15–30 min
Xylazine	0.02–0.03 mg/kg With lidocaine	Caudal epidural	15–30 min
Mild sedation with good analgesia			
Drug	Dosage	Route	Duration
Ketamine	Butorphanol, 0.025 mg/kg; xylazine, 0.050 mg/kg; ketamine, 0.100 mg/kg	IV	<30 min
—	Double the dose	IM	<30 min
Recumbent sedation with analgesia			
Drug	Dosage	Route	Duration
Xylazine–ketamine	Xylazine, 0.05 mg/kg; wait 5 min; ketamine, 2–4mg/kg	IV IV	30–45 min
—	Xylazine, 0.10 mg/kg; wait 10–15 min; ketamine 2–4 mg/kg	IM IV or IM	30–45 min
Xylazine–telazol	Xylazine, 0.05–0.10 mg/kg; Telazol, 4–5 mg/kg	IM IM	60–75 min
Triple drip 1-L bottle of guaifenesin + 1000 mg ketamine + 100 mg xylazine	Induction: 0.5–1.0 mL/kg; maintenance: 2 mL/kg	IV IV	75–90 min

Tolazoline, an alpha2-adrenergic receptor antagonist, may be used to reverse the effects of xylazine, 2mg/kg, IV or IM.
Abbreviations: IM, intramuscular; IV, intravenous.

the anterior aspect of the scrotal neck can be difficult because of limited access and therefore, the posterior approach is recommended for vasectomy. In either position, the neck of the scrotum is clipped and prepped for aseptic surgery. Local anesthetic is injected along two proposed incision lines over each spermatic cord or along a single incision approach over the median raphe of the scrotum beginning 6 to 8 cm above each testicle.[5,6]

A 3-cm incision is made through the skin and tunica dartos to expose the spermatic cord within the tunica vaginalis (**Fig. 1**). The ductus deferens (DD) is readily identified by palpating a firm cord-like structure approximately 2 to 3 mm in diameter in the spermatic cord. The cord is carefully dissected free of surrounding tissue and a curved hemostat is placed under the cord to elevate it through the skin incision (**Fig. 2**). A 2- to 3-cm incision is made through the tunica vaginalis in an area not covered by the cremaster muscle to expose the contents and identify the vas deferens. Great care must be taken with this incision to avoid cutting the pampiniform plexus or other structures within the cord. Once the DD is identified, two ligatures are placed around it approximately 3 to 5 cm apart using #0 absorbable suture. The DD between the ligatures is removed and the skin closed with a nonabsorbable suture (**Fig. 3**).[5,6] The

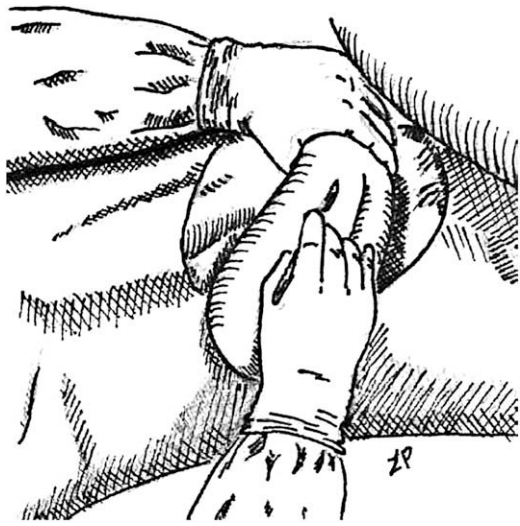

Fig. 1. A 3-cm skin incision made in the scrotal neck and continued deeper through the tunica dartos exposing the spermatic cord.

excised DD is taken and the contents squeezed onto a slide and observed under a microscope for spermatozoa. Postsurgical antibiotics may be given to guard against infection at the surgical site and the bull may take up to 30 days to clear all sperm from the system so he should not be used until this time guideline has been met.

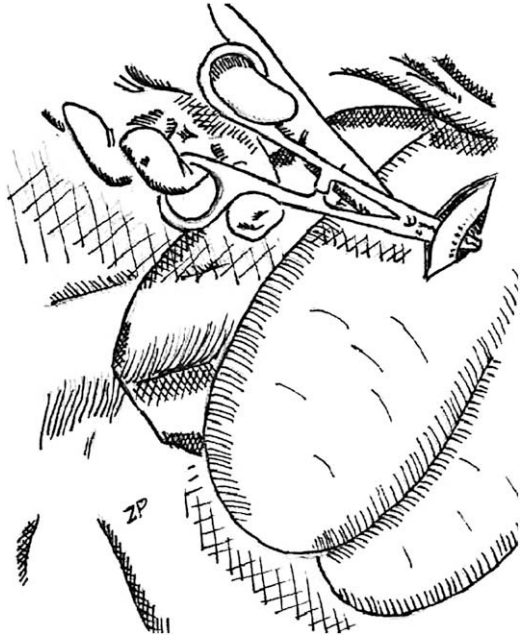

Fig. 2. Spermatic cord freed from the surrounding tissue, elevated with hemostats and carefully opened.

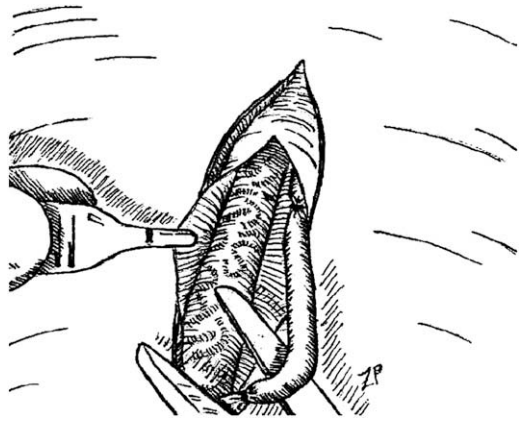

Fig. 3. The DD is isolated and two ligatures, 2 to 3 cm apart, and the segment, are removed.

Caudal Epididymectomy

This procedure is preferred over a vasectomy because it is simpler and can be performed with the patient lightly sedated in a standing position. The area of the scrotum over the tail of the epididymis is clipped, surgically prepped, and infiltrated with a local anesthetic. The surgeon then grasps the neck of the scrotum over one testicle, forcing it ventrally. A 2- to 3-cm skin incision is made directly over the tail of the epididymis, parallel to the raphe (**Fig. 4**).The incision is continued through the common vaginal tunic until the tail of the epididymis ''pops out.'' With careful dissection, the tail of the epididymis is freed from the testicle and an Allis tissue forceps is used to grasp and exteriorize the tail of the epididymis fully. The DD and the body of the epididymis are identified and each is clamped by a hemostat. A nonabsorbable suture is placed proximal to each clamp and the tail of the epididymis is removed (**Fig. 5**). This procedure is repeated on the other testicle. The common vaginal tunic is closed with an absorbable simple interrupted suture pattern, whereas the skin on the scrotum may be left open (**Fig. 6**).[4–14] A postsurgical antibiotic is not necessary if the animal is put in

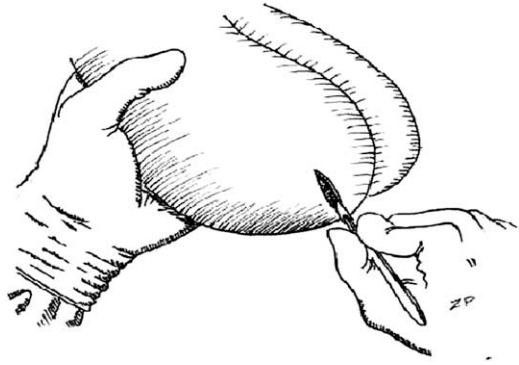

Fig. 4. The testicle is forced to the bottom of the scrotum, the tail of the epididymis is identified, and an incision is made directly over the tail. The incision is continued deeper until the epididymal tail "pops" out.

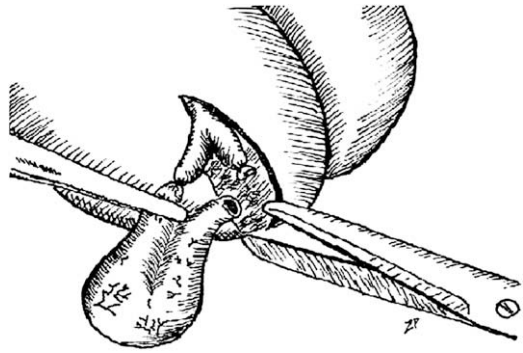

Fig. 5. With careful dissection, the loop formed by the vas deferens and the epididymal tail is identified and ligated on both sides of the loop. The tail is then excised. (*Modified from* Hendrickson DA, editor. Techniques in large animal surgery. 3rd edition. Ames (IA): Blackwell Publishing; 2007. p. 251–6; with permission.)

a clean, dry pen for 5 days after surgery to monitor any abnormal swelling and bleeding.

Penile-Prepuce Translocation

PPT is a surgical procedure that moves the penis and prepuce off the midline to an area in the lower left flank. Protrusion of the penis is not prevented but intromission

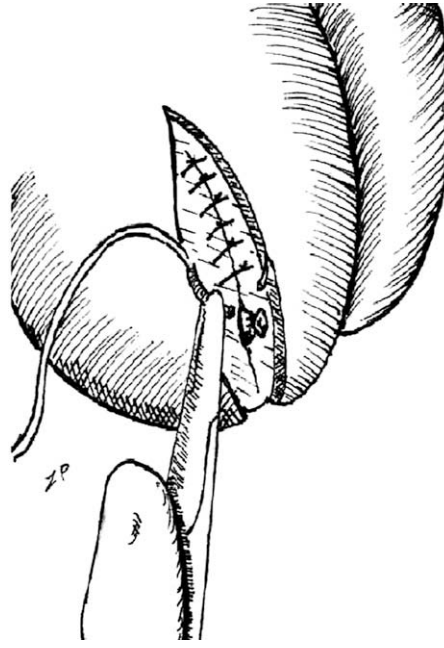

Fig. 6. The common vaginal tunic is closed with absorbable suture material and the skin incision can be left open. (*Modified from* Hendrickson DA, editor. Techniques in large animal surgery. 3rd edition. Ames (IA): Blackwell Publishing; 2007. p. 251–6; with permission.)

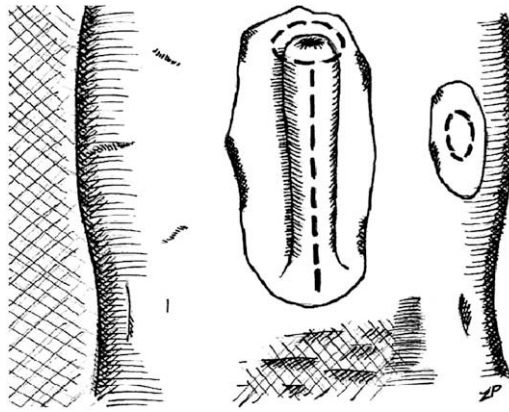

Fig. 7. Outlining of the skin incisions of the penile translocation techniques. (*Modified from* Hendrickson DA, editor. Techniques in large animal surgery. 3rd edition. Ames (IA): Blackwell Publishing; 2007. p. 251–6; with permission.)

is. This procedure is more complicated than other teaser surgeries but, in the authors' opinion, is the preferred technique. These bulls appear to maintain libido and function for a long time, which could be related to the fact that presumably no pain is experienced when they get an erection compared with penile tie-down procedures.

PPT is performed with the patient in dorsal recumbency under GA. The site to which the preputial orifice is to be moved should be marked while the bull is standing normally because it can become distorted when he is in dorsal recumbency and may result in the bull being able to gain intromission. This circular excision of skin should be on the left flank such that the lower edge of the circular excision of skin is 3 cm above the left flank fold.

The surgical area around the preputial orifice to the scrotum and the ventral abdomen on the left are prepared for aseptic surgery.

A single interrupted suture is placed at the dorsal aspect of the preputial orifice to serve as a reference when orienting the orifice into the translocation site. Initially, a circumferential skin incision beginning 4 cm from the preputial orifice is made around the

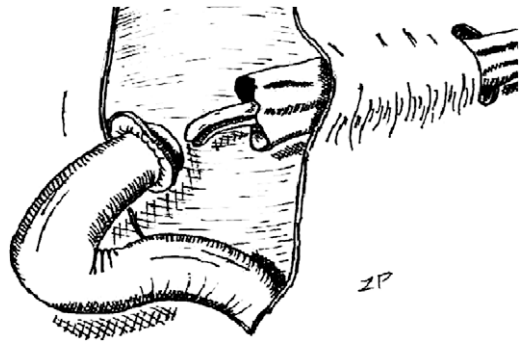

Fig. 8. Subcutaneous tunnel to draw the freed penis-prepuce through to new translocation site. (*Modified from* Hendrickson DA, editor. Techniques in large animal surgery. 3rd edition. Ames (IA): Blackwell Publishing; 2007. p. 251–6; with permission.)

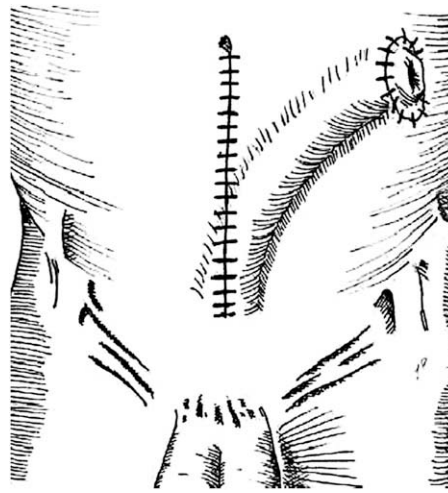

Fig. 9. Translocated penis-prepuce. (*Modified from* Hendrickson DA, editor. Techniques in large animal surgery. 3rd edition. Ames (IA): Blackwell Publishing; 2007. p. 251–6; with permission.)

prepuce and a second midline incision starting cranial to the scrotum is made forward, connecting to the circumferential incision around the preputial opening (**Fig. 7**). The prepuce is carefully dissected free off the abdominal wall, preserving the large blood vessels as much as possible. Significant hemorrhage may occur when dissecting the preputial orifice free from the body wall and must be controlled.

A circular flank incision is made at the previously identified location above the left flank. The diameter of this incision should be similar to the preputial orifice being translocated. After removing the circular piece of skin, a tunnel is made subcutaneously by introducing long sponge forceps or Knowles cervical forceps through the circular flank incision to the caudal end of the midline incision. The tunnel is opened further by opening the forceps sufficiently to redirect the prepuce and penis without any restrictions. A sterile plastic sleeve is placed over the preputial orifice to prevent contamination of the tunnel when the penis and prepuce are pulled through (**Fig. 8**).

Using the previously placed skin suture as a guide, the dorsum of the preputial orifice is aligned with the dorsal aspect of the circular flank incision. The orifice is sutured in two layers. The subcutaneous layer is closed with a simple interrupted pattern using absorbable suture and the skin is closed with a simple interrupted nonabsorbable

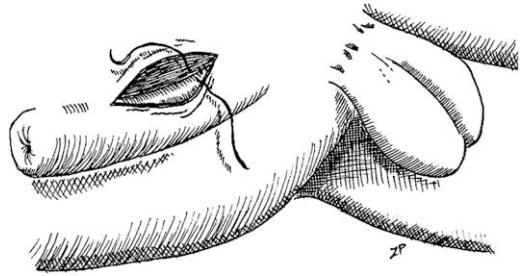

Fig.10. Suturing dorsal surface of scarified tunica albuginea to scarified surface of linea alba.

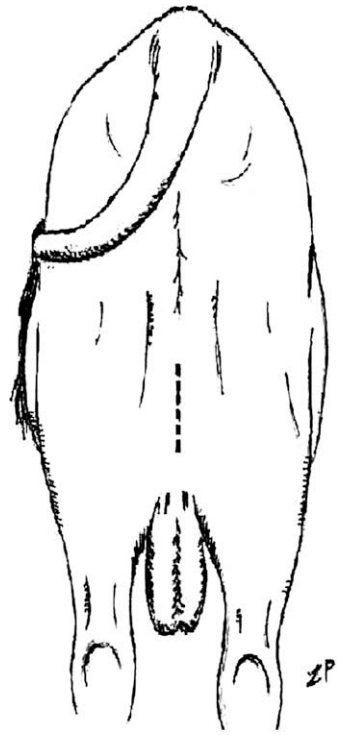

Fig. 11. Incision site for perineal fixation of the penis.

suture (**Fig. 9**). The ventral midline incision is also closed in two layers in a subcutaneous continuous pattern using absorbable suture and incorporating the abdominal fascia to reduce tissue dead space. The skin is closed using nonabsorbable suture in a continuous forward interlocking pattern (see **Fig. 9**). The circular incision at the

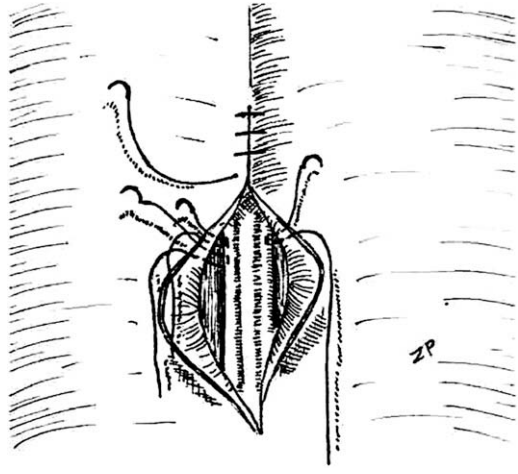

Fig. 12. Preplaced fixation sutures through the tunica albuginea laterally to the subcutaneous fascia.

original preputial opening site is left open for drainage. A bilateral caudal epididymectomy is performed, the bull is administered antibiotics for 5 days, and sutures are removed in 2 weeks. Postoperatively, it is important to make sure the bull can urinate freely from the new opening. The bull is ready to use after a 4- to 6-week recovery period.[4–14]

Penile Fixation or Penopexy

Penopexy 1

Penile fixation is a procedure that creates a permanent adhesion between the tunica albuginea of the penis and the ventral body wall, preventing protrusion and intromission. The bull, under GA or heavy sedation, is restrained in right lateral recumbency. The ventral abdomen from the preputial orifice to the scrotum on the left side is prepared for aseptic surgery. Local infiltration with lidocaine along the intended incision line maybe necessary for bulls under heavy sedation.

A 10-cm longitudinal incision is made caudally 2 to 3 cm lateral to the midline and beginning midway between the preputial orifice and the base of the scrotum. Blunt dissection is continued through the subcutaneous connective tissue until the penis is located. The penis is exteriorized through the incision and the dorsal surface is dissected free of all connective tissue, beginning caudal to the reflection of the prepuce and continuing caudally for approximately 10 cm, exposing the tunica albuginea. A corresponding area of the linea alba is likewise prepared and the dorsal surface of the penis and the linea alba are vigorously scarified to provide a tissue bed for adhesions to develop. At this point, it is important to identify the urethral groove on the ventral surface of the penis so that it is not accidentally incorporated in the sutures that will be apposing the two scarified tissue beds. Four to six simple interrupted sutures using nonabsorbable material are preplaced 2 cm apart (**Fig. 10**). Before placing the sutures, care should be taken to ensure the sutures begin caudal to the preputial reflection or fornix and the glans penis is not protruding through the preputial orifice. Each suture should include the dorsal one third of the penis and the linea alba. Subcutaneous sutures are placed with an absorbable material, and the skin is closed with a monofilament nonabsorbable suture. This technique results in a permanent adhesion between the tunica albuginea and the line alba. Ideally, the bull should be rested for 6 weeks, to allow adhesions to develop. Bilateral caudal epididymectomy should be performed in conjunction with this technique.[4–8,10]

Penopexy 2

An alternative technique is to fix the penis to the subcutaneous tissue in the perineal area of the bull. This procedure can be done under mild sedation and caudal epidural anesthesia. The perineal area from the neck of the scrotum to the anus is prepared for aseptic surgery. A 4- to 5-cm skin incision is made over the area of the distal loop of the palpable sigmoid flexure, followed by blunt dissection, to free up and expose the ventral surface of the penis below the attachment of the retractor penis muscle (**Fig. 11**). Two to three simple interrupted sutures or an interrupted horizontal mattress suture using heavy nonabsorbable material are placed in the tunica albuginea laterally on both sides of the penis, avoiding the urethra. It is better to include the distal portion of the retractor penis muscles in the sutures, to help stabilize the penis. The sutures are then passed through the adjacent tough connective tissue found in the perineal area of the bull, and sutured (**Fig. 12**). The skin is then closed with a nonabsorbable suture material. Six weeks are allowed for adhesion formation.[6,12]

Bilateral caudal epididymectomy is also performed in conjunction with this technique.

SUMMARY

The literature contains several other surgical techniques described for teaser bull preparation. Each procedure has its advantages and disadvantages. The procedures discussed in this article are those most familiar to the authors and have worked well in the past. Other techniques reported in the literature include amputation of the penis, preputial pouch formation, creation of a preputial stenosis, and artificial corpus cavernosal thrombosis. All have been attempted at one time or another, but for various reasons they were never favored by the authors. By far the most client-requested technique is PPT. Although the procedure involves extensive surgical and tissue dissection, it is not a complicated surgery. These bulls appear to work well for a number of years. Ultimately, the method elected will be influenced by the owner, veterinarian, field facilities, size of the bull, available help, cost, and open or closed herd.

ACKNOWLEDGMENTS

The illustrations of the surgical procedures were provided by Zeke Proctor.

REFERENCES

1. O'Connor ML. Estrus detection. In: Youngquist RS, Threlfall WR, editors. Current therapy in large animal theriogenology 2. Saunders; 2007. p. 270–8.
2. Smith DR. Estrus detection. In: Morrow DA, editor. Current therapy in theriogenology 2. Saunders; 1986. p. 153–8.
3. Kunkle WE, Sand RS, et al. Effect of body condition on productivity in beef cattle: factors affecting calf crop. In: Fields MJ, Sands RS, editors. CRC Press; 1994. p. 186.
4. Claxton MS. Methods of surgical preparation of teaser bulls. Compendium Contin Educ Pract Vet 1989;11(8):974–81.
5. Wolfe DF. Surgical preparation of estrus-detector males. In: Wolfe DF, Moll HD, editors. Large animal urogenital surgery. Baltimore (MD): Williams and Wilkins; 1998. p. 327–33.
6. Gilbert RO, Fubini SL. Surgical management of specific conditions. In: Fubini SL, Ducharme NG, editors. Farm animal surgery. Saunders; 2004. p. 363–4.
7. Turner AS, McIlwraith CW. Bovine urogenital surgery. Techniques in large animal surgery. 2nd edition. Lea and Febiger; 1989. p. 289–332.
8. Hendrickson DA. Surgical techniques for teaser bull preparation. Techniques in large animal surgery. 3rd edition. Blackwell Publishing; 2007. p. 251–6.
9. Riddell MG. Prevention of intromission by estrus-detector males. In: Wolfe DF, Moll HD, editors. Large animal urogenital surgery. 2nd edition. Baltimore (MD): Williams and Williams; 1998. p. 335–43.
10. Walker DF, Vaughan JT. Bovine and equine urogenital surgery. Philadelphia: Lea and Febiger; 1980. p. 27–36.
11. Morgan G. Surgical correction of abnormalities of the reproductive organs of bulls and preparation of teaser animal. In: Youngquist RS, Threlfall WR, editors. Current therapy in large animal theriogenology 2. Saunders; 2007. p. 243–52.
12. Gill MS. Surgical techniques for preparation of teaser bulls. the veterinary clinics of North America food animal practice. Saunders; 1995. p. 123–35.
13. Belling TH. Preparation of "teaser" bull for use in beef cattle artificial insemination program. J Am Vet Med Assoc 1961;138:670.
14. Noordsy JL. Food animal surgery. 2nd edition. Lenexa (KS): Veterinary Medicine Publishing; 1989. p. 225–8.