Diagnostic Approach to Forestomach Diseases

Dusty W. Nagy, DVM, MS, PhD

KEYWORDS

• Forestomach diseases • Rumen fluid analysis • Ultrasonography • Radiography

KEY POINTS

- A complete physical examination is the core to approaching disease of the ruminant forestomach.
- Rumen fluid analysis will help to determine the heath of the rumen and aid in diagnosis of fermentative disorders.
- Ultrasound is a useful tool in identifying motility disorders of the forestomach; however, it lacks some specificity in identification of the exact disease process. It performs best in cases of traumatic reticuloperitonitis.

Video content accompanies this article at http://www.vetfood.theclinics.com.

INTRODUCTION

Diseases of the gastrointestinal system are commonly seen by the ruminant practitioner. Forestomach disease in the ruminant animal can be divided into primary and secondary causes. Primary diseases of the forestomach are caused by disruptions in the ruminal wall and contraction cycle or by a disruption in the normal flora and fermentation processes of the rumen. Secondary disease of the reticulorumen is caused by abnormalities in rumen contraction and/or fermentation secondary to other systemic illnesses. It is important to recognize that rumen function is complex and that the contraction cycle and fermentation are deeply inter-related. As such, diseases of contraction will eventually result in fermentation abnormalities and vice versa. This article will focus on the diagnostic approach to this general group of diseases.

PATIENT HISTORY

As with all disease investigations, a good history will help build a reasonable list of differential diagnoses. Routine information such as signalment, chief complaint, initial

The author has nothing to disclose.
Department of Veterinary Medicine and Surgery, University of Missouri, College of Veterinary Medicine, 900 East Campus Drive, Columbia, MO 65211, USA
E-mail address: nagyd@missouri.edu

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clinical signs, duration of signs, onset (gradual or sudden), and progression (slow or rapid) may all be helpful. In addition, detailed information regarding the diet (type, formulation, duration of feeding, recent or historical changes in components, amount fed, or amount consumed) should be obtained. The mixed diet and potentially components should be visualized for fiber length, moisture, odor, and obvious abnormalities such as mold, spoilage, and contamination.

PHYSICAL EXAMINATION

Understanding the location, structure, and function of the forestomach is critical to the examination. The rumen occupies the left side of the abdomen immediately distal to the diaphragm to the pelvic inlet. The cardia can be found slightly above the middle of the seventh intercostal space (ICS) or eighth rib, while the dorsal blind sac of the rumen will be just cranial to the pelvis when the rumen is full.[1] The ventral sac will cross slightly over midline in the normal animal. As it progresses caudally, the ventral sac may come close to the right body wall. The reticulum is located to the left of midline cranioventrally at the level of ribs 6 to 8 immediately caudal to the diaphragm. The omasum lies to the right of midline adjacent to the rumen and reticulum and to the left of the liver under ribs 8 to 11. Evaluation of the forestomach should include an assessment of contraction rate and strength, as well as abdominal and rumen contour, and an assessment of rumen fill.

Rumenoreticular motility incorporates 3 contraction patterns responsible for mixing, eructation, and rumination.[2,3] Primary contractions are responsible for mixing of ingesta and maintaining the normal stratification of rumen contents. These start as a biphasic reticular contraction that moves ingesta dorsocaudally into the rumen. Contraction of the dorsal rumen sac while the ventral sac relaxes will force ingesta into the ventral rumen. After this, a wavelike contraction involving the caudoventral sac, caudodorsal sac, and ventral sac will move ingesta into the reticulum and cranial rumen. Particles of 2 to 4 mm or smaller will pass through the reticulo-omasal orifice at the next reticular contraction. Primary contractions occur at a rate of 50 to 100 contractions per hour.

Secondary contractions will allow for eructation of excessive gas in response to stimulation of tension receptors within the rumen. Contraction of the dorsal and caudodorsal rumen sacs will force gas cranially. At the same time, contraction of the rumenoreticular fold will inhibit ingesta from moving to the cardia. Receptors at the cardia detect the gas and open, allowing for the eructation of gas. Secondary contractions occur every 2 minutes and can be confirmed by the eructation of gas.

The presence of coarse feed in the rumen can be sensed by receptors in the reticulum, rumenoreticular fold, ruminal pillars, and esophageal groove. This stimulates the vagus nerve, causing an extrareticular contraction prior to the primary contraction cycle. During inspiration, the glottis closes, and the cardia opens, allowing a bolus of ingesta to enter the distal esophagus. This bolus is delivered to the mouth by reverse peristalsis. Rumination typically begins 30 minutes after eating and continues in 10- to 60-minute cycles. The total amount of time ruminating will depend greatly on feed type. The more course the feed, the more time cows will spend ruminating.

Physical examination of the omasum is rarely undertaken. The contractions are more regular than those of the rumenoreticulum.[1] The contractions are biphasic, with the first portion pushing ingesta into the laminae and squeezing out the fluid. The second phase is a whole-organ contraction that moves ingesta into the abomasum.

In the healthy cow, rumen contractions should be easily ausculted in the left paralumbar fossa at a rate of 2 to 3 contractions per 2 minutes. In most clinical settings, no