

# Quick and Easy Diagnostic Techniques

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## Abstract

Easily performed diagnostic techniques in cattle are presented. Methods to differentiate diseases and conditions of the musculoskeletal, neurologic and gastrointestinal systems are included.

## Résumé

Nous vous présenterons des techniques de diagnostic faciles à effectuer chez les bovins. Ces méthodes couvrent l'identification de maladies et de troubles de santé touchant aux systèmes musculo-squelettique et nerveux, et au tractus gastrointestinal.

## Introduction

While there is no substitute for a thorough physical examination when trying to determine what is making an animal sick, diagnostic techniques can be helpful in differentiating diseases and at times in making a prognosis. The following techniques are easily performed in any practice.

### Four-Point Nerve Block

**Indications:** Localization of lameness to the foot, anesthesia for surgery/therapy of the foot.

**Materials:** 20-gauge, 1-1/2 inch needles, lidocaine.

**Procedure:**

1. Insert the needle into the dorsal aspect of the pastern, in the groove between the proximal phalanges, just distal to the fetlock. Administer 5mL of lidocaine deep, and 5mL while pulling the needle out.
2. Repeat the previous block from the palmar/plantar aspect of the pastern, just distal to the dewclaws.
3. Palpate the nerve over the lateral aspect of the fetlock, approximately 0.75 inch (2 cm) dorsal and proximal to the dewclaw. Administer 5mL of lidocaine over the nerve.
4. Repeat the previous block on the medial side.

### Rumen Fluid Analysis

**Indications:** Rumen fluid analysis can be helpful in the diagnosis of forestomach diseases in cattle.

**Materials:** Larger samples can be obtained with an orogastric tube (preferably weighted). A mouth speculum and fluid pump are needed with this technique. Alternatively, smaller samples can be obtained via rumenocentesis with a 14-gauge, 2-inch needle and syringe. Slides, coverslips, tincture of iodine and a microscope are needed for both techniques.

**Procedure:** Fluid pumped from the orogastric tube method should be placed in an airtight container. A rumenocentesis is performed by inserting the needle through through the skin and abdominal muscles into the rumen in the lower left flank area. Fluid is then aspirated with a syringe. Local anesthesia and sedation of the animal may be needed in some cases.

**Caution:** There is a slight risk of causing peritonitis with rumenocentesis (~1%), and rumenocentesis should be performed with caution in late-pregnant females (ultrasound-guided is best). Although the amount of fluid obtained is small, this technique avoids saliva contamination that can occur from collection with an orogastric tube, and it appears to be less stressful in some cases. Once fluid is collected, it can be analyzed for color, odor, pH, protozoal species and motility, iodine and gram-staining characteristics, and chloride levels. Anorexia may cause the fluid to look darker, the pH to increase, and the number and motility of protozoa to decrease. Protozoal motility may also decrease if samples are exposed to cold or air. Iodine uptake indicates protozoa were probably alive prior to being removed from the rumen environment. A grey color, low pH, and dead or no protozoa are seen with rumen acidosis caused by grain overload. Large numbers of gram positive rods (*Lactobacilli spp*) may also be seen with rumen acidosis. Elevated rumen chloride (> 50 mEq/L) indicates an abomasal or proximal small intestinal obstruction (either functional or mechanical).

### Lumbosacral Cerebrospinal Fluid Tap

**Indications:** Animals showing clinical signs of central nervous system disorders.

**Materials:** 20-gauge 1-1/2 inch needle (calves), 18-gauge, 3-1/2 inch or longer needle (adults), sterile gloves, lidocaine, small syringe, small EDTA and plain Vacutainer® tubes, slides.

**Procedure:** Ambulatory patients can be tapped standing or restrained in lateral recumbency on a tilt table. Non-ambulatory patients should be placed in lat-

eral recumbency or in sternal recumbency in a “dog-sitting” position with the rear legs forward on either side of the animal. The pelvis needs to be straight and level. Clip, surgically prepare and block the lumbosacral area. While wearing sterile gloves, palpate the indentation of the lumbosacral junction. Insert the needle into the deepest part of the indentation, directly on midline. Keep the needle perpendicular to the spine from the side view, and straight up and down from the rear view. If bone is encountered, redirect the needle slightly cranial or caudal until the needle drops into the lumbosacral space. Advance the needle slowly until a slight “pop” is felt. The animal usually jumps slightly when the needle punctures the dura mater. CSF should flow from the needle or can be gently aspirated with a syringe. If the needle is in the lumbosacral space and advanced until bone is encountered again, back the needle out 1-2mm and try to aspirate. Place the fluid in an EDTA tube for fluid analysis and a plain tube if cultures are desired. Normal, non-traumatically obtained fluid should be perfectly clear with no discoloration, sediment or turbidity. It is best to have the sample analyzed locally as soon as possible (within one hour). If this is not possible, place half of the sample in an equal volume of 40% ethanol to preserve the cells (inform the laboratory that this has been done), or centrifuge half the sample to concentrate the cells and prepare slides to be sent with the rest of the fluid.

**Caution:** Some animals will react violently when the dura mater is punctured. Make sure animals are well restrained to prevent injuries to the animal and personnel.

### Epidural Aspirate

**Indications:** Diagnosis of lymphosarcoma of the spinal cord.

**Materials:** 20-gauge, 1-1/2 inch needle, small syringe, slides.

**Procedure:** Insert the needle into the epidural space at the lumbosacral or sacrocaudal junction. A small drop of saline can be placed in the hub of the needle to check the position of the needle. Attach the syringe and aspirate. Let the pressure off of the syringe and withdraw the needle. Spray the contents of the needle onto a slide, prepare a smear and stain with Diff-Quik. Look for lymphocytes in the absence of blood contamination for a diagnosis. Because of the predominance of lymphocytes in bovine blood, a contaminated sample can be difficult to interpret.

### Rectal Mucosal Biopsy

**Indications:** Cytology or histopathology for diagnosis of Johne’s disease.

**Materials:** Rectal biopsy instrument, sharpened needle cap, or bottle cap.

**Procedure:** Place hand wrist deep into the rectum. Secure a fold of mucosa between two fingers and pinch off a piece of the mucosa with the biopsy instrument inserted with the opposite hand. Alternatively, pinch off a piece of mucosa between thumb and needle cap. Make impression smears for acid-fast staining or place the sample in formalin for histopathology.

**Caution:** Only go in wrist deep, staying in the retroperitoneal area to prevent a full thickness biopsy and peritonitis.

### Fecal Smear

**Indications:** Diagnosis of Johne’s disease or cryptosporidiosis.

**Materials:** Acid-fast stain, slides.

**Procedure:** Smear a small amount of feces on a slide. Heat-fix the slide for Johne’s and let it air dry for cryptosporidiosis. Under 40x or 100x power, look for small, acid-fast bacilli in clumps (*Mycobacterium paratuberculosis*), or round, refractile, acid-fast protozoa (*Cryptosporidium*).

### Liver Biopsy

**Indications:** Clinical and/or laboratory evidence of liver disease.

**Materials:** Tru-Cut® biopsy needle (Travenol Laboratories, Inc., Deerfield, IL 60015), sterile gloves, lidocaine, #15 scalpel blade.

**Procedure:** The biopsy is performed in the 10th or 11th intercostal space, 3-4 inches dorsal to a line from the elbow to the tuber coxae. Clip, surgically prepare and block the biopsy site. Make a stab incision with the scalpel blade, staying closest to the cranial border of the caudal (11th or 12th) rib. Insert the biopsy needle through the stab incision, aiming straight in, or slightly cranioventral. Advance the needle through the diaphragm and into the liver. Open and close the biopsy instrument and remove it. Place the biopsy in formalin for histopathology.

**Caution:** Warn the client that the biopsy could have serious complications (severe hemorrhage and/or death), especially if the animal shows any signs of abnormal coagulation.

### Abdominocentesis

**Indications:** Characterization of ascitic fluid or diagnosis of peritonitis.

**Materials:** 18-gauge, 1-1/2 inch needle, teat cannula, lidocaine, #15 scalpel blade, gauze sponges, small EDTA Vacutainer® tube.

**Procedure:** There are four sites for abdominocentesis in the adult bovine: 1) 5cm caudal to the xiphoid and 5cm to the left of midline (left cranial quadrant); 2) and 3) anterior to the left and right anterior attachments of the udder (left and right caudal quadrants); 4) 20-30cm cranial to the right caudal quadrant (right cranial quadrant). Clip and surgically prep all sites. If using a teat cannula, block the site and make a stab incision. Using an 18-gauge needle is the easier method. If a teat cannula is used, be sure to place the cannula through a gauze sponge before inserting it into the abdomen to prevent blood contamination of the sample from the stab incision. An attempt should be made to obtain fluid from all four sites if peritonitis is suspected, since peritonitis can be localized to one site. Place the fluid in an EDTA tube. Because small amounts of fluid are usually obtained, a small EDTA tube is preferred to

prevent artifacts caused by excess EDTA. Place fluid in a plain tube for culture.

### **Lung Aspirate**

**Indications:** Obtaining fluid for culture in a patient with respiratory disease.

**Materials:** 18-gauge, 1-1/2 (calves) or 3-1/2 (adults) inch needle, syringe.

**Procedure:** Insert the needle through an intercostal space over an area where abnormal lung sounds are auscultated. Aspirate fluid and place on culturette, and into blood culture bottle.

**Caution:** Stay close to the cranial border of the ribs and beware of the heart. Fatal hemorrhage from hitting a major vessel can occur.