

# Surgical placement of rumen cannula

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## Abstract

This presentation will focus on permanent rumen cannula surgical technique. Selection of surgical candidate, pre-operative recommendations, anesthesia and surgical techniques, source of cannulas, postoperative care, and common complications will be discussed.

**Key words:** rumen, cannula, surgery

## Presentation objectives

Upon completion of this rumen cannulation presentation the participant will be able to select the ideal surgical candidate, obtain a suitable cannula, describe the anesthesia and surgical technique, discuss the postoperative care, and list common complications.

## General considerations

The primary use for cattle fitted with a permanent rumen cannula is for research. It is used to administer medication directly into the rumen and/or take rumen samples. Cannulated cows are also used to provide fresh rumen flora for rumen transfaunation. The ideal surgical candidate is a healthy, docile, 2-to-3-year-old cow, with good feet and legs. She should be in moderate body condition. Overly fat or thin cows are not ideal. It is the goal for this animal to remain a productive member of the herd for several years.

## Source of rumen cannulas

Bar Diamond, Inc.<sup>3</sup> is a common source of rumen cannulas. To minimize leakage, a 3-inch cannula is inserted, then replaced 3-4 weeks later with a 4-inch cannula.

## Pre-surgical procedures

Restrict feed for 24 to 36 hours and water for 12 hours to decrease the volume of ingesta in the rumen. Consider the use of presurgical antibiotics and analgesics. Place the cannula with the plug removed in very hot water to make it pliable and facilitate insertion. The cannula does not require sterilization.

## Preparation of the surgical site

Clip the left paralumbar fossa from the 10<sup>th</sup> rib cranially to just past the wing of the ilium caudally, just over the dorsal midline to the bottom of the flank ventrally. Prepare the skin as for any sterile surgical procedure. The animal should remain standing with regional anesthesia provided by a proximal (preferred) or distal paravertebral nerve block with 2% lidocaine.

## Surgical technique

This procedure uses sterile surgical technique with sterile surgical gloves and sterile instruments. It is recognized the surgical field is not sterile after the rumen is opened. All attempts are made to keep the surgical field as clean as possible without

gross contamination with rumen content. The surgical site is draped with a fenestrated moisture-resistant drape and anchored to the skin with towel clamps. Measure and mark the intended incision line with needles. The dorsal or top needle should be placed in the center of the paralumbar fossa 1 inch (2.5 cm) below the transverse processes. Measure 7.5 inches (19cm) when inserting a 4-inch cannula or 6 inches (15cm) when inserting a 3-inch cannula ventrally from the top needle to the middle of the paralumbar fossa and set the second needle. Measurement is critical to minimize leakage. The skin incision is made needle to needle. The external abdominal oblique muscle is opened using a combination of sharp and blunt dissection parallel with the muscle fibers. The internal abdominal oblique and the transverses muscle are opened using a muscle spreading technique along the lines of the muscle fibers. Opening the muscles in this fashion creates a valve-like opening around the cannula and facilitates a tight and secure cannula. Puncture the peritoneum then enlarge the peritoneal incision with sharp dissection.

Grasp the dorsal sac of the rumen with two vulsellum forceps one dorsal and one ventral approximately 6 inches apart. The forceps should allow exteriorization of the rumen wall without undue tension. Expose approximately 1 to 1.5 inches (2.5 to 3.75cm) of the rumen wall through the abdominal incision. Suture the rumen to the skin. An interrupted or continuous horizontal mattress suture with #3 medium chromic gut on a cutting needle is utilized. The objective is to form a seal between the skin and the serosa of the rumen. Take care to make a continuous seal especially at the dorsal and ventral commissures of the incision without decreasing the size of the opening.

Incise the rumen wall. Ideally there will be approximately ½ inch (1 cm) of rumen wall exposed inside the skin incision. Control hemorrhage by grasping, turning, and pulling vessels as in dehorning.

Remove the cannula from the hot water bath, reach through the cannula from the outside, grasp the inner flange and pull it through the opening as if turning it inside out. Lubricate the cannula with a soapy solution and start it through the incision and into the rumen. Push the inner flange back through the cannula opening and into the rumen. Make sure the inner flange is in direct contact with the rumen wall and there is no ingesta caught between the rumen wall and the cannula. Check if you can see the cut edge of the rumen wall under the outer flange and in not folded back into the rumen. It may be necessary to run your finger along the rumen incision to ensure the cut edge of the rumen is exposed. Clean the blood and ingest from the area. Lubricate and place the plug into the cannula.<sup>1</sup>

## Postoperative care

The postoperative care of rumen cannulated cow is extremely important for the success of the procedure. Cows are administered meloxicam 0.450 mg/lb (1mg/Kg) in the rumen at the time of surgery and the following day. Most NSAIDs are not FDA-approved for use in cattle. Applicable regulations, including the

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establishment of ELUD and following appropriate withholding times, must be followed for all extra-label drug treatments. Antibiotics, Polyflex<sup>b</sup> 2-5 mg/lb (4-11mg/Kg), is administered IM for seven days beginning on the day of surgery. The cannulas are visually inspected and cleaned twice daily until healed. Temperature, pulse, and respiration are measured and recorded twice daily for the first two days and once per day for the next five days. Monitor feed intake, water intake, respiration, defecation and urination daily for the first week.

Day 7-14 of the postoperative period, monitor daily feed consumption and the surgical site for excessive swelling, tenderness and or drainage. Continue to clean the surgical area daily.

Day 14 -21 post-surgery, continue to monitor the surgical site and clean daily until healed. The 3-inch cannula may be removed, and a 4-inch cannula inserted after three weeks.

## Common complications

Hemorrhage from the incision of the rumen wall may be seen following surgery. The cause is inadequate hemorrhage control prior to inserting the cannula. If excessive, the hemorrhage can be controlled with pressure, or in severe cases clamping vessels and ligation.

Necrosis of the skin around the cannula may occur if the cannula is too tight. This is best prevented by measuring your skin incision. Treatment is difficult and may result in extended healing time and excessive rumen leakage.

Excessive leakage of rumen content may occur in late lactation due to diminished body condition. One method to decrease the leakage is to place a small inner tube around the cannula between to body wall and outer flange of the cannula. The inner tube is inflated to decrease leakage of rumen content.

## Endnotes

<sup>a</sup> Bar Diamond Inc, Parma, Idaho

<sup>b</sup> Boehringer Ingelheim, Duluth, Georgia

## References

1. Ames NK, *Noordsy's Food Animal Surgery*, 5<sup>th</sup> Edition, pp 112-113, Wiley Blackwell, Hoboken New Jersey.

