



## Acute Ruminal Drinking in a 2-week old Male Friesian Crossbred Calf

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### ABSTRACT

Post-mortem examination was carried out on a 2-week old male Friesian crossbred calf to determine the cause of death. The body condition of the calf was fair with pale mucous membranes. There was petechial to ecchymotic epicardial haemorrhages with mild hydroperitoneum and hepatomegaly. The enlarged rumen contained a large amount of white offensive rancid-smelling curdled milk mixed with watery content while the abomasum contained some sand sediment. A diagnosis of acute ruminal drinking was made based on the calf's age, reportedly feeding entirely on milk ration, and the presence of a large amount of curdled milk in the rumen. Early diagnosis and the treatment of underlying pathological conditions, correction of predisposing management practices, and rumenostomy are some of the ante-mortem ways to combat and improve the prognosis of the condition in affected calves.

**Keywords:** Ruminal drinking; Friesian calf; Post mortem; Diagnosis

### INTRODUCTION

Oesophageal groove dysfunction in calves entirely on the milk diet might lead to the spillage of the ingested milk into the reticulo-rumen instead of directly into the abomasum resulting in a condition known as ruminal drinking (RD) or reticulo-rumen milk accumulation (Dirr and Dirksen, 1989; Adetunji *et al.*, 2016). The condition may predispose affected calves to fermentative ruminal acidosis (Gentile *et al.*, 2004), including rumen mucosal ulceration and necrosis, maldigestion, and recurrent tympany or bloat (Gentile, 2004; Adetunji *et al.*, 2016; Kaba *et al.*, 2018). Despite reports of RD cases in calves, there is a paucity of information on its exact pathogenesis (Breukink *et al.*, 1988). However, the milk spilled into the rumen is rapidly fermented to lactic acid and other volatile fatty acids (VFAs) by resident bacteria to lower the pH of the rumen (Longenbach and Heinrichs, 1998) significantly as well as give off the foul-stale-sour odour (Garry, 2009). Sudden death has been reported in RD following severe nutritional imbalance with the resultant systemic metabolic acidosis and complications by opportunistic micro-organisms due to the ruminal pH-altered gut microbiota balance (Loernz, 2004). The resultant fermentative ruminal acidosis in affected calves could either be acute or chronic, with the acute form usually superimposed on another pre-existent pathological condition (El-Ashker *et al.*, 2012). However, in the chronic form, pre-existing disease condition does not exist (Stocker *et al.*, 1999). Usually, the chronic form of fermentative ruminal acidosis occurs due to stressful conditions associated with transportation, dehorning, perinatal maladjustment syndrome

weakness, and introduction to new environments or new groupings (Stocker *et al.*, 1999). Nevertheless, inappetence, unthriftiness, severe growth retardation, recurrent tympani, and abdominal distension with a long dry hair coat and sticky clay-like faeces characterize the chronic form (Breukink *et al.*, 1988).

Ruminal drinking has been extensively reported (Breukink *et al.*, 1988; Dirk and Dirksen, 1989; El-Ashker *et al.*, 2012; Adetunji *et al.*, 2016). However, there exists a paucity of information concerning the condition in Nigeria. Therefore, we report a case of RD in a 2-week old Friesian-cross calf.

### CASE PRESENTATION

#### Case history

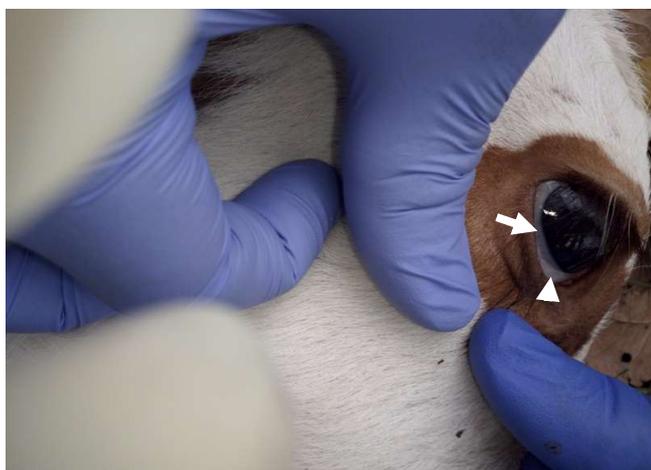
A 2-week old Friesian crossbred (Friesian x local breed) male calf reportedly died on a cattle ranch. The Post-mortem Unit of the Department of Veterinary Pathology, University of Abuja, Abuja, Nigeria, was immediately contacted to perform a post-mortem examination on the carcass. The animal handler reported that the calf normally suckles the dam before it goes out and whenever it comes back with the other cattle from grazing within the immediate vicinity of the ranch daily. The animal handler also reported that the calf showed no visible sign of illness until it suddenly became recumbent and died. The cow and the calf had no vaccination and treatment history. Similarly, the animal handler reported that the dam usually feed on some Wheat offal /farm wastes mixture with ample water supply from a borehole whenever stabled.

### Post-mortem Examination and Findings

A post-mortem examination conducted according to the protocol described by King *et al.* (2013) revealed that the carcass was fair in body condition what was the BCS? with pale ocular and oral mucous membranes (Figure 1). The medial lobe of the right lung showed focal hepatization with focal petechial to ecchymotic epicardial haemorrhages (Figure 2). The peritoneum contained about 25 ml of blood-tinged to brownish fluid (Figure 3), whereas the liver was markedly congested and slightly enlarged. The enlarged rumen contained a large amount of whitish offensive rancid-stale-sour curdled milk mixed with watery content within it (Figure 4). The mucosa of the rumen only showed multifocal areas of congestion.

### Diagnosis

The clinical history and the post-mortem findings formed the basis for the acute RD diagnosis with ruminal atony-induced ruminal tympany, grain overload-induced ruminal acidosis, and agonal myocardial ischaemia-induced epicardial haemorrhage as possible differentials.



**Figure 1:** Photograph of the head of a 2-week old male Friesian crossbred calf following post mortem showing the pale ocular mucus membrane (arrows).

### DISCUSSION

The presence of a large amount of the offensive rancid-stale-sour curdled milk mixed with watery content within the rumen of the 2-week old Friesian carcass, entirely on milk ration, might have indicated oesophageal groove dysfunction. Such oesophageal groove dysfunction usually results in the inability to deliver the consumed milk into the calf's abomasum entirely directly, often associated with RD.

The oesophageal groove dysfunction notwithstanding, about 10% of ingested milk often reaches the reticulo-rumen in healthy calves due to the incomplete closure of the groove (Ruckebusch and Kay, 1971) before being actively transported to the abomasum via the omasum uneventfully within three hours post milk consumption (Lateur-Rowet and Breukink, 1983). Besides, overfeeding far beyond the capacity of the abomasum could also predispose to milk backflow into the reticulo-rumen even as milk reflux from the abomasum to the reticulo-rumen is, sometimes, a physiological process for healthy ruminal microflora

development and establishment specific to that particular calf (Garry and McConnel, 2020).



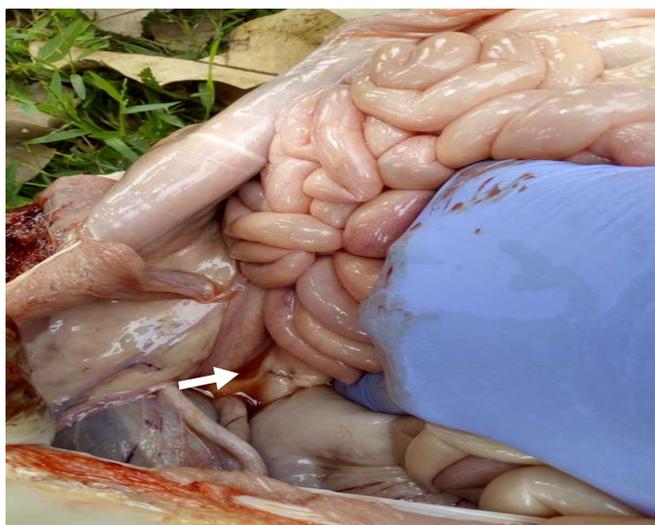
**Figure 2:** Photograph of the heart of a 2-week old male Friesian crossbred calf following post mortem showing the focal epicardial haemorrhage (scissors head).

The curdling of the milk with the foul-stale-sour odour upon the rumen's opening might have been due to bacterial fermentation of the milk leading to lactic acid and other VFAs production to lower the rumen pH and cause ruminal acidosis and bloat (Lorenz, 2015).

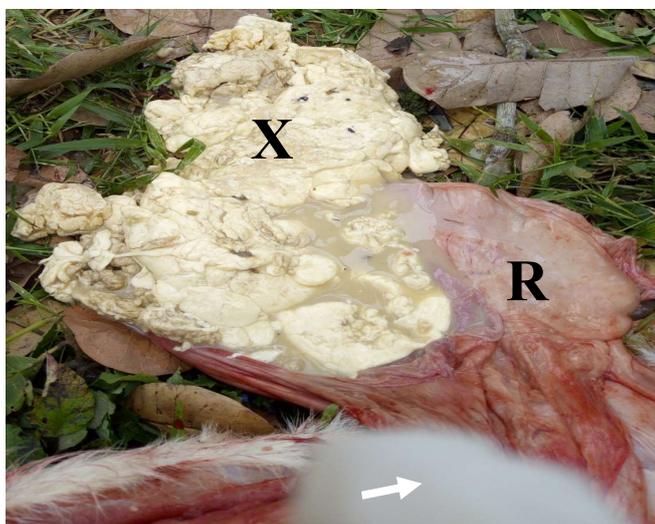
However, no bacterial culture of the rumen content took place in the present case. The sudden death is consistent with an earlier report (Lorenz, 2004). The post-mortem examination did not reveal the presence of any underlying disease condition. Similarly, the calf never left its pen or was subjected to any form of transportation stress predispose it to the condition, according to the handler. However, milk gulping or rapid milk consumption, instead of the suckling, and irregular feeding time might have predisposed the calf to the condition, according to Gentile (2004).

The pale mucous membranes, indicative of anaemia, might have been due to insufficient iron content of the consumed milk (Bhardwaj *et al.*, 2010). Although the observed epicardial haemorrhage and congestive hepatomegaly indicated vascular compromise that might be associated with the condition in the affected calf, the epicardial haemorrhages could have also been due to agonal death (Whitenack and Johnson, 1986). The presence of some sand within the reticulum might be due to curiosity on the part of the affected calf. This is because calves are known to explore their environments by tasting every object within reach outside hunger or attempt to stimulate rumen development in the absence of forage or grains (Thomas, 2019; Lewis, 2020).

Addressing the secondary underlying cause of the condition is usually the first line of treatment in acute cases in affected calves, where possible. Repeated rumen lavage with 1 – 2 L of warm water to increase rumen pH can mitigate the condition (Gentile, 2004), including the training of calves to suckle herdsmen's fingers first before the milk (Breukink *et al.*, 1988).



**Figure 3:** Photograph of the abdominal cavity of a 2-week old male Friesian crossbred calf following post mortem showing the blood-tinged to brownish fluid (arrow).



**Figure 4:** Photograph of the rumen of a 2-week old male Friesian crossbred calf following post mortem showing the white curdled milk (X) within the watery content (arrow) of the rumen (R).

However, the abrupt weaning of calves unto hay and concentrates should curb the calves' condition that fails to respond to these measures (Breukink *et al.*, 1988). Severe chronic cases of associated bloat might require rumenostomy (Kaba *et al.*, 2018). Ruminal drinking is a recognizable and preventable condition on cattle farms with early diagnosis and treatment or appropriate management practices. However, the differential diagnosis of RD might be the sudden onset of ruminal atony-induced ruminal tympany resulting from anaphylaxis or grain overload (Constable, 2015) as well as ruminal acidosis associated with grain overload. Nevertheless, grain overload complications occur more in much older cattle on dry feeds and forage, unlike RD in calves entirely on milk diets (Gentile *et al.*, 2004). The reported epicardial haemorrhage could also be seen in agonal death due to myocardial ischaemia, according to Edston (1997).

## Conclusion

The present report showed the presence of RD in a 2-week old calf on a cattle ranch to highlight the need for vigilance towards the predisposing factors of the condition and early diagnosis for appropriate treatment in ensuring more favourable outcomes.

## Conflict of Interest

The authors declare that they do not have any conflict of interest.

## Author's Contribution

SEA, NAS, ISI, and OZT performed the post-mortem examination and SEA, NAS, ISI, OZT, and SAE interpreted the results, including the manuscript's development and vetting for submission.

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