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Foal Disorders
Lameness

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A foal's birth marks the start of something exciting: a new partner to train, a clean slate with which to begin, and potential just waiting to be tapped. But something exciting can quickly turn to something disappointing if that foal isn't healthy.

At the 2014 Kentucky Breeders' Short Course, held Feb. 8 in Lexington, Bonnie Barr, VMD, Dipl. ACVIM, an equine internal medicine specialist at Rood & Riddle Equine Hospital, also in Lexington, reviewed four common health problems newborn foals face. She also described what owners and breeding managers should watch for in each scenario and when to seek veterinary attention.

### Predisposing Factors

It's often impossible to discern whether the foal about to pop out of a mare in labor will have a health problem. There are, however, a few predisposing factors that could indicate a potential problem.

"Most disorders of the newborn foal result from high-risk pregnancies," Barr explained. "Conditions that affect fetal development and maturity, delivery, or the peripartum period may result in severe neonatal illness."

Such conditions can include:

- Maternal illness;
- Placentitis (inflammation of the placenta);
- Vaginal discharge;
- Twinning;
- Dystocia (prolonged or difficult births);
- Premature placental separation (commonly known as a "red bag" delivery);
- Premature births;
- Hypothermia;
- Stress; and
- Localized disease in the neonate.

Additionally, Barr said, environmental conditions including unsanitary foaling conditions, poor husbandry, exposure to pathogens the mare isn't immune to, and poor nutrition could also predispose a foal to developing disease.

### Normal vs. Abnormal

Once a foal is born, it's important to determine whether he's acting normally or if there might be something wrong. Normal, healthy foals should have a good attitude, be willing to nurse, be active in the stall, and interact with the mare. If the foal doesn't display such characteristics, the owner or manager should seek immediate veterinary attention.

Even if foals appear healthy, a veterinarian should examine them shortly after birth to ensure there are no unapparent or underlying health problems.

### Foal Health Concerns

Next, Barr reviewed four common health problems newborn foals are susceptible to.

**Failure of Passive Transfer**—Failure of passive transfer (or FPT) is the most common immunodeficiency in horses and occurs in 5-20% of foals, Barr said.

Foals are born without immune protection against infectious disease organisms and require passive transfer of antibodies found in the mare's colostrum (first milk). If a foal doesn't receive enough quality colostrum, he doesn't receive the antibodies he needs for protection against viruses and bacteria; this termed FPT.


Recognizing and Preventing Failure of Passive Transfer

Barr said there are several reasons why a foal might not receive enough colostrum at birth:

- Production failure—This occurs when the mare does not produce enough colostrum or when the mare doesn't produce good-quality colostrum. Thus, it's important for managers to evaluate a mare's colostrum quality using a gross assessment ("Good quality colostrum is yellow and sticky," Barr said) and a stall-side test (either a colostrometer or a refractometer) to ensure their foal consumes appropriate colostrum.
- Ingestion failure—This happens when the foal isn't able to consume the mare's colostrum. Compromised or weak foals or those with musculoskeletal problems might not be able to stand to nurse. This can also happen if a mare rejects a foal and doesn't allow him to nurse.
- Absorption failure—This occurs when the foal's system isn't able to absorb the colostrum consumed. Premature foals and those with a hypoxic-ischemical (GI) injury, inflammatory injury, or other illness can have problems absorbing colostrum appropriately.

Veterinarians diagnose FPT by measuring the foal's antibody levels shortly after birth. Barr recommended measuring foals' serum immunoglobulin (IgG, another term for antibody) concentrations at 8 to 24 hours of age to determine if FPT has occurred:

- Serum IgG levels greater than 800 milligrams per deciliter (mg/dL) represent adequate antibody transfer;
- Levels ranging from 400 to 800 mg/dL represent partial transfer; and
- Levels below 400 mg/dL represent failure of passive transfer.

While many foals with FPT remain healthy without treatment, Barr said researchers have identified that many foals with FPT also develop sepsis. Therefore, most veterinarians treat most FPT foals.

Veterinarians typically administer frozen colostrum or colostrum replacer if the foal is less than 12 hours old. Previous research has shown that newborn foals' GI tracts absorb various macromolecules (including IgG) at a rate of 100% starting at birth. However, this rate decreases to less than 1% by the time the foal is 20 hours old. Thus, for the foal to absorb the required amount of IgG, he must consume the colostrum while his GI tract can still absorb appropriate antibody quantities.

For foals that have missed the "oral window," Barr said, veterinarians generally use intravenous therapy with either fresh plasma, frozen hyperimmune plasma, or IgG concentrates. These are less desirable options, however because they don't contain all the other beneficial immunologic factors foals receive from colostrum, including proteins, immune modulators, and pro- and anti-inflammatory substances. So it's important to identify FPT foals early to allow them the best chance at consuming colostrum and gaining its immunologic benefits.

Although it's difficult to prevent FPT altogether, breeders can take steps to minimize the chance of it occurring, including:

- Providing broodmares and foals with a clean environment and proper nutrition;
- Ensuring mares receive appropriate vaccines in the tenth month of gestation; and
- Making sure the foal receives adequate colostrum shortly after birth and keeping some frozen colostrum on hand in case the mare doesn't provide a suitable option.

**Neonatal Sepsis**—The most common cause of illness and death in foals is neonatal sepsis (or a systemic inflammatory response in the presence of or as a result of a suspected or diagnosed infection), Barr said. While sepsis can be caused by bacteria, viruses, or fungus, the majority of neonatal cases are bacterial in origin.

There are several routes of infection for neonatal sepsis, Barrn said, including:

- The GI tract (foals ingest bacteria);
- The respiratory tract and secondary aspiration;
- The placenta (prior to birth); and
- The umbilicus.

Clinical signs of neonatal sepsis are widely variable, but include lethargy and weakness.

Photo: Courtesy Dr. Bonnie Barr

Clinical signs of disease generally develop when the foal is 7-10 days old, and are widely variable but rapidly progressive, Barr said. Early signs of disease include a loss of suckle, fever or hypothermia, lethargy, weakness, and injected sclera or oral membranes (meaning the sclera of the eyes or the gums are peppered with broken blood vessels). Later clinical signs can include:

- Tachycardia (increased heart rate);
- Tachypnea (increased respiratory rate);
- Petechia (purplish red blood spots) in the oral, sclera, or aural (ear) membranes;
- Coronary band hyperemia (reddening caused by increased blood flow);
- Increased or decreased capillary refill time;
- Septic shock; and
- Multi-organ system failure.

The gold standard for diagnosing neonatal sepsis is a blood culture to identify the presence of a pathogen. "But," Barr said, "it's not quick. It takes several days, and many foals don't have several days."

Therefore, many veterinarians will use diagnostics that are suggestive of neonatal sepsis, including:

- Identifying blood work abnormalities including leukopenia (a reduced white blood cell count), hypoglycemia (low blood sugar), azotemia (elevated blood urea nitrogen and creatinine concentrations), increased lactate levels (which indicate low oxygen levels), and FPT—all of which signify a foal in shock, Barr said;
- A modified sepsis score, which is a point system modified from human medicine and based on factors from the foal's history, clinical signs, blood work, and laboratory data; and
- Infection localized to a body system (most commonly the lungs).

Veterinarians treat neonatal sepsis with antibiotics, fluids, proper nutrition (either oral or intravenous, if need be), plasma administration, and supportive care.

As veterinarians on the whole gain experience in treating neonatal sepsis, the prognosis for affected foals has improved, Barr said. From 1990 to 1995, 72% of septic foals treated at the University of Pennsylvania School of Veterinary Medicine New Bolton Center survived to discharge, and by 2006 Rood & Riddle had a 70% survival to discharge rate. Barr said foals with more complications are less likely to survive, and early recognition and referral are keys to survival.

Like FPT, it's difficult to definitively prevent neonatal sepsis; however, owners and managers can take steps to reduce their foals' risk of developing disease, including:

- Vaccinating the broodmare appropriately;
- Maintaining a clean environment for the mare and foal;
- Reducing the potential bacterial load introduced during udder seeking (during the process of seeking the udder, foals can ingest bacteria that enter the intestinal tract and are absorbed by the GI tract);
- Cleaning and caring for the umbilicus appropriately; and
- Ensuring foals receive appropriate amounts of colostrum to prevent FPT.

**Neonatal Encephalopathy**—This disorder has gone by several different names in the past, including neonatal maladjustment syndrome, hypoxic ischemic encephalopathy, and "dummy foal" syndrome, among others. But now, Barr said, the disease is termed neonatal encephalopathy (NE). The syndrome is the same, but the terminology has been simplified—it now describes the age group (neonatal foals) and body system (the brain and central nervous system) affected.

Previously, Barr said, veterinarians thought affected foals resulted from a hypoxic-ischemic event (where the foal was deprived of oxygen), such as a red bag delivery or dystocia. But, not all dummy foals had a history of a hypoxic-ischemic event. Recent research results, however, showed that an upregulated fetal inflammatory response can also cause a foal to display signs of NE.

Clinical signs of NE generally appear between birth and 36 hours of birth and vary from very mild to very severe based on what part and how much of the brain is affected, Barr said. Central nervous system signs include:

- Loss of tongue curl;
- Loss of suckle;
- Dysorientation;
- Wandering;
- Hyperresponsiveness (an abnormal degree of responsiveness to stimuli);
- Abnormal breathing patterns; and
- Seizures.

Affected foals also can develop renal (kidney) and GI issues, Barr said. Renal problems are often subtle and transient, she said. GI issues, on the other hand, can range from mild indigestion to severe diarrhea, she explained, and often appear a few days after nervous system signs.

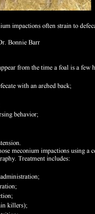
Veterinarians diagnose NE based on the foal's history and clinical signs, Barr said, and treatment typically includes antimicrobial, fluid, and plasma administration; supportive nursing care; and therapy to stop seizures.

If foals only develop neurologic signs, they're typically hospitalized for about 10 days and have an 80-90% survival rate to discharge, Barr said. If foals develop further clinical signs and secondary complications, however, the survival rate drops. Fortunately, Barr added, if foals survive they generally have a good long-term prognosis with few to no lasting effects.

NE isn't necessarily easy to prevent, Barr said, however, there are some things breeders can do to help reduce its likelihood. First, she said, it's important to recognize, diagnose, and treat placentitis in mares promptly, as researchers have shown that treatment appears to reduce the incidence of neonatal diseases. Next, be on hand to manage dystocias quickly or call for veterinary assistance at the first sign of trouble during foaling. And finally, use good management techniques for mares and foals, including providing proper nutrition, maintaining a sanitary environment, and treating fevers and illnesses promptly.

**Meconium Impactions**—Finally, Barr described meconium impactions—the most common cause of abdominal pain and distension (swelling) in neonatal foals. A variety of factors can cause meconium (the first manure a foal will pass) impactions, she said, including:

- An excessive amount of meconium;
- Impaired gastrointestinal motility; and
- Prolonged recumbency (lying down), dehydration, or medication administration.



Foals with meconium impactions often strain to defecate.

Photo: Courtesy Dr. Bonnie Barr

Clinical signs can appear from the time a foal is a few hours old to when he's a few days old and include:

- Straining to defecate with an arched back;
- Restlessness;
- Tail swishing;
- Changes in nursing behavior;
- Depression;
- Rolling; and
- Abdominal distension.

Veterinarians diagnose meconium impactions using a combination of the foal's history, abdominal ultrasound, and contrast radiography. Treatment includes:

- Antimicrobial administration;
- Fluid administration;
- Nursing restriction;
- Analgesics (pain killers);
- Intravenous nutrition;
- Supportive care; and
- Enemas.

Barr said there are several types of enemas veterinarian can use, including phosphate enemas (however, there's a risk of the foal developing hyperphosphatemia), soapy water enemas, and acetylcystine retention enemas. She said researchers have shown that acetylcystine enemas have a high success rate (93%) when coupled with intravenous fluids and pain management.

Veterinarians can successfully manage most foals with meconium impactions medically, she said; however, some foals with severe impactions might require surgery. A complication associated with meconium impactions is a ruptured bladder from the foal straining to defecate. The long-term prognosis for affected foals is good.

### Take-Home Message

Tiny foals can have some big health problems. When you're expecting a foal, knowing what health problems to watch for, understanding how to manage them, and knowing when to call a veterinarian can mean the difference between life and death for your new arrival.