

## Calf diarrhoea: Serious concern for calf mortality

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Calf diarrhea, also known as calf scours, is a common and concerning condition affecting young calves, particularly in the livestock industry. It is one of the major causes of death in dairy calves and attribute approximately 57% of calf mortality, resulting in economic losses across the world due to high morbidity, mortality and veterinary cost. It is characterized by frequent and watery bowel movements in calves less than three weeks old causing dehydration, decreased appetite and difficulty in standing. In severe cases, calves may suffer from ataxia, acidemia, bacteremia, arrhythmia and hypovolemia leading to death. It can be caused by a variety of factors, including viral, bacterial, and parasitic infections, as well as management and environmental factors.

The etiology of calf diarrhea can be broadly divided into infectious and non-infectious wherein infectious includes bacteria, viruses and protozoa. Non-infectious or predisposing factors includes inadequate nutrition of pregnant dams and colostrum, less immunoglobulin ingestion from calves gut and environmental factors like poor sanitation, overcrowding, poor quality milk/ milk replacers. Some of the infectious causes can be generally summarized below.

### *Escherichia coli (E.coli)*

It is the most frequently implicated agents, causing calf scour and can be classified into six pathogroups based on virulence scheme: Enterotoxigenic *E. coli* (ETEC), Shiga toxin-producing *E. coli* (STEC), Enteropathogenic *E. coli* (EPEC), Entero-invasive *E. coli* (EIEC), Entero-aggressive *E. coli* (EAEC) and Enterohaemorrhagic *E. coli* (EHEC). ETEC is the most typical cause of diarrhea in newborn calf.

### Clinical Signs

During the first four days after birth, newborn calves are particularly vulnerable to ETEC infection and experience watery diarrhea. It infects the gut epithelium and multiplies in the intestinal villi. Anorexia, elevated body temperature, increased heart rate, watery to semisolid faeces and dehydration are mainly observed. Calves from 4 days to 2 months old may manifest with diarrhea or primarily as dysentery and mucus in the feces

## Salmonella

Salmonellosis is commonly found in calves less than 3 weeks of age. Salmonella produces enterotoxin, causing inflammatory changes in intestine and bacteremia. Severe symptoms are observed in 10 days to 3-months old calves. The infected calf can act as a source of zoonosis through direct contact or food-borne routes. Most common strains are *S. dublin* and *S. typhimurium*

### Clinical signs

Salmonella infection can cause a number of different clinical signs, from asymptomatic to symptomatic salmonellosis. *S. typhimurium* causes systemic disease and acute diarrheal disease more frequently than *S. Dublin*. Watery, mucoid diarrhoea accompanied by fibrin and blood is the hallmark of the clinical signs. Depending on the severity of the infection, calves can release the bacterium sporadically and for varying lengths of time.

### *Clostridium perfringens*

They are gram-positive, spore-forming anaerobic bacterium causing a wide range of diseases in mammals and birds due to the ubiquitous nature of the bacterium in the environment. They can be subdivided into five types (A, B, C, D, and E) based on the production of toxins wherein Type C has been mostly reported in conjunction with calf diarrhea.

### Clinical signs

Intestinal pain and diarrhoea are brought on by enterotoxin's actions on epithelial cells. Hemorrhagic enteritis with ulceration of the mucosa is observed and death may occur in a few hours, but in less severe cases, calf may survive for a few days and recovery is possible with treatment. Low levels of proteolytic enzymes (like trypsin) in the digestive system of newborn calves make them more susceptible to infection.

## Cryptosporidium

They are protozoan parasite frequently associated with gastrointestinal tract diseases in humans and neonatal cattle. There are 24 species of *Cryptosporidium* among which *C. parvum* is a potential zoonotic agent and is considered to be main cause of calf diarrhea. Infection can be detected as early as 5 days of age with the greatest proportion of calves excreting organisms between 9-14 days. Oocyst-infested environments have the potential to infect both humans and animals instantaneously.

### Clinical signs

Calves infected with *C. parvum* can be asymptomatic or develop severe diarrhoea with dehydration. Animals with compromised immune systems are more vulnerable to the disease. Infection damages the intestinal epithelial cells, leading to severe villous atrophy in infected animals and damaged to the intestinal epithelium causes prolonged malnutrition and reduced growth rates in affected calves due to malabsorption of digested foods.

## Eimeria

*Eimeria* species causes coccidiosis in ruminants and poultry. The most prevalent species of *Eimeria* that causes coccidiosis in cattle are *E. bovis*, *E. zuernii* and *E. auburnensis*. *E. zuernii* causes



winter coccidiosis in cattle which is highly pathogenic. Prepatent period is 16-17 days.

### **Clinical signs**

Bloody mucoid diarrhea, epithelial mucosal lesion, dehydration, depression, tenesmus and occasional rectal prolapse are among the common clinical signs. Bloody mucoid diarrhea is often seen 1-3 days before 1st oocyst are shed and in acute cases, death of calf can occur within 5-7 days. The disease is most common in fall and least during summer time.

### **Bovine Viral Diarrhea (BVD)**

Bovine Viral Diarrhea virus is an enveloped, single-stranded RNA virus. It can cause calf diarrhea in two major ways, persistent infection resulting in primary damage to enterocytes and susceptibility to co-infection or transient infection with replication in enterocytes and lesion formation contributing to diarrhea.

### **Clinical signs**

Commonly observed symptoms include diarrhea, pyrexia, depression, anorexia, oral ulcerations and leukopenia leading to immunosuppression. Pregnant cows if exposed to a noncytopathic BVDV during 45-125 days of gestation deliver persistently infected (PI) calves since the fetus is not immunocompetent. Most PI calves are born weak and susceptible to other pathogens and experience poor growth.

### **Prevention & Control**

Management of calf diarrhea can be done mainly at three levels i.e., peripartum calving management, calf immunity and environmental stress or contamination. Peripartum calving management includes adequate feeding and mineral supplements of pregnant cows during the last trimester to reduce calf morbidity and mortality rates. Under calf immunity building, neonatal calf should receive 2-3L (for beef calves) or 3-4 L (for dairy calves) of colostrum within the first 6 hrs after birth. Milk or freshly reconstituted milk should be fed at body temperature (38 degree Celsius). In environmental stress or contamination management, all feeding facilities and equipment's (milking bottles and water buckets) should be maintained with strict hygiene practices and calves should be dewormed at appropriate intervals. Moreover, extreme weather conditions such as low temperatures, rain, wind, and high levels of moisture act as stress factors to young calves and increase the susceptibility of calves to diarrhea therefore, by implementing a managed breeding programme, the calving season can be changed to coincide with more favorable environmental conditions.

In summary, calf diarrhea is a significant health issue in young calves, characterized by watery diarrhea and caused by various infectious agents and environmental factors. It can have severe health and economic consequences, making prevention and prompt treatment essential in the management of this condition in the livestock industry.

