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Problems during Pregnancy



1


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Normal expectations

ESTRUS CYCLE:

- Pregnancy rate at first control at 16-18 days: 35-60%
- Early Embryonal Loss between 14-50 days : 10-15%
- Abortion between 50 and term : 8-10%
- Foaling rate per cycle : 35%

SEASON: Foalingrate = 80+%



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Causes of Early Embryonic Loss Maternal Causes

Hormonal:

- progesterone deficiency?? -> P4 supplementation

Uterine:

- Insufficient uterine involution postpartum
- Fibrosis
- Chronic inflammation

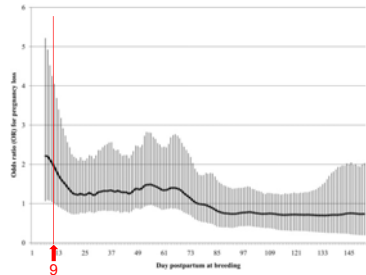

Age related (>15jr):

- Oocyte quality / Chromosomal abnormalities

Lactation; body condition; nutrition

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Embryonic loss in function of days postpartum

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Endotoxemia can cause embryonic loss

- 100% loss of pregnancy after endotoxemia between 14 and 35 days of pregnancy
- 50% loss if endotoxemia occurs between 40 and 80 days
- 0% loss after mild colic or endotoxemia past 80+ days


WHY?

Systemic inflammation resulting in release of inflammatory substances including PGF-2 α . PGF will cause regression of the CL and loss of pregnancy as a result of progesterone deficiency

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Problems in later gestation

- Abortion
 - viral
 - mechanic - anatomic
- Uterine torsion
- Ruptured prepubic tendon – abdominal hernia
- Placental hydrops
- Endotoxemia related to colic
- Placentitis
- Premature placental separation


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Causes of Abortion

Estimated:	%
• Twin pregnancy	30%
• EHV-1 and EVA	25%
• Bacterial (placentitis)	15%
• Malformations	5%
• Mare disease	5%
• Unknown	20%

50% of all abortions remain undiagnosed


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Abortion and stillbirth

- Abortion:
 - Pregnancy loss after completion of organogenesis
 - Rate in horse is about 10% from day 50 to term
- Stillbirth:
 - Delivery of a nonviable fetus at (or near) term
 - Should this be considered a result of abortion of dystocia?

pag. 8



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Signs of impending abortion

- Premature udder development
- Relaxation of vulva and tail ligaments
- Vaginal discharge
- Placental tissue protruding through cervix or vulva
- Often no warning signs (diagnostic!)



pag. 9


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Diagnosis of abortion

- A definitive diagnosis is only reached in 50%
- To increase chances for diagnosis carefully collect samples from:
 - Fetus (liver, lung, spleen, heart, kidney, stomach content)
 - Placenta (full thickness - cervical star, body, horns)
 - Mare (mostly history and clinical examination)


pag. 10


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Precautions

- All aborted material should be removed
- Area disinfected (soap, disinfectant, warm, high pressure)
- Isolate aborted mare ??
 - Depends on situation
 - Infectious pressure on remaining pregnant mares
 - Where to move mare?


pag. 11


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Infectious causes of abortion

- EHV1.4 (Equine Rhinopneumonitis)
- EVA (Equine Viral Arteritis)
- EHV3 (Coital exanthema)
- Equine infectious anemia (EIA)
- Leptospira interrogans
- Taylorella equigenitalis (CEM)
- Trypanosoma equiperdum (Dourine)
- Salmonella abortus (Hematogenous placentitis)
- Streptococcus zooepidemicus (Ascending placentitis)
- MRLS in USA (Placentitis and Fetal infection - eastern tent caterpillar)
- Nocardioform placentitis


12


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Equine Herpes Virus 1&4

- 1 & 4: most important
- Endemic in domesticated horse populations
- EHV1:
 - Respiratory illness
 - Abortion
 - (frequently fatal) pneumonitis in neonatal foals
 - Myelo-encephalopathy
- EHV4: respiratory illness
- EHV3: coital exanthema


13


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Rhinopneumonitis – EHV-1 - Transmission

- Spread via
 - aerosolized secretions from infected coughing horses,
 - direct and indirect (fomite) contact with nasal secretions,
 - contact with aborted fetuses, fetal fluids, placentae
- Latent infection, no clinical signs, may experience reactivation of infection and shedding of the virus when stressed.
- Difficult to control
- Outbreaks of EHV-1 or EHV-4 can occur in closed populations of horses.


14


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EHV-1 - Rhinopneumonitis

- Sometimes acute febrile respiratory illness on primary infection mostly in young animals (weanlings and 1 yrs old)
- Abortion in the pregnant mare (> 5-7 months).
- Can cause abortion storms (up to 90%)
- Infection at end of pregnancy can cause stillbirths and weak infected foals (fatal pneumonia)

15


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EHV-1


Abortion

- Mare shows no symptoms
- Incubation time : 20 – 30 days but can be as long as 90 days
- 90% more than 8 months pregnant
- Incidence : 10 – 90 %

Diagnosis

- Fetus is fresh
- Fetus shows signs of sepsis, ascites and icterus
- Liver necrosis : white foci of necrosis in the fetal liver -> submit to pathology

16

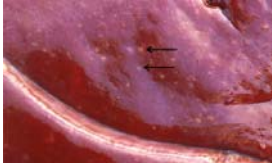

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Diagnosis of EHV-1

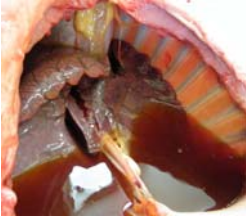
- Clinical signs
- Paired serology (indicative – not definitive)
- Necropsy of fetus AND placenta
- Placenta: minimal lesions – some edema – virus isolation
- Fetus:
 - Fresh fetus – little autolysis
 - Hydrothorax – hydroperitoneum
 - Multifocal hepatic necrosis
 - Virus identification from lung/liver/thymus (isolation – fluorescence antibody test)

17

Rhinopneumonitis – EHV1



Equine herpes virus 1 abortion: white foci of necrosis in the fetal liver (arrows).



Equine herpes virus 1 abortion: excessive pleural fluid and prominent bands of interlobular edema in the lungs.

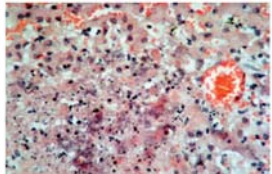


Figure 8-19 Focal hepatic necrosis in fetus aborted as a result of EHV-1 infection.

18

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Rhinopneumonitis EHV-1

Late term very fresh foetus wrapped in amnion

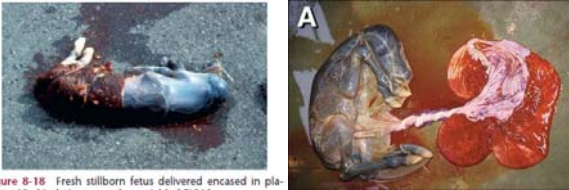
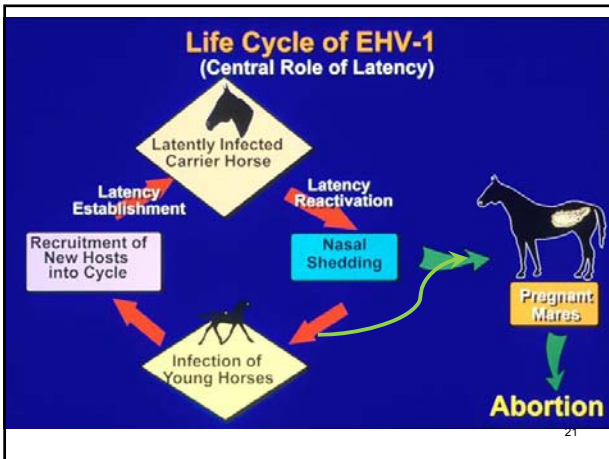
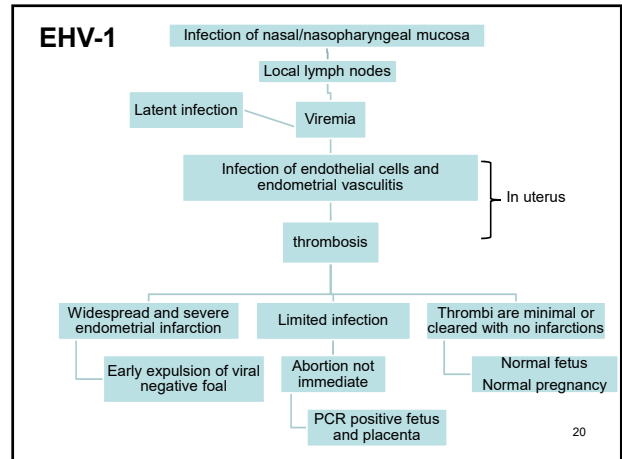


Figure 8-18 Fresh stillborn fetus delivered encased in placenta. Viral isolation procedures yielded EHV-1.



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EHV-1 - Prevention

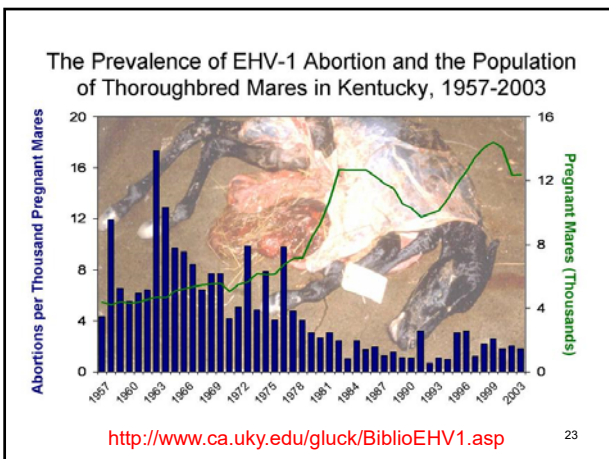
Vaccination!

- Immunity is of short duration and does not deliver 100% protection
- Provides protection on farm level – not individual level - all animals need to be vaccinated (2x/year)
- pregnant mares additionally: mo 5, 7 and 9 of gestation**

Herd Management

- Divide pregnant mares in small separated groups
- Do not introduce new mares in the pregnant groups
- Keep the young stock and transient horses away from the broodmares

Hygiene is crucial in case of abortion – keep infection pressure down!!



The American Association of Equine Practitioners - www.AAEP.org

Guidelines

AAEP guidelines are created to simply serve as guidelines for the practitioner and the equine industry. As such, they do not have the force of law. All guidelines issued by the AAEP should be regarded as one of several tools a practitioner may take into consideration in the context of his or her practice. All practitioners are encouraged first and foremost to understand and comply with the laws, regulations and standards of care of their appropriate jurisdiction. While guidelines are intended to promote a standard for veterinary practice, lack of adherence to any specific AAEP guideline does not constitute grounds for disciplinary action. The AAEP can exercise disciplinary action only in connection with its own members and its action is limited to denial of membership in the AAEP. The AAEP shall have no liability whatsoever for any guideline.

A committee, subcommittee, or task force of the AAEP reviews guidelines every three to five years. Any major revisions are approved by the AAEP board of directors.

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GUIDELINES	
AAEP Ethical and Professional Guidelines	Click to Expand
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AAEP American Association of Equine Practitioners

Home » Guidelines » Vaccination Guidelines » Risk-Based Vaccination Guidelines

Risk-Based Vaccination Guidelines

These are vaccinations included in a vaccination program after the performance of a risk-benefit analysis. The use of risk-based vaccinations may vary regionally, from population to population within an area, or between individual horses within a given population. Disease risk may not be readily identified by laypersons. It is important to consult a veterinarian when developing a vaccination program.

- Anthrax
- Botulism
- Equine Herpesvirus (Rhinopneumonitis)
- Equine Viral Arteritis
- Equine Influenza
- Potomac Horse Fever
- Rotaviral Diarrhea
- Snake Bite
- Strangles

25

Equine Herpesvirus Resources

Equine Herpesvirus Myeloencephalopathy (EHM) & EHV-1 Resources

[Equine Herpesvirus Myeloencephalopathy \(EHM\) & EHV-1 FAQ](#)

Download the AAEP's "Equine Herpesvirus (EHV): What Every Horse Owner Should Know" client education PPT (Updated 2011)

[Brochure you can give to clients](#)

Website with well organized EHV-1 information

[University of California, Davis, School Vet Med](#) – detailed and practical information about handling sick horses, diagnostic testing, and control

Background papers

[ACVIM EHV-1 consensus statement](#) – current detailed information about the virus, neurological disease, and control

[Nasal Shedding of Equine Herpesvirus-1 from Horses in an Outbreak of Equine Herpes Myeloencephalopathy in Western Canada](#)

Additional Resources

[USDA EHV Resources](#)

[USDA Equine Biosecurity Brochure](#) (available in Spanish as well through USDA/APHIS)

[AAEP Equine Herpesvirus \(EHV\) Control Guidelines](#)

[AAEP Biosecurity Guidelines](#)

[US State/Canadian Provincial Animal Health Departments \(State Veterinary Offices\)](#)

Home » Vaccination Guidelines » Risk-Based Vaccination Guidelines » Equine Herpesvirus (Rhinopneumonitis)

Equine Herpesvirus (Rhinopneumonitis)

Equine herpesvirus type 1 (EHV-1) and equine herpesvirus type 4 (EHV-4) can each infect the respiratory tract, causing disease that varies in severity from sub-clinical to severe and is characterized by fever, lethargy, anorexia, nasal discharge, and cough. Infection of the respiratory tract with EHV-1 and EHV-4 typically first occurs in foals in the first weeks or months of life, but recurrent or recrudescent clinically apparent infections are seen in weanlings, yearlings, and young horses entering training, especially when horses from different sources are commingled. Equine herpesvirus type 1 causes epidemic abortion in mares, the birth of weak nonviable foals, or a sporadic paralytic neurologic disease (equine herpesvirus myeloencephalopathy-EHM) secondary to vasculitis of the spinal cord and brain.

Both EHV-1 and EHV-4 spread via aerosolized secretions from infected coughing horses, by direct and indirect (fomite) contact with nasal secretions, and, in the case of EHV-1, contact with aborted fetuses, fetal fluids, and placentae associated with abortions. Like herpesviruses in other species, these viruses establish latent infection in the majority of horses, which do not show clinical signs but may experience reactivation of infection and shedding of the virus when stressed. These epidemiologic factors seriously compromise efforts to control these diseases and explain why outbreaks of EHV-1 or EHV-4 can occur in closed populations of horses.

Because both viruses are endemic in most equine populations, most mature horses have developed some immunity through repeated natural exposure; thus, most mature horses do not develop serious respiratory disease when they become infected but may be a source of exposure for other susceptible horses. In contrast, horses are not protected against the abortifacient or neurologic forms of the disease, even after repeated exposure, and mature horses are in fact more commonly affected by the neurologic form of the disease than are juvenile animals.

Recently, a genetic variant of EHV-1 has been described (defined by a single point mutation in the DNA polymerase [DNApol] gene) that is more commonly associated with neurologic disease. This mutation results

27

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Equine Viral Arteritis - EVA

- Worldwide.
- Confused with other conditions with clinically similar conditions.
- Outbreaks infrequent, related to lack of recognition.
- Arteritis : characteristic vascular lesion

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Clinical signs - EVA

- Fever, depression, anorexia
- Edema on limbs, ventrum, periorbital region, scrotum
- Urticaria, conjunctivitis
- Rhinitis
- Abortion—associated with 'abortion storms'
- Leukopenia

Note: The majority of acute EVA infections are subclinical or inapparent.


a urticaria

b distal limb edema

c petechial hemorrhage

d Scrotal edema

30



Ocular edema Conjunctivitis Scrotal edema

Equine Viral Arteritis (EVA)

31

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The aborted fetus - EVA

- No typical symptoms
- Vasculitis in the uterus, compromise of uterine circulation, placental exchange is compromised, suffocates in utero, foetus stressed, abortion
- AUTOLYSIS CAN BE SEEN
- Pulmonary oedema (rib impressions on surface of lungs)
- Oedema in de liver (light coloured shiny surface)

32

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Edema in lungs and liver



33

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Diagnostic testing

- Virus isolation and/or paired serology.
- Virus isolation sampling can include whole blood, nasopharyngeal swabs, conjunctival swabs, fetal or placental tissues/fluids.
- EVA is fragile at room temperatures, but stable when frozen. Samples should be frozen and shipped with freezer packs.
- Paired (acute and convalescent) at interval of 3-4 weeks.

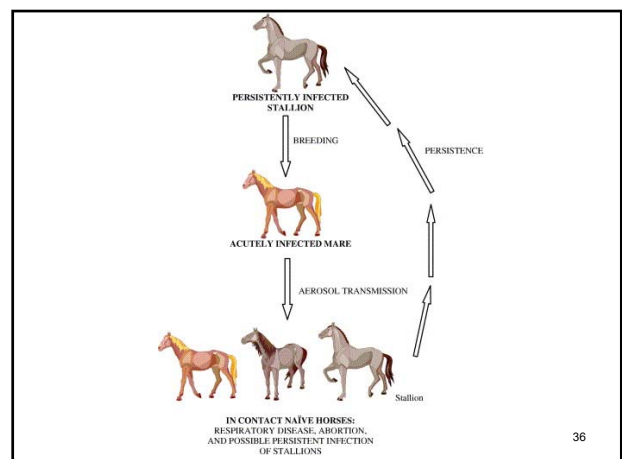
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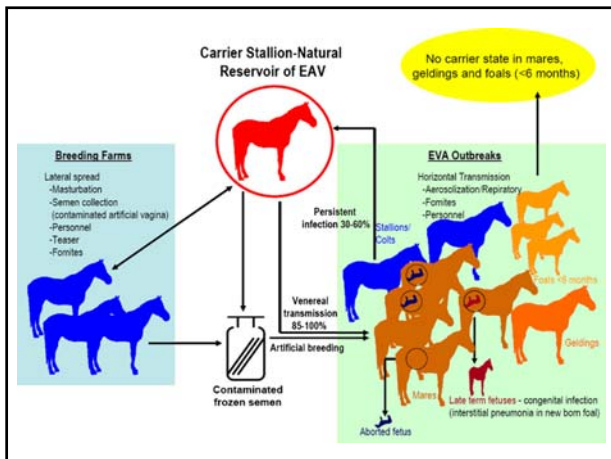
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Transmission - EVA

- Aerosol transmission via respiratory secretions of acutely infected horses.
- Venereal transmission (less frequent) during breeding with carrier stallions, also cooled or frozen semen can be infectious.
- Indirect transmission (fomites, urine, feces, artificial insemination, and vaginal secretions)
- Congenital infection in foals has been reported.
- The virus is heat sensitive but is able to persist at freezing temperatures.

35





Carrier stallions - EVA

- Carrier stallions continue to shed through semen, **but not through the respiratory tract**.
- Only stallions** develop into the carrier state.
- Virus survives in the ampulla of the genital tract (permanent, renewable reserve) and is shed with the semen.
- Vaccinated stallions or previously exposed (non-carrier) stallions will NOT become carrier when exposed to the virus. PROTECTED

Carrier Stallion - EVA

- Carrier status is variable in duration (a few years to lifelong shedders).
- Vaccination of carrier stallion does NOT eliminate the virus or carrier state.
- Virus survival is "testosterone" dependent.
- Suppressing testosterone for period of min 6 weeks will eliminate the virus in most stallions.

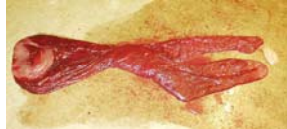


Prevention / Vaccination - EVA

- Limit the spread of EVA in large outbreaks
- At-risk stallions re-vaccinat **annually**
- Implications regarding breeding shed access and export must be considered when vaccinating at-risk horses. Stallions are screened serologically and certified before primary vaccination.
- Currently it is not possible to differentiate vaccinate from natural infection via serology

Endotoxemia related abortion

- Endotoxemia will induce the production of various prostaglandins including PGF-2 α from the uterus
- High doses of progesterone or altrenogest will suppress the endogenous PGF-2 α release and stop abortion
- These observations also support the use of altrenogest in cases of placentitis (direct effect on the uterus and myometrium)

Placentitis


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Non-infectious abortions and problems

- Vulvar hemorrhage pre-partum
- Twinning
- Uterine torsion
- Hydro-allantois
- Rupture of pre-pubic tendons
- Prolonged gestation
- Mummification/fetal maceration

43

Vulvar bleeding prepartum

- Varices located at or just caudal of the vestibulo-vaginal folds
- Discrete to obvious dripping of blood
- Not life threatening
- Can start a few days to weeks before foaling






Figure 72.1 Mare with numerous varicose veins (arrows) near the vestibulo-vaginal fold as viewed through a vaginal speculum.



44


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Vulvar bleeding prepartum

Etiology:

- Pre-partum ruptured varicose veins
- Presumably caused by changes in steroids, making these varices more fragile.

Treatment:

- Do nothing
- Cauterize (heat or silvernitrate)
- Do NOT ligate!! Veins are too fragile and will rupture at ligation site

45



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Twinning: Problems

- Double ovulation occurs in 5 to 20% of all cycles
- 90% of all twin pregnancies will result in abortion
- 90% of all twins born will need additional medical care
- Financial and emotional downsides
- Reduced fertility after abortion, dystocia and retained placenta






46


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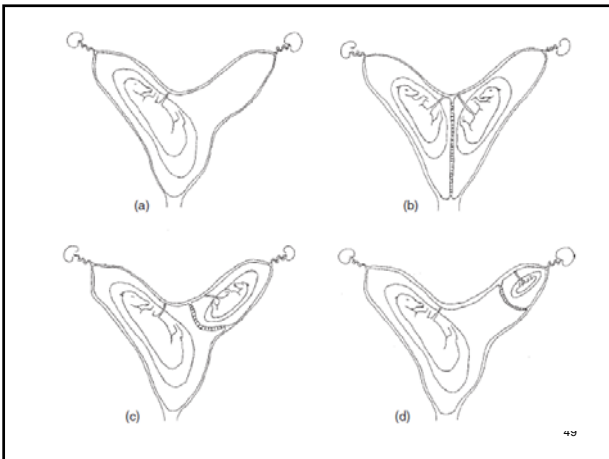
Twinning: Origin


- Heterozygotic twins (>99%)
- Double ovulations (synchronous vs. asynchronous)
- More common in older mares
- Breed predisposition for multiple ovulations:
 - Thoroughbreds (15-25%)
 - Standardbreds (13-15%)
 - Draught horses (24%)
 - Quarter horses & Appaloosas (8-10%)
 - Domestic ponies (2-3%)
- Hormonal manipulation of estrus cycle: PG & hCG
 - Increased ovulation rate and increased pregnancy rates?

47

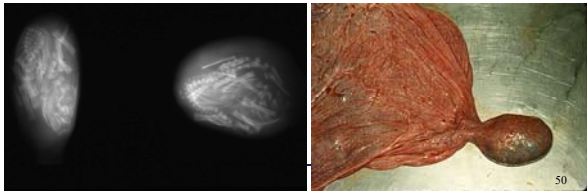



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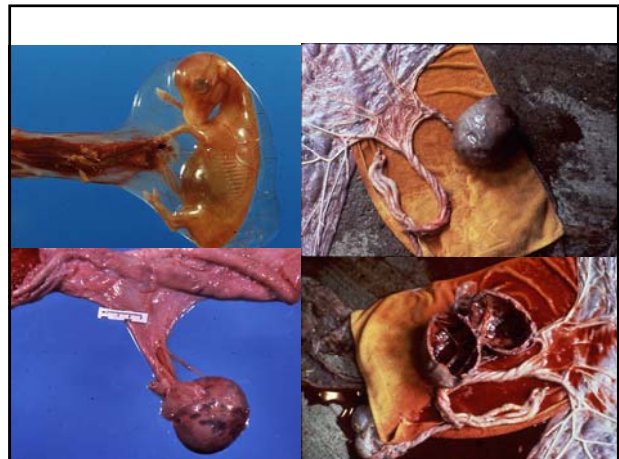




Remnants can sometimes be found as a sac hanging in the allantoic cavity of the surviving fetus/foal.

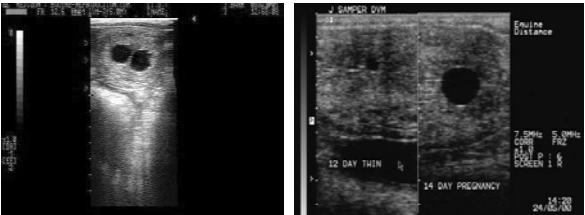
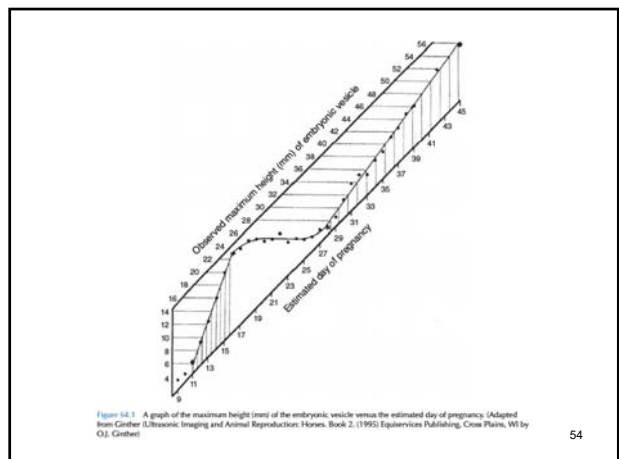



Umbilical sac remnant

Prevention of twinning

- Can only in part be avoided by good management.
- It is important to note every double ovulation or risk for double ovulation
- If a double ovulation is diagnosed/suspected then **pregnancy diagnoses planned at 14 days post ov with recheck at 16 days.**

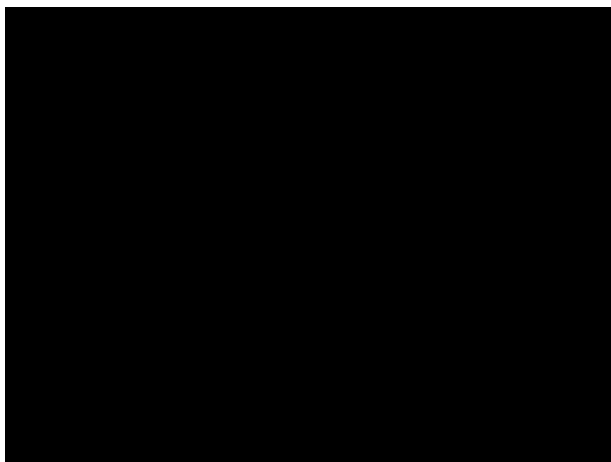
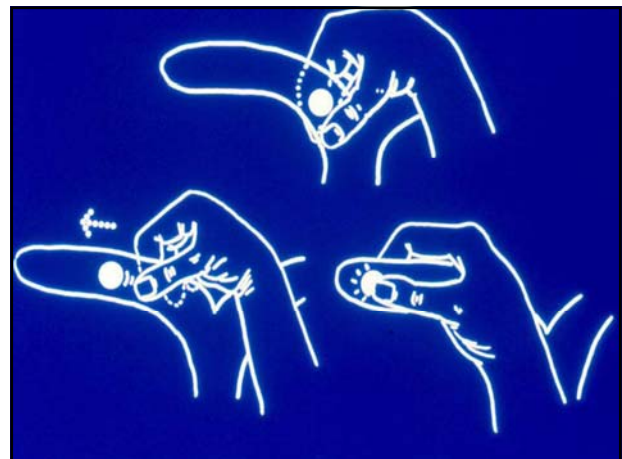
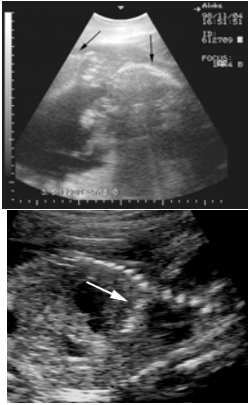




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Twin Pregnancy : Treatment

- Manual crushing of one embryonic vesicle
 - **The earlier you crush the better the chances for survival**
 - Preferably during mobility phase
 - High success rate (>90%)
- Wait for natural twin reduction (only for unilateral twins)
- Transvaginal or transabdominal puncture
- Decapitation by flank incision approach
- Terminate pregnancy

55

Transvaginal or transabdominal puncture of foetus

- A small volume of procaine penicillin is injected in the thorax of the foetus

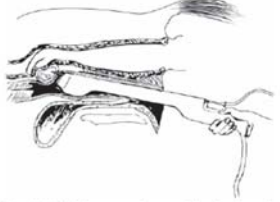
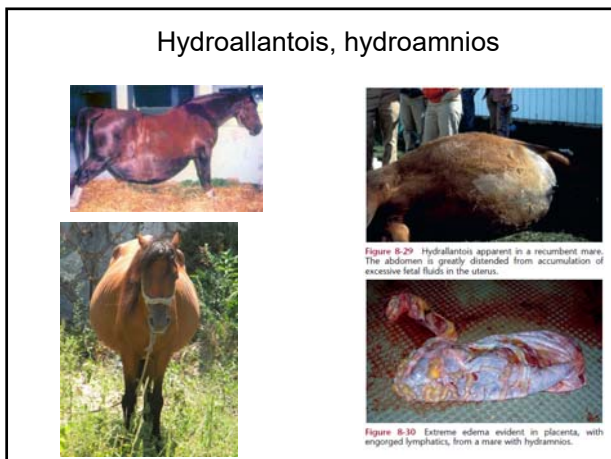
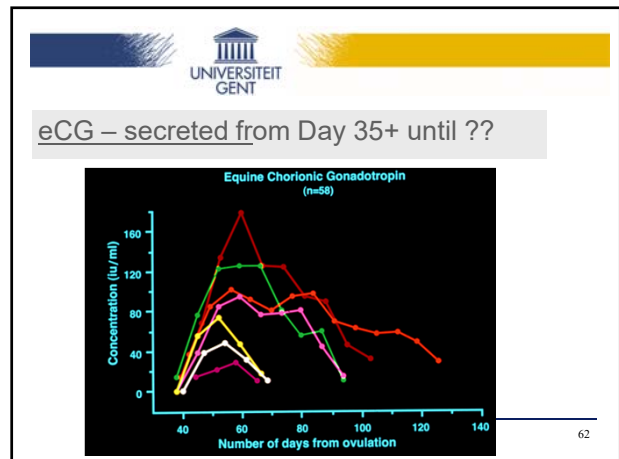
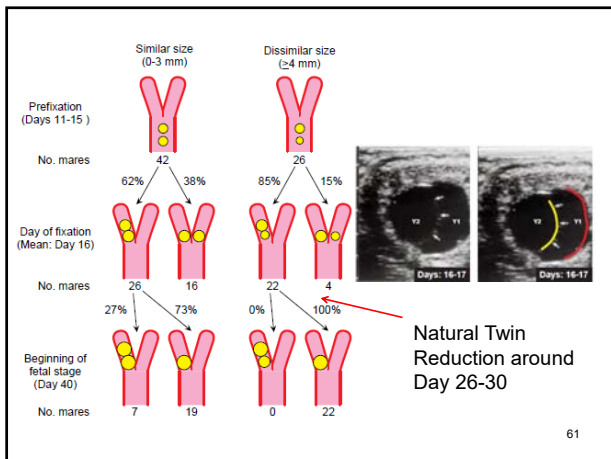


Figure 66.1 Hand, uterus, and transvaginal probe orientation for aspiration.

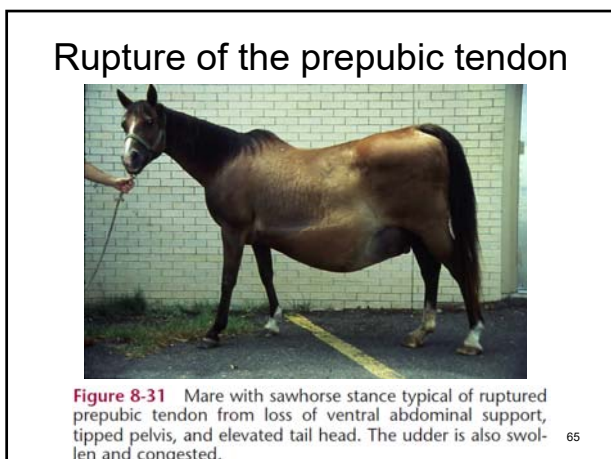


Fig. 1. (A) During craniocervical dislocation, the head is stabilized between the thumb and forefinger before bending from side to side to damage the ligamentous attachments. (B) Dislocation is achieved by placing the thumb on the base of the cranium and applying pressure.

60



- ### Hydroallantois, hydroamnios
- Pathology at the level of the placenta, foetus at the basis not the mare.
 - Does not compromise future fertility
 - Foal is not viable
 - Very slowly (over hours) remove excess allantoic fluid with transcervical catheter. Watch for hypovolemic shock.
 - Induce parturition with oxytocin after the larger part of fluid has been evacuated.
 - Assist with delivery because the overstretched uterus may have poor contractility
- 64



- ### Rupture of the prepubic tendon
- Very painful - life-threatening
 - No abdominal press during parturition
 - Mammary gland often involved in trauma (no or insufficient milk)
 - Permanent lesion that cannot be repaired surgically
 - If able to survive, should not carry foal in future
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Abdominal hernia

Not life threatening – not painful – can become pregnant again



67

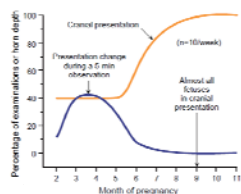
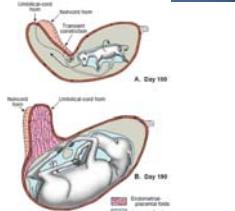
Extreme ventral oedema

- Not painful
- Resolves spontaneously after foaling (within 1-2 days)
- Mild exercising the mare will stimulate circulation and lymph drainage



68

Twisted umbilical cord



69



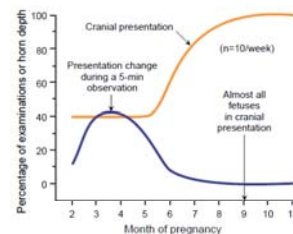
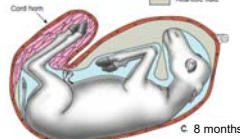
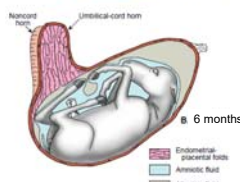
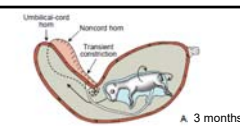
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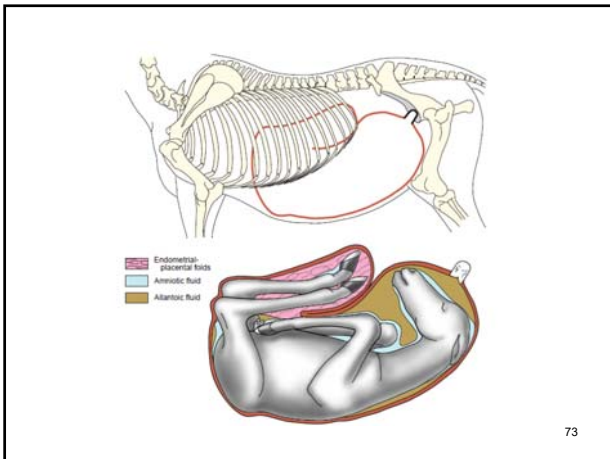
Uterine torsion

- Most frequently at 7-8 months of gestation
- Mild, chronic colic but no gastrointestinal abnormalities
- **Verify the orientation of the broad ligaments**
- Risk for fetal hypoxia and uterine necrosis

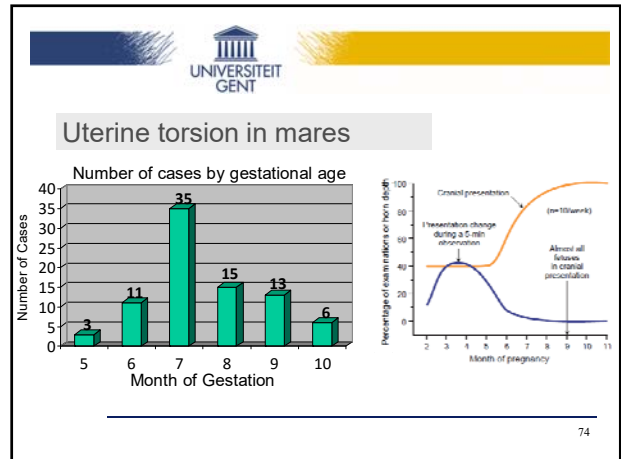
540° torsion



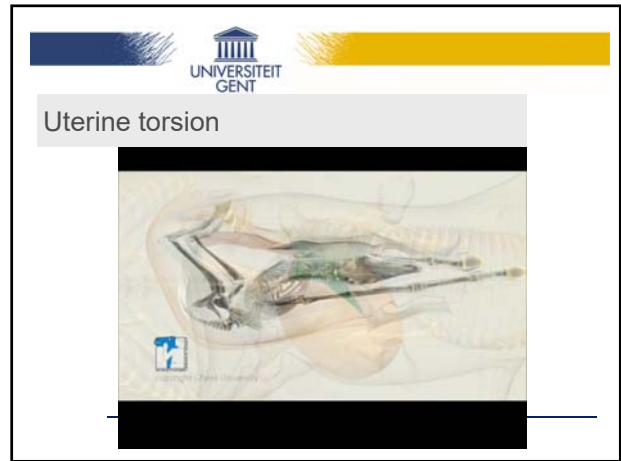
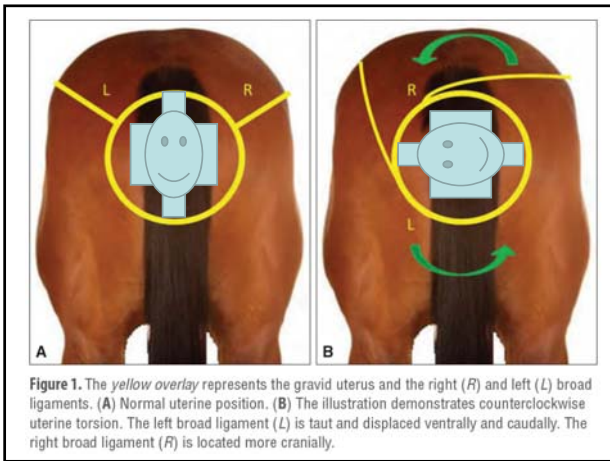
From: Equine Pregnancy: Physical Interaction between the Uterus and Conceptus door O.J. Ginther in Proceedings of the AAEP (www.ivis.org) 72



73



74



Surgical reposition

- Performed on the standing mare
- Flank incision to allow passage of arm
- Incision on left for counterclockwise rotation
- "Lift" the uterus up and flip back into the normal position
- Verify the broad ligaments to confirm correct position

77

Plank in the flank rotation to the left place mare on left side

Figure 2. The rolling procedure for counterclockwise torsion. The mare has been anesthetized and placed in left lateral recumbency. A plank is held in position at the right flank, and the mare is about to be rolled over its back into right lateral recumbency. One person stabilizes the plank while several assistants roll the mare with ropes, one assistant manages the anesthetic, and one assistant stabilizes the head.

78

- <http://www.thehorse.com/videos/30762/univ-of-georgia-staff-working-to-correct-uterine-torsion>
- Or search the web for « TheHorse uterine torsion in mare »

79

