



Gastric disorders of cattle in western Rio Grande do Sul State, Brazil¹

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ABSTRACT.- Brandolt I.M.C, Maurique A.P, Damboriarena P.A., Trost M.E., Pozzobon R. & Anjos B.L. 2020. **Gastric disorders of cattle in western Rio Grande do Sul State, Brazil.** *Pesquisa Veterinária Brasileira* 40(6):417-425. Laboratório de Patologia Veterinária, Hospital Universitário Veterinário, Universidade Federal do Pampa, BR-472 Km 585, Uruguaiiana, RS 97500-970, Brazil. E-mail: anjosbl@gmail.com

A retrospective study of gastric disorders in autopsied cattle in the Western region of Rio Grande do Sul State, was performed. The exam reports of bovine necropsy of the Veterinary Pathology Laboratory, Unipampa, were analyzed in the period from 2010 to 2018. All cases in which death was primarily caused by disturbance in the gastric chambers were included. During the period evaluated, 141 cattle were necropsied. Of those, 25 had gastric disorders. Of those, 53% had alterations in the rumen, followed by abomasum (17%), involvement of two chambers (13%) and reticulum (9%). Most cases corresponded to beef cattle raised in an extensive system and most them for calf production and fattening with an average age of approximately three years. The cases occurred in farms of four different municipalities. Bullous bloat by excessive *Trifolium repens* ingestion was the gastric disturbance with the highest number of dead cattle observed in this study, especially in irrigated areas of livestock farms. Cases such as lactic acidosis, ruminal alkalosis due to excessive urea ingestion and *Baccharis coridifolia* poisoning were also important gastric disturbances in necropsied cattle, associated especially with poor management and period of scarcity of good quality fodder. Cases of *Clostridium perfringens* infection were also observed in young cattle suggesting that it is an important infectious agent in the evaluated cattle herds, also showing failures in vaccination of the herds. As observed, gastric disturbances in cattle in the western region of Rio Grande do Sul have several causes. Metabolic/toxic and infectious disturbances were important causes of mortality in the herds, inducing considerable economic losses. Based on this study, it is clear that the majority of outbreaks or isolated cases occurred due to errors in the management of the properties and the vast majority of them could have been avoided with improvements in the technical qualification of the workers and simple adjustments in the farming methods. It is also emphasized the importance of the conclusive diagnosis to control these disorders, once after the orientation to the producers, was observed significant decrease in cattle losses in the farms.

INDEX TERMS: Gastric disorders, cattle, Rio Grande do Sul, Brazil, diseases of cattle, gastric disease, veterinary pathology.

RESUMO.- [Distúrbios gástricos de bovinos no Oeste do Rio Grande do Sul.] Foi realizado estudo retrospectivo dos distúrbios gástricos em bovinos necropsiados na região Oeste

do Rio Grande do Sul. Foram analisados os relatórios de exame de necropsia de bovinos do Laboratório de Patologia Veterinária (LPV) da Universidade Federal do Pampa (Unipampa), Rio

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Grande do Sul, no período de 2010 a 2018. Foram incluídos todos os casos nos quais a morte foi causada primariamente pelo distúrbio nas câmaras gástricas. De um total de 141 bovinos necropsiados, 25 corresponderam a distúrbios gástricos. Dentre esses, 53% apresentaram alterações no rúmen, seguido de abomaso 17%, acometimento concomitante de duas câmaras 13% e retículo 9%. A maioria dos casos ocorreram em bovinos de corte criados em sistema extensivo e a maioria destinados à produção de bezerros e engorda com média de idade de aproximadamente três anos. Os casos ocorreram em propriedades rurais de quatro municípios da região Oeste do estado. O timpanismo bolhoso por ingestão excessiva de *Trifolium repens* foi o distúrbio gástrico com maior número de bovinos mortos observados nesse estudo, especialmente em propriedades com criação de animais em áreas de irrigação. Casos como acidose láctica, alcalose ruminal por intoxicação por ureia e intoxicação por *Baccharis coridifolia* também foram importantes distúrbios gástricos nos bovinos necropsiados e percebeu-se sua associação a falhas no manejo e à época de escassez de forragem de boa qualidade. Foram observados ainda casos de infecção por *Clostridium perfringens* em bovinos jovens o que sugere também tratar-se de um importante agente infeccioso nos rebanhos bovinos avaliados, demonstrando ainda falhas na vacinação dos rebanhos. Conforme observado, diversos são os distúrbios gástricos em bovinos na região Oeste do Rio Grande do Sul, tendo como importantes causas de mortalidades os distúrbios metabólicos/tóxicos e infecciosos, induzindo consideráveis perdas econômicas. Com base nesse levantamento, percebe-se que a maioria dos surtos ou casos isolados estudados ocorreram por erros no manejo nas propriedades e, na sua grande maioria, poderiam ter sido evitados com especialização da mão de obra e ajustes simples. Ressalta-se ainda a importância do diagnóstico conclusivo para controle desses distúrbios, uma vez que, após a orientação aos produtores, observou-se significativa diminuição das perdas de bovinos nas propriedades.

TERMOS DE INDEXAÇÃO: Distúrbios gástricos, bovinos, Rio Grande do Sul, Brasil, doenças de bovinos, distúrbios gástricos, patologia veterinária.

INTRODUCTION

Most of the herds in the state of Rio Grande do Sul are raised in an extensive or semi-extensive manner and are affected by diseases that are directly linked to feeding (Dalto et al. 2009, Lucena et al. 2010, Kitamura et al. 2002). Conversely, in other countries where intensive management is practiced primarily, respiratory and metabolic diseases are more prevalent (Gagea et al. 2006). Factors such as a sudden change in diet (Câmara et al. 2009), an increase in protein mineral supplements (Kitamura et al. 2002), excessive grain intake (Maruta & Ortolani 2002), and fields with a predominance of legumes (Dalto et al. 2009) compose important risk factors for the occurrence of gastric disorders in ruminants.

Gastric disorders may be associated with motility, characterized by changes in ruminal contractions (Câmara et al. 2009), metabolic disturbances, mechanical alterations, infectious agents, or an undetermined origin (Júnior et al. 2008, Cleef et al. 2009, Dalto et al. 2009, Oliveira et al. 2013). This can lead to changes in the ruminal microbiota, triggering

a series of changes in ruminal physiology and consequent systemic changes that can lead to death (Maruta & Ortolani 2002, Radostitis et al. 2007, Júnior et al. 2008, Dalto et al. 2009, Marques et al. 2018).

Knowledge of the regional diseases that affect cattle herds, especially those related to management, is necessary in order to establish primary differential diagnoses when a disease breaks out in a herd (Lucena et al. 2010). However, the veterinary diagnostic service in western Rio Grande do Sul is underutilized by professionals working in the region. Accurate data on the causes of mortality in cattle is extremely important, especially in border areas. There are some small- and medium-sized, but several large rural producers who, for the most part, raise cattle using extensive management and sometimes use crop-livestock integration systems, which require constant attention to the health status of the herds (Anjos 2018, personal communication).

In this context, the objective of this paper was to report on the main causes of gastric disorder-related cattle deaths in western Rio Grande do Sul diagnosed by the "Laboratório de Patologia Veterinária" (LPV) of the "Universidade Federal do Pampa" (Unipampa) from 2010 to 2017.

MATERIALS AND METHODS

Necropsy records of ruminants examined at the LPV-Unipampa from September 2010 to December 2018 were analyzed. The cattle diagnosed with gastric disorders were then sampled; only deaths associated with such disorders were considered. Information about the epidemiological aspects, clinical signs, macroscopic and microscopic findings obtained during laboratory evaluations, and those obtained from consultations in the region's rural areas were investigated.

RESULTS

Of the total 1,238 necropsies performed in the sector, 141 corresponded to necropsies of cattle. Twenty-five diagnoses were attributed to gastric disorders. These diseases caused lesions in one or more stomach chambers: the rumen was the most frequently affected (15/25), followed by the abomasum (5/25), concomitant involvement of two chambers (3/25), and the reticulum (2/25). The exclusive involvement of the omasum was not present in any case. The vast majority of cattle came from rural properties, in municipalities in western Rio Grande do Sul, especially Uruguaiana. Most of the cattle evaluated were adults (11/25), were destined for meat production (20/25), and were raised using extensive farming (21/25). The Braford breed (14/25) was the most common. All cases observed came from herds that received mineral supplementation, and those destined for meat production received urea-based protein salt at some point in the year. Cases of bullous white clover tympanism (*Trifolium repens*, 8/25), lactic acidosis (4/25), ruminal alkalosis due to urea poisoning (2/25) and poisonous plants (*Baccharis coridifolia*, 2/25), and necro-hemorrhagic abomasitis associated with *Clostridium perfringens* (2/25) were most common (Table 1).

All cases of tympanism occurred in the form of an outbreak in young to adult cattle of the Braford, Angus, and Hereford breeds. In these cases, the cattle were in a field with a large quantity of *T. repens* (Fig.1). The clinical signs were characterized by apathy, diarrhea, anorexia, prostration,

Table 1. Epidemiological aspect and diagnosis aspects of gastric disorders that caused the death of cattle examined by the Veterinary Pathology Laboratory, Unipampa, from October 2010 to December 2018

Case	Municipality	Age	Sex	Breed/ Production system	Diagnosis
1	Uruguaiana	Adult	Female	Holstein/confined	Right displaced Abomasum and ruminal atony
2	Uruguaiana	8 years	Female	Holstein/semi-extensive	Traumatic reticulopericarditis
3	São Borja	1,5 years	Male	Braford/extensive	Rumenitis by Lactic acidosis
4	São Borja	1,5 years	Male	Braford/extensive	Rumenitis caused by Lactic acidosis
5	São Borja	1,5 years	Male	Braford/extensive	Rumenitis caused by Lactic acidosis
6	Uruguaiana	9 years	Female	Holstein/semi-extensive	Right displaced Abomasum and Ulcerative abomasitis
7	Uruguaiana	1,5 years	Male	Braford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
8	Uruguaiana	1 years	Male	Braford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
9	Uruguaiana	1,5 years	Male	Braford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
10	Uruguaiana	1,5 years	Male	Braford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
11	Uruguaiana	1,5 years	Male	Braford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
12	Uruguaiana	1,5 years	Male	Braford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
13	Uruguaiana	Adult	Female	Braford/extensive	Ruminal alkalosis by urea toxicosis
14	Manoel Viana	5 day	Female	Angus/extensive	Necrohemorrhagic abomasitis by <i>Clostridium perfringens</i>
15	Uruguaiana	2 years	Male	Hereford/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
16	Uruguaiana	7 years	Female	Braford/extensive	Necrohemorrhagic omasitis and abomasitis by <i>Clostridium perfringens</i>
17	Uruguaiana	9 years	Male	Braford/extensive	Traumatic reticulopericarditis
18	Quaraí	1 years	Female	Braford/extensive	<i>Baccharis coridifolia</i> poisonig
19	Quaraí	1 years	Female	Braford/extensive	<i>Baccharis coridifolia</i> poisonig
20	Uruguaiana	1,5 years	Male	Holstein/extensive	Ulcerative abomasitis
21	Uruguaiana	Adult	Male	Red Angus/extensive	Ruminal alkalosis by urea toxicosis
22	Uruguaiana	2 years	Male	Simmental/intensive	Necrohemorrhagic rumenitis and reticulitis caused by Lactic acidosis
23	Uruguaiana	2 years	Female	Hereford/extensive	Mild multifocal ulcerative abomasitis
24	Uruguaiana	2 years	Male	Red Angus/extensive	Frothy bloat and ruminitis by <i>Trifolium repens</i> ingestion
25	Uruguaiana	9 years	Female	Holstein/extensive	Abomasal lymphosarcoma (Bovine enzootic leukosis)

Fig.1. *Trifolium repens* in pasture cultivated under irrigation.Fig.2. Bovine in the right lateral position with rumen sharply distended in a case of frothy bloat due to excessive ingestion of *Trifolium repens*.

recurrent tympanism, and decubitus followed by death, with an average evolution of two days. In one of the outbreaks, a bovine with an approximate one-year history of recurrent tympanism developed chronic vagal indigestion. In this case, a markedly distended rumen was observed (Fig.2) and a tympanism line was present in the esophageal mucosa (Fig.3). The ocular and oral mucous membranes were markedly congested. Areas of necrosis and focal ulcers were observed in the rumen mucosa, with diffuse peritonitis (Fig.4) and multiple abscesses in the liver. Only in the bovine with vagal indigestion was extensive focal ulcerative ruminitis observed, with vacuolization and keratinocyte necrosis. The microbiological evaluation of the abscess was positive for *Enterobacter aerogenes*.



Fig.3. Esophagus of a bovine with frothy bloat with excessive intake of *Trifolium repens*. Note the congestion of the more cranial portion of the esophageal mucosa with a sudden change in color of the more caudal portion due to rumen distension (tympanism line).



Fig.4. Bovine. Transmurular ulcerative ruminitis with peritonitis in a bovine with secondary vagal indigestion relapsing chronic cases of bullous tympanism associated with excessive ingestion of *Trifolium repens*. Yellow fibrin filaments and hemorrhagic area are observed near the rupture site.

The cases of lactic acidosis occurred in a Simental bull of approximately two years fed with corn silage, rice bran and oats in addition to pasture of oats and ryegrass which at macroscopic examination showed moderately hyperemic ruminal mucosa with areas of loss of epithelium and papillae (Fig.5) and in the form of an outbreak in Braford cattle with approximately two years of age. The herd consisted of 170 animals, of which 14 showed clinical signs, six died and three were necropsied. Approximately 15 days before prior to the appearance of clinical signs, husked grains of rice and sorghum grass silage were introduced into the cattle feed. The clinical signs were marked apathy, decreased food intake, goosebumps, severe dehydration, diarrhea, decubitus, and death with a clinical evolution of approximately 3 days. During necropsy, extensive focal lesions of erosion and focal areas of ulceration and necrosis in the rumen mucosa were observed, in addition to marked hyperemia of the pre-stomachs and abomasum. The contents of the stomach and pre-stomachs consisted of a large quantity of rice grains. Microscopically, areas of marked multifocal suppurative necrosis were observed in the rumen mucosa. Extensive areas of hydropic degeneration with loss of the epithelial lining associated with intense underlying neutrophilic infiltrates were also observed. In some of these areas of ruminal wall necrosis, there were thrombi associated with negative images of angioinvasive hyphae up to 15µm in diameter with positive periodic acid-Schiff and Grocott stains. The hyphae were wide, up to 30µm in diameter, were non septated, and had irregular branching compatible with fungi of the *Zygomycete* class.

The outbreak of Mio-mio (*B. coridifolia*) (Fig.6) resulted in 100% mortality, where 31 cattle died, two of which were necropsied. The cattle had been purchased from a property in the region and introduced to a farm in the municipality of Quaraí. The clinical signs observed were anorexia, severe dehydration, hyperthermia, polydipsia, weakness, motor incoordination, sternal and lateral decubitus, and death. During necropsy, there was ruminal content that was unusually liquid and fetid in the ruminal wall, mainly in the ventral sacs



Fig.5. Bovine. Ruminitis due to lactic acidosis due to excessive ingestion of grains. The rumen mucosa is markedly hyperemic and with marked loss of ruminal papillae.

(Fig.7); hyperemia with multifocal areas of ulceration and necrosis; and loss of ruminal papillae in some areas (Fig.8). There was also moderate transmural edema in the ruminal wall. Microscopically, there was hydropic degeneration, individual necrosis of the mucosal cells associated with vascular congestion, and vessels of the lamina propria full of inflammatory cells (neutrophils). Serious injuries were characterized by a significant decrease in the thickness of the ruminal mucosa associated with large areas of degeneration and epithelial necrosis, infiltration of neutrophils, and basophilic bacillary bacteria. In addition, in some places, large cracks were identified between the mucosa and the lamina diffusely congested in the rumen.

Both cases of ruminal alkalosis caused by excess dietary urea occurred in the form of an outbreak with high morbidity and low mortality and was associated with protein salt intake. In the first case, the outbreak occurred in a herd of bulls. The owner reported that he had started a protein salt diet 20 days

before the clinical signs appeared and did not acclimate the animals beforehand. The clinical signs reported were: ruminal distension, ammonia odor, and ruminal motility cessation, which progressed to motor incoordination, muscle tremors, tachypnea, sternal decubitus, and finally lateral decubitus and death. In the second case, the owner reported that during the outbreak, the deaths were rapid and no marked neurological clinical signs were observed besides cattle discomfort and slight rumen distension. During necropsy, no specific macroscopic lesions were observed, however, there was marked congestion of the ocular and oral mucosa and of organs such as the lung, liver, and kidneys. The content of the rumen was also darker.

C. perfringens caused abomasitis in two calves, one at 7 days and the other at 5 days of life. According to the owner, the clinical signs observed were apathy, weakness, pale mucous membranes, and severe dehydration. During necropsy, the abomasum was markedly distended with red-black focal areas (Fig.9), which were also present in the serosa of the omasum.



Fig.6. Branches of *Baccharis coridifolia* in a field with native pasture invaded by the plant.

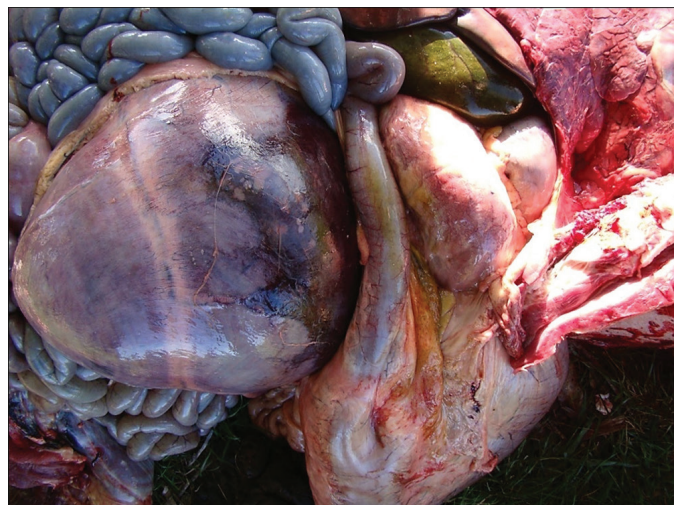


Fig.7. *Baccharis coridifolia* poisoning in a bovine. The rumen presents a focal area of transmural hemorrhage in the region of the ventral ruminal sac.



Fig.8. Bovine rumen. Marked loss of ruminal papillae with a focal area of ulceration and hemorrhage.

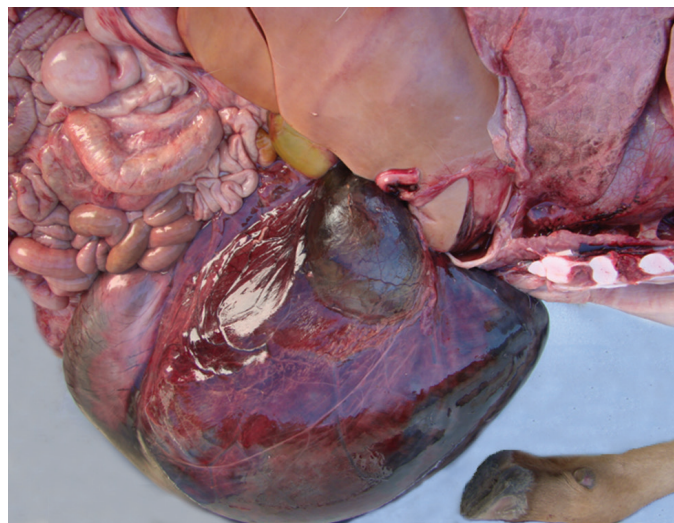


Fig.9. Bovine. Necrohemorrhagic abomasitis associated with infection by *Clostridium perfringens* in a calf. Transmural hemorrhage is noted throughout the organ.

The abomasum mucosa had multifocal areas of hemorrhage and necrosis, and the contents were markedly liquid and blackish (Fig.10). In the cranioventral portion of the lungs, focal areas of consolidation were observed. Microscopically, there were focal areas of extensive necrosis and hemorrhage in the mucosa of the abomasum with inflammatory infiltrate composed predominantly of neutrophils associated with intralesional bacillary bacterial aggregates. The diagnosis of *Clostridium* spp. was confirmed by bacterial isolation and cultivation.

The diagnosis of traumatic reticulopericarditis occurred in a Holstein cow and a Braford bull and was associated with metallic foreign bodies that compromised cardiac function. In the Holstein cow, traumatic reticulopericarditis was found in addition to peritonitis with adhesions and a large amount of fibrin, and an intrathoracic abscess close to the pericardial sac, which produced a large amount of pus when cut (Fig.11). In the Braford bull, a 15cm long metal wire was found, which had perforated the reticular wall, triggering an inflammatory reaction with the formation of an abscess 3cm in diameter, which adhered to the serosa of the pericardial sac.

DISCUSSION

The epidemiological data observed in this study revealed a high frequency of gastric disorders resulting from failures in the feeding management of herds. This factor is preponderant in the development of diseases that affect the pre-stomachs and stomach of cattle (Radostitis et al. 2007, Afonso & Mendonça 2007, Riet-Correa 2007, Dalto et al. 2009, Lucena et al. 2010).

The epidemiological and clinicopathological findings of the tympanism cases were compatible with foamy tympanism caused by the ingestion of white clover (*Trifolium repens*) (Garry 2006, Guard 2006, Dalto et al. 2009). Several rural properties in the region use this leguminous plant intercropped with grasses, such as ryegrass, to provide greater pasture

availability for cattle during the winter. One of the main triggering factors of tympanism is a cattle pasture that is more than 60% occupied by only white clover (Riet-Correa 2007). This was the case for all the outbreaks researched in this study. Similar to the literature, tympanism was characterized mainly by the presence of the tympanism line and marked rumen distension (Garry 2006, Brown et al. 2007).

For all the outbreaks, the owners reported that the main supposition of death was hematic anthrax. It is important to note that three hours after death, the body retains a large amount of gas and can seem like other diseases that cause sudden death or are hyperacute (Riet-Correa 2007). It had been recommended that all owners, if possible, reduce the grazing time of cattle in fields high in white clover.

Ruminal lactic acidosis is generally associated with lactating cows (Maruta & Ortolani 2002) and confined steers (Ogilvie 2000). The animals in this outbreak, however, were beef cattle raised in a semi-extensive manner and fed a large amount of grains that, combined with epidemiological aspects such as the presence of dominant cattle and a small amount of feeders, contributed to some cattle eating excessive quantities of grains. (Quevedo et al. 2014). There is a subclinical form of the disease, however, the acute form has clinical signs similar to those described in other studies (Maruta & Ortolani 2002, Afonso & Mendonça 2007, Júnior et al. 2008). The intralesional hyphae observed in the ruminal lesions presented a morphology similar to that of *Zygomycetes* such as *Aspergillus*, *Absidia*, *Mucor*, *Rhizopus*, or *Mortierella*. All these fungi have angioinvasive capabilities and can induce thrombosis, as observed in one of the cattle, leading to infarction in areas of the ruminal wall (Quinn et al. 2005, Ortega et al. 2010). As a form of control, the owner was instructed to temporarily suspend the supply of grains, and to gradually reintroduce it, so that the ruminal microbiota could adapt (Afonso & Mendonça 2007, Quevedo et al. 2014).

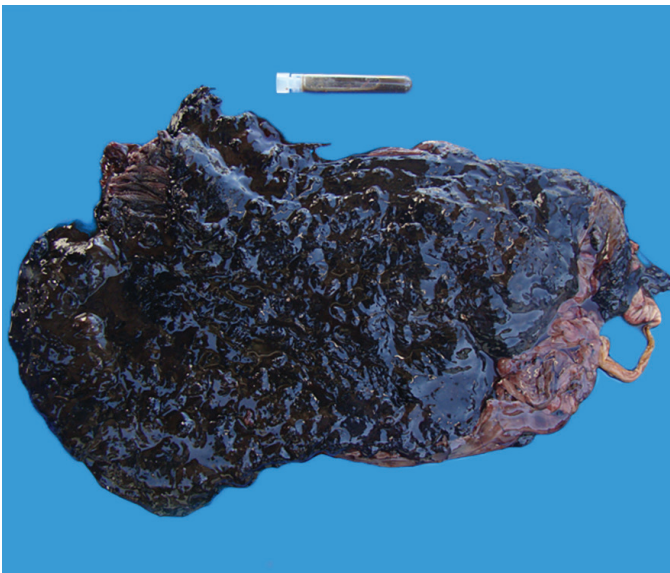


Fig.10. Bovine. Necrohemorrhagic abomasitis associated with infection by *Clostridium perfringens* in a calf. The abomasum presents necrosis and marked diffuse hemorrhage of the mucosa. Note the hemorrhagic content contained in the collection tube.

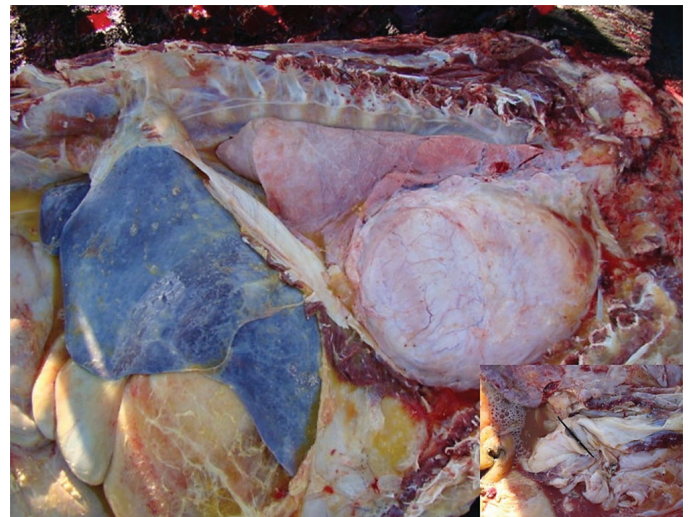


Fig.11. Bovine. Traumatic reticulopericarditis in a Holstein cow. Marked peritonitis is observed with adhesions of the pre-stomach wall and abomasum to the diaphragm, in addition to marked distension of the pericardial sac. In detail, the perforating foreign body can be seen in a fibrous path formed between the reticulum and the pericardium sac.

The outbreak of Mio-mio poisoning occurred in cattle that came from a property where there were already specimens of *Baccharis coridifolia*. Stress conditions such as fasting and thirst, and an introduction to highly-invaded pastures without prior knowledge of the plant are described as triggering factors for poisoning (Varaschin et al. 1998, Rissi et al. 2005, Almeida et al. 2009). The cattle affected by this outbreak were familiar with the plant, however, after arriving at the property they were confined for approximately two days before being introduced into the field. The animals developed clinical signs of poisoning one day after being released and deaths occurred for up to five days after that. All sick cattle died, with an index of 100% mortality. The injuries observed in this outbreak were identical to those described in the literature on natural (Tokarnia et al. 2002, Rissi et al. 2005) and experimental poisoning (Varaschin et al. 1998). Some methods have been described to induce an animal's aversion to the plant; however, they have not been entirely effective (Almeida et al. 2013). As a form of control, prophylactic measures should be adopted, such as providing adequate fodder and water to the animals before introducing them to places with the plant (Riet-Correa & Méndez 2007).

In this region, a large amount of *Baccharis megapotamica* (Anjos 2018, personal communication) has also been observed, with clinical signs and lesions similar to those seen with *B. coridifolia* poisoning (Oliveira-Filho et al. 2011, Panziera et al. 2015). However, on the properties where the outbreaks occurred in this study, this plant was not found.

The cases of ruminal alkalosis caused by an excessive intake of urea occurred in the form of an outbreak in extensively-raised beef cattle who were supplemented with protein salt. The use of non-protein nitrogen, through urea, together with mineral mixtures (protein salt) is a cost-effective alternative to providing greater amounts of protein in the diet, especially during the winter period (Kitamura et al. 2010). Alkalosis usually occurs in non-adapted animals that ingest high doses of urea in the first few days of consumption (Kitamura et al. 2002, Riet-Correa 2007), which was observed in both outbreaks in this study. According to the cattle owner in one of the outbreaks, there were dominant animals in the batch, which may have contributed to some cattle ingesting greater amounts of protein salt. A preventive measure against ruminal alkalosis is to keep the saltshakers covered, preventing them from being hit on rainy days (Riet-Correa 2007, Kitamura et al. 2010). On both properties, there were unshelled saltshakers where urea-rich salt was available. However, this factor was not associated with the poisoning in these two outbreaks. The clinical signs described in the literature are ruminal changes that can progress to incoordination, hypersensitivity, dyspnea, ruminal atony, muscle tremors, and convulsive conditions (Kitamura et al. 2002, Antonelli et al. 2004, Garry 2006), all of which were observed with more or less intensity in the cases described here, with the exception of convulsive episodes. The marked rumen distension found during necropsy in one of the cattle may be due to ruminal atony during the clinical picture. As a treatment, the rapid administration of 3 to 5 liters of weak acids (acetic acid or vinegar) orally or intra-ruminally (Kitamura et al. 2002, Riet-Correa 2007) is recommended, a measure adopted in one of the cattle committed, however, without success. As a form of prevention, urea should be introduced gradually into the

diet, so that the ruminal microbiota can adapt (Riet-Correa 2007, Kitamura et al. 2010).

The abomasitis caused by *Clostridium perfringens* type A occurred in two calves at seven and five days of life. This bacterium is commonly associated with enteritis in newborn cattle (Songer & Miskimins 2005). The disease is characterized by a rapid onset of abomasal tympanism, abdominal pain, and hemorrhagic diarrhea (Schlegel et al. 2012). For the bovines of this study, no characteristic signs of the disease were observed, which may be due to the rapid death of the animal since the disease usually presents itself in the hyperacute form (Schlegel et al. 2012). Macroscopic lesions were similar to those described in the literature, characterized mainly by necrotizing and hemorrhagic inflammation of the abomasum mucosa (Songer & Miskimins 2005, Schlegel et al. 2012). In some cases, similar lesions could be seen in the rumen, reticulum, and duodenum. These macroscopic findings are characteristic of abomasitis caused by *C. perfringens* type A, and the visualization of intralesional bacillary bacteria together with the isolation of the agent through bacterial culture are sufficient to establish the disease diagnosis (Songer & Miskimins 2005, Schlegel et al. 2012). As a form of prevention, vaccination of the entire herd is recommended.

Traumatic reticulopericarditis is more frequent in dairy cattle, as they are more predisposed to risk factors such as receiving food in a trough and being managed close to fences and corrals with the risk of encountering sharp objects (Marques et al. 1990, Oliveira et al. 2013). In this study, only one bovine was of dairy ability. The Braford bull was in confinement at a semen sale center and received feed in the trough daily. The variation in the clinical picture demonstrates that it may be acute or the animal may adapt, triggering a chronic condition (Marques et al. 1990). The pathological findings in this study were characteristic of chronicity, with adhesions, the presence of varying degrees of fibrin, purulent secretions over the reticulum and adjacent organs, and a pleural effusion and abscesses in both the abdominal and thoracic cavities near the pericardial sac (Marques et al. 1990, Oliveira et al. 2013). These injuries are associated with the size and location of the sharp foreign body, which, depending on the inflammatory process, often cannot even be found (Mendes et al. 2009). In both cases, it was possible to detect the foreign body, which had pierced the wall of the reticulum and diaphragm and reached the pericardial sac. The use of a metal detector can be a good alternative for an early diagnosis, improving treatment possibilities, however the best form of control is through prophylactic measures with attention to the feeding management of cattle (Mendes et al. 2009, Marques et al. 2018).

Based on the present study, the need for joint diagnostic action to apply more effective measures to control these conditions is clear. The need for implementing diagnostic methods and frequently monitoring pathological conditions that occur in the region is also evident.

Raising and handling dairy and beef herds still requires very simple techniques with low investment in new technologies and modernization of the rearing system. Thus, the present work provides significant evidence for necessary improvements in health management, focusing on food management as a major factor in the development of gastric disorders responsible for substantial economic losses in the region. It also emphasizes

the dangerous consequences of excessive ingestion of *Trifolium repens* and urea and poisoning by *B. coridifolia* due to errors in the handling of animals resulting in high mortality rates.

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