Scientific Works. Series C. Veterinary Medicine. Vol. LXIX (2), 2023
ISSN 2065-1295; ISSN 2343-9394 (CD-ROM); ISSN 2067-3663 (Online); ISSN-L 2065-1295

THE APPEARANCE OF DIARRHEA IN THE NEONATAL CALF PERIOD - CASE STUDY

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Abstract

Neonatal calf diarrhea syndrome, also known as calf scours or enteritis, is a common condition that affects young calves, particularly those between one and three weeks of age. This syndrome has a multifactorial etiology and has a negative impact on farm economics and welfare. The severity of diarrhea can range from mild to severe, and it can lead to dehydration, electrolyte imbalances, and even death in severe cases. Early recognition and prompt treatment of diarrhea are essential to minimize the negative impact on calf health and productivity. This study was conducted on a private farm at the request of the owner on a 3-week-old female in October 2022. The clinical examination was requested due to changes in the general condition such as apathy, uncontrollable diarrhea, dehydration, colic syndrome, inappetence, high body temperature. This abstract provides an overview of the causes and management of diarrhea in neonates, including prevention strategies and treatment options. Understanding the appearance of diarrhea in the neonatal period is crucial for healthcare providers and caregivers to ensure the optimal health and well-being of newborns.

Key words: *cattle, diarrhea, therapy*

INTRODUCTION

Neonatal calf diarrhea syndrome, also known as calf scours or enteritis, is a common condition that affects young calves, particularly those between one and three weeks of age. (Heinrichs, 2015)

This syndrome has a multifactorial etiology and has a negative impact on farm economics and welfare.The origin of neonatal diarrhea is complicated and the subsequent course and severity of diarrhea are affected by the pathogens present, the condition general and calf susceptibility, quality environment (stress factors), protection against weather conditions, the quality of colostrum management, nutrition (insufficient or inadequate nutrition) and the general level of prevention measures implemented on a farm (Gulliksen et al., 2009).

The severity of diarrhea in newborn calves can vary depending on the underlying cause and the individual calf's immune status and overall health. Mild cases of diarrhea may only involve a few loose or watery stools, while severe cases may result in profuse diarrhea, dehydration, and electrolyte imbalances that can be life-threatening (Torres et al., 2014). Diarrhea can also have negative effects on calf growth and development, including reduced weight gain, delayed weaning, and decreased feed efficiency, which can result in significant economic losses for farmers and producers (Cho & Yoon, 2014).

Table 1. Receptivity of cattle according to age (N. Sattler, 2006)

Age	The pathogen involved
0-4 days	*Escherichia coli, Clostridium perfringens*
4-14 days	Rotavirus
5-15 days	*Clostridium*, type A, B and C
5-10 days	*Coronavirus*
4-30 days	*Cryptosporidium* spp.
5-40 days	*Salmonella* spp.
14-30 days	Parvovirus Rotavirus BVD
+ 18 days	Coccidia

The severity of diarrhea can be influenced by various factors, including the calf's age, management practices, environmental conditions, and infectious agents (various

viruses, bacteria and parasites, including rotaviruses, coronaviruses, *Escherichia coli*, *Salmonella* spp. and *Cryptosporidium*, the most common and economically important being *Salmonella* and *E. coli* species) (Brown & Baker, 2018).

Clinically, diarrhea represents an excretion of fecal matter that contains excessive amounts of water. The consistency varies depending on the severity, so the feces can look pasty to liquid, presenting a whitish, greenish, yellowish color (Lorenz et al., 2011).

This is accompanied by a series of symptoms, such as: loss of appetite, dehydration, hypothermia, prolonged recumbency, prostration, fever (McGuirik et al., 2007).

Cattle diarrhea can be classified into alimentary and microbial (bacterial, viral and parasitic) which require a mandatory differential diagnosis (Thompson et al., 2012).

The differential diagnosis is made against infectious causes which include bacterial infections, viral infections, protozoal infection, non-infection causes (dietary factors, passive transfer failure, intestinal obstruction, metabolic disorders, medication or toxic exposure) and other condition (umbilical infections or hypothermic stress) (Meale et al., 2020).

To establish a definitive diagnosis, a thorough history, clinical examination, and diagnostic testing should be conducted (Gulliksen, et.al., 2009).

The therapeutic approach for neonatal diarrhea in cattle consisted in a combination of supportive care, fluid therapy, nutritional support, and targeted treatment based on the identified cause. Thus, this can include parenteral rehydration, quality nutritional support, antibiotic therapy, antiparasitic medication, improving hygiene and well-being conditions (Pardon et al., 2013).

MATERIALS AND METHODS

This study was conducted on a private farm at the request of the owner on a 3-week-old female in October 2022. The farm was visited for 5 consecutive days, in October 2022.

Personnel walked through the calf pen and visually assessed the health of the calf. This farm is using antimicrobials as treatment for disease in calves and not for prophylactic or metaphylactic use.

Figure 1. Cattle female, 3-week-old

The clinical examination was requested due to changes in the general condition such as apathy, uncontrollable yellow diarrhea, severe dehydration, colic syndrome, inappetence, fever, prolonged lateral decubitus. To establish the diagnosis of diarrhea and determine the underlying cause (etiology) in calves faecal samples were collected from the animal.

The faecal sample was first evaluated macroscopically, and its color and consistency were recorded; than we used VetExpert Rapid Test BoviD-4 Ag to identify the existence of the pathogen that caused the condition.

Test BoviD-4 Ag is a quadruple test for the differentiation of pathogens that cause diarrhea in calves based on the immunochromatographic method, which allows to determine with great precision the presence of *Cryptosporidium*, rotavirus, coronavirus and *E. coli* in the feces of calves.

The therapy was administrated for 5 days thus, in the first day we administered 2 l of Ringer's lactate solution 4 vials, Beformed (vitamin B_1, vitamin B_2, vitamin B_6, vitamin B_{12}, niacin and D-panthenol) in a dose of 15 ml/animal, Buscopan (butyl scopolamine and metamizole sodium) in a dose of 2 ml/animal and

Gabbrovet solution (paromomycin sulfate), in a dose of 2.5 ml/10 kg.

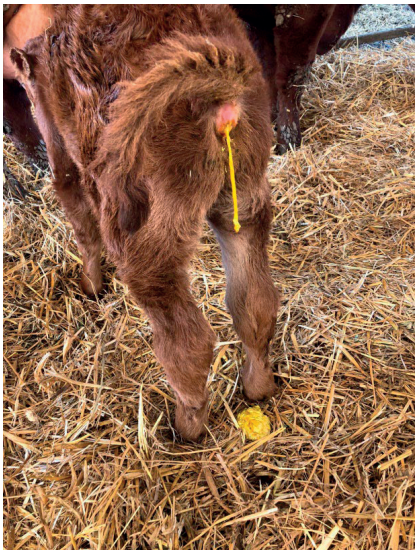

Figure 2. Female calf excreting yellow faecal, liquid consistency

On the second day of treatment, we administered 2 l of Ringer's lactate solution 4 vials, glucose 20 ml, Beformed (vitamin B_1, vitamin B_2, vitamin B_6, vitamin B_{12}, niacin and D-panthenol) in a dose of 10 ml/ animal, Buscopan (butyl scopolamine and metamizole sodium) in a dose of 2 ml/ animal and Gabbrovet solution (paromomycin sulfate), in a dose of 1 ml/10 kg.

On the third day of treatment, we administered 1 l intravenous infusion, composed of Ringer's lactate solution 2 vials, glucose 10 ml, Beformed (vitamin B_1, vitamin B_2, vitamin B_6, vitamin B_{12}, niacin and D-panthenol) in a dose of 5 ml/animal, Buscopan (butyl scopolamine and metamizole sodium) in a dose of 2 ml/animal and Gabbrovet solution (paromomycin sulfate), in a dose of 1 ml /10 kg. In the following 2 days, were administrated Beformed in a dose of 5 ml/ animal and Gabbrovet (paromomycin sulfate) 0.5 ml/10 kg.

RESULTS AND DISCUSSIONS

During the clinical evaluation of all the periods of the disease, it was found that the health of the calf improved and the symptoms have dimmed after the third day of treatment.

In the following two days, we continued the monitoring and administration of the supportive treatment to avoid any recurrence of the disease.

The result of the rapid test was negative for the pathogens included in the kit, thus the etiological agent causing this condition was not elucidated.

In a previous study, 108 cases of diarrhea in calves were analyzed retrospectively, the study classified the diarrhea manifested in cattle into two groups: with an infectious cause and with a non-infectious cause, compared to our case where the animal presented a non-infectious diarrhea (Cho YI et al., 2013).

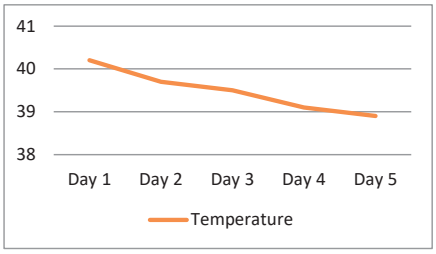

Figure 3. Body temperature monitoring for 5 days consistency

In the specialty literature it was specified that the 2007 National Animal Health Monitoring System (NAHMS) for US dairy reported that approximately 57% of calf mortality at weaning was caused by diarrhea and the majority of cases occurred in calves less than 1 month old (Cho YI et al., 2013). A similar mortality rate (53.4%) for dairy calves due to calf diarrhea was recently reported in Korea. The economic loss associated with calf death in Norway where calf production is 280,000 heads per year was estimated to be approximately 10 million US dollars in 2006 (Cho YI et al., 2013).

Nutrition has a significant role in the occurrence of this pathology, thus it was found that alimentary diarrhea is frequent especially in the case of artificial breastfeeding or is associated with excessive consumption of milk, but characterized by the absence of fever (Heinrichs, 2015).

Previous studies showed that in order to evaluate the infectious etiologies linked to calf diarrhea 165 cow ranches provided a total of 199 and 245 faecal samples from healthy and

diarrheic calves, respectively (Cho et al., 2013; 2014).

Figure 4. Result of faecal sample consistency

Samples were tested by a panel of multiplex PCR assays for 11 enteric pathogens: bovine rotavirus group A (BRV-A), bovine coronavirus (BCoV), bovine viral diarrhea virus (BVDV), bovine enterovirus (BEV), bovine norovirus (BNoV), Nebovirus, bovine torovirus (BToV) *Salmonella* spp., *Escherichia coli*, *Clostridium perfringens* with β-toxin gene and *Cryptosporidium parvum*. Multiple infections were present in more than half of the fecal samples from the diarrheic calves (Cho, 2013; Vandenhole, 2019).

Statistically, calf diarrhea was strongly linked with BRV-A, BCoV, BNoV, nebovirus, *Salmonella* spp., *E. coli*, and *C. parvum* (Browin & Baker, 2018).

C. parvum and BRV-A were identified as the most frequently occurring enteric pathogens for calf diarrhea, with detection rates of 33.7% and 27.1%, respectively, and odds ratios of 173 and 79.9, respectively. Unexpectedly, BNoV and Nebovirus were often found in diarrheic calves, pointing to the possibility that these viruses may play a substantial role in calf diarrhea (Meale, 2020).

CONCLUSIONS

Diarrhea is a common problem in newborn calves, and its appearance is typically characterized by the excretion of fecal matter with excessive water content.

Diarrhea in newborn calves can have multiple causes, including infectious and non-infectious factors.

Early intervention and appropriate treatment can lead to positive outcomes.

Monitoring the calf's progress, including improvements in symptoms and overall health, is important for evaluating the effectiveness of the therapeutic approach.

In the present case, symptomatic treatment was used to improve the symptoms, without a definite diagnosis.

Prevention strategies are the key in managing diarrhea in newborn calves and this includes proper colostrum management to ensure adequate passive transfer of antibodies, maintaining a clean and hygienic environment, implementing good nutrition and feeding practices, and adhering to biosecurity measures.

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