



**Catherine Lane** FdSc REVN

Catherine graduated from Hartpury College in 2012 after gaining the Equine Veterinary Nursing Science Degree; she also qualified as an equine artificial insemination technician in 2012. She works at Western Counties Equine Hospital, Devon, where she is the head nurse and is currently working towards the Higher Education Clinical Veterinary Nursing Diploma at Myerscough College.

# Equine reproduction Part 2: Management of Pregnancy

**Catherine Lane** FdSc REVN

Western Counties Equine Hospital, Culmstock, Cullompton, Devon, EX15 3LA. UK

**ABSTRACT:** Following insemination of the mare, various aspects need to be taken into consideration including ultrasound scans, and the management of the mare to ensure a successful gestation period.

## Introduction

This article follows on from Equine reproduction. Part 1: Artificial insemination in last month's issue. Following artificial insemination of the mare, veterinary nurses should understand and be able to advise owners correctly on the following aspects of the mare's gestation period.

## Ultrasound scan following insemination

The mare should be scanned for evidence of ovulation and the presence of fluid 12–24 hours after chilled artificial insemination and 6–12 hours after frozen semen insemination.

### Endometritis

Presence of fluid can indicate *endometritis* (inflammation of the endometrium). Endometritis is associated with decreased pregnancy rates in mares, however not all mares with subclinical endometritis accumulate fluid. Some may exhibit abnormal oedema patterns.

Endometritis is part of the body's defence mechanism for the removal of bacteria and excess spermatozoa introduced into the uterus during insemination. However, if fluid is present within the uterus, it should be removed to optimize the embryo's survival. This can be done as early as six hours after ovulation by uterine lavage, using isotonic saline accompanied by oxytocin (IM or IV); oxytocin causes uterine contraction and therefore uterine clearance of the fluid. The cervix relaxes, which causes the cervical lumen to widen, and this allows inflammatory fluid to be expelled by the uterine contractions.

Endometritis is a normal process following insemination, however it must be differentiated from infectious endometritis, which is a major cause of infertility and early pregnancy loss. It is caused by a failure of the body's normal defence mechanisms to prevent pathogenic organisms from entering the uterus.

## Diagnosis of pregnancy

The first ultrasound examination to diagnose pregnancy should be performed between days 14 and 15 following ovulation. The second scan is carried out around days 26 to 30, which allows visualisation of the normal development of the pregnancy. If the mare is not pregnant, she should be prepared again for artificial insemination at the next oestrous period.

## Managing the mare

In horses, the average gestation period is 342 days (approximately 11 months) but this can range between 321 and 365 days. The management of the mare will alter during this period to facilitate an uncomplicated birth of a healthy foal.

### Nutrition

The mare's nutrition during pregnancy has a significant effect on whether or not a foal develops osteochondrosis (OCD), which is a form of developmental skeletal disease. The mare's body condition score will affect her foetus's physiology. For example obesity in the mare could cause increased foetal adiposity and detrimental effects to the orthopaedic health of the offspring, which can affect growth and subsequent performance of the adult

DOI: 10.1080/17415349.2015.1035950

horse. Conversely, malnutrition of the broodmare can cause intrauterine growth retardation of the foetus, which may have long-term effects on the offspring that manifest during foetal, neonatal or even adult life.

Mares will have different nutritional requirements depending on their breed and physiological state. Mares which have not got a foal at foot will meet their energy (calorie) requirements in the first eight months just by eating good forage; a stud balancer can be given to supplement vitamins and minerals at this stage.

In the last three months of pregnancy, native ponies can survive on pasture and a stud balancer without any detriment to the foal or loss of body condition; this feeding regime can continue even when the mare is lactating. However, more domesticated horses such as Arabians and Thoroughbreds require a stud mix or cubes to be introduced gradually to provide all of the necessary calories, protein, vitamins and minerals a mare needs to supply to her developing foetus. This hard feed should be fed in conjunction with good forage.

### Exercise

Mares can be exercised from day 16 to day 80 of gestation without causing any detriment to the pregnancy; however this may cause greater foetal length. Mares should be given access to paddock exercise throughout their pregnancy to decrease the amount of ventral oedema and to maintain muscular and cardiovascular fitness in order to maximise the potential for an uneventful parturition. Ventral oedema or swelling of the abdomen can arise due to obstruction of blood flow caused by the weight of a large foetus.

### Immunity

The mare's immunity is lowered during gestation, thus increasing susceptibility to parasite infections as well as bacterial, viral and fungal infections. Mares with a good history of worm control and who are grazed on low-risk pasture should have regular faecal worm egg counts to monitor for parasite infestations; however, mares will need to be wormed for cestodes in the autumn as these are not accurately detected on a faecal worm egg count. The mare should be wormed in the last 2 weeks of her pregnancy as *Strongyloides westeri* migrating larvae can pass through the mammary glands to

infect nursing foals, causing diarrhoea in foals around 10–14 days old.

To elevate newborn foal antibody levels, pre-partum immunisation of the mare is safe and effective. The mare should be vaccinated against:

- rotavirus at 8, 9, and 10 months of gestation
- equine herpes virus (EHV) 1 and 4 at 5, 7 and 9 months of gestation to reduce the chances of abortion caused by EHV
- tetanus toxoid and influenza vaccines in the last four weeks of gestation

### Husbandry

The broodmare should have her hooves regularly trimmed every 6–8 weeks to prevent foot abscessation, which is a common problem in horses with overgrown hooves. The mare should also have regular dental checks at least yearly and ideally twice yearly, to ensure that she can eat her food without discomfort. It is also advisable to have her teeth checked at the first pregnancy scan.

### Foaling box

The foaling box should ideally be 5m × 5m (16ft × 16ft) with an environmental temperature of around 25°C and this stable should be well ventilated. Clean straw is the best bedding to use, as shavings can block the foal's airways if inhaled. The mare should be moved into this location for foaling down, 4–6 weeks prior to her due date. This will enable her to gain immunity to the local pathogens which she will pass on to the foal via her colostrum.

## Mid- to late-term pregnancy failure

During the gestation period, mares can experience pregnancy failure, stillbirth and perinatal foal death. Abortion of the equine foetus can arise due to infectious or non-infectious causes, which may affect the mare, foetus or both, or by external agents.

### Equine herpes virus (EHV)

EHV is the most important infectious cause of abortion in horses in the UK and can be caused by EHV-1 and, less commonly, EHV-4. Abortion usually occurs between seven months and full term. Pregnant mares can be infected without causing abortion, but

transplacental infection results in rapid placental separation and the foetus is aborted within its membranes. If EHV is suspected following abortion, the foetus should be sent for virus isolation; samples are usually collected from the placenta, lung, spleen, liver and kidney.

### Equine viral arteritis (EVA)

Equine viral arteritis (EVA) is another cause of abortion among mares. This is a highly contagious viral infection, which occurs in Europe, North and South America, Africa, Asia and Australia. Due to good management and hygiene levels in the UK this is not a common cause of abortion in mares. Breeding stallions should have a serum sample analysed for antibody levels to EVA and be castrated if their serology is positive, to stop the spread of the virus.

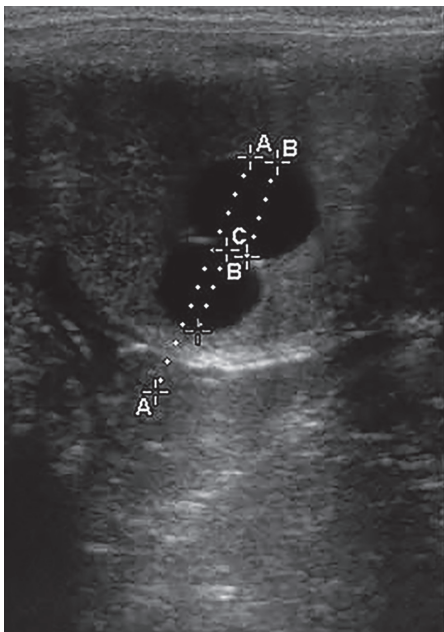
### Placentitis

Placentitis is another common cause of abortion, premature delivery and neonatal death. Placental infection often results from ascending spread through the cervical canal and is most common in later pregnancy. Clinical signs include vulval discharge, premature udder development and lactation. Placentitis is usually caused by *Streptococcus equi* ssp. *zooepidemicus* and *Escherichia coli* infections. The growth of the foetus/foal is usually retarded, probably due to a combination of loss of functioning placental area, direct effects of inflammatory mediators on the developing foetus and prematurity. Not all foals born alive will be infected, but the risk of congenital sepsis may be increased.

### Twin pregnancy

Twin pregnancy (**Figure 1**) is pathological and represents a potentially life-threatening condition to the mare and foals. Historically, twinning is the most common cause of abortion in Thoroughbreds and it occurs in approximately 2% of pregnancies. The most common form of equine twin is dizygotic twins (twins arising from ovulation of two follicles). Monozygotic twinning is very rare and occurs when a single embryo splits at some stage during early embryonic development to form two separate embryos.

Untreated twins that do not naturally reduce prior to 30–45 days gestation result in high abortion rates during the second half of pregnancy. Poor neonatal viability, foetal dysmaturity, dystocia



**Figure 1.** Twin embryonic vesicles, the dotted lines are used to measure the size of each vesicle and the distance between the two. (Image used by kind permission of Western Counties Equine Hospital)

and reduced fertility in subsequent breeding attempts are common sequelae to untreated twinning, therefore *twin reduction* is advised. The preferred technique for twin reduction is manual crushing of one embryonic vesicle between 14 and 18 days post ovulation, with success rates of greater than 90% prior to embryonic fixation.

**Further Reading**

Coutinho da Silva, M., Canisso, I., MacPherson, M., Johnson, A. and Divers T.J. (2013). Serum amyloid A concentration in healthy periparturient mares and mares with ascending placentitis. *Equine Veterinary Journal*. 45(5):619–624.

Foote, A., Ricketts, S. and Whitwell, K. (2011). A racing start in life? The hurdles of equine feto-placental pathology. *Equine Veterinary Journal*. 44(4):120–129.

LeBlanc, M. and Causey, R. (2009). Clinical and subclinical endometritis in the mare: both threats to fertility. *Reproduction in Domestic Animals*. 44(3):10–22.

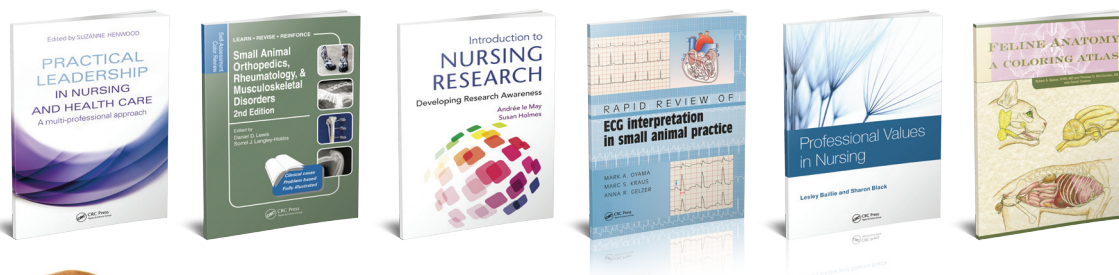
Liu, I. and Troedsson, M. (2008). The diagnosis and treatment of endometritis in the mare: Yesterday and today. *Theriogenology*. 70(3):415–420.

Morley, S. and Murray, J. (2014). Effects of body condition score on the reproductive physiology of the broodmare: A review. *Journal of Equine Veterinary Science*. 34(7): 842–853.

Sper, R., Whitacre, M., Bailey, C., Schramme, A., Orellana, D., Ast, C. and Vasgaard, J. (2012). Successful reduction of a monozygotic equine twin pregnancy via transabdominal ultrasound-guided cardiac puncture. *Equine Veterinary Education*. 24(2):55–59.

Woodward, E., Christoffersen, M., Campos, J., Squires, E. and Troedsson, M. (2012). Susceptibility to persistent breeding-induced endometritis in the mare: Relationship to endometrial biopsy score and age, and variations between seasons. *Theriogenology*. 78(3):495–501.

**EXCLUSIVE 20% DISCOUNT** on all CRC Press titles for **VNJ** readers



Simply visit [www.crcpress.com](http://www.crcpress.com) and enter code **ABP01** when ordering to claim your 20% DISCOUNT, plus free shipping!

[www.crcpress.com](http://www.crcpress.com)

