

# MANAGEMENT OF TWIN PREGNANCY AND DETERMINATION OF FOETAL GENDER

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## MANAGEMENT OF TWIN PREGNANCY

Twin pregnancy, if untreated, is a significant cause of pregnancy loss - foetal loss, late term abortion, dystocia or the birth of growth retarded foals which suffer high morbidity and mortality. Approximately 70% of the uterine capacity is required to provide adequate placental exchange for normal foetal development. Placental competition leads to insufficiency and usually results in abortion. Twins have accounted for 10-30% of recorded abortions. In addition, mare fertility may be reduced during the following breeding season.

Multiple conception (twins and triplets) occurs due to the successful fertilisation of multiple ovulations. Breeds which demonstrate a higher rate of multiple ovulation per cycle (e.g. the Thoroughbred at 15%) exhibit a greater tendency to conceive twins than the pony breeds where multiple ovulation is uncommon. Within the Thoroughbred breed barren and maiden mares show a higher rate of multiple ovulation than lactating mares.

The losses associated with twin pregnancy are now regarded as avoidable with veterinary management. However, some cases are still reported and are likely to occur because of poor examination technique, e.g. performed in an unsuitable environment, the whole uterus not visualised, confusion with endometrial cysts or most likely failure to detect twins from an asynchronous pair of ovulations. (Check ovaries for more than one CL).

A natural mechanism exists to prevent more than one conceptus establishing but this appears to have limited efficiency. Ginther (1989) has carried out extensive examinations of the biology of twin pregnancy. Summarising his data, approximately 70% of twins establish in the same uterine horn (unicornuate twins) especially if there is a significant difference in ovulation times and therefore blastocyst size. A high proportion of these unicornuate twins (approximately 70%) undergo natural reduction to a singleton pregnancy before 30 days of gestation. In contrast, of the 30% of twins which establish in opposite horns (bicornuate twins) almost none undergo natural reduction (other than the background pregnancy loss rate).

Ginther proposed his nutritional deprivation hypothesis which suggests that nutrient uptake of a blastocyst is impeded if a second blastocyst prevents contact of the embryonic disc region with the endometrial wall. There is no opportunity for this mechanism to work in cases of bicornuate twins. The modest efficiency of this natural reduction process justifies veterinary intervention to reduce pregnancy wastage.

Efficient management of twins relies upon early detection and action at a stage when pregnancies can be manipulated easily, with minimal risk and before either the development of endometrial cups or placental limits are established.

A variety of options are available depending on:

1. Gestational age at which diagnosis is made.
2. Disposition of chorionic vesicles/pregnancy within the uterus eg. unicornuate, unicornuate touching, bicornuate or body.

### Diagnosis at 16 days (post service)

The majority of twin conceptions are recognised at this stage including most cases where asynchronous ovulation has occurred. In mares with marked endometrial cyst formation positive diagnosis may be delayed for several days. Cysts are generally thicker walled, not as regular, do not move with time or gentle pressure and they may have been detected at pre-covering examinations.

At this stage uterine tone has not yet fixed the blastocysts into a horn base and they remain mobile and moveable within the uterus. Elimination of one blastocyst is achieved by manual rupture. Using the scanner probe the selected blastocyst can be swept into the tip of a uterine horn by gentle pressure against the horn and inner aspect of the mare's body wall. When fixed at the tip a further increase in pressure causes rupture and a "popping" sensation can be appreciated.

The grounds for selection of which blastocyst to crush are arbitrary, either choosing the smallest or the one most conveniently moveable. Rupture achieved in the horn tip avoids accidental exertion of pressure on the retained blastocyst although, within seconds liberated fluid will track down and pool around it. These fluids are rich in endogenous prostaglandins and firm manipulation of the uterus is known to release PGF<sub>2α</sub>.

This technique must be carried out carefully to avoid injury to the mare and should only be attempted when the rectal wall is relaxed. Sedation with an  $\alpha_2$  agonist (detomidine) produces rectal and myometrial relaxation allowing easier manipulation.

Bicornuate twins are readily treated in this way but in unicornuate cases when the blastocysts are in apposition it may take several minutes of gentle massage with the probe to achieve separation before moving one blastocyst to the horn tip – sedation is very helpful in these cases. The pregnancy loss rate after crushing at this stage is minimal provided the procedure is accomplished without excessive physical handling of the uterus. When loss occurs it is more likely to be associated with factors such as endometrial infection/inflammation. There has been no clear cut evidence to support the administration of anti-prostaglandin drugs or progesterone prior to manipulation.

At sixteen days post-covering one twin may often be found in the uterine body. In which case it is preferable to re-scan and act the following day as both twins will usually now be situated in the horns. Attempting to crush a blastocyst in the body requires undue pressure and crushing the horn-based twin in the expectation of the body twin moving may run the risk of a body pregnancy establishing.

A follow-up scan at 48 hours after crushing allows assessment of success.

#### **Diagnosis at 20 days (post service)**

Bicornuate twins can still be managed by crushing with generally excellent results. However, unicornuate twins will be fixed by uterine tone. Separation is not possible and apposition becomes so close that manual crushing can only rarely be considered. Additional serial scans should be carried out to assess development – approximately 50% of these twins in membrane to membrane contact will convert to a singleton by 28 days due to natural reduction.

#### **Diagnosis at 30 days (post service)**

Bicornuate twins may be treated by crushing (controlled pressure to achieve snowflake effect) but success rates are reduced compared to 16 days. Unicornuate twins cannot be treated by rupture successfully and if one has not achieved dominance then consideration should be given to prostaglandin administration. In all cases of twins in which a successful resolution has not been achieved by 34 days, termination is considered advisable prior to endometrial cup formation (unless the mare cannot be covered again).

#### **Diagnosis after 35 days (post service)**

In the unusual event of twin pregnancy remaining undetected until after 35 days, treatment options are limited and attempts to induce a fertile oestrus may be unsuccessful.

If no action is taken approximately 10% of such mares will give birth to a normal single foal. Almost all of which are unicornuate twins where direct membrane contact occurs before 40 days. Given the possible disruption to the following breeding season it may be advisable to consider termination if both twins remain viable at the upper age limit at which they can be scanned conveniently.

Techniques are being explored which attempt to achieve selective reduction of one embryo/foetus by ultrasound guided needle puncture through the anterior vagina (up to approximately 60 days) or through the ventral abdominal wall (from 120 days). Success has so far been very limited in terms of live normal foals – however experimental studies indicate that needle puncture and drainage of allantoic fluid may be a useful technique if carried out at 45-50 days of pregnancy. It appears that placental limits are defined relatively early in gestation (60-70 days) so achieving a foetal death after this stage may provide only a small chance of producing a normal single foal at term.

#### **DETERMINATION OF FOETAL GENDER**

Morphological developments occur in the equine foetus at approximately 60-65 days of gestational age which allow ultrasonographic identification of foetal gender.

The primitive external genitalia, the genital tubercle (GT) develops on the body surface between the hind limbs at 60 days and is recognisable on ultrasound as a highly echogenic bi-lobed structure resembling an =. During the following 5 days the GT undergoes migration, caudally in the filly to lie under the tail (precursor of the labia of the vulva) and cranially in the colt to a position on the abdominal floor behind the umbilicus (precursor to the sheath). Migration to the sex-specific position is recognisable on ultrasound from 60-65 days.

Diagnosis requires a scanner capable of good ultrasonic resolution at depths of up to 12 cm in order to achieve accuracy. Working frequencies can be 5 or 7.5 MHz.

Experience has shown that successful examinations can be conducted per rectum up to 75 and occasionally 80+ days but after this stage the denser foetal structures cause acoustic shadowing, obscuring the GT.

During the course of examination considerable foetal movement takes place and the examiner

has minimal control over the position of the foetus. For evaluation of foetal gender three 'standard views' are helpful.

1. Longitudinal scan (Plane 1): Foetus visualised length wise. Head, neck, ribs, lungs, heart, stomach, urachus, forelimbs and hindlimbs visible.
2. Perineal scan (Plane 2): Perineum visualised in transverse section. Tail head/sacrum, stifles/hind limbs visible.
3. Transverse scan (Plane 3): Abdomen visualised in transverse section. Vertebrae, abdominal wall, umbilicus (if cranial), upper hind limbs (if caudal) visible.

Identification of the GT in relation to these views enables diagnosis.

1. **FILLY:** GT seen in plane 2 within the triangle formed by tail head/sacrum and stifles.

GT not visible in plane 3 and only recognisable occasionally in plane 1 where it appears to overlay the tail.

2. **COLT:** GT seen in plane 1 apparently lying between or just in front of the stifles, and in plane 3 on the ventral abdominal floor, just caudal to the umbilicus.

GT not visible in plane 2.

#### Practicalities

1. Mechanical sector probes which have a forward angled field can be easier to use than linear probes where the field is perpendicular (no need to place probe directly over the foetus).
2. If the foetus is not lying in a standard plane gentle ballotment will provoke it to move.
3. Sedation is rarely helpful (extra relaxation may cause the foetus to move out of reach).
4. In a proportion of examinations abnormalities may be noted e.g. lack of foetal heart beat, cloudy echogenicity or reduction of foetal fluids and, occasionally, morphologic abnormalities.

#### Results

When the operator has practised and acquired confidence in the technique, a diagnosis can be made with complete accuracy. Very occasionally, e.g. mares which have deep pendulous uteri or are difficult to examine, a diagnosis cannot be made.

#### Later Examination

In addition to the technique described above it has been shown that trans-abdominal ultrasound examination between 100-200 days can be used to identify the foetal penis or mammary glands. Each mare may require a number of time-consuming and awkward examinations. These practical disadvantages severely limit the value of this approach.

#### FURTHER READING

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