Meeting the demand for laparoscopic artificial insemination in sheep and goats

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Abstract

Demand for laparoscopic artificial insemination in small ruminants is growing exponentially. Use of a well-designed estrus synchronization protocol allows does and ewes to be inseminated in a timely manner with good conception rates. Females are sedated with an intramuscular cocktail to facilitate inversion and laparoscopic access to their uterus for deposition of fresh or frozen semen directly into the lumen of both uterine horns.

Keywords: Laparoscopy, artificial insemination, small ruminants

Introduction

Use of assisted reproductive technologies (ART) is becoming more popular within small ruminant industries. Requests for laparoscopic artificial insemination (LAI) services increase each year as producers look for ways to advance genetics in a quick and cost-effective manner. Availability of global importation of semen from bucks and rams to the United States has further driven the demand for this surgical procedure. Laparoscopic artificial insemination allows semen to be deposited intrauterine in these 2 species with difficult to pass or impassable cervixes. The thought of performing laparoscopic surgery in small ruminants can be daunting to the veterinarian. With a basic understanding of synchronizing estrus and a review of laparoscopic equipment and procedure, a general practitioner should be able to competently add laparoscopic artificial insemination to their list of service offerings.

Estrus synchronization

A standard small ruminant controlled internal drug release (CIDR) synchronization protocol is utilized. Does and ewes have a CIDR placed on day 0. A dose of prostaglandin is given on day 11. The CIDR is removed on day 12 and a dose of PG600® (Intervet/Merck Animal Health, Madison, NJ) is given intramuscularly. Food and water are removed mid-day on day 13 and a teaser ram or buck is turned in with females. Laparoscopic artificial insemination is performed on day 14 at 48 - 54 hours after CIDR removal.

Sedation

Does and ewes are sedated prior to LAI using a combination of ketamine, xylazine, and butorphanol. Ketamine (1 mg/kg) is combined with 20 mg/ml xylazine (0.05 mg/kg) and butorphanol (0.025 mg/kg) to make a stock solution for the LAI procedure. Ewes are given intramuscularly 0.02 ml/kg whereas does respond variably to an intramuscular dose of 0.01 - 0.02 ml/kg. After 10 minutes, the sedated females are ready to be stood alongside an artificial insemination table and rolled into dorsal recumbency.

Patient preparation

Once in dorsal recumbency on the artificial insemination table, the front limbs of the female are hooked under the corresponding leg brackets at pastern joint level. Hind limbs are secured to their corresponding leg brackets using the attached rope and ratcheted down. Female's eyes are covered using a towel and halter combination or a custom-designed blindfold. A 30 x 30 cm area cranial to the udder is clipped using commercial sheep shears followed by a surgical blade. The area subsequently undergoes a surgical scrub using alternating chlorhexidine scrub-soaked gauze and sterile saline-soaked gauze.

Artificial insemination procedure

Artificial insemination table is inverted. Two stab incisions (3 - 5 cm) are made through the skin ~ 12 cm cranial to the udder on either side of midline. A teat cannula or Veress needle is inserted bluntly through 1 stab incision, puncturing into the abdominal cavity. Tubing leading from a carbon dioxide insufflator is connected and the abdomen is insufflated at 5 - 7 liters per minute. Teat cannula or Veress needle is then removed and immediately replaced with a trocar. A laparoscope is introduced via the trocar and the uterus is visualized. Semen is requested to be prepared while the second trocar is placed through the second skin stab incision. The prepared artificial insemination gun is inserted through the second trocar by an assistant and handed off to the technician performing the insemination. Needle of the artificial insemination sheath is

aligned perpendicular to the base of 1 uterine horn. A quick stab is made, presumably penetrating the uterine lumen. Assistant plunges half of the semen dose. Gun is then removed from that uterine horn and moved to the opposite horn. Similar stab technique is used to insert the needle into the second uterine horn, and the remaining semen in the straw is deposited. Insemination gun is removed, trocar stopcocks are opened, and excess carbon dioxide is drained from the abdomen. Then trocars are removed and 1 staple is placed in the skin over each incision. Blindfold is removed, and the female is rolled off the table. Ewes readily walk away whereas goats may lie sedated for up to 45 minutes.

Conflict of interest

None to declare.