



Issue 5 2011

Talking Breeding

From the editor...

The traditional start of the breeding season when mares can be bred in the first week of September is a busy time for breeding studs throughout Australia. With foals on the ground, the attention of all horse breeders, whether they be hobby or commercial breeders, is focused on getting dry mares and maiden mares in foal, as well as newly foaled mares back in foal so that a 12 month interval between foals is maintained.

This season has been good over the winter months with plentiful early spring pasture on the Eastern coast, if it is not waterlogged, but many parts of WA remain drier than normal.

In this issue we discuss the 'miss-a-year' mare - the mare which fails to get back in foal when she is lactating with a foal-at-foot. We provide some practical guidelines to help improve fertility in these mares.

We also include a brief on the use of artificial lighting to help stimulate ovarian function in mares to prepare them for breeding as early as possible in the season.

And lastly, we provide a research review on the chances of getting a mare back in foal after a caesarean. There are also a number of handy hints on practical aspects of breeding mares.

For those of you who are first time breeders, let's hope that the foal your mare delivers is healthy and is a reward for all the planning and waiting over the past 11 months!

All the best,

Dr John Kohnke BVSc, RDA

The Use of Artificial Lights to Stimulate Ovarian Activity

It has become popular on large studs and breeding farms to use photoperiod stimulation to trigger an earlier onset of ovarian function in dry or barren mares in preparation for breeding. During the short day length and low light intensity of winter, the secretion of Gonadotrophin Releasing Hormone (GnRh) is dramatically reduced and the ovaries go into a anoestrus or dormant period over winter. However, just after the winter solstice (22nd June in the Southern Hemisphere), the GnRh levels circulating in the mare's blood begin to increase in response to the subtle increase in day length. The GnRh increase stimulates the secretion of Follicle Stimulating Hormone (FSH) to initiate ovarian activity and the production of oestrogen and follicles. Initially the follicles are not fertile, but as the hormone triggers become more intense as daylight increases, once each cycle's production of follicles reach 30mm or more in size at 17-21 day intervals, they become fertile and the mare can be bred when in season.

The technique of exposing mares to 16 hours of artificial light from the time of the winter solstice or from the 1st July each year, helps to shift the onset of ovarian activity forward by up to 2 months as compared to the natural seasonal increase in day length as spring approaches. Ovarian activity is triggered in 60-65 days under artificial lights from mid winter. Older mares, over 18 years of age, may take 80-90 days to trigger fertile ovarian function. Too much light intensity above 100 watts in a stable, or for greater than 16 hours, can delay the onset of seasonal cycles. The minimum light intensity is 20 watts evenly spread throughout the stable area, but 100 watt of white light produced by an incandescent globe or 25 watt energy saving (daylight tube) - or roughly enough light to read a magazine by evenly spread over the stable, ensuring that corners are well lit, is adequate for 16 hours set by a time switch in a 4 metre by 3.5 metre stable to extend the low light from late afternoon to 10 pm. In an outside yard 25 metres square, studies have indicated that 8 x 1000 watt metal halide floodlights, set on 6 metre high poles to reduce shadows and dark corners around the yard to provide even light, are adequate to extend the photoperiod to 16 hours per day, with fertile ovulations in 60 days. A alternative sequence of short bursts of 100 watt even light over a 60 minute period, timed for 9 hours after sunset (usually 2-4 am in the early morning), has been found to have a similar effect in stimulating ovarian activity in 60 days, at a reduced cost for electricity.

Consult your specialist equine breeding vet for more advice.

In this Issue...

- The Miss-a-Year Mare - Infertility or Feeding?
- Artificial Lights to Stimulate Ovarian Activity
- Caesarean - 'end of the road' for a brood mare?

Plus Handy Hints and lots more...

Handy Hint 1

Check that the Foaling Membranes are Completely Shed

The uterine attachment of the placenta or 'foaling membranes' in a mare covers the whole surface area of the pregnant uterine horn and is attached by thousands of interlocking 'villi' to increase the surface area to allow transfer of nutrients from the mare's blood to the developing foal. At foaling, the basement membrane cells of the placenta under hormone control (oxytocin which contracts the uterus), lose blood supply (which reduces haemorrhage at foaling) and this usually facilitates quick separation of the placenta from the uterine wall. In some mares, particularly those which foal before their due date, or in late foaling mares due to hormone imbalances, the placenta fails to shed at foaling and all of it, or pieces, may be retained. Studies have found that 2% of mares naturally retain their membranes for longer than 4 hours after foaling, or pass incomplete sections of the membranes. It is essential that retained sections of the membranes are removed within 8 hours after foaling, otherwise the cervix closes and manual removal by your vet is difficult and may damage the cervix or cause discomfort and haemorrhage within the uterus. Your vet will give an injection of Oxytocin hormone to try to stimulate uterine contractions to clean out fluid/blood and release the membranes, but manual removal with irrigation may be necessary within the 8 hour period after foaling. It is a good idea to spread the membranes out on a flat surface to check if they are complete. If it is your first foaling, seek advice from an experienced person to show you how to check the membrane bag. Once the cervix closes, any retained pieces or sections of the placenta will quickly become infected and can risk the onset of acute septicaemia and toxic laminitis or founder within 24-36 hours, as well as dramatically reduce the mare's future breeding prospects.

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The 'Miss-a-Year' Mare Infertility or Feeding?

It is not uncommon for a mare to develop a pattern of missing a year between foals, producing a foal every second year, especially as she reaches 15 years of age or older. Horse breeders often breed an aged mare every second year to reduce the drain on the mare and to hopefully help her produce a strong viable foal after the gap year.

However, many older mares appear to suffer from a sub-fertility problem and fail to get in foal if bred when they have a foal at foot.

There are a number of possible reasons related to the age of the mare.

1. The presence of cervical infection, excess uterine fluid retention and/or uterine infection in the post foaling period, especially if a mare sustains tearing or lacerations during foaling.
2. In an aged mare which has had a number of foals, collapse of the uterus deeper within the pelvic cavity can result in forward sloping of the vagina and cervix, with vaginal windsucking (pneumovagina). It is also often associated with urine pooling at the cervix and subsequent poor fertility after foaling.
3. Seasonal stress associated with transport with a foal at foot or relocation to another stud with a change of feed, hierarchy in the mare group with competition for feed and a change in environment can affect the fertility of a mare with a foal at foot.
4. In many cases, the apparent infertility can be caused by a lack of adequate energy and protein to maintain a suitable condition score and body weight to optimise fertility and conception, over and above the elevated needs of lactation in a "wet" mare.

Note: An overview of subfertility in both mares and stallions was provided in Talking Breeding #2, available by contacting Gary at newsletters@kohnkesown.com, or downloading it from the website www.kohnkesown.com from the newsletter section.

Did you know that...

Surveys have found that up to 83% of otherwise healthy, non-infected, young mares should be fertile and get in foal within the 2 months after foaling in a good season. However, it is not uncommon for a mare with a foal at foot to fail to cycle regularly as a result of relatively inactive ovaries. An apparent 'shut down' of ovarian function can be directly related to a less than adequate energy intake early in the season, superimposed by the demands of lactation and milk production at the peak of lactation 4-10 weeks after foaling. Where the drain of lactation is superimposed on energy needs necessary to maintain optimum fertility, this increases the chance that they will only be likely to get in foal when they are mated within the first month after foaling, or after the peak of lactation as the foal starts to wean itself and demand for milk production is reduced and more energy is available for ovarian activity and preparation of the uterine environment after breeding. Some only regain their fertility as dry mares once their foals are weaned in the following year.

Observations indicate that when a mare is under nutritional stress, or has a relative energy or protein deficiency in her diet to meet the needs of late pregnancy or during the peak of lactation, the first effect will be suboptimal fertility, then reduced milk production and finally body weight loss.

A less than required energy and protein intake has been a major cause for suboptimal fertility during the recent drought years in many areas, where the pasture was unable to provide sufficient energy and other nutrients, even with a daily 'hard' feed. Many mares with foals at foot during a dry season will feed their foals, slowly losing body condition, sometimes by up to 50kg in a 500kg mare (10% reduction in body weight), without showing any obvious loss of condition. The slow loss of condition as energy is diverted to milk production, or keeping warm under cold, exposed paddock conditions or in mares foaling down in early spring, can adversely affect their fertility and chances to get in foal. In some cases, even if they do conceive, they may be unable to maintain a viable early pregnancy during the first 65 days after conception, with a delay in return to service.

The failure of a dry mare to conceive after over-wintering under cold conditions with energy loss when grazing on dormant, sparse pasture, is highly likely to be due to the lack of adequate energy to stimulate ovarian function, even in response to increasing day length in spring.

Energy-Protein Relationships

The breeding mare goes through several phases of energy and protein needs during her annual pregnancy and lactation cycle. The NRC (2007) provides guidelines which illustrate the relative energy and protein needs of the phases of a mare's reproductive cycle, based on a 500kg mare.

500kg MARE	Daily Energy Need (MJ of DE)	Daily Protein Need (g)
Non-Pregnant (rest or maintenance)	70 MJ	630g Crude protein
5-8 months of pregnancy Body weight increases to 523 kg with foetal weight	70 MJ increasing to 77 MJ*	685g increasing to 759g Crude protein
9th month of pregnancy	80 MJ	797g Crude protein
10th month of pregnancy Body weight increases to 548kg with foetal weight	85 MJ**	841g Crude protein
11th month of pregnancy Body weight increases to 566kg due to unborn foal, membrane and foetal fluid weight	90 MJ	893g Crude protein
First three months lactation back to 500kg body weight	133 MJ***	1530g Crude protein
Three months to weaning	120 MJ****	1330g Crude protein

Explanatory Notes:

*The increase in energy is due to the increased growth rate of the unborn foal. The mare should be provided with additional bone minerals, trace-minerals and vitamins as a supplement in her diet each day to meet the needs for bone and joint development from 6 months of pregnancy, such as contained in **Kohnke's Own Cell-Grow**. This is especially important during the 3 months prior to foaling to store reserves of copper, zinc, manganese, iron, selenium and Vitamin A in the unborn foal's liver to offset the lower content in mare's milk relative to the expected growth rate and trace-mineral needs of the growing foal until weaning.

** The size of the unborn foal in the womb can reduce the bulk a mare can consume, requiring a higher energy density in the ration, such as an increase in grain in the hard feed, with a lower volume of feed.

***This represents a 30% increase over the energy need of late pregnancy. In good seasons, the growth of spring pasture can help offset this increased demand for energy in a mare at the peak of lactation. A 500kg lactating mare can produce up to 17-20 litres of milk per day at the peak of lactation.

**** The energy demand is still higher than late pregnancy and although milk production is reducing, additional energy should be available to allow the mare to regain body weight and condition so as to help stimulate ovarian function in a mare which has been drained by lactation.

Note: The need for adequate energy and protein to meet the needs of heavy lactation can reduce body reserves on a lower than required energy diet on pasture alone, especially in a poor season, affecting fertility, then milk production and finally body weight of the mare. A 500kg mare often loses 50kg of body weight before it becomes apparent.

Under Australian seasonal conditions, the energy intake of mares which foal late in the season is likely to be adversely affected by the drying off of pasture and increasing lactation demand from suckling foals until the end of November-December period of the breeding season. Any reduction in energy protein intake will adversely affect fertility, ovulation and conception.

A number of studies have shown that inadequate dietary energy or protein intake may prevent ovulation, or if ovulation and conception do occur, the nutritional stress may result in an increased risk of early embryonic death in the first 65 days of pregnancy.

It is unwise to try to slim down an overweight mare for at least the first 90 days of pregnancy as body weight loss by the restriction of energy (or protein) increases the risk of early abortion.

Guidelines for Nutritional Management

Studies have provided some data on the factors that influence the practical aspects of energy-protein interrelationships that can directly affect a mare's reproductive ability.

An adequate intake of feed in terms of energy and protein, will help to ensure optimum fertility in an otherwise healthy mare.

An inadequate intake of protein, even with adequate energy, or where a mare is losing body weight on a negative plane of nutrition when she has a foal at foot, can delay the onset of oestrus, decreasing overall fertility due to failure to ovulate, although the mare may show normal oestrus intensity and cycle length.

There is a dramatic increase in the amount of energy and protein required during the early lactation period. (Refer to table on page 2)

The peak of lactation occurs between 4-10 weeks (average 2 months) after foaling, with the average mare producing 3% of her body weight of milk per day at peak lactation. This is a drain on the mare's system and can slowly deplete the body reserves to provide both energy and protein to help maintain lactation and if the grazing and supplementary feeding provided does not meet her needs, the mare's fertility, then lactation output and finally body weight will be adversely affected. Many mares will feed their foals at the expense of their own body reserves and lose weight if they are unable to meet their needs from pasture grazing and hard feed. **Loss in weight means a loss of fertility.** Even skinny mares will come into season, but may fail to ovulate and conceive.

Mares which are losing weight during lactation will often fail to cycle regularly or develop adequate follicles to help their chance to get in foal and maintain their pregnancy during the first 3 months of lactation. After the peak of lactation, the energy drain on the body reserves even if the diet is inadequate to meet the daily needs, starts to decrease and many mares begin to cycle more intensely and conceive later in the season. Fertility will also improve if the seasonal decline in pasture during late spring and summer is compensated for by increasing the hard feed while there is also a lower drain of lactation as the foal reduces its intake and dependency on mare's milk as it learns to graze.

Unfortunately, under the drought conditions which we have had over the past decade in many parts of Australia, studs where pasture has been the main contributor to the energy and protein intake with minimal hard feed, reported a decrease in conception rates and in some cases, stud masters reduced the numbers of mares bred each season by selecting mares from good bloodlines and not breeding less well performed mares.

Handy Hint 2

Boost Energy Intake by Adding Extra Oats to the Hard Feed

Often a simple daily grain supplement of 2 kg of whole oats, in addition to the hard feed containing a commercial mare cube or pellet, will provide a boost of 25 MJ DE. In addition, an extra biscuit of good quality lucerne hay, which contributes 10 MJ DE and 170g crude protein (35 MJDE total) can help to increase the energy and protein intake for lactation when a mare is hungry and is able to consume a larger bulk of feed after foaling. If additional oats and lucerne hay is added to a commercial feed, or pelleted ration, then a supplement of bone minerals, trace-minerals and vitamins, such as in **Kohnke's Own Cell-Grow**, (a 3 pellet supplement which mixes well into oats, cubes or pellets and does not blow out of paddock feeders, given at the rate of 15g per kg of extra grain and hay, should be added to make up the shortfalls of these essential nutrients in heavily pregnant and lactating mares). The extra oats is well accepted by mares, and even with the Cell-Grow added to make up shortfalls of calcium, trace-minerals and vitamins, is often a much cheaper alternative as compared to adding an extra 2 kg of a commercial mare feed. As a foal starts to share (co-feed) its mother's feed after 6-8 weeks, then changing to crimped oats will help to improve the utilisation of the oats before the foal develops its molar teeth to chew harder feed.

Did you know that...

A mare which is thin (not fleshy) with a condition score below 4 (less than adequate condition over ribs, pin bones and tail butt area, with a faint outline of the ribs), at breeding, will foal down a normal weight foal at full term 11 months later, if her dietary energy and protein intake is improved. However, unless her body condition is improved, such a mare will have a high risk of subfertility and embryonic loss during the first 65-90 days after conception.

Even without weight loss, studies have shown that thin, lactating mares have longer intervals between foaling and ovulation, require more cycles per conception, have lower conception rates and increased embryonic death rates compared to nursing mares in 'fleshy' or fat condition.

Handy Hint 3

Check the Nutritional Intake of the Previous Year

The nutritional management in a previous poor season (e.g. drought conditions), or inadequate feed during the previous lactation at another stud, may reduce fertility of the mare in the subsequent breeding season, even if she is fed more energy to restore her condition in the next season to maintain her in reasonable condition. It may take 2 breeding seasons, even in a mare gaining condition, to restore optimum fertility and chances of getting in foal as a dry mare early in the season, particularly when she has a foal at foot. Thin, older mares are particularly prone to 'missing a year' between foals when lactating. Often a thin, aging mare has an inward sloping perineal area with a sunken vulva, resulting in an increased likelihood of pneumovagina (vulval wind-sucking) and chronic uterine infection, as compared to a well conditioned older mare.

Handy Hint 4

Provide More Energy Early in Lactation

The practice of 'flushing', or putting a thin mare on a rising plane of nutrition for 2 months after she foals down to help improve her condition, will often help to improve fertility and chances of conception, but sometimes in a delayed response over 2-3 months. Where mares are grazing selenium deficient pastures, a mare's fertility may also be assisted by providing a daily supplement of Vitamin E and organic selenium, such as **Kohnke's Own E-Se Supplets** (1 scoopful daily for 30 days in a 500kg mare prior to breeding the mare). A late foaling mare in thin condition is best not bred late in the season. A rest period will help ensure that she has more opportunity to regain her body reserves and conceive early in the next season. A mare in a "fleshy" or better condition has an overall better chance of getting in foal late in the season, but the energy and protein intake must be adequate to meet the increased needs superimposed by lactation.

Practical situations

1. Loss of weight in a mare during the last 3 months of pregnancy does not affect the birth weight of the foal, unless the mare loses weight over a short period of time due to poor pasture under drought conditions, inability to graze due to poor teeth, arthritis in an aged mare, or a hoof abscess etc. However, it can directly influence the quality and amount of the mare's colostrum and subsequent milk production, so that the foal's growth rate and immune status may be compromised.
2. Maiden mares turned out into a paddock with older mares may be forced away from feeders by dominant mares in the established paddock hierarchy. They often lose body condition, particularly if they have been maintained in equestrian training or on high energy racing rations prior to breeding time, and fertility will be decreased.
3. It is best to keep newly retired race fillies or mares in light work to maintain body weight and mate them whilst in work, rather than risking them losing condition when turned out into a paddock on a lower energy diet. It is also wise to segregate maiden and other mares and provide two or three feeders away from the main group to encourage newly introduced or maiden mares to get a fair share of provided feed.
4. **A mare should ideally be in 'fleshy' or heavier condition for breeding.** Overweight or obese mares will cycle and are fertile. To avoid early embryonic abortion, they should be maintained in this condition until at least 90 days of pregnancy before starting a weight management plan.

Handy Hint 5

Check The Condition of all Mares Prior to Breeding

A well cared for mare in good condition entering the stud environment in the late winter as a dry mare, or a lactating mare in early spring with a foal at foot, may start to lose condition and her fertility will be adversely affected. In this case, it is wise to ensure well conditioned mares are fed in a separate group and feed intake adjusted regularly to avoid loss of condition. Mares which conceive with a foal at foot and are obviously losing condition due to lactation demands or inadequate dietary intake, must be recognised quickly and supplemented to maintain body weight until at least after the peak of their lactation or for 90 days after service. Ideally, they should not be allowed to fall below a 'fleshy' condition throughout the ongoing pregnancy.

Obese or overweight mares will carry their foals and foal down normally without difficulty, and provided that their body weight is maintained, they should conceive and maintain a viable pregnancy with a foal at foot. However, obesity appears to adversely affect the volume of milk produced, perhaps by a deposition of fat in the milk glands, and the foal's growth rate may be compromised. Feed to maintain overweight mares in a stable condition, even if it requires separate feeding in a group of other heavily conditioned mares with feeders spaced out to avoid dominance and swapping of the feeders within the mare group.

Excess energy intake in a lactating mare does not increase fat or protein content of a mare's milk, but in fact lowers them slightly. There is no practical advantage in over-feeding a lactating mare to boost her milk production, except that the fertility of a very thin mare will be increased by providing more feed so that she can gain weight.

Did you know that...

A mare which is losing weight, regardless of her optimum body weight, will suffer a delay in the onset of oestrus after foaling and lower fertility, as well as a higher risk of early embryonic abortion in the first 90 days of pregnancy if she does conceive. Weight loss after lactation, even if a mare conceives, adversely influences the size and viability of the developing embryo and increases the chances of early embryonic abortion.

This is thought to be a mechanism that has evolved in mares to counter the effect of drought-induced starvation, where they will abort early to give themselves a better chance of feeding their foal and maintaining their body weight and becoming pregnant in the subsequent season.

Research Round-Up

Caesarean section is a relatively uncommon procedure to assist a mare with foaling difficulties (dystocia) due to mal-presentation, an overly large foal, weakness and lack of uterine muscle tone of old age, previous recto-vaginal fistula repair, illness or placental and umbilical cord abnormalities. In many cases, an owner will elect a caesarean if the mare is carrying a valuable foal or the mare herself is well bred and successful as a race horse or in horse sports. The aim of an emergency caesarean in a mare is to deliver a live foal and/or save the mare. However, at the time of an emergency caesarean, many horse owners wish to know if the mare can be successfully bred after the surgery.

A review of mare and foal survival and subsequent fertility rates in mares after a caesarean delivery was carried out by specialist equine reproductive veterinarians at the prestigious Rood and Riddle Equine Hospital in the heart of the Thoroughbred breeding area of Lexington, Kentucky, USA. The survey included 97 mares presented with birthing difficulties (dystocia) over a 24 year period. An emergency caesarean was carried out on an average of 20% of mares with foaling difficulties presented at the clinic during this period. The

case reports indicated that if a mare was presented within 90 minutes of rupture of the chorioallantois membranes ('breaking the waters') there was a 73 % overall chance of the mare breeding subsequently. If the dystocia was prolonged for more than 90 minutes, the subsequent ability to breed a live foal was 51%. The older the mare at the time of caesarean, the lower the subsequent breeding rate, with mares over 20 years of age averaging 30% success in the following breeding seasons. The foaling rate in young mares was reduced to 40.5% in the first season after a caesarean, but increased to around 60% in the next 2 seasons. Foal survival following prolonged dystocia averaged 26%, but 5 out of 6 foals (83%) survived following emergency caesarean section. Around 50% of foals survived after elective caesarean surgery in mares with medical or surgical conditions. Retained placenta was a common problem in 46% of mares after a caesarean. It was concluded that acceptable foaling rates are possible in mares following a caesarean if labour is not prolonged and the mare is less than 16 years of age.

Reference: Abernathy et al (2009) Survival and Fertility Rates after Caesarean Section. AAEP Proc Vol 55:268.

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

Kohnke's Own® E-Se Supplets



Disclaimer: The information and recommendations in this newsletter have been presented as a guideline based on the veterinary experience and knowledge of the author, Dr John Kohnke BVSc RDA. Whilst all care, diligence and years of practical experience have been combined to produce this information, the author/editor, Dr John Kohnke, accepts no responsibility or liability for unforeseen consequences resulting from the hints and advice given in this newsletter.

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