Diagnosis and Management of Rumen Acidosis and Bloat in Feedlots

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KEYWORDS

• Acidosis • Bloat • Feedlot • Diagnosis • Rumen

KEY POINTS

- Ruminal bloat and ruminal acidosis represent the most common digestive disorders in feedlot cattle.
- Prevention of digestive disorders focuses on proper grain adaptation, sufficient ration fiber, ionophore inclusion, and minimizing feed variation.
- Diagnosis of digestive disorders should include a thorough feed and treatment history, evaluation of animals in their home environment, and complete necropsy.
- Treatment of digestive disorders depends on the specific digestive disorder and severity. A large number of animals may be affected so triage becomes critical to minimize impacts.
- Numerous animal and operational variables determine the digestive disorder prevalence, preventive techniques, treatment options, and overall impacts of digestive disorders in the feedlot.

INTRODUCTION

Most beef cattle in North America are raised on pasture for most their lives and then are finished in a feedlot on a high-concentrate diet composed of cereal grains such as corn, wheat, or barley. Economics favor a grain-finishing production system because of several factors, including reduced cost per unit of energy and resulting improved growth efficiencies associated with grains compared with roughages; availability of grains and land; logistical, storage, and operational efficiencies of transporting and handling grain; consistency of the nutrient profile of grains; and the quality and flavor aspects of beef produced from grain-fed cattle. The rumen is remarkably adaptable to

Disclosure: The authors have nothing to disclose.
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Vet Clin Food Anim ■ (2017) ■–■
http://dx.doi.org/10.1016/j.cvfa.2017.06.005 **vetfood.theclinics.com**

digest both forage and grain, and health challenges are common to cattle in each production phase. During the traditional feedlot phase of production, digestive disorders such as acidosis and bloat can result from the rapid fermentation of grain in the rumen. Understanding contributing causes and management factors that can help mitigate these potential maladies is important in order to optimize cattle production and health.

PREVALENCE OF DIGESTIVE-RELATED MORTALITY

Compared with other causes of mortality in the feedlot, digestive-related mortalities comprise 19.5% to 28.4% of all mortalities.[1–3] An internal database was examined that represented 4,487,364 head of cattle marketed between the years 2014 and 2016 in 11 feedlots ranging from southern Idaho to southern Arizona. In these feedlots and over this time frame, digestive mortality represented 0.073% (percentage of monthly occupancy) with a range from 0.064% (2016) to 0.082% (2015).[2] In addition, digestive mortality accounted for 26.9% of all mortalities with a range of 25.3% (2016) to 28.4% (2015). This prevalence was similar to that found by Vogel and Parrott,[3] who reported an average monthly digestive mortality of 0.06% (range, 0.05%–0.08%) and digestive mortality comprising 25.9% of all mortalities. In a more recent publication by Vogel and colleagues,[1] an analysis was performed from an industry feedlot database with closeout records from 2005 to 2014. This analysis revealed that 19.5% of mortalities were digestive related, with a range of 0.039% to 0.049% monthly digestive mortality, and the average day-on-feed at death was day 99. In addition, digestive mortality tends to be positively correlated with days on feed and with the beta-agonist feeding period.[1,4,5] Anecdotally, the investigators have observed that Holsteins and cattle housed in feed yards at higher elevations are more at risk of bloat. In addition, it has been observed that cattle in feedlots north of 38° north latitude have a higher prevalence of digestive mortality.[2] This finding could be a function of genetics, weather, or other factors associated with more northern latitudes.

An analysis of mortalities diagnosed as bloat or acidosis provides the relative contribution of each diagnosis to total digestive-related mortality.[2] From the years 2014 to 2015, 96.3% of all digestive mortalities were diagnosed as bloat compared with 3.7% diagnosed as acidosis. From a mortality standpoint, the contribution of bloat to digestive-related mortality represents most cases.

RUMINAL ACIDOSIS REVIEW

Ruminal acidosis in feedlot cattle can occur when rumen osmolality increases because of accumulation of lactate, short-chain fatty acids (ie, volatile fatty acids [VFAs]), and glucose. As a result, rumen pH decreases and the body reacts in a protective fashion by reducing feed intake and reducing acid absorption.[6,7] Lactate accumulation predominates in acute acidosis from the increased rate of production of glucose and reduced use of glucose, causing lactic acid–forming bacteria to proliferate.[8] The significance of ruminal lactate concentrations in subacute and acute acidosis seems to differ.[9] Researchers have indicated that concentration of total organic acids is of greater significance in subacute acidosis[10] and lactate may be of greater significance in acute acidosis.[11] As a result of ruminal acid accumulation, the ruminal osmotic pressure exceeds that of blood, resulting in a concentration gradient and a net flux of water into the rumen. This high osmotic pressure and influx of water can cause diarrhea and dehydration as well as damage to the rumen epithelium causing rumenitis (**Fig. 1**).[6]

During repair, the rumen wall can be thickened, and ruminal papillae can be altered, resulting in parakeratosis.[12] This resulting damage to the rumen epithelial wall can