

THE FRIESIAN

## TIMELY TOPICS Neonatal Isoerythrolysis (NI)

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<u>Neonatal Isoerythrolysis (NI)</u> is a medical condition that can be an issue not just in Friesian foals, but foals of all breeds. So what exactly does "Neonatal Isoerythrolysis" mean and really, how does one even go about pronouncing it? Let's

issue in newborn mules (due to the "donkey factor"). Other names given to this condition are "Jaundice Foal Syndrome" and "hemolytic icterus". This is a potentially life-threatening condition that occurs in roughly 1-2% of births. The good news



break it down. "Neonatal"(nee-oh-ney-tol): relating to, or affecting, the newborn. "Iso" in this context probably means "similar to". "Erythro" (eryth-ro) refers to the red blood cell and "lysis" (lsis) is defined as destruction. When we then put these definitions together, we then begin to understand what is really happening in NI: the destruction of red blood cells specifically in the newborn. This condition occurs not only in horses, but also in humans, often in kittens and is quite an

is that with the right preparation and information, these foals can be managed successfully and the risk of NI greatly decreased.

In order to better understand how NI can occur, we must first understand a bit more about a horse's red blood cell groups (or systems) and their associated factors. In the horse, there are 8 different major red blood cell groups, of which 7 are recognized on an international basis. They are named A, C, D, K, P, Q and U and are each a result of a particular gene. (The T group

is primarily of research interest.) "These blood groups genes produce sheets, known as factors. Over 30 different factors have been identified. The as factored. The blood groups are named with an upper case letter to denote the system and a lower case letter to designate the factor (antigen)." system while there are a number of factors for each red blood cell (1) While there are a number of factors for each red blood cell group, there are some that are most commonly typed for by qualified laboratories and include A(a,b,c), Ca, Ka, P(a,b), Q (a,b,c) and Ua. Of these, the Aa and Qa are the most important (a,b,c) and Ua. for hemolytic reactions, such as NI. A foal may inherit its red blood group cell type from either its sire or dam. If the mare and stallion have the same blood type, then NI will not occur. If the foal inherits the red blood cell group of the mare, then, again, NI will not result. It is when the foal inherits the red blood cell group of its sire and this group is different than its dam that the possibility of NI will exist.

Exposure of the mare to red blood cell antigens (red blood cell group) that she interprets as "foreign" (something other than her own blood group), either during pregnancy or at foaling, can cause the mare to produce antibodies against these "foreign" red blood cells. This results in the destruction of the red blood cells, erythrolysis. During a mare's first pregnancy (a maiden mare) there is usually only a limited production of antibodies against a red blood cell group different than her own, so NI is rarely seen in that first foal, but because the possibility can exist, each and every foal should be evaluated for the possibility of NI. If a mare is exposed a second time, by breeding to the same stallion for example, then the production of antibodies can be significantly higher. The antibodies do not affect the foal in utero because they are too large to pass through the utero-placental barrier. These antibodies are concentrated in the mare's colostrum during the last 2-3 weeks of pregnancy. If these anti-RBC antibodies go undetected and the newborn foal is allowed to nurse the mare, thus consuming these antibodies in the colostrum, the antibodies are then absorbed into the foal's bloodstream and begin their attack on the RBC's of the foal. Symptoms are usually seen in the foal within the first 24-72 hours of life. The time at which the foal's ability to absorb any antibodies into the bloodstream and lymphatic system is greatest during the first few hours of life and then will gradually decrease as the intestinal lining "closes" (loses its ability to absorb these large molecules). Symptoms of NI include jaundice (yellowing of the gums and white portions of the eye), weakness, lethargy, decreased nursing, an increase in both the heart rate and respiratory rate, lying down excessively, passing a red colored urine and possibly death.

There are other ways in which a mare might become exposed to a "foreign" blood type. The mare may have had a blood transfusion (whole blood or blood based products) and this is an important part of a potential broodmare's medical history. If the mare is sold, this history may not be known to the new owner who may inadvertently find him or herself dealing with NI in a resulting foal. A mare can also be exposed to the foal's red blood cell group is during foaling, especially if it is a difficult or traumatic delivery. NI would not be a factor for that foal, but potentially for successive foals. It is important to have a veterinarian examine a newborn foal within the first 12-14 hours of its life. A thorough physical examination of the foal and blood work is an essential part of this visit. The foal IgG test can determine if the foal received adequate antibodies, thus adequate disease protection, from the mare via the colostrum and a CBC can tip the veterinarian off as to whether NI could be a problem.

Prevention of NI is the best strategy but an awareness of the possibility of an issue with an "as of yet" unborn foal can be the next best bet. Your veterinarian can draw a blood sample from your mare during the last 2-4 weeks of gestation and have it tested for any antibodies that can indicate what blood type she has been exposed to. Even if the stallion's blood type is unknown, the most common blood types involved in NI, namely Aa and Qa, may be what the mare would be producing antibodies against. Because there are several different red blood cell groups and a screening test may only look specifically at the 4 most common, a negative test doesn't mean that the foal is completely safe from NI, but is can mean that the risk is much lower. Information on sample collection and shipping can be obtained from the laboratory performing the test and it is important to obtain this information ahead of time. Often times, the results are reported within 1-2 days of the sample's arrival at the lab.

Another test that can help to determine if a potential problem with NI could occur is the Jaundiced Foal Agglutination (JFA) test. A sample of the foal's blood is mixed with a sample of the mare's colostrum. If there are a large number of antibodies to the foal's RBCs in the colostrum, the mixed sample will clot and produce clumps. This test can be performed "stall side" by your veterinarian and the right equipment. This is a less sensitive test but can be helpful with a mare that has previously had a NI foal and was bred back to the same stallion or to another stallion of unknown blood type.

A more proactive approach would be to blood type the mare and compare it to the known blood type of the stallion. This can give you information about the major blood types of the sire and dam that are tested for, determine if they are compatible and allow you to make decisions based on those blood types most often involved in NI. One step up from there would be to cross-match the mare and stallion prior to breeding. This test compares whether there are antibodies in the mare's serum to the stallion's red blood cells. Cross-matching can detect incompatibilities between the mare and stallion that will not be evident on blood typing as blood typing may not be available for every blood group, often just testing for the major ones. Again, one must obtain the information necessary from the laboratory chosen to do the testing such that the samples are collected and shipped according to specifications required by the lab.

Management of a foal that shows the symptoms of NI will be dependent on the severity of the symptoms. "It depends on the type of antibody and how much the foal has ingested. He may just seem lethargic, but some foals suddenly collapse when they're only 12 hours old if they're short on oxygen. They may have kidney failure or liver disease because there is not enough oxygen getting to these vital organs." (4) "If the



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mare has only a few antibodies in her colostrum it might take longer for the foal to show signs, and they may be mild." (4) "It is important to have an accurate diagnosis. Other conditions that cause weakness and lethargy include sepsis from bacterial infection (of the bloodstream) and depression associated with dummy foal syndrome (perinatal asphyxia syndrome, from inadequate oxygen supply at/around the time of birth)." (4) Other symptoms that may tip one off to the possibility of NI are a fever and jaundice. Foals that diagnosed with NI should be hospitalized for treatment as soon as possible for 24-hour supportive care. Some foals become so anemic from the RBC destruction that they may require blood transfusion. Medication is necessary to control the fever and prevent infection. Overall, the prognosis is pretty good for survival, as most foals will recover with time, medication and careful transfusions. Prognosis for survival can be dependent on whether the foal develops liver failure, symptoms originating from damage to the brain, and complications from bacterial infection. Foals that are give more than one blood transfusion are also at greater risk for developing liver failure, thus decreasing their chance for The overall survival rate, according to one study, survival. is about 75%. (6)

If the suspicion exists that NI may be a possibility in an unborn foal and testing confirms the presence of incompatible blood types of the sire and dam, what can be done to manage the foal at birth to prevent NI from developing? Muzzle the foal so it does not ingest the mare's colostrum and provide a different source of colostrum from a known, safe source. Muzzling the foal allows it to remain with the mare, important for that good maternal bonding. The colostrum from the mare can be stripped out and discarded. After about 36 hours, the mare will no longer be producing colostrum and the foal's gut will be in the process of "closing", so the muzzle can be safely removed and the foal allowed to nurse the dam. It is extremely important to remember to provide both a safe source of colostrum as well as a substitute for mare's milk (i.e. a mare milk replacer or goat's milk) for the first 36 hours of its life to provide both maternal antibodies as well as nutritional support for the newborn. It is important for your veterinarian to provide guidance through this process for a successful outcome for both mare and foal.

In one published paper, "population studies of red cell factors most frequently involved in NI reveal that approximately 14% of foals have erythrocyte incompatibilities with the dam. The true prevalence of NI is much less than 14% however" and "only a small percentage of mares will produce enough alloantibodies (an antibody produced following the introduction of an antigen) of sufficient affinity directed against specific antigenic factors on the foal erythrocytes to result in NI." (6) The reported prevalence in Standardbreds is 2%, in Thoroughbreds .05% and in mules 8-10%. While the incidence in Friesian horses has not been specifically reported, this breed has been observed to have a notable prevalence of NI.

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## The FHANA Health Committee:

The FHANA Health Committee is dedicated to promoting the health of our Friesian horses and providing information to the membership. The Health Committee: Katherine Fox, DVM; Elizabeth Sharp; Ann Blakey, PhD; Monica Muehlhause-Horn; Krista Porter, DVM; Carol McCoy-Brown; Kris Fulwiler; Laurie Bell; Amy Austin.



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