Foal Diarrhea

Established and Postulated Causes, Prevention, Diagnostics, and Treatments

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KEYWORDS

• Foal • Infections • Enterocolitis • Diagnosis • Therapy

KEY POINTS

- Diarrhea is one of the most important diseases in young foals and may occur in more than half of foals until weaning age.
- Several infectious and noninfectious underlying causes have been implicated but scientific evidence of pathogenesis is constantly evolving.
- Practically it is important to investigate all known different potential causes and to identify infectious agents to avoid outbreaks, as well as to evaluate in individuals the level of systemic compromise and establish an adequate therapy.
- In addition it is crucial to differentiate foals that can be managed in field conditions from those who should be sent to a referral center.
- This article reviews these aspects and recent developments in the diagnostic and therapeutic approaches.

INTRODUCTION

Diarrhea is defined as increased frequency of defecation with increased water content in feces.[1] Foals that develop diarrhea usually have enteritis, which is associated with systemic inflammatory response syndrome (SIRS).[2] More than 50% of foals experience 1 or more bouts of diarrhea in the first 6 months of life.[3–5] There are established and putative infectious and noninfectious causes of foal diarrhea. Treatment is mainly symptomatic but some specific treatments of various causes are available.

PATIENT HISTORY

Vaccination and worming status, information on number and ages of the affected foals, and hygienic conditions on the farm are important.[6,7] Failure of passive transfer of immunity might be reported.[8] Diarrhea commonly occurs within the first 6 months of

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life. Depending on the etiology, outbreaks can occur, or single foals might be affected.[9,10] Risk factors include suboptimal deworming of mares and extensive use of antibiotics.[4] Additional observations can be depression, decreased suckling reflex, weakness, colic, weight loss, and occasionally sudden death.[8]

CLINICAL PRESENTATION

Clinical signs vary.[6,7] Initial signs may include colic, hypermotility or amotility, and abdominal distension. Fecal consistency can range from watery to pasty, with different colors, and may contain blood or casts.[7] Foals tend to dehydrate quickly and can reach severe dehydration evidenced by sunken eyeballs and a prolonged skin tent. Depression, weakness, anorexia, salivation, and bruxism are frequently observed. Body temperature varies from fever to hypothermia.[2] Cases of enteritis commonly have signs of SIRS, including congested mucous membranes, tachycardia, weak pulses, tachypnea, and cool extremities.[2,7] When signs progress, recumbence, coma, and death may occur.[7] Up to 50% of diarrheic foals less than 30 days of age with diarrhea are bacteremic.[11,12]

CLINICAL PATHOLOGY

If dehydration is present, hematocrit is high.[13] Signs of inflammation are present in the leukogram, including leukopenia or leukocytosis, commonly due to abnormal neutrophil counts. A left shift might also be present, particularly in cases with SIRS.[11] Plasma total proteins can be increased or decreased, as in cases with sepsis, protein-losing inflammation (salmonellosis), or *Lawsonia intracellularis* infections.[14,15] Acute phase proteins, such as fibrinogen and serum amyloid A, are usually elevated.[13]

Electrolyte derangements are common and should be evaluated. Up to 66% of the foals have been reported as hyponatremic and 33% hypokalemic. Hyperchloremia or hypochloremia also can occur.[13] Foals with diarrhea usually have a strong ion metabolic acidosis with low blood pH, low plasma bicarbonate levels, and a decreased strong ion difference (strong ion difference = Na + K-Cl lactate = 36–44) due to electrolyte derangements.[11,13] Increased lactate concentrations are also common and contribute to the low SID.

Urea and creatinine levels are often increased, indicating a prerenal and occasionally also a renal azotemia.[11]

ETIOLOGY

Noninfectious causes include foal heat diarrhea, perinatal asphyxia syndrome, necrotizing enterocolitis (NEC), dietary imbalance, equine gastric ulcer syndrome, luminal irritant diarrhea, and secondary lactose intolerance.[16,17]

The most common infectious agents include rotavirus (RV), *Clostridium perfringens* types A and C, *Salmonella* spp, *C difficile*, *Cryptosporidia*, and *L intracellularis*.[2,3,6,11,15,17] Less common causes are *Coronavirus*, *Rhodococcus equi*, and *Strongyloides westeri*.[18–20] Single case reports have also been published on *Aeromona hydrophyla*,[21] *Neorickettsia risticii*,[22] candida[23] and *Listeria monocytogenes*.[24] Coinfections can occur,[22] as with *C perfringens* and *C difficile*.[25]

Foal Heat Diarrhea

Foal heat diarrhea is usually a self-limiting condition in foals aged 5 days to 15 days. It occurs in 75% to 80% of neonatal foals and usually lasts 3 days to 4 days.[16] These foals have diarrhea, show no signs of systemic disease, and continue to suckle