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MANAGING THE SICK FOAL TO PRODUCE A SOUND ATHLETE

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Introduction

Every breeding farm hopes for an uneventful foaling season, a high percentage of live births, and strong foals that remain healthy and grow well. Regardless of management, however, every farm has to deal with foal illness from time to time. Detecting health problems and getting the sick foal into a program of veterinary care must be done quickly to ensure the best outcome. Supporting sick foals with proper nutrition is an important factor in survival and recovery. This paper will discuss some of the more common foal diseases as well as the medical and nutritional management included in treatment.

Neonatal Foals

The ill neonate presents unique challenges as its immune system and nutritional status are not well prepared to battle disease. The neonate's immune system is slow to respond to challenges, and the foal is not nutritionally prepared for caloric interruption. Three critical factors in the therapy of the ill neonate are treatment of the underlying disease process, supportive nursing care, and nutritional support.

Nursing care of neonates (those from birth to about seven days old) includes keeping the foals clean and warm. Hydration status must be monitored; weak foals may need help in standing or lying down; and recumbent foals must be turned from side to side at regular intervals. Most importantly, the foals must receive some form of nutrition. Because these young animals have limited energy reserves, nutritional support involves providing a continuous supply of energy in a form that can be tolerated.

It is vital to avoid overfeeding. Foals that nurse enthusiastically from a bottle are in danger of overfilling their stomachs. Small frequent feedings are less likely to cause digestive upset.

Colostrum, mare's milk, or a milk replacer can be given to foals that are able to suckle. These fluids may be provided via nasogastric tube to foals that can't nurse.

Another way of delivering energy is the use of total parenteral nutrition (TPN). Although this mixture of glucose, amino acids, and lipids does not meet all requirements for normal growth and development, it does provide sufficient energy to

sustain life, allowing the foal time to recover. Because of the exacting protocol, TPN must be administered in a controlled setting. An intravenous pump ensures a steady rate of delivery, avoiding sharp fluctuations in plasma glucose and insulin levels. A double-lumen catheter in the foal's neck allows the constant flow of TPN solution and the simultaneous introduction of any necessary medications through a separate tube. Blood samples are taken hourly at first to monitor glucose, with the interval lengthening as the foal's condition improves.

TPN can be used as a nutritional adjunct for any sick foal that is not able to consume adequate calories. A disease process in which TPN is particularly useful is enterocolitis (inflammation of the large intestine) characterized by severe diarrhea. This condition can be life-threatening, especially in neonatal foals. Caused by rotavirus, clostridium, salmonella, or other organisms, inflammation prevents absorption of nutrients in the gastrointestinal tract. TPN provides nourishment while allowing the gastrointestinal tract to "rest."

Foals that are too weak or uncoordinated to stand and nurse are also TPN candidates. Foals suffering from botulism, those with neurologic signs, and those in a stupor or coma may be in this category.

Several factors must be considered in planning nutritional support for the sick neonatal foal. The foal's condition dictates the starting point, and frequent changes are made as improvement is seen. In general, foals that lie on their sides and cannot achieve a sternal position (head up, weight supported on chest and trunk) without assistance are candidates for TPN. A foal in this condition is likely to develop secondary gastrointestinal problems if fed volumes of milk adequate to support nutritional requirements. Foals that can maintain sternal recumbency can usually tolerate milk, starting with small amounts during the first day.

A normal healthy foal ingests about 20% of its weight in mare's milk every day. Total intake for a foal weighing 50 kg would be about 10 liters per day. In sick foals, however, this level of intake may overwhelm digestive capability, leading to colic or other gastrointestinal problems. A guideline for an average newborn foal weighing approximately 50 kg is as follows:

$$5000 \text{ ml (10\% bw)} \div 24 \text{ hr.} = \text{approx. } 200 \text{ ml/hr} = 7 \text{ oz/hr}$$

Intake for a sick foal that can attain a sternal position may begin at only 5 to 10% of body weight for the first 12 to 24 hours. A foal that is able to stand can usually be started at about 10% of body weight. At first, small feedings of about 10-14 ounces should be given every two hours. As the foal's condition improves, the amount of milk and the interval between feedings can be increased until the foal is getting the full 20% of body weight in milk daily. Care must be taken to make the changes gradually so as to avoid gastrointestinal complications.

Although the small amount of milk initially fed does not support rapid growth, it must be understood that sustaining life is the primary focus for extremely sick foals. Survivors are usually able to catch up in growth soon after they return to health.

Management to Prevent Illness

Colostrum, the first secretion of the mammary glands, contains antibodies that are important in the rapid response to disease. The foal loses its ability to absorb these antibodies after 24 hours, so nursing within the first few hours of life is essential. Studies have shown that foals exposed to salmonella before they ingest colostrum are at increased risk of developing an infection, a situation that can be minimized by careful attention to cleanliness. An older foal may not be affected by salmonella exposure; however, it may be quite serious in a neonate with an underdeveloped immune system and low nutritional stores. As insurance against disease, managers at some farms strip 4 to 8 ounces of colostrum from the mare and tube or suckle it into the foal immediately after birth. When bottle-feeding, care must be taken to prevent an enthusiastic foal from drinking too quickly and aspirating milk. It is also important to make sure that the hole in the bottle's nipple is not too large.

In the management of foal health, prevention of disease is far preferable to treatment, with excellent hygiene being the key. A foal may actually get its first exposure to pathogenic bacteria as it passes through the birth canal; from the time it draws its first breath, its environment is full of potentially harmful organisms.

Cleanliness is vitally important and cannot be overemphasized as a factor in preventing outbreaks of diarrhea. Some farms begin daily washing of the pregnant mare's ventral surfaces as much as a week before foaling, especially during wet weather when mares are turned out in muddy pastures. In any case, washing is important just before foaling, as the foal's early attempts to nurse may put its muzzle in contact with bacteria on the mare's legs and belly. Foaling outdoors or in a foaling barn is a choice each farm must make, and each situation has advantages and disadvantages. Foaling stalls should be thoroughly disinfected and equipment should be sterilized before use.

Overcrowding of horses should be avoided, as disease can be spread between horses by direct contact or by aerosolized bacteria carried by dust.

Common Diseases in Young Foals

One of the most common problems in young foals is enterocolitis caused by salmonella, clostridium, or rotavirus picked up from the environment or spread from other horses on workers' hands or clothing. All personnel attending a foaling should wash their hands frequently and should wear latex gloves when disinfecting the umbilicus.

It has been shown that close proximity facilitates the spread of disease, and one mare or foal shedding salmonella can lead to illness in the rest of the barn. Likewise, a cycle of diarrhea among several foals can sometimes be broken by turning the foals out on grass instead of keeping them together in the barn.

Septicemia, a generalized blood-borne infection, can follow invasion of bacteria through the mucosal membranes of the umbilicus, gastrointestinal tract, or respiratory

tract. Such infection may localize in the foal's joints. Treatment varies by the organism and the number of joints involved. Antibiotics are usually effective, although organisms like salmonella that live deep in the tissues may be more difficult to eliminate. Again, prevention is achieved through excellent hygiene.

Colic is sometimes seen in very young foals, most often from meconium impaction, overfeeding, or infection. Management steps should be aimed toward prevention, as well as rapid treatment if problems occur.

HIE, or hypoxic ischemic encephalopathy, is the term given to any neurologic problem not known to be caused by infection or physical injury. The designation signifies alterations in brain function caused by a lack of oxygen and/or decreased blood flow to the brain before, during, or after birth. Terms such as neonatal maladjustment syndrome and "dummy foal" refer to the same condition. Signs including seizures, lethargy, stumbling, incoordination, and cessation of nursing may be noticed shortly after birth, but may not be noted until 24 to 72 hours later.

HIE can have a number of causes. Dystocia (difficult or delayed birth), possibly involving a compressed umbilical cord, is sometimes a factor. Placental insufficiency (placenta is not able to supply adequate oxygenated blood to the fetus) may be a cause, either because the placenta cannot keep up with rapid fetal development at the end of pregnancy or because of premature placental separation.

Mares that graze fescue pastures in late pregnancy often have abnormally thick placentas, pregnancies that are longer than average, and decreased or absent milk production. Removing mares from fescue pastures during the last months of pregnancy helps to prevent these problems. There is anecdotal evidence of a dramatic decrease in foaling problems, including HIE, on farms that have carried out pasture renovation to remove fescue and replace it with alternative forages.

Nutritional support is the key to recovery for foals suffering from HIE. Providing nursing care as well as TPN, mare's milk, or a milk replacer keeps these foals alive and hydrated until neurologic signs subside. With early care, many HIE foals recover and show normal growth and development.

Foals born prematurely or in immature condition often do not catch up to their peers in size or development, and athletic potential may be limited.

Gastrointestinal Health and Probiotics/Prebiotics

A critical factor in the health of every horse, regardless of age, is the number and type of microorganisms in the gut. In older horses, gut bacteria are essential for digestion. In young foals, the microflora are of significantly less nutritional importance; however, they are important in the host's defense against disease. Host bacteria may directly produce antibiogens (products which kill pathogens) that outcompete pathogens or prevent their adherence to the mucosal surface. The practice of coprophagy, or eating manure, is widespread among growing foals and may be a way of populating the gut with additional flora from more mature horses as the foal develops and its diet includes less milk and more forage.

The exact mechanism and the significance of bacterial function in foals are not completely understood. What is known is that any disturbance to this microbial balance—stress, travel, illness, change of diet, administration of antibiotics or other medications—has the potential to cause digestive upset. To maintain gastrointestinal health, some equine managers have turned to probiotics and prebiotics. Simply defined, probiotics are infusions of live organisms with the purpose of increasing numbers of helpful bacteria or yeast in the gastrointestinal tract. Prebiotics are designed to enhance the gut environment so as to support growth of microorganisms that are naturally present. These products have come into prominence in recent years, and many types are available to horse owners. However, their efficacy in horses of various ages is somewhat in question for several reasons.

- Especially in young foals, giving a probiotic to enhance fermentation is of little value because fermentation is not important when milk makes up the majority of the diet.
- Very few, if any, oral digestive aids have been clinically tested in foals, so their effect is not known.
- *Lactobacillus* strains number in the thousands; only those naturally found in the horse's gastrointestinal tract can be expected to benefit the horse. Commercial *lactobacillus* blends are often made up chiefly of strains found in cattle, with few or none that are specific to equines. Viability and benefits of these bovine strains are unknown.
- In older foals and mature horses, the gut contains billions of microorganisms. While digestive health products are purported to contain millions of live bacteria and/or yeast cells, studies have shown that many of the organisms die prior to use because of environmental temperature variations, elapsed time since manufacture, or other factors. Introducing too small a number of organisms may have little impact on gut function. If this is the case, many commercial probiotics are probably ineffective.

So, is there any discernable effect, good or bad, from the use of yogurt and other prebiotics and probiotics? Anecdotal evidence supports their positive effects in some cases; some managers and veterinarians don't recommend them. Horses with some conditions do seem to benefit, and therefore these products probably belong in the "can't hurt, may help" category.

Growing Foals and Weanlings

After the first few weeks, foals are stronger, more vigorous, and in better shape to survive illness because they have begun to develop at least minimal stores of energy and nutrients. Developments like diarrhea are still serious but are less often life-threatening in older foals.

As in very young foals, the treatments for enterocolitis, joint infections, and severe colic include nursing care and nutritional support. Because they are more mature and have some nutritional reserves, older foals may not need the intensive fluid therapy and frequent meals that are critical to neonates. Developing specific feeds for sick foals or horses has been problematic because horses that are very ill usually cannot be coaxed to eat very much, regardless of what is offered to them.

Prevention of infectious diseases depends heavily on foal management. Vaccines are not available to protect foals against salmonella and clostridium infections. Rotavirus vaccine is available for mares but is not completely effective.

Respiratory diseases are common in foals and can range from mild to severe. Infections can develop over the course of several months with few signs, while other foals develop acute infections, sometimes including serious and debilitating pyogranulomatous lung abscesses. Causative agents include pasteurella, streptococcus and *Rhodococcus equi*. *Rhodococcus* lives in the soil, surviving for many years and spreading easily through airborne dust.

Many foals with respiratory infections can be treated on the farm, although extremely sick foals sometimes need to be hospitalized for intranasal oxygen therapy. Foals that are too sick to nurse may need to be fed parenterally or by nasogastric tube.

Effective antibiotic treatment depends first on identifying the organism involved and selecting specific products to combat the infective agent. With careful treatment, most foals recover well and their potential for performance is not impacted. The incidence of foal pneumonia drops as foals reach weaning age and older.

Several steps can be taken to help prevent respiratory disease. Antibody-laden plasma gathered from hyperimmunized pregnant mares can be harvested and given to newborn foals to boost immunity. Overcrowding of mares and foals should be avoided to slow the development and spread of foal pneumonia. Some farms with *Rhodococcus equi* problems have found that, during the summer months, keeping horses stalled during the day and turning them out at night prevents transmission of bacteria that are spread when foals inhale dust kicked up by mares that are troubled by flies.

Economic Considerations

While many sick foals require minor treatment that can be handled on the farm, foals that are severely ill may require care that can be given only in a clinical setting. This care can be expensive, often totaling \$5,000 to \$15,000 or more for treatment of the average critically ill neonate. Realistic decisions on care and management of the sick neonatal or older foal must consider this expense as compared to the foal's current and potential value.

Outlook for Athletic Performance

A study in 1991 found that a group of foals that had *Rhodococcus equi* respiratory infections earned the same amount of money in their two- and three-year-old racing

years as horses that had not been sick (Bernard et al., 1991). In the same study, foals that had streptococcal respiratory infections earned less money in their three-year-old years than those with *Rhodococcus equi* infections and less money than the North American average in the two- and three-year-old years. Reasons are not clear for the parallel between streptococcus infections and decreased performance.

Conclusion

Disease prevention, early detection of illness, nursing care, antibiotic therapy, and nutritional support are important in producing healthy foals that can be expected to achieve their athletic potential. Many foals that survive illness will be fully capable of normal training and performance as mature individuals. Because of variations in farm management, genetic makeup, and response to training programs, it is impossible to predict with any certainty the probable career successes of a specific individual.

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