Horse Owner Guide to Foaling and Foal Care

Patrick McCue, DVM, PhD
Diplomate ACT

EQUINE Reproduction Laboratory
Colorado State University

FOALING AND FOAL CARE

Key concepts for success:

- Breeding farm personnel are encouraged to communicate with their veterinarians
  - In preparation of the breeding season
  - What to do in emergency situations
  - Care of the mare and foal
  - Foaling kit – what to have on hand
- Develop a list of 'talking points' to cover important topics

CALCULATION OF THE DUE DATE

- Duration of pregnancy is approximately 340 days (range 320-360 days)
- Due date can be calculated by subtracting 25 days from the ovulation date or last breeding date
- Example:
  - Last breeding date April 30, 2013
  - Due date April 5, 2014

Calculation Of The Due Date

- Accuracy of the due date is highly dependent on the accuracy of the breeding or ovulation date
- Determination of an accurate due date is difficult for pasture bred mares

HOUSING AND MANAGEMENT

- Avoid unnecessary transport
- Move to site of foaling *at least* 7-14 days prior to due date; ≥ 30 days may be optimal
  - Allows acclimation to new environment
  - Mares begin to develop immunity to local pathogenic organisms
  - Antibodies will be passed to foal in colostrum

FOALING STALL

Stall prior to set-up for foaling

Stall after set-up for foaling

SCREENING FOR PLACENTITIS

- Bacterial placentitis is the # 1 cause of abortion in mares
- Placentitis can be detected by ultrasound
- Treatment can be effective in prevention of abortion and delivery of a live foal

SCREENING FOR PLACENTITIS

- Bacterial placentitis is the # 1 cause of abortion in mares
- Placentitis can be detected by ultrasound
- Treatment can be effective in prevention of abortion and delivery of a live foal

Normal Placental Exam (CTUP)

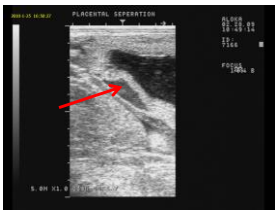
SCREENING FOR PLACENTITIS

- Bacterial placentitis is the # 1 cause of abortion in mares
- Placentitis can be detected by ultrasound
- Treatment can be effective in prevention of abortion and delivery of a live foal

Thickened Placenta

SCREENING FOR PLACENTITIS

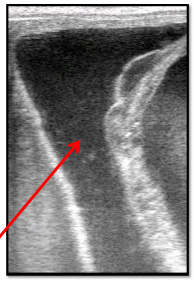
- Bacterial placentitis is the # 1 cause of abortion in mares
- Placentitis can be detected by ultrasound
- Treatment can be effective in prevention of abortion and delivery of a live foal



Placental Separation from Uterus

SCREENING FOR PLACENTITIS

- Bacterial placentitis is the # 1 cause of abortion in mares
- Placentitis can be detected by ultrasound
- Treatment can be effective in prevention of abortion and delivery of a live foal



Placental Separation from Uterus

VACCINATION OF PREGNANT MARE

- 4 weeks prior to due date
  - 4-way vaccine – Tetanus, EEE, WEE, Influenza
  - West Nile Virus
  - Rabies
- Additional vaccines may be administered at that time based on geographic location, potential for exposure and medical risk
  - Strangles, botulism, rotavirus, clostridium, Potomac horse fever
  - www.AAEP.org/owners/guidelines/vaccination guidelines

CASLICK MANAGEMENT

- Check pregnant mare for presence of a Caslick
- Caslick should be opened 7-14 days prior to due date (or sooner if needed)

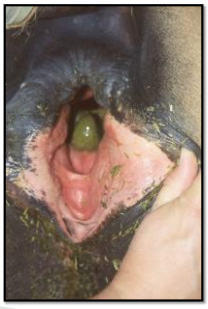

Intact Caslick


Checking Caslick


Opening Caslick

CASLICK MANAGEMENT

- Failure to open a Caslick fully can result in severe injury to the perineum



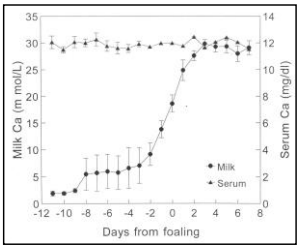
PRE-FOALING EVALUATION

Procedures:

- Prediction of foaling
  - Physical examination of the mare
    - Waxing
    - Relaxation of the perineum/vulva
- Milk calcium testing
- Labor alert devices

PREDICTION OF FOALING

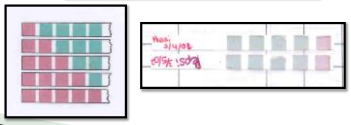
- Calcium increases in milk as foaling approaches
- Calcium levels above 200 ppm indicate that the mare has high probability of foaling within 48 hrs



MILK CALCIUM TEST KITS

Predict-A- Foal®:

- Test strip evaluated for color change in any of the 5 test squares



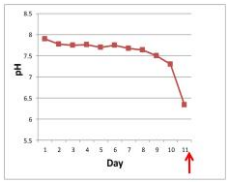
MILK CALCIUM TEST KITS

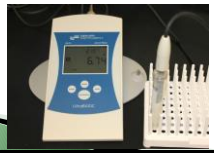
FoalWatch®:

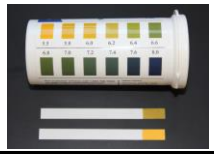
- Titration of calcium levels
- When color changes to blue, scale on glass chamber indicates $CaCO_3$ level

pH – Prediction of Foaling

- Milk pH decreases prior to foaling
- Drops from ≥ 7.0 to ≤ 6.4
- pH meter or pH paper can be used







LABOR-ALERT DEVICES

Foalert®

- Transmitter sutured to vulva
- Separation of vulva lips at foaling pulls magnet out of transmitter
- Alarm sent to receiver
- Activates cell phone
- Main advantage:
  - Daytime foaling mares

VIDEO MONITORS

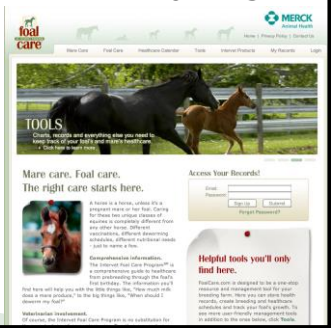
- Closed circuit television or video systems
- Can be linked to internet and monitored
  - Via computer
    - At work
    - At home
  - Via cell phone

VIDEO MONITORS

- New Web Cam System

How to keep track of everything

www.foalcare.com



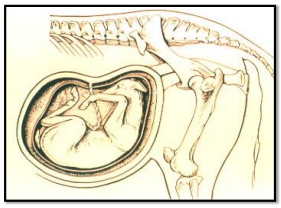
Kitty

Mare Healthcare Scheduling Calendar:

Prebreeding:		
Breeding should follow usual procedures for mares in estrus.		
Breeding soundness exam		
Deworm for all stages of encysted small strongyles		
Optional: Vaccinate for Rabies		
Start Date	**End Date**	**Description**
5/14/2011		*Optional*: Start Regu-Mate® (altrenogest)
5/29/2011		End Regu-Mate® (altrenogest)
6/8/2011		Breeding Date
6/8/2011	**9/29/2011**	**First trimester**
6/8/2011	9/29/2011	Monitor progesterone levels in at-risk mares
6/22/2011	6/24/2011	Ultrasound to confirm pregnancy
7/2/2011	7/6/2011	Ultrasound to reconfirm viable pregnancy and rule out twinning
7/23/2011	8/17/2011	Ultrasound for fetal sexing
8/7/2011		First deworming
9/30/2011	**1/21/2012**	**Second trimester:**
9/30/2011	1/21/2012	Monitor hoof and dental care
11/5/2011		First vaccination for EHV-1
11/5/2011		Second deworming (90 days after previous)
1/5/2012		Second vaccination for EHV-1

CONTROL OF FOALING

- Fetus initiates foaling process
- Foaling triggered when fetus is physiologically ready to survive outside the uterus



STAGE I OF LABOR

Clinical Signs:

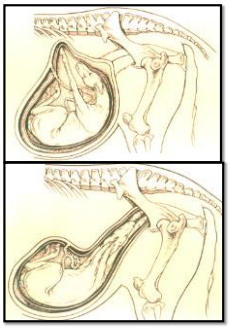
- Restlessness
- Frequent lying downing and standing
- Pawing at ground
- Patchy sweating
- Actively running or squirting milk
- 1 to 4 hours duration

STAGE I OF LABOR

STAGE I OF LABOR

Fetal Movement:

- Head and forelimbs extend
- Body rotates into dorsal position



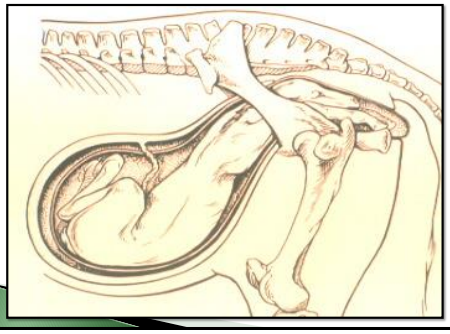
'BREAKING WATER' – RUPTURE OF CHORIOALLANTOIC MEMBRANE

STAGE II OF LABOR

Clinical Signs:

- Active labor
- Strong contractions
- Appearance of amnion
- Birth of foal
- 10 to 20* minutes duration
- Delay in delivery increases risk of fetal or neonatal death

STAGE II OF LABOR



STAGE II OF LABOR

STAGE II OF LABOR

STAGE II OF LABOR

STAGE II OF LABOR

STAGE III OF LABOR

- Placenta is passed in 15 min – 3 hrs
- Average time is 1.5 hours
- Placenta is considered abnormally retained after 3 hours

DYSTOCIA

- Refers to an abnormal or difficult birth
- Stage II of labor > 30 minutes
- Incidence is 4-8 % of all births in horses
- Most prevalent in maiden mares

DYSTOCIA

- Refers to an abnormal or difficult birth
- Stage II of labor > 30 minutes
- Incidence is 4-8 % of all births in horses
- Most prevalent in maiden mares

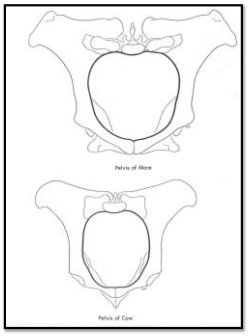
CAUSES OF DYSTOCIA

Maternal Causes:

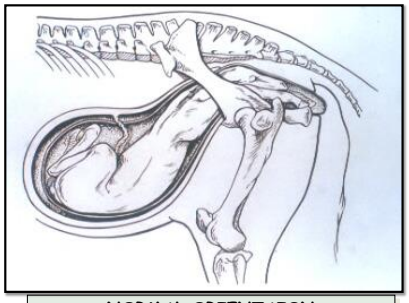
- Uterine inertia
- Narrowing of birth canal (i.e. pelvic fracture)
- Less common

Fetal Causes:

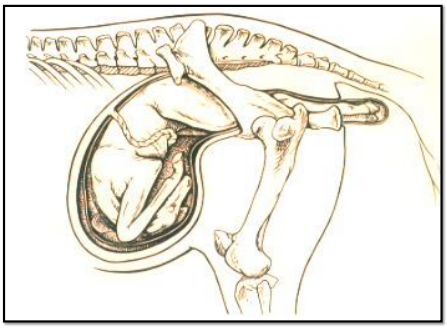
- Abnormal orientation of fetus (i.e. how the fetus lines up in birth canal)*
- Developmental abnormalities
- Dead or sick foals
- More common



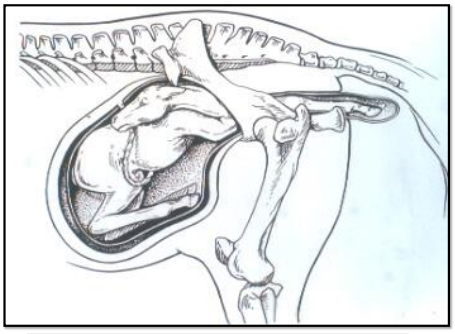
BIRTH CANAL: MARE vs COW



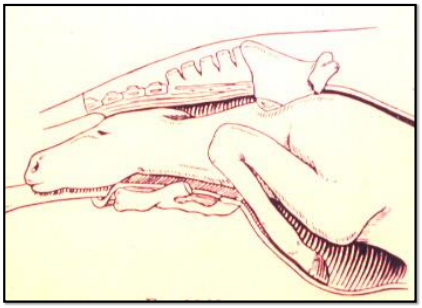
NORMAL ORIENTAION
Frontwards, right side up, limbs and head extended



BACKWARDS PRESENTATION



NECK FLEXED TO RIGHT (HEAD BACK)



LEFT FORELIMB FLEXED AT KNEE (CARPUS)

‘ON-FARM OBSTETRICS’

Key components:

- Training
  - Especially for on-site foaling attendant
- Experience
- Preparation
  - Equipment, supplies
  - Emergency plan*

‘ON-FARM OBSTETRICS’

Emergency Plan:

- Each farm should have their own tailored plan
- Relevant factors:
  - Experience and availability of farm personnel
  - Availability and proximity of veterinary services
- Know limitations of personnel
- Understand the situation
- Call for assistance if in doubt

WHEN TO CALL FOR ASSISTANCE

- If there has been no progress toward delivery by 15 - 20 minutes after ‘water breaks’
- Progress abruptly stops
- If the mare becomes painful or shocky
- If you detect a significant problem*
- If you are unsure of the issue
- If you do not have the knowledge or ability to diagnose or correct the problem

Level	Management Difficulty	Foaling Complication or Issue
1	Mild	Elbow lock
		Upside-down foal
		Backwards foal
		Uterine inertia
		'Red-bag' (Premature placental separation)
2	Moderate	Front Leg(s) flexed at the knee (carpus)
		Neck flexed ventrally; muzzle below pelvic brim
		'Hip-lock'
3	Difficult	Front leg(s) flexed at shoulder
		Neck flexed to side; muzzle not reachable
		'Breech' presentation
		Transverse presentation
		Twins (when both entering birth canal simultaneously)

ASSISTING DELIVERY

'ON-FARM' OBSTETRICS: ELBOW LOCK

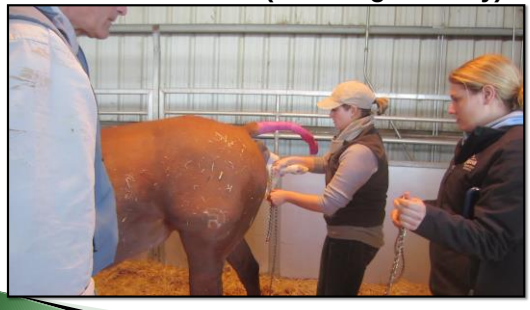
- Orientation
  - Frontward presentation
  - Right side up
  - Both front feet and muzzle visible
  - One leg protrudes more
- Problem
  - Uterine contractions do not advance one leg
  - Elbow 'caught' on pelvis

ELBOW LOCK

- 'On-Farm' Obstetrics
  - When mare relaxes between contractions, pull on retained limb
  - One should feel a 'pop' when the elbow is freed
  - Foal usually delivered unassisted with subsequent contractions
  - Provide assistance only if needed

DYSTOCIA: Lack of Progress

DYSTOCIA: Assist (Standing Delivery)



‘ON-FARM’ OBSTETRICS: RED-BAG

- Orientation
  - Usually normal frontward presentation
  - Brick red, velvety membrane protrudes through vulva
- Problem
  - Failure to rupture outer placental membrane
  - Premature placental separation
  - Foal at high risk of hypoxemia

‘RED-BAG’

- ‘On-Farm’ Obstetrics
  - Emergency situation
    - Call for farm assistance
  - Rupture membrane immediately (knife, etc.), which will ‘break her water’ (allantoic fluid exits)
  - Assist with delivery
    - Use guidelines* to assist
  - Have oxygen available for supplementation

ADVANCED OBSTETRICAL PROCEDURES

Delivery Options:

- Vaginal delivery with mare awake
- Vaginal delivery with mare under general anesthesia
- Cesarean section surgery
- Fetotomy

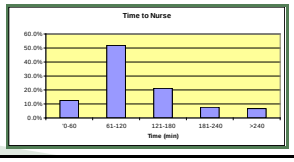
MARE UNDER GENERAL ANESTHESIA

POST-FOALING TOPICS

- Care of the newborn foal
  - A-B-C Guidelines
  - 1-2-3 Rule
- Colostrum evaluation
  - Quality testing
  - Colostrum bank (frozen)
- Navel care
- Enema administration
- Foal IgG tests
- Placenta
  - Retained Placenta
  - Placental Evaluation

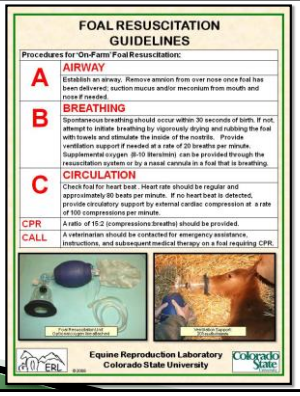
1-2-3 Rule for Newborn Foals

- 1 - Stand by one hour
  - 58 minutes (average time to stand)
- 2 - Nurse by two hours
  - 142 minutes (average time to first nurse)
- 3 - Pass meconium by three hours
  - 86 minutes (average time to pass meconium)



BIRTH RESUSCITATION

- Training
  - Indications for resuscitation
- Preparation
- Equipment
  - Resuscitation device with nose cone
  - Oxygen tank (E-tank), regulator and tubing
  - ± Aspiration device
  - Foal resuscitation guideline chart



FOAL RESUSCITATION GUIDELINES

Procedures for 'On-Farm' Foal Resuscitation:

A — AIRWAY
Establish an airway. Remove amnion from over nose once foal has been delivered; suction mucus and/or meconium from mouth and nose if needed.

B — BREATHING
Spontaneous breathing should occur within 30 seconds of birth. If not, attempt to initiate breathing by vigorously drying and rubbing the foal with towels and stimulate the inside of the nostrils. Provide ventilation support if needed at a rate of 20 breaths per minute. Supplemental oxygen (8-10 liters/min) can be provided through the resuscitation system or by a nasal cannula in a foal that is breathing.

C — CIRCULATION
Check foal for heart beat. Heart rate should be regular and approximately 80 beats per minute. If no heart beat is detected, provide circulatory support by external cardiac compression at a rate of 100 compressions per minute.

CPR — A ratio of 15:2 (compressions:breaths) should be provided.

CALL — A veterinarian should be contacted for emergency assistance, instructions, and subsequent medical therapy on a foal requiring CPR.

Equine Reproduction Laboratory
Colorado State University

OXYGEN SUPPLEMENTATION

Equipment:

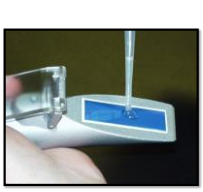
- Portable 'E-tank'
- Regulator valve
- Tubing
- Nasal adaptor

- 8 - 10 liters of O_2/min flow rate

COLOSTRUM EVALUATION

Equine Colostrum Refractometer

- Add one drop of colostrum onto prism
- Close prism cover
- Read % score
- Equine interpretation scale



CSU 2006

COLOSTRUM EVALUATION

Clinical Relevance:

- Prediction of success of passive transfer of maternal antibodies even before foal has nursed
- Allows for early treatment (oral supplementation)
- Critical for colostrum banking (frozen colostrum)

COLOSTRUM BANK

Technique:

- Evaluate quality of colostrum
- Collect 250 mls (8 ounces)
- Strain through gauze or cheesecloth
- Pour into labeled plastic bottle
- Freeze
  - 1 to 2 year storage life

COLOSTRUM BANK

Thawing:

- Thaw bottle in warm water
  - Do not microwave
- Administer thawed colostrum to foals at-risk of FPT
- Volume dependent on risk and mare status
  - 1 quart needed for complete colostrum replacement
  - 8 to 16 ounces for partial supplementation*

UMBILICAL STUMP TREATMENT

Clinical Relevance:

- Infectious agents may enter the foal through the open umbilical stump
- Repeated application of an antiseptic agent can reduce the incidence of 'navel ill'
- Chlorhexadine solution (1:1)
- 3 times per day for 3 days

MECONIUM IMPACTION

- Meconium should be passed within 3 hours after birth
- Foals with meconium impactions are painful and strain to defecate
- Secondary issues:
  - Failure of passive transfer (affected foals nurse less often)
  - Sepsis (due to bacterial translocation across inflamed intestine)

MECONIUM IMPACTION

MECONIUM IMPACTION

Management Strategies:

- Prevention or treatment of meconium impaction
- Sodium phosphate enemas most common
- Options:
  - Routine treatment of all foals
  - Only administered to foals that cannot pass meconium on their own

MECONIUM IMPACTION

Acetylcysteine Enema

- Administered by veterinarians to foals with refractory meconium impactions
- Contains acetylcysteine and sodium bicarbonate
- Mix with water in enema bottle

MECONIUM IMPACTION

- Administered into rectum through a Foley catheter
- Clamp catheter
- Allow to stay for 15 minutes
- Remove catheter
- Breaks up meconium

TESTING FOR PASSIVE TRANSFER

- Measure IgG level in the serum of the foal to verify the extent of passive antibody transfer
- Options:
  - 12 hrs (transfer not complete)
  - 24-36+ hrs (transfer complete)
- Advantages of early testing
  - Oral IgG supplementation is still an option
    - Frozen-thawed colostrum (or other IgG source)

TESTING FOR PASSIVE TRANSFER

Techniques:

- SNAP® test
  - Field test
- ARS IgG Test
  - Quantitative test

TESTING FOR PASSIVE TRANSFER

Interpretation (all foal IgG tets):

Concentration (mg/dl)	Evaluation
800	Excellent
400	Adequate
200-400	Inadequate (FPT)
< 200	Complete FPT

PLACENTAL EVALUATION

Importance:

- Offers insight to *in utero* environment and health of newborn foal
- Critical to health of postpartum mare
- Passed within 3 hrs

PLACENTAL EVALUATION

Chorioallantoic Membrane:

- Chorionic surface
  - Brick red
  - 'velvety'
- Allantoic surface
  - Pink, smooth
  - Prominent blood vessels
- Cervical Star

PLACENTAL EVALUATION

Is Entire Placenta Present:

- If a piece of placenta is *missing*, it will be the tip of the non-pregnant horn

PLACENTAL EVALUATION

Consult with your Vet:

- If the placenta is retained
- If a piece is missing
- If the cervical star area is abnormal
- If the placenta is excessively heavy
- If you are at all unsure if there is a problem

Keys to Successful Foaling Season:

- Owner/attendant education
  - Hands-on training
- Communication with your veterinarian
- Preparation
  - Foaling kit
  - 'Birth Resuscitation' kit
- Emergency Plan