

Scouring the Depths: Unraveling the Complexities of Calf Diarrhea

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Scours in beef cattle, a syndrome manifesting as diarrhea, presents a significant challenge in animal health, as highlighted by the USDA's report of 18.9% of young beef cattle illnesses being attributed to digestive issues, including a worrying 16.3% calf mortality post-weaning (USDA, 2021). This condition poses immediate health risks and leads to long-term consequences, such as a 4% reduction in weaning weights (Anderson et al., 2003).

At the heart of this issue are various pathogens, including Bovine Coronavirus (BCoV), Bovine Rotavirus (BRV), Bovine Viral Diarrhea Virus (BVDV), and several bacterial infections like Salmonella, E. Coli, and Clostridium species, along with the protozoa Cryptosporidium spp. (Muktar et al., 2015). The intestinal damage triggered by these pathogens significantly hampers the animal's ability to absorb nutrients, leading to dehydration, electrolyte imbalances, and, in severe cases, death (Stoltenow and Vince, NDSU AS-776).

Scours varies across individual animals and infections. The syndrome's complexity is further evidenced in findings from The University of Missouri's Veterinary Medical Diagnostic Laboratory, with 42.1% of beef calves' digestive lesions classified as enteritis (Rivero et al., 2022).

Understanding the Infectious Etiology of Scours

Major and Emerging Pathogens

As reviewed by Cho and Yoon (2014), scours in beef cow-calf operations can be caused by 10 different enteric pathogens. Emerging pathogens of note are Bovine Caliciviruses and Bovine Torovirus (BToV). Notably, scours affect newborn or unweaned calves and feedlot cattle.

Clinical Presentation of Viral Pathogens

Rotavirus: The NSP4 (nonstructural glycoprotein 4) of rotavirus acts as an enterotoxin, disrupting cellular homeostasis by increasing cytoplasmic calcium ion levels. This leads to lesions and drastic nutrient and water absorption changes, culminating in scours.

BCoV: This virus can present in three distinct clinical syndromes: calf diarrhea, winter dysentery, and as part of bovine respiratory disease (BRD). All begins in the small intestine. A BCoV infection may cause a fever ranging from 103.1–104.4°F within 4–5 days post-infection, followed by fluctuations in blood lymphocytes and a spike in fecal antibodies (Ridpath et al., 2020).

BVDV: Symptoms include low-grade fevers, leukopenia, anorexia, diarrhea, depression, reduced milk production, oral ulcerations, hemorrhagic syndrome, and lymphopenia, often

leading to secondary infections.

Clinical Presentation of Bacterial Pathogens

Salmonella: Salmonella typically causes scours characterized by watery, mucoid diarrhea with fibrin and blood in calves. The bacteria initially invade the intestinal mucosa and lymphoid tissues, leading to systemic disease.

E. coli: This bacterium targets the distal portion of the small intestine, where its adhesion leads to villous atrophy and cell loss. The resulting endotoxins increase chloride secretion into the gut, leading to diarrhea.

Clostridium perfringens: Though less common, the toxins produced by this bacterium cause cell lysis through phospholipid membrane hydrolysis, resulting in cramping and diarrhea in calves.

Mitigating Scours

Antibiotics and Vaccination

While antibiotics are a typical response to bacterial causes of scours, vaccination holds the key to prevention, especially in young calves. However, challenges remain, such as the mismatch between circulating strains of pathogens like BrV and the available vaccines. This issue, as noted by Maier et al. (2022), often leads to vaccine failure. Despite this, biotechnological advancements pave the way for more effective strain classification and development of strategic vaccines, offering hope for improved control measures.

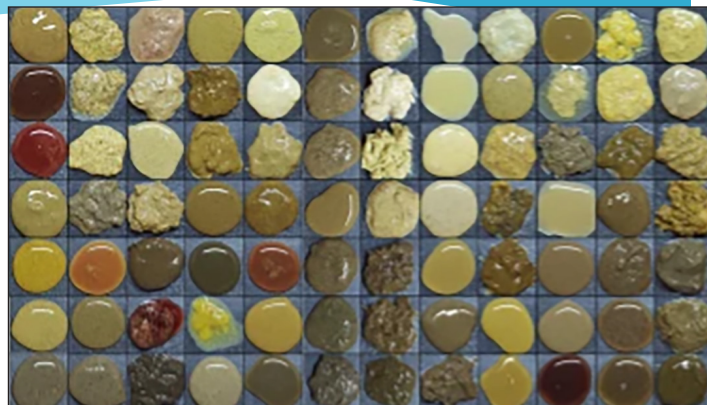
Enhancing Colostrum Quality

The maternal plane of nutrition plays a critical role in providing high-quality colostrum, essential for neonatal calf immunity. A key indicator of colostrum quality is its total protein content, which is rich in vital immunoglobulins. While timely vaccinations for dams are essential, the prompt consumption of colostrum by calves is crucial for successful passive immunity transfer. Ensuring calves receive colostrum as early as possible is a cornerstone in preventing scours.

Emerging Technologies and Practices

Recent studies have explored novel methods to combat scours. For example, lactoferrin, an iron-binding protein found in colostrum, has been investigated for its role in bacterial proliferation control. Pempek et al. (2019) supplemented scouring calves with lactoferrin. They observed a tendency to reduce diarrhea two weeks post-diagnosis, though it did not significantly affect long-term mortality.

Additionally, groundbreaking research by Kim et al. (2021) introduced fecal transplants as a potential method to reduce



▲ **Figure 1.** Different Visual Observations Of Scours Or Diarrhea In Calves, Adapted From Kim et al., 2021.

scours. In their study, calves that underwent fecal transplants showed reduced scours in the first six weeks (based on visual assessments) and increased weight at 12 and 24 months of age, with heavier carcass weights at slaughter. This approach opens new avenues for managing gut health and improving overall calf performance.

Conclusion: Combating Scours for a Healthier Future in Beef Cattle

In conclusion, scours in beef cattle, a multifaceted clinical syndrome, remains a significant challenge in animal husbandry. Its impact ranges from immediate health concerns to long-term repercussions on cattle growth and farm economics. The complexity of this condition, stemming from various enteric pathogens, underscores the need for a comprehensive and nuanced approach to prevention and treatment.

Effective management of scours involves a blend of traditional practices and innovative techniques. The role of vaccines, while crucial, is hindered by the evolving nature of pathogens, necessitating ongoing research and development for more effective solutions. Antibiotics continue to play a role in bacterial cases, but their use must be judicious to avoid resistance issues.

A critical factor in the fight against scours is enhancing colostrum quality through proper maternal nutrition and management. The transfer of passive immunity via colostrum is paramount in safeguarding neonatal calves against this debilitating condition. Emerging technologies, such as lactoferrin supplements and fecal transplants, offer promising new avenues for mitigating scours, with studies showing potential benefits in reducing the incidence and improving overall animal health and growth.

This article has highlighted the diverse etiology of scours, the clinical presentations of the various pathogens involved, and the multiple strategies for mitigating this condition. As we continue to advance our understanding through science and innovation, the agricultural community remains committed to improving the health and well-being of beef cattle. By embracing proven methods and novel research, we can look forward to a future where scours are a manageable, if not negligible, concern in beef cattle rearing, faithfully serving the industry through science and heart.

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