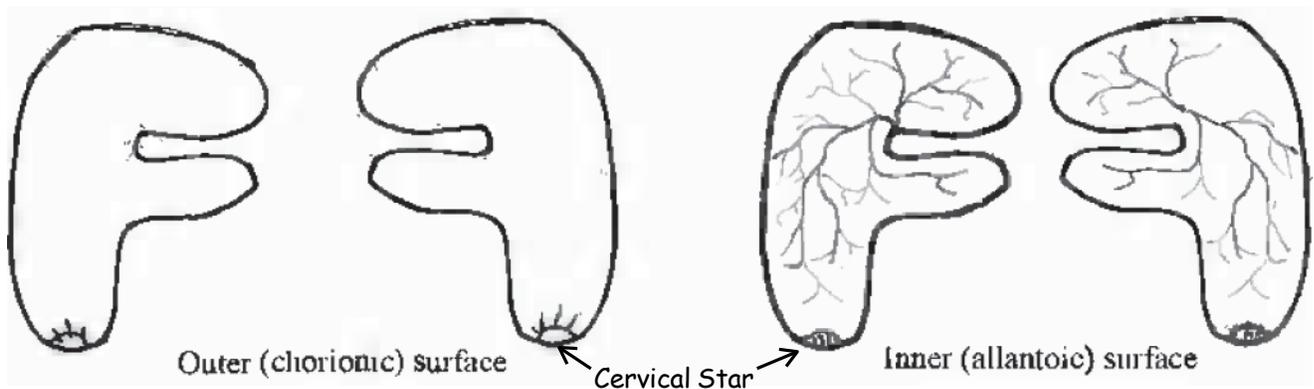


Sampling Protocol for Equine Abortions

1. **Examine the umbilical cord and placenta for any abnormalities.** This is best accomplished by arranging the placenta in an "F" or "Y" shape with the horns of the placenta forming the arms and the body forming the base (see Figure 1). First examine the allantoic surface and then turn the placenta inside out to examine the chorionic surface.
 - a. Weigh the placenta_____
 - i. Normal is 11% of foal weight
 - b. Measure the umbilical cord length (fetal end to junction with chorioallantois)_____
 - i. > 85 cm is associated with placental insufficiency
 - c. Count the number of twists in the umbilical cord (normal ~4)_____
 - i. Note any edema, hemorrhage or urachal dilation
 - d. Indicate the attachment of the cord to the chorioallantois on the diagram below
 - e. Note any gross lesions on the diagram below
 - f. Collect **multiple** sections of placenta for ancillary testing. **Critical in the diagnosis of some mycotic and bacterial infections!**
 - i. **Histopathology** (10% neutral buffered formalin; 10:1 formalin to tissue ratio)
 - Both horns, 2 sites of body, cervical star, umbilical cord, amnion
 - See Figure 1
 - ii. **Bacteriology/mycology via culture or PCR** (fresh)
 - Specifically cervical star as most infections are ascending in mares
 - iii. **Virology and molecular techniques (PCR)** (fresh-frozen)



2. **External examination of the fetus for any outward congenital malformations, meconium staining, or skin lesions**
3. **Estimate/verify the gestational age_____**
 - a. Weigh the fetus_____
 - b. Measure the crown to rump length_____
 - c. Note fetal characteristics_____
 - d. Refer to the chart on aging
4. **Determine the state of preservation**
 - a. Fresh_____, autolyzed_____, mummified_____, macerated_____
5. **Classify the fetal death**
 - a. Abortion_____, stillbirth_____, non-viable neonate (lungs partially inflated)_____
6. **Perform a routine necropsy and note any gross abnormalities**
 - a. Check the shoulder joints as hemarthrosis is an indication of dystocia
7. **Collect the following tissues for ancillary testing. Remember to maximize sampling initially. Samples can always be discarded later!**
 - a. **Histopathology and immunohistochemistry** (10% neutral buffered formalin; 10:1 formalin to tissue ratio)
 - i. Eyelid, tongue, thyroid, thymus, lung, heart (t-section), diaphragm, liver, kidney, adrenal gland, spleen, ileum, colon, mesenteric lymph node, skeletal muscle, half of brain, multiple sections of placenta, any lesions
 - ii. IHC is available for many infectious agents
 - b. **Bacteriology/mycology via culture or PCR** (fresh)
 - i. 5 ml stomach content, lung, liver, placenta (cervical star)
 - ii. Collect stomach content in a syringe with a large gauge needle
 - iii. Package each specimen separately in sterile containers
 - c. **Virology and molecular techniques (PCR)** (fresh-frozen)
 - i. Lung, liver, kidney, spleen, placenta, half of brain
 - ii. Package each sample separately in sterile containers
 - d. **Nutrition/Toxicology** (fresh-frozen)
 - i. Liver (2- 5 grams of tissue required)
 - e. **Serology** (refrigerated or frozen)
 - i. Fetal fluids- heart blood, thoracic fluid, abdominal fluid
 - ii. Collect in sterile red top tubes

Gestational Age Estimates for Equine Fetuses

Days Gestation	Fetal Weight	Fetal Length (cm)	Fetal and Placental Characteristics
16		0.3	
20		0.6	
25		0.6-0.8	
30	0.2 gm	0.9-1.0	Eye, mouth, and limb buds visible, chorionic vesicle present only in uterine horn
35		1.5	
40		1.8-2.2	Eyelids and pinnae have appeared
45		2.0-3.0	
50		3.0-3.5	
60	10-20 gm	4.0-7.5	Lips, nostrils, and beginning development of feet observed; eyelid partially closed. Placenta not attached but entering the body of the uterus
90	100-180gm	10-14	Villi of placenta present but without firm attachment, mammary nipples and hooves visible, body and horn of uterus both involved and enlarged
120	700-1000gm	15-20	External genitalia formed but scrotum empty, placenta attached, ergots and orbital areas prominent
150	1500-3000gm	25-37	May or may not have fine hair on orbital arch and tip of tail, prepuce not yet developed
180	3-5 kg	35-60	Hair on lips, orbital arch, nose, eyelashes, and fine hair on mane
210	7-10 kg	55-70	Hair on lips, nose, eyebrow, eyelids, edge of ear, tip of tail, back, and mane
240	12-18 kg	60-80	Hair on mane and tail, back and distal extremities
270	20-27 kg	80-90	Short, fine hair over entire body
300	25-40 kg	70-130	Body completely covered in short hair, prepuce developed, hair on mane and tail increased
330	30-50 kg	100-150	Complete hair coat with final color, testes descended

Bergin WC et al. Developmental horizons and measurements useful for age determination of equine embryos and fetuses. Proc Am Assoc Equine Pract 1967; 13:179-196.



Figure 1. Normal equine fetal membranes. Black lines indicate the 7 sites to sample for histopathology.