



**Hearn Veterinary Services**

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## **Foaling Notes 2010**

### **Last Month of Gestation**

#### ***Careful Checks and 24 Hour Monitoring***

Mares should be examined twice daily, when they are turned out and brought in. Special attention is given to udder and vulvar areas. The foaling person should familiarize themselves with each mares' normal stall behaviour (old records or notes will help). As mares approach foaling the changes are subtle, but easier to pick out if you know the mare's normal routine. Normally the description of impending foaling, includes a period of uneasiness, when monitoring for the start of delivery is intensified.

#### ***Vaccination Status***

Vaccines that might be boosted prior to foaling:

- Tetanus Toxoid
- Rabies
- Influenza – e.g. Fluvac, Prestige, FluAvert, Calvenza
- Botulism - only a problem if mare and foal are shipping to the USA. Especially Kentucky.
- Equine Herpes Virus - Pneumabort k
- West Nile Virus
- Strangles
- Encephalomyelitis – e.g. Encevac (major problem just south of the border).

#### ***Neonatal Isoerythrolysis (N.I.) Antibody Check***

This is a rare but commonly fatal disease, similar to the Rh factor in human babies. There is a simple screening test that can be done 3-4 weeks before foaling. It allows veterinarian and foaling management system to completely prevent hemolytic foals, by identifying which foals are going to hemorrhage before foaling, and then preventing the foal from nursing the mare and

acquiring any dangerous antibodies through the mare's colostrum. Frozen colostrum is substituted for the mare's colostrum and bottle fed for the first 24 hours of the foal's life.

Neonatal Isoerythrolysis occurs when the mare and fetus have different blood types, and red blood cells (RBC) leak across the placental barrier from the fetus to the mare, stimulating the mare to form antibodies to the fetus' blood. The antibodies are passed back to the foal in the mare's colostrum, rapidly absorbed through the gastrointestinal tract and destroy the foal's Red Blood Cells, causing anemia.

### **Minimize Stress during the last 30 days**

It is best to minimize procedures done during the last month of gestation as the stress (in theory) can precipitate a premature foaling or abortion. However, this is a rare complication. The most common problems occur when a disease like Strangles is introduced into the barn, and the stress causes abortions.

## **FOALING AREA**

The best foaling area is clean, has a normal bacterial flora and is free of any fecal matter. It is impossible to keep a stall perfectly clean, but every effort should be made to keep it as clean as possible without trying to sterilize the surfaces. On large farms, the best foaling barns allow foaling in all stalls, to reduce the bacterial build-up of a few stalls that have a large number of deliveries. Every effort should be made to significantly reduce the contamination of any one area. This is the most effective way to control outbreaks of neonatal infections such as septicemia and diarrhea. Unfortunately, the climate in Canada is too cold to effectively heat an entire old barn, so it is common to use a small foaling unit in the early season, and then if presented with evidence of too much build up of bacteria, to switch to foaling in all stalls in the barn.

Some farms consider using two stalls to foal. The mare is allowed to foal or at least breaking water in one stall, and then moved to the clean stall. It has been shown that it is the bacteria that the foal is exposed to during the first 24 hours of life that causes the infections. Therefore, stalls should be picked prior to foaling, mucked out immediately following foaling, picked during the next 24 hours, and then thoroughly cleaned, when the foal is moved out of the foaling area.

Good drainage from the foaling stalls is a major benefit as it minimizes the build up of bacteria within the foaling area. Steam cleaning and painting the foaling area is the most effective way to decrease a build up of bacteria.

## **Impending Parturition**

### **Mammary and Teat Development**

This usually starts 4-6 weeks prior to foaling with the most of the change occurring in the last 2 weeks. The final enlargement of the teats usually happens during the last 24-48 hours. Premature mammary development may be a sign of impending abortion and your veterinarian should be consulted.

### **Waxing**

The accumulation of a wax like secretion on the teat usually starts 8-72 hrs prior to foaling. However it may be highly variable and occur up to two weeks or in the last hour prior to foaling in some mares. Some mares will even run milk for days prior to foaling.

### **Relaxation of the Pelvic Ligaments and Vulva**

The croup and tail head will relax and form a dip, and the vulva will soften and lengthen.

### **Mammary Secretions**

Calcium and Magnesium levels can be used to provide an estimate of when a foaling will occur. Unfortunately, it only gives you a probability and not a certainty, so you still have to do night checks. eg. Predict A Foal

## **High Risk Mares**

These mares should be watched carefully at foaling and a vet should be close at hand in case there is a problem:

- Laminitis
- Fractured pelvis
- Wobbler
- Heaves
- Previous Ruptured Blood Vessel (e.g. Uterine Artery).
- Vulvar Discharge: A small amount of brown discharge is normal but any other discharge probably indicates an infection.
- Colic - don't confuse with foaling
  - Foaling = Cervix open
  - Colic = Cervix closed

# FOALING

## STAGE I (Warm Up)

The first stage is very variable, ranging from 5 minutes to 6 hours (normally 15 to 30 minutes). If the foaling attendant is very attentive, they may notice that the mare's behaviour patterns have changed 6 - 12 hrs. prior to foaling. Mares appear more restless, and nest (circle the box trying to find a good place to foal). Often they will go through several cycles of warming up and cooling down, before they finally go on and foal. Some common signs are rolling, pawing, looking back at the abdomen, sweating up, frequent urination and defecation, frequent laying down and rising, and the Flehmen response (curling the upper lip).

The udder will normally wax at this time, if it has not already done so. Some mares will foal with very little udder, and it seems that the foal will never be able to get enough milk. However, nature seems to look after them and most mares with small udders respond to the foal's insistent nursing and come to their milk within several hours after foaling.

The tail is bandaged and the perineum is washed thoroughly.

The foaling person should prepare and lay out foaling equipment, umbilical dip, etc.

## STAGE II (labour)

Labour starts when the water breaks, and normally lasts about 20 minutes, and most mares will lie down. Often the mare spends 10 minutes settling and only pushes for 10 minutes. If the foaling is assisted, the total period is shortened to 10 - 15 minutes.

**Presentation Check:** If possible, the presentation and posture of the foal should be checked, as soon as the water breaks. One should be able to readily palp the head and two front legs. If possible the ventral pelvic floor should also be checked to insure that neither of the back feet are caught. Quite often the foal is lying upside down or sideways (normal) as the foal twists from lying on its back as it first enters the birth canal. Give the mare time to correct the position: she may want to get up and down several times on both sides. If the presentation is abnormal, contact your veterinarian for instructions.

One hoof will normally appear at the vulva first. This is normal, and allows one elbow and one shoulder to pass through the pelvic inlet at a time. Therefore, pulling the second hoof up will only make the delivery more difficult. If the second hoof is back farther than knee of the other leg, it is likely that the elbow of the shorter leg is flexed and locking the delivery at the pelvic inlet. In this case it is necessary to bring the second leg up a little. Give the mare lots of time at this point to completely dilate her cervix. Pulling will bruise the vaginal tract and/or possibly tear the cervix. A good rule of thumb is to not interfere unless there is no progress for more than 10 minutes.

The foal is born in the amnion and will normally rupture it by itself. However, it is considered good practice to routinely rupture the sac at delivery, to insure that a weak foal or thickened

Amnion doesn't prevent the foal from breathing. If the red chorion appears at the vulva before the foal is born (**Red Bag**), there is premature separation of the placenta. The separation of the placenta from the uterine wall will cut off blood supply to the foal through the umbilical cord depriving it of oxygen, so the foal needs to be delivered as quickly as possible. We have several of these every year, and very rarely experience any problems - this is probably because these are usually only partial separations and sufficient blood supply from the mare is maintained.

When providing traction on a foal, pull with a steady moderate force when the mare pushes. It is useless to pull when the mare is resting as very little progress is made. Unless there is an emergency, only one person should pull at any one time, as the force exerted by two men can tear the cervix or severely damage the uterus of the mare.

Any traction should initially be applied directly away from the vulva, and then angled down as the chest of the foal is delivered. If the foal becomes stuck, stop and make sure that both front feet and the head are in the correct diving position. If it is urgent that you deliver the foal as quickly as possible, concentrate on pulling first one leg and then the other. This allows the shoulders to enter the birth canal one at a time. If the foal is stuck at the hip level, stop and attempt to check whether there is a hind foot stuck up under the foal. Try pushing the foal back into the mare and then rotating the foal or rolling the mare, to deliver the foal. This allows the foal's hips to enter the pelvis on an angle, which provides more room.

Once the foal is out, place one attendant on the mare's head to prevent her standing and flex the foal's back legs to deliver him without breaking the umbilical cord. The umbilical cord is then allowed to pump the rest of the blood into the foal.

#### **POST DELIVERY:**

The umbilical cord may be allowed to break on its own or clamped with 2 clamps, and then separated. The umbilical stump should then be dipped in the umbilical dip (2% Chlorhexidine is best). Make sure to use a weak solution that will disinfect but not burn the tissue at the umbilical stump.

The foal is pulled around to the mare's head and towelled off.

An enema should be administered. E.g. 30 mls Glycerine + 30 mls warm water. This may be repeated twice a day for 3 days, if necessary. Inject very slowly to allow the fluid to work around the faeces and further anterior. Administering an enema too fast tends to balloon the rectal wall and not allow the fluid to seep as far forward.

Colostrum Check - refer below.

Tie up the placenta to the tail with binder-twine, leaving a mild weight for traction. If it bangs on her hocks, she may become disturbed or kick at it. If the placenta is left on the ground the mare may step on it causing her to evert one of her uterine horns.

## STAGE III (Placental Delivery)

The placenta is normally delivered within 1-3 hours, and normally weighs 8-15 lbs. It should be carefully checked by spreading it out, and inspecting the tips of the horns. This is done to make sure that they are complete and that the cervical area is not thickened or discoloured. Placental infections and pieces left in the mare, can lead to laminitis, and the death of the mare, so it is critical that the placenta is checked! Place the placenta in a bucket or plastic bag so that it can be examined by the veterinarian.

## Retained Placenta (>6 hours)

At 6 hours, give 1 cc of oxytocin (20 IU) in the muscle, and start the mare on antibiotics (either Trimethoprim Sulpha or Penicillin). Wait 4 hours. If there was no progress, repeat the injection. The procedure may be repeated up to 4 times (80 IU total) over 16 hours. If there is still no progress, call your vet. If the mare is abnormally stressed or has received Ventipulmin or Banamine at foaling, she is much more likely to retain her placenta and require Oxytocin.

(Foaling Normals: Refer to foaling sheet reference values).

## Procedures to Prevent Neonatal Infections

(Madigan: Manual of Equine Neonatal Medicine 3<sup>rd</sup> Edition)

1. **Stalls:** Keep the mare in facilities in which foaling will take place to allow production of antibodies to pathogens within the area. Clean foaling stalls twice daily and disinfect stalls prior to use.
2. **Prevent Contact:** Immediately following delivery, prevent the foal from contacting the mare until steps 3 and 4 are completed.
3. **Clean the Mare:** Wash the mare after foaling with large volumes of soap and water to remove bacteria around the perineum, udder, and rear quarters where the foal may lick during udder seeking.
4. **Test Colostrum:**
  - a. **Colostrum Refractometer:** Milk off 1 ml of colostrum and place on a warm refractometer (in the tack room or lab). If the colostrum Brix % is greater than 20 it is normal.
  - b. **Colostrum Specific Gravity:** Milk off 120 mls of colostrum, test the specific gravity and bottle-feed the foal prior to the foal rising, upon obtaining a suck reflex (usually by 20 minutes). Use colostrum from the bank if the specific gravity is < 1.060 or you are unable to milk the mare for any reason.
5. **Bottle Feed the Foal:** bottle feed 120 mls of the mare's colostrum to the foal. This insures that the foal gets some colostrum prior to ingesting significant quantities of bacteria. The process of locating the udder and first nursing often results in hunting around the mare and licking the walls. This hunting process results in the ingestion of a

significant quantity of bacteria, which may cause an infection if colostral antibodies are not also promptly absorbed into the system. If the mare has no colostrum, or she is NI Positive, it is possible to use cow's colostrum. If foaling was not observed and the foal is standing or nursing, start preventative antibiotics for 72 hours.

### **Post Foaling Checks:**

Refer to the foaling sheet for a check list.

The TIME TO STAND and TIME TO NURSE are the two most important parameters to monitor. These are the best early warning signs. They are also easily monitored and recorded. Some insurance forms are even requesting them to be reported as proof of normality.

### **Veterinary Examination**

This is normally done within 24 hours of foaling. A careful physical exam, conformation inspection, placental exam, CBC, and IgG (>8 hours) should be performed on the foal.

The mare should also be examined, and her behaviour, CBC, udder, vulva, and vagina checked.

Refer to foaling sheet for a check list.

### **Colostrum and the Newborn Foal**

Newborn foals acquire their immunity through nursing their mare's first milk, which is called colostrum. The colostrum contains a high density of antibodies which are absorbed through a special process across the foal's intestinal wall during the first 16 hours of life. The absorption of these antibodies is critical to providing the immunity that allows the foal to fight infections in its environment, during the first several months of life. After that time the foal will make its own antibodies to fight infections.

Three factors are important in determining whether the absorption of colostrum is adequate:

- 1. Concentration:**
  - a. IgG concentration is directly proportional to the Brix % sugar level.
  - b. IgG concentration is directly proportional to the Specific Gravity (S.G.) of the colostrum. S.G. $\geq$ 1.060 is normal.
- 2. Volume:** How large is the udder?
- 3. Foal Health:** Sick foals are much less likely to consume sufficient colostrum to get their antibody levels up to ideal levels.

**Saving Extra Colostrum for the Colostrum Bank:** If the mare's colostrum has a S.G.>1.070 (Refractometer > 25% Brix) with a normal udder it is safe to collect 250 mls. Foals will usually

nurse off only one teat when they first nurse. Therefore, collect the colostrum from the opposite teat to the one first suckled by the foal.

**Failure of Passive Transfer:** Insufficient good quality colostrum may lead to failure of passive transfer. This is a deficiency of sufficient antibodies, which places the foal at a high risk of acquiring an infection during the first few months of life. If IgG < 1.060 (Refractometer < 20% Brix), the density of antibodies within the colostrum is low and it is likely that the foal will not receive sufficient colostrum to elevate his IgG (antibody level) to 400 mg/dl (the minimum required level).

### **Measurement of Colostrum Specific Gravity**

**Brix Sugar Refractometer:** The Brix Sugar Refractometer is a simple, quick method to estimate the IgG content of a mare's colostrum post foaling. Place a couple of drops of colostrum at 20 degrees C on the refractometer (also stored at 20 degrees C) and read the level. Normal is greater than 20%.

**Hydrometer:** The small hydrometer requires 70-80 mls of colostrum to work, but is simple and easy to read. The large hydrometer requires 250 mls. Make sure to allow the colostrum to cool to room temperature (20 degrees Celsius: this will slightly increase the Specific Gravity). Colostrum should be placed in a bottle and given back to the foal. Hydrometer should be kept clean and dry, between foaling, to insure accurate readings.

**Colostrometer:** The cylinder must be filled with distilled water, but the device only requires 5 mls of colostrum. The colostrum and distilled water must be at room temperature and all air bubbles must be expressed from the colostrum chamber. Any excess colostrum must be carefully cleaned off the chamber. The calibration of the device, is very delicate and is easily disturbed by transport and handling. Keep clean and dry.

### **Diagnosing Failure of Passive Transfer**

At foaling: Check colostrum Specific Gravity or Brix Sugar Index. This provides a very accurate prediction of which foals will have problems, and an opportunity to intervene early and save the cost of supplementary plasma later.

#### **At 8 - 16 hours Post Foaling:**

IgG < 200: Supplement with colostrum or plasma.

IgG 200 – 400: Supplement with colostrum.

IgG 400 - 800 mg/dl: monitor foal. Supplement if foal shows signs of disease, or weakness.

IgG >= 800: Normal

#### **At > 16 hours Post Foaling:**

IgG < 200: Supplement with 2L plasma.

IgG 200 - 400 and a Healthy foal: Supplement with 1L plasma.



IgG 200 - 400 and a Sick foal: Supplement with 2L plasma.

IgG > 800: Normal

## **IgG Test Methods**

### **ELISA**

1. SNAP - A test designed for semiquantitative measurement in the field.
2. Cite Test - This is a good test, provided you have good colour vision. It can be difficult to differentiate the shades of blue, especially in a poor light. The test is best done in a lab at room temperature, not in the tack room.
3. Palm Lab – Spectrophotometer result: more accurate.

### **Zinc Sulphate**

This test provides a good early guess. Takes about 1 hour and under some conditions the test may be misinterpreted.

### **Gluteraldehyde**

Gamma Check E: Gluteraldehyde clot test: Mix blood with gluteraldehyde in a test tube and time how long it takes to form a gel clot.

### **Radio-Immunodiffusion (RID) – Gold Standard**

This is the gold standard (the best test available). However, the test takes 24 hours to run so it is not practical for use in the field.

## **Colostrum Supplementation**

**This is the cheapest solution, and has an excellent safety record.**

1. If foal is < 12 hours old, feed colostrum from colostrum in the bank. Multiple farms now maintain a colostrum bank. It is recommended to save only colostrum with a Specific Gravity of over 1.070, or a Brix Sugar % of over 25).
2. Bovine Colostrum: Cow colostrum has been shown to work well in supplementing foals. However, cows are not exposed to the same organisms as foals, so they form different specific antibodies. Mild scours and gas may produce some side effects.

## **Plasma Supplementation**

This is the only option after 16 hours (poor chance after 12 hours). However, it is expensive:

### **Administration of plasma:**

The amount needed can be estimated from the IgG level, the size, and the health of the foal. Anaphylactic reactions can occur so the foal must be observed closely for immune reactions (increased respiratory rate, tremors, etc.). Deaths are rare but can occur.

### **References**

Knottenbelt, Derek; LeBlanc, Michelle; Lopate, Cheryl; Pascoe, Reg R; Equine Stud Farm Medicine and Surgery. 2003. Saunders, Edinburgh

Madigan, John E. Manual of Equine Neonatal Medicine 3<sup>rd</sup> Edition. 1997. Live Oak Publishing, P.O. box 8329, Woodland, California, 95695

Koterba, Anne M.; Drummond, Willa H.; Kosch, Philip C. Equine Clinical Neonatology. 1990. Lea & Febiger, Philadelphia, London

Ginther, O.J. Reproductive Biology of the Mare. 1992. McNaughton and Gunn, Inc., Ann Arbor, Michigan