



Issue 2 2010

Talking Breeding

From the editor ...

Our inaugural issue of Talking Breeding was enthusiastically accepted by readers, with many emailing their appreciation and asking questions regarding their mares and foals.

In this issue, we discuss the causes of infertility in mares and stallions. Mare infertility was the topic of a recent in-depth review published in the American Association of Equine Practitioners Proceedings in 2008, presented by Michelle LeBlanc, a specialist equine reproduction veterinarian based in Kentucky, USA. In many cases, the underlying cause for a mare failing to get in foal is not so much as absolute infertility, but rather subfertility caused by a number of disease and structural changes in the reproductive organs. Most problems can be overcome to return the mare to successful breeding.

We also review stallion subfertility and management to improve sperm quality, concentration and vigour.

We hope that you find the 'subfertility' issue interesting and practical as a useful reference to keep on hand in case you need information.

All the best,

Dr John Kohnke
BVSc, RDA

Review reference: Dr Michelle M LeBlanc (2008)
AAEP Proc 54, pages 391-407.

Add your name to the email list...

If you have found this issue of 'Talking Breeding' of interest, you can subscribe to receive future issues, published at 3-4 month intervals by emailing Gary at newsletters@kohnkesown.com, stating your interest in breeding horses. You can also request a back issue of Talking Breeding Issue 1, to add to your horse breeding file!

Handy Hint 2

Fluid Retention in the Uterus Reduces Fertility

Retention of fluid in the womb is most commonly due to impaired cervical function, endometritis and excess glandular secretions, especially in mares over 12 years of age and in mares which have had a number of foals and may have developed a 'saggy' pendulous uterus which tends to collect fluid but is unable to contract to expel it. Exercise is helpful to assist drainage of the uterus as the movement of the intestinal mass during exercise helps to compress the womb and assist drainage. The combination of daily exercise, preferably under saddle for 15-20 minutes and injection of small doses of oxytocin will help fluid to clear from the uterus prior to breeding a mare. Consult your vet for advice.

In this Issue...

- Infertility or subfertility in mares – a review
- Subfertility in stallions – there is hope

Plus Handy Hints and lots more...

Handy Hint 1

Ensure Adequate Feed Intake During the First 90 Days of Pregnancy

Ensuring an adequate intake of energy during the first 65 days after conception is critical to maintain pregnancy and reduce the risk of Early Embryonic Abortion (EEA). It only takes 4 days of reduced feed intake to less than 80% of daily requirements to trigger EEA. This reduced feed intake could be a result of long distance travel, or could occur on arrival at a new property with inclement weather which reduces grazing, poor or drought affected pasture, change in 'hard' feed, or 'bossing' by other mares in the establishment of mare 'hierarchy' in a paddock. The risk is less during the period from 65 days to 90 days of pregnancy, but can occur if reduced feed and energy intake results in weight loss and resorption of the conceptus. Ensure that adequate feed is provided during the first 90 days of pregnancy to reduce food-induced EEA. Providing an extra couple of feed bins separate from the mare group helps displaced, new mares in a paddock to feed by themselves with less risk of 'bossing' torment at feed time which may result in injury through biting, kicking or dominant aggressive behaviour by other mares.

Fact Sheet

'Managing Early Pregnancy in the Mare' provides practical guidelines on feeding and care of pregnant mares during the first 3 months of pregnancy. The fact sheet includes the best time to travel a mare early in her pregnancy to reduce the risk of stress and low energy-induced Early Embryonic Abortion. To obtain a copy, email Gary at newsletters@kohnkesown.com.

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Infertility or Subfertility in Mares - A Review

Many owners become frustrated when a mare seems to be unable to conceive despite being healthy and physically normal in the conformation of the breeding tract and regularity of her cycles. Although a few mares, especially as they age beyond 20 years become infertile due to chronic uterine infection or changes to the uterine lining, in most cases, a mare suffering from subfertility or reduced fertility can be managed to return to full reproductive health that will enable her to carry a full term pregnancy.

Underlying causes

There are 4 areas that can indicate subfertility or an inability to get in foal or to retain the conceptus after the first 14 days of early pregnancy, assuming the mare was bred to a fertile stallion.

1. Abnormal or no signs of oestrus
2. Accumulation of excess uterine fluid
3. Repeated or chronic infection
4. Early Embryonic Abortion (EEA)

These underlying causes can be single or multi-factorial in nature. These include the affects of aging, concurrent metabolic disease (such as laminitis or Cushing's Disease in an aged mare), poor nutrition, chronic pain (eg lower back pain), obesity, poor body condition, as well as seasonal influences such as temperature and rainfall. Physical abnormalities which directly influence retention of uterine fluid or increase the risk of uterine infection can also cause subfertility. Hormone imbalances or abnormalities in synchronisation due to ovarian changes or developing cystic follicles, or tumours in aged mares, can influence the ability of a mare to cycle normally, release eggs at the optimum time in the oestrus cycle and prepare the uterus to accept and nourish the fertilised egg or developing conceptus.

Handy Hint 3

Feeding for Fertility

An adequate intake of energy and protein on a 'rising plane' of nutrition in the 4-6 weeks prior to breeding a mare can improve the chances of fertility by optimising ovulation and the uterine environment to nourish the fertilised egg and developing conceptus. Ideally, a mare should be in thin to moderate condition to allow her to gain some condition in the lead up to breeding. Mares which are overweight should be maintained to avoid a loss of condition in the 4-6 weeks prior to breeding. A loss of condition can adversely affect the oestrus cycle and uterine environment. **For a review of feeding prior to breeding, email Gary at newsletters@kohnkesown.com and request Fact Sheet B1 'Poor Feed - Poor Fertility'**

Handy Hint 4

Plan for a Change in Climate

A change in climate, such as when a mare is transported from cold conditions in winter and early spring in southern Australia (Victoria or Tasmania) to warmer more northern areas of Australia, may affect the initiation and timing of the first ovulation, especially if the mare is in poor condition and still retains her winter coat. Ideally, a mare should be shipped 4-6 weeks before she is bred so that she can adjust to the seasonal change and begin to cycle regularly and more intensely once she acclimatises and loses her winter coat. A mare moving south for breeding may also suffer a delay in oestrus cycle frequency and intensity until she has had time to adjust to the cooler conditions in early spring.

An increasing plane of nutrition is helpful to initiate fertile oestrus cycles.

Free Ration Analysis for your Broodmare

Kohnke's Own provide a free, unbiased ration analysis service using the latest **Feed XL** ration analysis program to check your mare's ration and to help ensure an adequate energy, protein and key nutrient intake (including phosphorus, selenium and Vitamins A & E intake), to optimise nutrition in preparation for breeding. Email our nutritionist, Ms. Simone Healey at simone@kohnkesown.com to request a ration form for you to complete to obtain your FREE ration analysis.

Management of Subfertility in Mares

In many cases in older mares, one or a combination of underlying causes can reduce fertility and the chances that a mare will retain the conceptus and have an uneventful pregnancy.

1. Abnormal Oestrus Cycles

Changes in the frequency, intensity and length of the oestrus cycle can be influenced by a number of factors. These include underlying uterine infection, aging, poor body condition, chronic pain, ovarian cysts and tumours, follicles which form but do not ovulate, Cushing's Disease in older mares, Equine Metabolic Syndrome (EMS) in overweight mares with concurrent Insulin Resistance (IR) and high circulating insulin, as well as aging, depleted ovaries or 'ovarian senility'.

Conditions such as Cushing's Disease can directly affect ovarian function in older mares by releasing ACTH hormone from the enlarged pituitary gland and increasing blood cortisone hormone levels which can depress normal hormone regulation of the oestrus cycle.

Aging influences the length of the 'heat' cycle, often resulting in shorter cycles and ovulation of small follicles prior to the mare coming into full season for breeding. In many cases, hormone therapy is helpful to override other hormone imbalances to quickly start the oestrus hormone cascade to normalise cycles. Consult your vet for advice.

2. Accumulation of excess uterine fluid

Repeat ultrasound examination of the ovaries and uterus in a mare which is subfertile or not exhibiting intense oestrus when 'in season' may be useful to monitor ovarian and uterine changes relative to synchronisation of ovarian activity. These observations can monitor follicle development and ovulation time matched with uterine fluid retention and cervical relaxation as a means of determining primary ovarian abnormalities or lack of proper uterine preparation for fertilisation and a suitable clean and nourishing environment for the early conceptus.

A. Ultrasound examination of the uterus should be carried out in conjunction with examination of the vagina by speculum to determine cervical relaxation, colour and moisture content of the vaginal lining or excess fluid accumulation.

B. Uterine cell counts (cytology) and bacterial swabs should be carried out on a barren mare or one which has a history of Early Embryonic Abortion (EEA). It is recommended that 2 swabs be taken - one of the vaginal and cervical area to check for white cell abnormalities or presence of bacteria and the other into the uterus to determine the presence of endometritis and fluid retention, both being common causes of subfertility, especially in older mares.

In these mares, a biopsy of the uterine wall should be performed to confirm endometritis or degenerative changes associated with chronic infection or simple changes relative to endometrial inflammation. However, not all mares with a positive bacterial culture have uterine inflammatory changes or low-grade endometritis. An examination of cellular types and biopsy of the uterine wall to check for the degree of endometritis as well as abnormalities in the uterine lining should be carried out. The degree of inflammation and the number of neutrophil white cells found in a uterine wall biopsy can have a direct influence on EEA. The type of bacteria isolated also has a direct effect on pregnancy rates, even when inflammatory

changes are not significant. Recent research has found that a 'flush' culture with a small volume of saline to expand the uterine wall and open the folds and deep crypts where bacteria colonise is more effective at diagnosing endometritis as compared with a uterine biopsy sample.

Uterine infection and endometritis must always be considered as a cause for mares not exhibiting normal oestrus cycles or lack of oestrus activity (anoestrus) during the seasonal period of normal oestrus or 'in season' cycles.

C. Estimate Intra-Uterine Fluid Retention - The presence of uterine fluid is a clinical sign, rather than a diagnosis for determining infertility. There are a multitude of causes for the retention of excess uterine fluid which include impaired cervical function, post-mating endometritis, a 'saggy' uterus in older mares after successive pregnancies, or impaired drainage. The location of the retained fluid can provide a clue to the affect of excess uterine fluid on fertility. Mares which retain more than 400-500ml of fluid for greater than 18 hours after breeding have decreased pregnancy rates.

Handy Hint 6

Older Maiden Mares with Reduced Fertility

Many owners of performance and show horses wish to breed an older, well performed mare once she has finished her show or performance career. However, one of the most common causes of reduced fertility and EEA in these otherwise non-infected (ie 'clean') older mares, is the retention of excess fluid due to closure of the cervix. Ultrasound examination of the uterus before breeding to check for excess uterine fluid (above 2cm or 400-500ml) is recommended. If uterine fluid is detected on ultrasound examination, a small dose of oxytocin by injection can be used to clear the inflammatory debris and fluid before breeding. In mares with retained fluid after breeding, oxytocin therapy with uterine irrigation between 4-8 hours after breeding will help improve conception rates in older, maiden mares. Consult your vet for advice.

Handy Hint 7

Treatment with Corticosteroids to Reduce Uterine Fluids

Administering a single injection of dexamethasone at the time of breeding can reduce the duration and severity of the inflammatory response. It acts to reduce uterine fluid accumulation and is recommended for mares with a 'saggy' uterus or damage to the cervix. Oral prednisolone therapy given every 12 hours for 4 days, starting 2 days before breeding, can help to reduce white cell numbers and the amount of retained uterine fluid. This therapy has been shown to increase the clarity of uterine fluids as well as improve the chance of pregnancy in mares with excess uterine fluid retention during the oestrus period.

Handy Hint 8

Examine the Vestibule - Vaginal Fold

It is important that your vet examines the vestibule (entrance to the vagina) fold, which is an important second barrier after the vulva lips ('vulval seal') to prevent vaginal and uterine contamination. This barrier may be torn in mares following the birth of a large foal, numerous foals or an overly aggressive stallion at breeding. If the fold is damaged, then a deep Caslick or a 'Gadd' operation is recommended to restore this important barrier, as well as standard Caslick's to close the upper opening of the vulval lips. Cervical tears can occur during foaling and mares with a history of repeated uterine infection, endometritis or EEA, despite antibiotic and other therapies, should undergo a careful examination of the cervix for evidence of tearing, fibrosis and non-elastic scar tissue when 'in season' prior to breeding. Infusion of antibiotics into the uterus should be carried out when the mare is 'in season' following a swab and antibiotic sensitivity test to determine the most effective antibiotic to control the contamination.

3. Repeated Uterine Infections

Chronic uterine infection is most common in older mares following previous foalings or mares with abnormalities of their vulval conformation. In many cases, damage to the cervix as a result of a difficult foaling or large foal, can increase the risk of uterine infection and endometritis. As mares age, particularly in a mare in poor condition, sinking of the vulva inward greater than 20° from vertical, or mares with a 2.5cm (1 inch) opening of the vagina above the pelvic bone, are likely to aspirate droppings or air ('vaginal windsucking') into the front end of the vagina and contaminate the cervical area with droppings and bacteria.

Handy Hint 5

Managing Uterine Infections and Endometritis

This is a job for your vet. In most cases, it is best to treat the mare with antibiotic flushes or infusions when she is in season with an appropriate antimicrobial preparation. This includes antibiotics selected by sensitivity tests after an initial swab and culture, as well as antifungal preparations in cases where yeast and moulds are detected in uterine swabs. Immune modulators based on cell wall extracts of mycobacterium spp have shown some benefits, as well as antiseptic flushes, such as weak PVP Iodine solutions. In my own experience, treating the endometritis and associated infection with antimicrobial preparations, Caslicking the vulva to prevent further contamination and not breeding the mare for one cycle (sexual rest) is often helpful in older mares to clean up chronic uterine infection and improve conception and long-term pregnancy rates.

4. Early Embryonic Abortion

Dr Michelle M LeBlanc in her review points out that embryo loss before 35 days is often due to defective eggs, genetic abnormalities in the foetus, poor quality embryos, infection and endometritis. Mares may abort between 35-80 days of pregnancy.

The major cause of EEA appears to be infection and failure of the endometrial glands in the uterine wall, possibly due to blood flow changes and periglandular fibrosis of the uterine lining. This can be confirmed by uterine biopsy. The risk increases as a mare ages. There is no known treatment, although progesterone therapy to maintain pregnancy until the placenta is established and progesterone hormone is naturally produced may have some benefit.

Progesterone therapy, by injections or implants, may be administered to help maintain pregnancy in problem mares, but there is little scientific evidence that giving progesterone helps maintain early pregnancy. Progesterone hormone assays can be taken to establish the blood levels of progesterone in early pregnancy and the need to give courses of injectable progesterone. Consult your vet for advice.

Did You Know That...

The embryo of an early pregnant mare is nourished by the egg yolk sac during the first 25 days of pregnancy. After 25 days of pregnancy the embryo is dependent on uterine wall secretions as it 'floats' within the uterine fluid. Implantation does not occur until after 45 days when membranes and the placenta are formed. Any sudden reduction of energy or protein up to 65 days can reduce the quality of the uterine fluid as nourishment and result in embryo death (refer to Handy Hint 1). The presence of infection or inflammatory exudates in the uterus also directly affects the viability of the embryo during the first 2 months of pregnancy.

SUBFERTILITY IN STALLIONS

There is Hope

Subfertility, or less than normal fertility in a breeding stallion, may not always be as clear cut as outright poor fertility, where there is an obvious increase in the numbers of mares returning to service. There is a tendency to blame the mare group for a less than overall fertility outcome over the breeding season on a stud. However, when the breeding records are carefully examined, often it is found that there was a delay in recognising a potential subfertility problem in an individual stallion during the breeding season.

Factors causing Subfertility

Although there are a number of causes of less than optimum fertility in a breeding stallion, the major factors include:

- Low natural fertility in aging stallions. The fertility of a stallion starts to decrease after 13 years of age, although some stallions remain highly fertile up to 18-20 years of age.
- Poor nutrition - less than optimum energy intake is a major cause of reduced fertility in an otherwise healthy and fit stallion.
- Disease, particularly infections.
- Abnormally low circulating hormone levels.
- Testicular degeneration, especially in older stallions.
- Over-use of a stallion at the height of the breeding season.
- Travelling and relocation stress.

The number of sperm in each ejaculate is influenced by:

- Age of the stallion.
- Season - a particularly poor winter which causes stress and sub-optimum nutrition will reduce the sperm count.
- Testicular size and consistency - large testicle size does not always coincide with high sperm counts. Spongy testicular consistency usually signifies degenerative changes.
- Frequency of service - the more frequently a stallion is used, the lower the sperm count in each ejaculate.
- The stallion's libido and sexual behaviour - stallions which are over-exercised and become tired will have less libido and may lose interest in mares.

In most stallions, a reduction in fertility due to testicular degeneration and other physical and hormonal changes occurs before there is an obvious decline in libido or service behaviour.

Where a stallion has had a history of high fertility in previous seasons, it may take some time under a natural service system to correlate a higher rate of 'clean' or young mares returning to service with a possible subfertility problem in a stallion. Often, a subfertility problem is not suspected until the mid to late part of the breeding season as a possible underlying cause of the poor conception rate in mares mated to an individual stallion.

These criteria can be regularly analysed to monitor a stallion's breeding performance by computerised pregnancy rates and service records available on most studs.

Handy Hint 9

Semen Collection and Examination

Standard semen analysis only evaluates the sperm number, morphology and motility. It gives a standard to compare a 'normal' stallion with one that is suffering from a subfertility problem. However, standard semen analysis does not assess the critical characteristics of sperm survival, egg penetration activity and viable storage time in the oviduct of the mare. These more sophisticated evaluation methods can be carried out by using mare oviduct cellular cultures to more accurately evaluate the actual fertilising potential of stallion semen.

For optimum fertility it is important that mares and working stallions are provided with adequate energy, protein and key nutrients such as phosphorus, organic selenium and vitamins A & E.

Providing Kohnke's Own E-Se supplets for 4 weeks prior to breeding a mare or stallion may assist in maintaining optimum fertility. Ideally, a stallion should be kept on E-Se supplets throughout the breeding season.

Product of the Month

Did You Know that: Stallion reproductive performance can also be evaluated by:

- The % of pregnancies in each 17-21 day average oestrus cycle length in the mare group
- the number of oestrus cycles needed by a mare mated to the stallion before she conceives
- the number of services required by the stallion per pregnancy in a mare group
- The rate of pregnancy in the mare group on a monthly basis

Evaluation of Stallion Fertility

Fertility evaluation, with collection of semen and a full assessment of sperm number, motility and percentage of dead or abnormal sperm per ejaculate can be carried out:

- Before purchase and sale.
- Prior to the start of the breeding season in a stallion with a suspected subfertility problem from the previous season.
- To determine the number of mares, or the possibility of increasing the number of mares that can be booked to a stallion in the forthcoming season.
- To evaluate any decline in seminal quality or influence of testicular degeneration in older stallions or those with a history of other concurrent disease.
- To investigate reasons for abnormal sexual behaviour or changes in sexual behaviour in an individual stallion during the breeding season.
- To assess the adverse effects of sexually transmitted infections, such as Klebsiella and Pseudomonas bacteria.
- When lowered ejaculation force or poor seminal quality is observed at service.

A full evaluation of a suspected subfertility problem should include the following appraisals carried out by a specialised equine stud veterinarian.

1. History - Number of mares mated (excluding 'foal heat' mares or late season matings), age, condition, breeding history and assessment of ultrasound ovarian records to assess ovulation and service timing, that can be used to provide an evaluation of the rate of possible pregnancies.

2. Physical Examination - Clinical examination to assess health, testicular size, consistency and epididymal lesions in the stallion.

3. Bacteriological Assessment - Bacterial swabs can be taken of the prepuce, the urethral fossa of the penis and of the urethra immediately before and after service to check for presence of infection that could be transmitted or cause reduced rate of pregnancy in the mare group.

4. Sexual Behaviour and Libido - Behaviour of the stallion in presence of a mare in full oestrus, including mounting desire and strength of ejaculation. Studies have shown that even though a stallion may exhibit aggressive service behaviour, mounts quickly and ejaculates strongly, he may still be suffering from a less than optimum level of fertility, or have an underlying cause for the subfertility problem. In most cases, when collected and examined under a microscope, the average ejaculate volume may contain fewer fertile and motile spermatozoa.

Semen Evaluation

A thorough evaluation of semen can not be based on a single collection and recent studies indicate that a number of collections over a 7 day period will provide the most comprehensive means of pinpointing a subfertility problem. This is achieved by collection by AI of 2 semen samples by use of an artificial vagina, 1 hour apart, and then once daily for 7 days.

This program will evaluate the daily production of sperm and testicular reserve of semen, as an indication of testicular tissue function in a stallion with suspected testicular degeneration.

