



# Neonatal or Hemolytic Icterus (NI)

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Photography by Danielle Ray-Swords

*The following is an excerpt from Dr. van Haeringen's larger work published as a PDF brochure and available for download for personal use. This excerpt is published by permission in THE FRIESIAN. You may find the downloadable PDF from the link in the "News" section on the FHANA web site - [www.fhana.com](http://www.fhana.com). FHANA has an NI committee that is working diligently with the blood typing laboratory of UC Davis to assist mare owners in their education and to prevent needless NI deaths. The committee will be posting a past article by Danielle Ray-Swords to the web site that will provide practical information regarding how to deal with the NI foal at home (July/Aug 2006 THE FRIESIAN).*

## PREFACE

Regardless of what tests are performed or what research is done, there is always a minimal risk that an unpleasant surprise may occur when a foal is born. Birth is a biological event where not everything will go according to mathematical rules. The chance of such a surprise is low, because there are diagnostic tests available to reduce the risk of Neonatal Icterus after birth.

At the present time, not much attention is being paid to research in the area of Neonatal Icterus.

It is a pity, because some issues will never be solved. This is dealing with the phenomenon of agglutinating antibodies and for the mares producing almost unlimited, non-specific antibodies against blood group factors. The duty of breeders, veterinarians and anybody else involved with horse breeding, will be to keep collecting accurate data and to report rare cases to the registries.

It is necessary to supply full data of all events and questions surrounding NI. This includes names of the animals and the registration and studbook numbers. For the mares, it is good to know if there has been an earlier suspicion of NI in the past. If there is such a history, it is important to know the data from the sires in these cases.

The aim of this brochure is to underline the problems around NI. I hope that reading these pages will answer some questions.

I wish to thank Laurie Kasperek from the Friesian FHANA (USA) for her translation of this brochure into understandable

English.

Veenendaal - The Netherlands - January 2007



## Development of NI

Sometimes during pregnancy, red blood cells enter the circulation of the mare. How this happens is not clear. It hardly ever affects the health of the foal. Obviously, some wounds occur, because after the birth a thorough inspection of the placenta of the mare can show signs of scars. This is an indication that during pregnancy the placenta has been injured at least once. It is almost common knowledge that bleedings



Special foal muzzle - dependable and secure.



occur during pregnancy, however the mechanism is unknown. Maybe by the hooves of the foal? Almost never is such an injury threatening to the unborn foal, but, inconspicuously, the process of NI has begun.

In such events, when a mare comes in close contact with unknown blood group factors, the immune system of the mare can start the production of antibodies. This has to be considered a normal process due to an effective immune system. Healthy mares ought to have a well functioning immune response, because they have to protect themselves against diseases and they have to transfer the antibodies to the foals as well. This transfer does not happen during pregnancy, but just after birth, when the foal starts to drink.

The amount of antibodies (titer) against blood group factors in the mares varies, depending on several reasons:

1. The time of pregnancy when the injury occurs. If this happens very late in gestation, the mare will not have the opportunity to build a high titer.
2. The frequency of NI births. In the event that the mare has given birth to more foals suffering from NI, the titer will increase during each gravidity. Generally speaking, a titer 1:16 a fortnight before parturition is a risk. However, titers 1:5000 have been noticed as well.

Those antibodies do not pass through the placenta from mare to foal and, therefore, they are not important, as long as the foal is not yet born. Antibodies will stay in the mare's blood.

After birth, the situation immediately turns into a dangerous one. The production of colostrum in the udder also means a transfer of antibodies from the mare's blood into her colostrum.

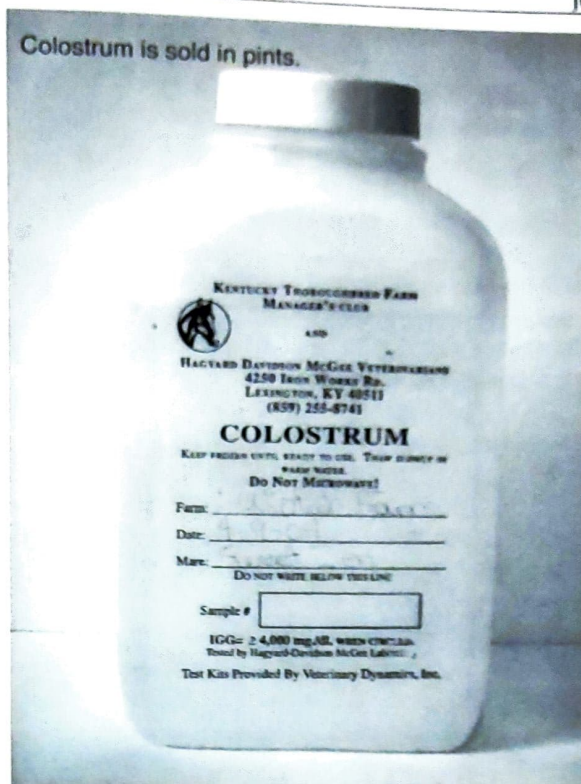
The newborn foal starts drinking and the antibodies enter the gut. In the very earliest days of life, the membranes of the gut have the ability to pass along bigger molecules from the gut into the blood stream. Antibodies against diseases are welcome because they are necessary for the protection of the foal against disease.

The drama starts when antibodies against the blood group factors meet the antigens in the red cell membranes of the foals. Such a reaction will result in the destruction of the membrane (lysis). The waste products which are the result of this destruction are the reason for the yellow color in the eyes and around the mouth and nose of the foal.

## Misunderstandings

Over the years several persistent misunderstandings have been observed.

1. NI will not occur in mares giving birth to a first foal. Several cases are known where these groups of mares have lost their foals due to NI. This misunderstanding is persistent



because this incorrect information was based on data from some older scientific books.

2. Foals suffering from NI can be reintroduced to the mare in three days.

A number of foals have died due to NI after a preliminary recovery, because they were allowed to drink the mare's milk after three days. This is very sad and a tragedy. It has been generally accepted that antibodies will not pass the membranes of the foal's gut 48 to 72 hours after birth. It was also accepted that the quantity of antibodies in the colostrum should be very low and harmless after this time. However, this appeared not to be the truth in all animals. Therefore, our advice is:

## SAFETY FIRST: A PERIOD OF FIVE DAYS SEPARATION HAS TO BE THE RULE.

3. A mare at the age of ten years or more who has not shown NI in the past will not do so in the future.

This is **incorrect**. There are situations where mares did not have the chance to develop NI because the blood group factors from the mare have not been incompatible with those from the stallion used so far.

## Frequently Asked Questions

### Which mares are at risk?

Particularly those mares that are lacking the factors Aa, Qa and Qc. To determine the risk, a laboratory test can be performed.

continued...





## NI, continued

In this test the Blood group factors will be determined.  
[see previous article from UC Davis - Ed.]

### How big is the risk that a mare really will develop NI?

Sorry, this is not known. It is hard to collect all the necessary data. First of all, all the mares should have been bloodtyped. Secondly, all data for mating and AI have to be known, including the bloodtypes of the stallions.

### Are there any differences per breed?

Most probably yes. In some breeds NI has been reported more frequently than in other breeds. In Thoroughbreds, Warmblood Horses and Friesian Horses, NI is observed rather frequently.

It is not clear if this means that differences really exist. Not all cases are known, due to lack of testing and reporting. The higher either the economic value or the emotional attachments are, the more tests are done. This also depends on the frequency of the risky factors in a population and breed.

These frequencies are variable per breed.

Thoroughbreds do have a rather low number of animals without Aa and Qa.

In Friesian horses Qa has never been observed. Qc appears to be very important.

In Warmblood breeds the majority of the NI cases are related to Aa.

In Shetland ponies, hardly any case of NI is known.



Other important reasons that contribute to the development, or not, of NI are presently unknown. Maybe the size of the foal and the length of the legs is important. Perhaps the bigger the foal, the more risk for injuries in the placenta?

### Is NI developed in each pregnancy?

A mare which has developed NI against factor Aa will most

probably repeat this every time when she carries a foal with the blood group Aa. On the other hand, a mare with a history of NI against Aa will not develop the antibodies if she carries a foal without the factor Aa. This can be a result of using a different stallion.

Furthermore, not each stallion is homozygous for Aa. If he is heterozygous, only 50% of his foals will have the possibility to create antibodies in the mare.

### What is the risk with mares who survived NI as a foal?

Those mares will not develop NI against the same factor, because they do have the risk factor and are not able to produce antibodies against this factor.

Foals born out of NI mares, going on to grow up without problems, do not possess the risk factor and, therefore, they can develop NI if there is incompatibility with their partner.

### Is NI a genetic disorder?

NO! It is absolutely not necessary for a stallion keeper to be ashamed. The problem is genetically specified, but it is absolutely incorrect to speak about a disorder. On the other hand, it appears that some families of mares do have more problems.

### Are NI mares of less value?

NO! In many cases it has been demonstrated that they have a very active immune system which will protect them from diseases.

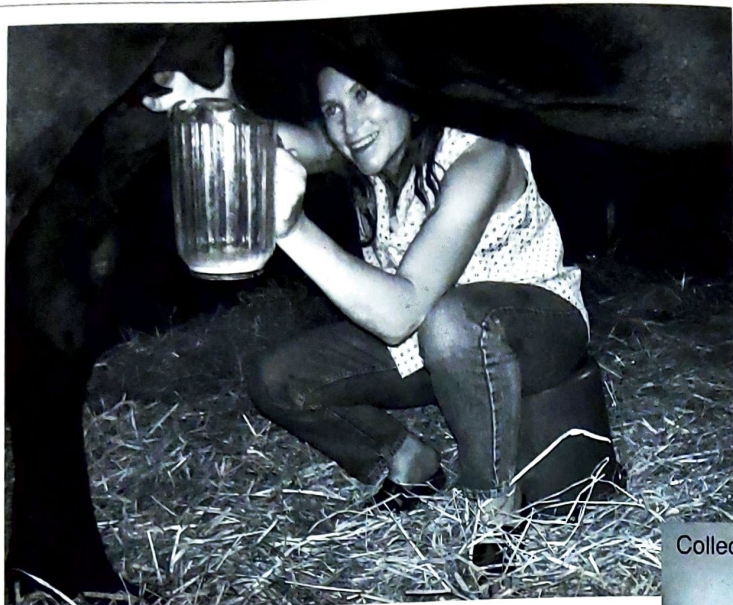
### How to care for an NI foal?

The mare is allowed to take care of the foal after birth, but drinking is forbidden! A partition inside the stall can be made with a fence; the two can touch but the foal cannot nurse. It's almost a must that the foal has to receive colostrum, but the source of that colostrum must be another mare. It is advised that the minimum amount will be at least 2 liters during 8-12 hours after birth, but certainly within 24 hours.

Most important are the IgG proteins in the colostrum, because they are the source of the antibodies. It is possible to measure the quantity of IgG in the milk. At least 8 grams per liter is preferred. Following the initial period, artificial substitutes can be administered. Foals appear to drink better from a rather flat pan than from a bottle. Drinking from a bottle is also a higher risk to choke and to develop a pneumonia. The mares have to be milked as frequently and as fully as possible; most mares accept this without much trouble.

In the majority of NI foals, it is not a problem to reacquaint the mare fully to the foal after five days, and the foals will start drinking easily.





### **Is there a risk if the NI foal is placed on a mare whose own foal has died?**

Certainly there is a risk, because it is not always known why the foal from the other mare died. Without testing there is a risk that the other foal died from NI.

### **Is it possible to start storage of Colostrum?**

YES. It is possible because colostrum can be frozen and stored in a normal freezer (minus 20°C). We are not aware of any problem with colostrum stored for more than 12 months. It is preferred to collect the colostrum from older mares which are at the same stable, because those animals usually have the highest amount of antibodies against pathogens in the same environment.

It is easy to test colostrum for the presence of antibodies against blood group factors. An amount of 5 ml will do. One always has to remember that testing is cheaper than losing a foal. Certainly, using colostrum from a mare with a dead foal in her breeding history has to be considered carefully and with trepidation.

### **How long are the antibodies present in the mare's blood?**

It is rare if they can be found present after ten days. After this time period, information about NI can be gathered only from the blood types of dam and sire.

### **Choosing a stallion for a particular mare - Is it possible?**

YES. Therefore it is necessary to know the blood groups from mare and stallion. Many stallions have been tested in the past. However, nowadays DNA tests are commonly used for almost all studbooks. Therefore, blood groups are not available from these recent stallions. Stallion keepers can do a good job in having their stallions tested. A breeder can test his/her mares. Based on the information from both animals, an analysis of the

risks can be made.

### **Do all mares need to be tested for blood groups?**

Theoretically this should be the best practice to avoid NI. Breeders who have lost foals to NI are easy to convince. Their colleagues who have not seen this drama are a bit slower!

### **What happens if a breeder insists on a high risk mating?**

The chance of NI will be high. As said before, this does not influence the gravidity. It starts with the colostrum after birth, because this is the source of the antibodies.

Collected Colostrum



If this is a reality, one can check the mare's blood for antibodies approximately a fortnight before the expected day of birth. If it is demonstrated that there is too high a titer, measures have to be set in motion. This may take several sleepless nights, because the foal must not be allowed to get any chance to nurse! Safety first - This ought to be for a period of five days! If the breeder has time and energy to do this job, things can all be fine. However, do not underestimate the efforts needed.

### **Is there a possibility of doing a DNA test for NI?**

Not yet. No tests exist at present to determine the blood groups by DNA. A tube of blood is the only possibility.

### **Are there any explanations for the development and the differences in symptoms of a foal with NI?**

Many parts of the body play an active role. Without basic research it will be hard to understand all the mechanisms involved. It is a sure thing that not all the same effects are seen in all similar circumstances. For example, the function of the gut of the newborn foal in passing the antibodies is not clear. There is not enough knowledge about the milk production of the mares. Is the milk production starting in a state of low or high volumes? We do not know how much a healthy foal may consume in the first hours of life.

