Neonatal Isoerythrolysis

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Neonatal Isoerythrolysis, NI, occurs in foals when there is an incompatibility between the foal's and mare's blood type. This disease can be very severe, and sometimes fatal. Thus, prevention and early detection are key. NI can occur in all breeds of horses and mules, and is seen in maiden mares.

There are sixteen blood types in the horse. In order for NI to occur, the foal must inherit its blood type from the stallion, the type must be different than the mares, and the mare must have developed anitibodies toward the foal's blood type. Mares most commonly develop these antibodies from foreign blood exposure during previous foalings, blood transfusion, receiving blood based products, or microcapillaries rupturing and exposing the foal's blood to the mare's blood and thus immune system during pregnancy. After birth, the foal ingests these antibodies from the mare's colostrum which are absorbed through the gut and end up in the blood stream. The antibodies attach to the foals red blood cells, and cause the foal's immune system to destroy them. These red blood cells are important to carry oxygen to the foals organs, when destroyed the red blood cell by-products can cause organ failure.

Clinical Signs

Foals appear normal at birth, and within the first 6-72 hours they may develop any of the following signs of disease:

- Weak/lethargic
- Decreased suckle
- Increased heart rate
- Increased respiratory rate and effort
- White or yellow mucous membranes

Prevention

Screening is key to prevent disease. A simple screening test is recommended for all mares including maidens. A blood sample, in a red top tube, is all that is needed for the test. The test needs to be performed within two weeks of foaling since antibody formation increases during this time period. In general, the test can be performed two weeks before the due date. If the mare has not foaled by her due date another test should be performed then, and then every two weeks after until she foals. The test involves testing for the antibodies to Aa, Qa, Qc, and Ua blood types, which of the sixteen blood types are the ones most commonly associated with disease. If the antibodies are found, agglutination will be seen. The results shown at right show several screens. Note that in the top row you can see the red color vs. yellow/clear color in the lower rows. The top row is an NI positive mare.

Below is an example of NI screening test results. Each row from left to right is one mare. Note the agglutination in the top row; this is a positive result.

Preparation with a positive mare

The first step is to gather the following supplies:

- Foal muzzle
- Bottle with a goat/sheep nipple
- Frozen colostrum (from NI negative mare & that has been tested to ensure high levels of IgG)
- A source of milk:
    - Goats milk (available at most grocery and health food stores),
    - Milk from NI negative mares that have foaled on the farm, or
    - Mares Match®

There are pros and cons to each source of milk that can be discussed with your veterinarian to see what works best for your situation. A foal will consume approximately 120 fluid ounces a day so it is important to make sure that there is enough stored in advance. In some cases, foals may need to be muzzled and supplemented for up to 48 hours.

Depending on history of the mare and which anti-body is positive, your veterinarian may start the mare on Domperidone® days before expected to foaling, milk her out frequently, and discard the colostrum. Thus, by the time the foal is born the colostrum will likely contain few antibodies to the foal's red blood cells. This allows greater potential for the Jaundice Foal Agglutination test, JFA, to yield negative results, and foal to be able to nurse from its mother sooner. (See details below for more information on this test.)

Caring for a foal from an NI positive mare:

Once the foal is born, it will need to be muzzled and fed colostrum (from NI negative mare) and then milk through a bottle until your veterinarian obtains a Jaundice Foal Agglutination, JFA, test. The JFA test consists of obtaining blood from the foal (red top tube), and colostrum/milk from the mare. These samples are processed in the lab to see if the mare's milk causes agglutination of the foal's red blood cells. In severe circumstances it can be seen without a microscope (picture on the next page); however in most cases, it is viewed under a microscope (picture on the next page). If the JFA results are negative, the foal is allowed to nurse immediately. Otherwise, the foal is bottle fed until the JFA is at a desirable level or the foal's gut closes (approx. 36-48 hrs), and can no longer absorb the antibodies. After receiving the initial 1-2 pint(s) of colostrum a foal will need approximately 8-12 fluid ounces of milk every two hours.

Agglutination or clumping of Red blood cells.

The picture on the right is under 40x magnification.

Treatment of foals that are affected by disease

Foals that develop clinical disease are treated according to their severity. In general, treatments include any combination of the following: withholding milk from the dam until the JFA is negative or the gut closes, corticosteroids, NSAIDs, antibiotics, IV fluids, oxygen, and whole blood transfusions. Clinical assessment, as well as blood work is used to monitor the degree of anemia, organ function and potential secondary infections to determine the course of treatment. Properly managed NI positive foals can be managed on the farm. Severely affected foals may need to be hospitalized for several days especially if oxygen, and whole blood transfusions are needed.

If you are not currently performing NI screens on your foaling mares, please discuss doing so with your veterinarian. NI screens are key to detect and prevent disease, thus saving money and time in treating an affected foal.