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Neonate Prognostic Indicators: Making Sense of the Noise

Imagine standing in a store, looking for a single product, but having hundreds of similar options to choose from and not being sure which one to pick. Such is often the case for veterinarians when it comes to choosing the best method for predicting survival in sick equine neonates. Do you rely on clinical signs? Or do you focus on antibody levels? What about metabolic pathways? Or the foal's history?

At the 2015 American Association of Equine Practitioners' convention, held Dec. 5-9 in Las Vegas, Peter Morresey, BVSc, MACVSc, Dipl. ACT, ACVIM, an internal medicine specialist at Rood & Riddle Equine Hospital, in Lexington, Kentucky, reviewed the many options available for predicting survival in ill equine neonates.

"Estimating the prognosis of the sick neonate has profound clinical, economic, and client relationship implications," Morresey said. "A plethora of information is available; however, inconsistency between study location and methodology has led to disparate results, and research center diagnostic capabilities are largely unavailable in field settings."

With that in mind, he reviewed some study findings and options that are most useful for determining a prognosis and predicting survival for sick foals.

History and Initial Evaluation Researchers have determined that some aspects of a foal's history and the veterinarian's initial evaluation can reveal substantial prognostic information, Morresey said:

- Prematurity and dysmaturity did not appear to affect survival, nor did age at the time of admission;
- Duration of clinical signs prior to admission, however, did impact outcome. In one study, there was a nearly sixfold increase in the risk of death for every day clinical signs were present prior to admission;
- Foals that exhibited a heart rate higher than 70 beats per minute, a respiratory rate of more than 60 beats per minute, a rectal temperature of 99°F or higher, normal mucous membranes, and the ability to stand at admission were all more likely to survive than other foals in one study; and
- Nonsurviving foals were more likely to be born to dams with systemic or placental disease than surviving foals.

Signs of Sepsis Morresey said researchers have found that clinical signs of sepsis (a systemic bacterial infection) can also provide prognostic information:

- In one study, sepsis was the most common problem in both foals that survived and those that did not;
- In another, a positive blood culture (which indicates bacteremia, or the presence of bacteria in the foal's bloodstream) was more common in nonsurvivors than in survivors;
- Researchers also found that bacteremia was most commonly due to *Escherichia coli*; and
- Sepsis scoring (a point system based on factors from the foal's history, clinical signs, blood work, and laboratory data) appeared to be more reliable than any single parameter in providing diagnostic information.

Bloodwork and Clinical Chemistry While bloodwork results and clinical chemistry have been important in determining foals' prognoses, veterinarian should consider many parameters:

- Researchers have suggested that a low segmented white blood cell count, a low red blood cell count, and increased fibrinogen concentrations were more common in nonsurvivors than survivors;
- Nonsurvivors were more likely to exhibit decreased immunoglobulin G (IgG, or antibody) concentrations; and
- Hypoglycemia (low blood glucose levels) was linked to nonsurvival in septic foals in one study, but blood glucose levels of less than 120 mg/dL were linked to survival in another.

Metabolic and Endocrine Pathways Another set of values that could help veterinarians predict foals' survival are their metabolic and endocrine pathways, Morresey said. However, he noted these values are difficult to measure in day-to-day clinical practice.

So What Do We Have?

Ultimately, Morresey said, while these study results provide details into values we can use to predict foal survival, the overall body of research yielded no consistent factors, research site dependent results, and a lack of repeatability between and within institutions (meaning the study results couldn't always be repeated or confirmed).

With that in mind, he recommended that practitioners take a disciplined and practical approach to evaluating foals:

- Get a thorough history of the foal and his dam—did the mare have anything in her history that would indicate something could be amiss? Were there any events during birth that could suggest a problem? Was the foal's umbilical cord twisted? Was there any suggestion that his intrauterine growth was limited?
- Evaluate him carefully at presentation. Take note of his clinical signs, his mucous membranes ("There's no good reason for a healthy foal to have injected [dark red or muddy-looking] membranes," Morresey said), and whether he is standing at admission. Is his mentation normal? Is he nursing or attempting to nurse? This is key, he said.
- Take bloodwork. Evaluate the foals' neutrophil levels, band cells, bacteriologic findings, and lactate levels.

Further, Morresey said, there's some good news for owners of sick foals, regardless of how the practitioner reaches his prognostic and diagnostic decisions: "It's all worth it." Research has shown that, at Thoroughbred auctions, there's no difference in price for a recovered sick foal that avoided complications compared to a healthy one, he said.