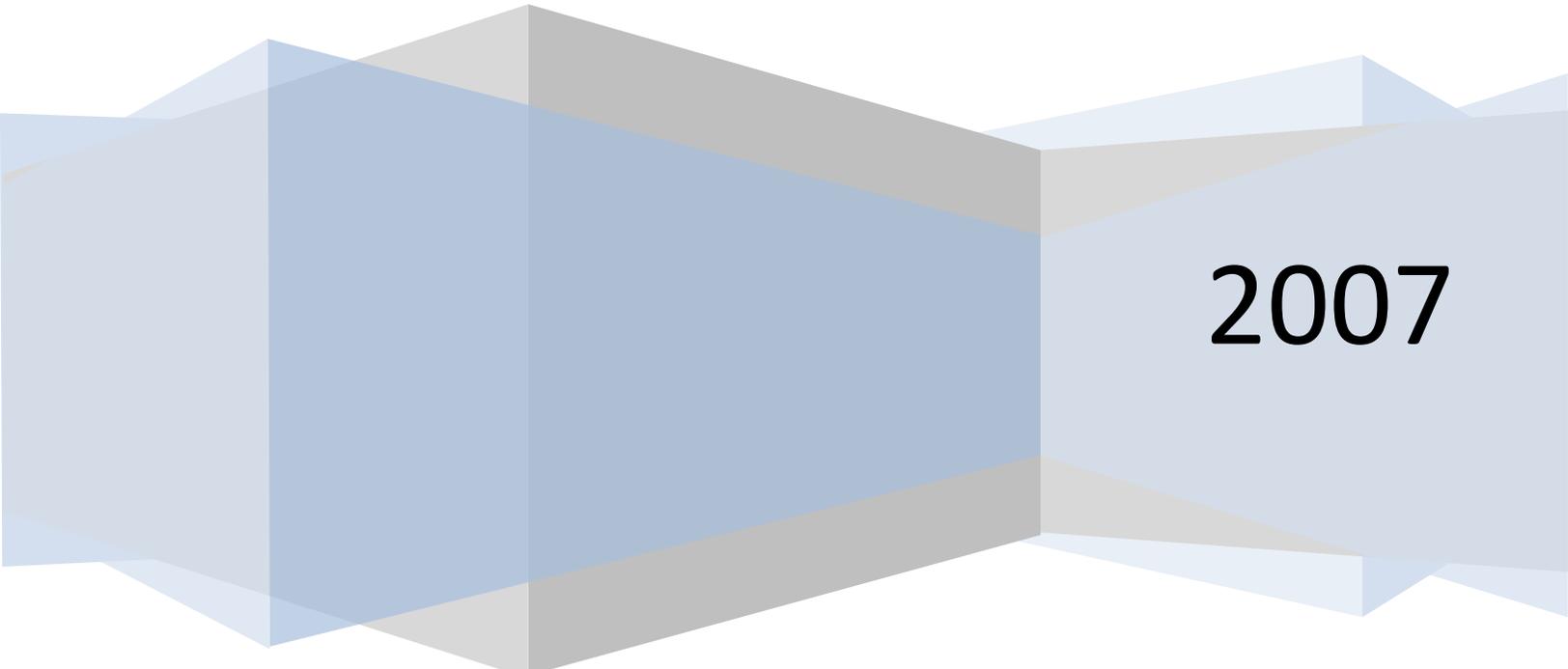


# Development of a Healthy Foal

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## **Last 3 Months of Pregnancy – Mare Care**

Pregnancy support to date should include all appropriate vaccinations, hoof care, dental care, regular deworming and nutritional support. A mid to late gestation ultrasound is beneficial to avoid disappointment or unnecessary vaccines if the mare should be open. Broodmare records are extremely valuable to keep track of dates and provide a detailed, chronological history.

Mares being ridden should have their workload significantly reduced in the last trimester. Mares not being ridden should be provided with at least daily turnout and at best, in groups to promote more movement. (Davies Morel, 2003) Formal exercise such as 10 – 15 minutes of light longing is helpful for mares that are easy keepers. (Kellon, 2007)

It is this writer's opinion that nutritional support should be optimum throughout the entire pregnancy to avoid deficiencies or excesses of vitamins, minerals and high energy feeds. Addressing these only in the last trimester of gestation does not provide optimum fetal growth & support since correction of these deficiencies or excesses takes time. Particular attention should be paid to Protein, Calcium & Phosphorous, Selenium, Zinc and Copper as it is felt these are the most common nutritional imbalances in the average equine diet. (Kellon, 2007)

In late gestation, mares may require 10% - 20% more energy to provide for the most significant period of growth of the fetus. More specifically, a mare's weight should increase by an amount equal to the foal's birth weight of approximately 8% - 11% plus 1% for the placenta and fluids while accounting for 2/3rds of this gain in the last trimester. If more feed or energy is not consumed, fetal growth & lactation may suffer. It is important to recognize that energy needs vary significantly according to breed, age, level of exercise, basic forage such as hay or pasture and individual metabolism. Overfeeding may be harmful and care should be taken to not allow the mare to rise above a Body Condition Score of 8. (Lewis, 1995) This writer recommends feeding broodmares a high quality vitamin/mineral supplement throughout gestation and adding grain or high energy feeds as required. Ideally, pregnant mares are best kept at Body Condition Scores between 6 - 7. (Wales, 2005)

The incidence of abortion in mares ranges from 5% - 15%. Management of the mare environment is essential and placentitis is the most common cause of late gestation fetal loss and is generally infectious. Reproductive history of mares is extremely valuable in determining risk. In the event of an abortion, the mare as well as the pasture, stall or corral in which she resided should be quarantined. The laboratory component of abortion is also important to assist in identifying a possible causative agent. Broodmares should be observed closely and often to help identify possible problems early. Signs of problems may include general ill health, early milk production and possible vaginal discharge. ([www.thehorse.com](http://www.thehorse.com), 2007)

## **4 – 6 Weeks Before Expected Due Date**

Current recommendations for the last 4 – 6 weeks of pregnancy are to administer annual vaccine boosters to broodmares to heighten immunoglobulins in the mare's colostrum. Various opinions exist as to the proper time to deworm broodmares prior to parturition, ranging from 1 month to 1 day prior, or the day of, foaling. It is this writer's opinion that deworming every 60 days during gestation and the day the foal is born is most beneficial taking care to use products approved for use during pregnancy. (Growth & Development, 2007; Kellon, 2005)

During this final 4-6 week period, the mare should be introduced to the environment (stall, paddock or pasture) that the mare is to foal. This helps reduce stress by sudden changes and allows her immune system to build antibodies for environmental pathogens. Continued exercise is important to help maintain fitness and may reduce the chances of edema in the legs and abdomen. Clean fresh water must be provided at all times as broodmares require larger quantities of water at this stage. (Davies Morel, 2003)

Textbooks tell us that the average gestation length for mares is 340 days. There is, however, a wide variance that may be individual to the mare and even breed. Therefore, it is more accurate to suggest that a viable foal is expected at a range of 310 – 365 days, giving a variation of 55 days. (Hayes, 1993)

Broodmares begin to show several physical changes during this last few weeks prior to parturition, some obvious and some more subtle. No two mares will seem to show the same physical changes in the same order, or even at the same time from one pregnancy to the next. Therefore, the observer should expect a wide variance in these changes and documentation in the form of record keeping from past pregnancies and/or for future pregnancies is helpful.

*Physical Shape & Vulvar Changes* - In early pregnancy, a mare tends to carry the foal high in the abdomen often giving the appearance of fullness in the flank. The belly then gravitates downwards (sometimes referred to as “dropped”) during the last 2-3 weeks of pregnancy. Relaxation of ligaments in the pelvic area begin to occur creating a hollow or depression around the croup muscles. The mucous membranes on the inside of the mare’s vulva may deepen in color and the relaxation of the vulva may also occur as indicators of preparation for parturition. These are, however, subjective by interpretation of the observer and individual to the mare. They are, therefore, not considered as reliable as assessing milk changes. (Davies Morel, 2003; Hayes, 1993)

*Rectal Temperatures* - With the highly accurate electronic thermometers available today, research has shown that slight changes in rectal temperature can be a reliable indicator of parturition. A mare’s body will fluctuate in a day however will remain consistent at the same hour on consecutive days. Seven days of measurements at the same time of day should be taken to establish a baseline prior to accepting any variation as significant. Some external factors may influence temperature, such as exercise or illness. Once daily routine and variation has been established, a temperature change that is greater than 0.5 degrees F to 1 degree F *lower* than normal is expected to be an indication of parturition within 18 – 24 hours. (Hayes, 1993)

*Milk* - Broodmare udders may begin to fill as early as 6 weeks prior to parturition with the average being 2-4 weeks. This is the development of the supporting matrix of milk-producing glands which secrete fluid prior to actual milk production. In normal situations, one of the most important determining factors of impending parturition is the character of this liquid or secretion. There are numerous milk analysis kits and devices available on the market that generally only require a drop or two of milk to assist in predicting parturition. The time to start checking the milk is when the nipples fill and extend. Enlargement of the milk veins may also become evident in the later stages of mammary development. (Davies Morel, 2003; Hayes, 1993)

*Behaviour* - As with all signs, behavioural changes in mares also vary widely. Mares may become less active, they may withdraw from the herd, show irritation and crankiness or increased attention seeking behaviour in the final weeks or days before parturition. They may bite at their flanks, kick at their belly’s, show a marked increase or decrease interest in food. As with any other signs, anything consistently outside of the mare’s normal behaviour may be considered and documented. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006)

*Pre-Labour Fetal Activity* - It is a common misconception that the foal remains in the “diving position” throughout the pregnancy. In truth, the fetus may be in a variety of positions in early pregnancy but lack of space dictates that changes in position occur with much less frequency in the third trimester. Pre-labour, the fetus becomes more active and the mare more likely to experience signs of abdominal discomfort, often making it difficult to discern from colic. A fetus may have a “flurry” of activity lasting 10 – 15 minutes each time as it extends forelimbs or hindlimbs causing increased pressure on the mare’s urinary tract or bowels. Unless significant ongoing discomfort is being shown by the mare, including straining to urinate or a build-up of gas, this increase in fetal activity often goes unnoticed or is seen as irritability of the mare and an active flank area. (Hayes, 1993; McDonald, 2006)

## **The Birth Process**

*Summary* - Within the space of a few hours, a fetus will move from the abdomen of the mare through the birth canal and be delivered into the outer world, followed by the expulsion of all associated placental membranes and fluid. Stress to the fetus during these few hours can significantly affect the chances of the foal's survival. The process of parturition is physically stressful for both the mare and the foal and is thought that the mare's body reads the signals to foal sent by the fetus itself which shows an increase in cortisol levels at maturity. The foaling attendant should be familiar and comfortable with both the physiological process and expected timelines of each stage of labour in order to help identify foaling dystocia early. It is the quick actions of the foaling attendant, should dystocia occur, that will save the foal and possibly the mare should the birthing process not proceed normally. The long-term prognosis for a newborn foal may be classified with a system that scores heart rate, respiration, muscle tone and nasal response. The scoring system would establish a foal as normal, moderate depression and markedly depressed. In this writer's opinion that any score less than normal should prompt immediate veterinary attention. (Davies Morel, 2003; McDonald, 2006)

*Stage One* - Research has shown that the elevation of both oxytocin and prostaglandin occur at parturition. These hormones may be in part responsible for signalling the beginning of uterine myometrial activity as well as fetal movement. The foal rotates into a dorsal position from a ventral-flexed position to the path of least resistance, the birth canal. The cervix will be encouraged to dilate by both hormonal levels and the pressure of the allanto-chorionic membrane and foal's forelimbs. The vulva will continue to relax and uterine secretions collect in the vagina.

A foaling kit should be at hand. An episiotomy should be performed at this stage if not done earlier.. Gentle washing of the mare's vulva and udder is suggested along with wrapping her tail. Large feed bins and water troughs should be removed from the immediate foaling area at this time as they pose potential danger to the foal. Bedding should be fresh, clean and deep.

The mare may show restlessness & agitation, colic-type symptoms, disinterest in feed, biting her sides, kicking at her belly and sweating. At the end of first stage labour, the fetus' forelegs and nose push their way through the dilating cervix rupturing the allanto-chorionic membrane. As the allantoic fluid releases, this signals the beginning of the second stage of labour. A brief internal examination may be made at this time to determine correct foal presentation as it is thought that this is the best time to correct fetal positioning problems. It is safest for the attendant if this fetal position check is done while the mare is standing. If an internal exam is performed, it is very important that it be done with care taken to create as sterile conditions as possible. Washing the vulva, using a gloved and lubricated hand is recommended. If anything other than the front legs and muzzle present, foaling dystocia is likely to occur and efforts should be made quickly to assess intervention needed along with a call to the veterinarian.

Timeline for Stage One Labour is 1 to 4 hours. (Davies Morel, 2003; McDonald, 2006; Wales, 2005)

*Stage Two* - The release of allantoic fluid helps lubricate the vagina and is thought to trigger the stronger contractions of this second stage of labour. The mare may lie down and get up numerous times in efforts to help position the foal during this stage; the abdominal muscles contract and the real work of pushing the foal through the birth canal has begun.

The amniotic sac, seen as a white membrane, is the first most visible occurrence outside the vulva and within it should be the foal's front legs and muzzle. The foal should be funnelled through the birth canal in a curved manner and expelled downwards to the mare's hind legs.

As Stage Two progresses in a normal delivery, the foal's front legs and muzzle are followed by the foal's thorax, the widest point of the foal to clear the birth canal. At the end of stage two, the delivery is essentially complete when the foal's shoulders have cleared the birth canal. The foal should be lying with its head near the mare's hind legs, its own hind limbs still within the mare. It is thought that the foals limbs remaining within the mare creates a calming effect on the mare so no intervention should be generally needed here.

Immediately after delivery the foaling attendant may clear the nasal passage by gently pinching and stroking the face of the foal from the eyes in a downward direction. The foal may be dried off as necessary. The umbilical cord should be allowed to break naturally and the umbilical stump treated after breakage with mild iodine solution or chlorhexidine. The foal's heart rate may be checked at this time by placing a hand on the foal's thorax. Mares should be encouraged to remain recumbent for 30 minutes post delivery to allow them rest and for recovery of the tract. This period marks the beginning of mare and foal bonding.

Timeline for Stage Two Labour is 5 – 60 minutes. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006; Wales, 2005)

*Stage Three* - The successful delivery of the placenta marks the end of Stage Three Labour. The mare may show signs of restlessness as uterine contractions begin again, although reduced to a level similar to Stage One labour, to help expel any remaining fluids, the placenta and assist in uterine involution. Blood vessels begin to constrict as the allanto-chorion begins to shrink and draw away from the uterus expelling the placenta inside out. The placenta may be delivered with the foal, shortly after the foal or may take several hours. The placenta should be tied up to prevent the mare from standing on or ripping it prematurely. The mare and a normal, alert foal may be left alone to continue the bonding process. As soon as the placenta is delivered it should be examined for completeness and weighed. Anything less than a complete placenta is cause for concern as minute pieces remaining inside the mare can cause life threatening infections.

Timeline for Stage Two Labour is normally 1 hour with variations to 10 hours. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006; Wales, 2005)

### **The Newborn Foal – First Few Hours**

The adaption of the foal from intra-uterine to extra-uterine environment is the most crucial and should be monitored carefully while the attendant remains as unobtrusive as possible to allow mare and foal bonding.

The foal should take its first breath within 30 seconds of delivery, establishing a rhythmic breathing pattern within 1 minute and taking an average of 60 – 70 breaths per minute. Heart rate can be easily checked shortly after delivery and may range from 40 – 80 beats per minute. Fetal rectal temperature should be 37.5 to 38.5 degrees Celsius. Mucous membranes should start to appear pink as the lungs deliver oxygen to the foal's body with a capillary refill of 1-2 seconds expected within 2 hours post-delivery. A foal should be seen to move into a sternum recumbent position within 5 minutes of delivery. They should respond to pain stimuli, nasal stimuli such as tickling and an increase in reflexes should be progressively evident with the foal extending its head and forelimbs, blinking and possibly whinnying. A foal should also express the suckle reflex if presented with a finger or bottle and may initiate moving towards the mare's head by crawling. The umbilical cord should break naturally within 5-10 minutes of delivery and dressed accordingly.

Foals may begin attempts to stand within 35 – 60 minutes of delivery and some variation exists among breeds. Their uncoordinated attempts help form muscle coordination and control. A foaling area free of projecting objects such as buckets, feeders and hooks is important as the foal is bound to do a nosedive or two before successfully rising to its feet.

The foal that successfully stands now begins clumsily searching for the udder. Foaling attendants may be frustrated by the foals attempts but interfering too soon may only increase the length of time it takes for the foal to nurse successfully. Once the foal is

suckling, they may be seen to suckle at 30 – 60 minute intervals. Foals not standing and nursing within 3 hours post delivery should be bottle fed or tube fed mare's milk as foals have limited energy supplies at birth.

Complete assessment of the foal within one hour of birth should include heart rate, respiration, ability to stand, vigour, ability to suckle, straight legs, body weight and general demeanor. Any abnormalities, depression, lethargia or general concerns should be brought to the attention of a veterinarian. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006; Wales, 2005)

### **The Newborn Foal – First 24 Hours**

Foals should have received quality colostrum within the first 24 hours and preferably within the first 12 hours after birth for there is a limited period of time in which their stomachs are able to absorb large immunoglobulins. They should be seen to pass meconium and urine within the first 12 hours and enemas may be used if the foal is observed to be excessively straining. The foal should be standing, nursing and sleeping at frequent intervals throughout the first 24 hours. It is this writer's opinion, and recommendations of various References listed here, that both the mare and foal be examined by a veterinarian within the first 24 hours. Veterinarians should examine the placenta, the mare's vulva for tears and/or hematomas and may easily measure blood IgG levels in the foal to determine success or failure of passive transfer of immunoglobulins. Failure of passive transfer remains the leading cause of foal death. A foal without sufficient antibodies during its first fragile days of life is at much greater risk of life threatening infection and illness.

Umbilical stump dressings should be done several times throughout the first day and continued for a number of days to follow. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006; Wales, 2005)

### **The Newborn Foal – First 7 Days**

Foals should be seen to pass meconium with relative ease within the first 24 hours then manure should be expected to change color to a light greenish/tan color. Diarrhea poses a significant risk of dehydration so attendants should be observant to changes in color and texture. Should diarrhea persist, intervention should be considered immediately.

Foals should be observed passing urine within the first twelve hours and in general, they most commonly urinate after nursing. Foals will spend the majority of their time resting with smaller periods of time standing, nursing, urinating and defecating.

The newborn foal should be kept in a confined, clean and safe environment for the first 3 days of life until it develops its eyesight and depth perception. Care should be taken to ensure the foal has shelter, is not exposed to increment weather or temperatures.

Foals may be seen to be nursing as often as every 30 – 60 minutes, the foal will gradually slow down. Foals not observed nursing for longer than 3 hours is cause for concern.

Handling of foals should be done as gently as possible with a lot of stroking and calm reassurance. Some medical treatment may require the foal be restrained. Proper restraint of the foal is to place an arm behind the buttocks and in front of the chest.

After the initial 24 hours post-delivery, the foal's greatest period of vulnerability is the 4 – 7 days following. Close observation should be given to all aspects of the foal's behaviour and feeding with any deviations considered as possible cause for concern. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006; Wales, 2005)

### **The Mare – Birth to 7 Days Post Delivery**

The mare has just completed an extremely physically exhausting process. Immediately post-delivery the mare should be encouraged to rest 30 – 40 minutes in the recumbent position. She may turn to lick and nicker at the foal. The mare should pass the placenta

within 2 hours for a normal foaling scenario and it is this writer's opinion that veterinary support be considered if Third Stage Labour is not complete within 4 hours post-foaling. Under normal conditions, the uterus will have shrunk to ¼ its fully expanded size and by 7 days post-foaling, should only be two to three times the size of a barren mare.

Upon rising of both foal and mare, the mare's next job is in allowing the foal to suckle and it is best if this can be accomplished after delivery of the placenta. The mare will often offer gentle encouragement such as nips and nickers while the foal bumps its way along to her udder. Observation without intervention is best at this stage unless the mare shows signs of aggression or rejection of the foal. Some milk may be collected just before or after the foal has suckled to assess colostrums quality, if needed.

The mare should be fed after she has passed the placenta, and after the foal has successfully nursed. Her diet may be changed slightly to include somewhat laxative feeds such as bran during this post-partum period. There may be discomfort from trauma during the birthing process inhibiting defecation in which pain medication may be used to help alleviate mild post-foaling discomfort.

Mare behaviour post-foaling should be as closely observed as the foal's. Continued signs of discomfort, lethargia, irritability may all be indicators of health concerns requiring veterinary assessment. (Davies Morel, 2003; Hayes, 1993; McDonald, 2006; Wales, 2005)

### **The Mare & Foal – The First Month and Lactation**

Management of the mare and foal will need to include consideration of whether the mare is to be rebred, in what manner and the general timeframe. Considerations must include an overall assessment of the birthing, first days and even weeks post-partum. To consider a viable rebreed, the overall process of parturition should ideally have been all within a normal range for both mare and foal, free of reproductive tract infections for the mare and normal uterine involution should be confirmed. Abnormalities or stresses to mare and/or foal within the first month should be considered as less than optimal for rebreeding. (Wales, 2005; Davies Morel, 2003)

Focus in the coming months for the mare during lactation should first be nutritional. The mare's diet and body condition should be optimal for lactation with a Body Condition Score that remains stable and above a score of 5. She should be bright, alert and healthy in appearance with good milk production. Consideration must be given to all factions of the diet, not just grain, but feeds rich in protein, vitamins & minerals to support the body's demands for lactation. (Kellon, 2007; Guelph, 2007)

Foals may start tasting the mare's feed within its first few days of life. It is appropriate to introduce creep feeding as early as one week of age but the foal should not be expected to consume a large portion of this feed prior to 6-8 weeks of age. Additional steps to encourage intake of a milk-based product may be needed if there is inadequate milk production, anemia or joint abnormalities. During this time, foal's will gradually be introduced to forage by sharing the mare's. (Kellon, 2007; Guelph, 2007; Davies Morel, 2003) Some experts recommend the use of probiotics for all foals however this writer's is not convinced this is necessary in all circumstances, preferring to treat foals with persistent diarrhea or as deemed necessary. Vaccinations should only be administered on an individual basis and in consideration of environmental risks, mare vaccination history and quality of colostrum received. (Davies Morel, 2003; Hayes, 1993)

Daily turnout of mare and foal is important after the foal's eyesight has developed, starting with short periods of time in good weather and increasing gradually. The optimal foal corral size this early is ¼ to ½ acre in size with safe fencing and free of equipment and protruding objects. (Davies Morel, 2003; Hayes, 1993)

### **The Foal – 1 Month of Age to Weaning**

The foal derives the majority of its energy and nutrients from the mare's milk in the first 8 – 10 weeks of life. It is essential, however, that the foal begin to consume a quality vitamin/mineral rich feed source in a creep feeder by 8 – 10 weeks of age as milk quality peaks and declines. This decline is likely nature's way to encourage the foal to search for other sources of feed. As the foal increases interest and consumption in the mare's feed, care should be taken to ensure that both mare and foal are receiving enough to meet lactation and growth requirements. (Kellon, 2007; McDonald, 2006; Daves Morel, 2003)

There is little need for dentition at this age unless abnormalities are noted. (Wales, 2005; Davies Morel, 2003)

Immunization and parasite control should be given according to the specific needs of the individual area and may start at 3 – 6 months of age. Parasite control should begin at 30 days of age and a safe deworming product used every 30 days until the foal reaches one year of age. Parasitism is a common cause of poor growth and appearance in foals and weanlings. (Kellon, 2007; McDonald, 2006; Wales, 2005)

Exercise in the form of continued turnout is essential for muscle development and proper bone growth. Turnout with other mares and foals will help the foal develop social skills and will likely increase overall movement as the foals learn to play together. (Wales, 2005; Davies Morel, 2003; McDonald, 2006)

Handling of the foal should complement the handling that was initiated in the first few weeks of the foal's life. Gentle handling and stroking of the foal with patience and by providing reward is optimal. A leather foal halter may be used with care and attention given to proper fit should the halter be left on the foal for an extended period of time. Halter breaking should be taught in small, incremental steps, each lesson being kept short and building upon the previous lesson. Handlers should avoid tug-of-wars at all costs to avoid damage to the foal's head and neck which may occur in a struggle. Leading may be taught using a rope behind the foal's hindquarters and a second handler is often beneficial in the early stages of these lessons. Once leading has been mastered, a foal may be taught to tie. Again, care and attention must be given to not create a struggle or tug-of-war with the foal avoiding the potential for injury and harm.

Growth rates should be carefully monitored to avoid obesity or accelerated growth which can lead to joint and tissue damage. The obese foal or fast growing foal may need to have its diet restricted for a period of time and extra care must be taken to ensure proper ratios of calcium & phosphorous, generous levels of copper and zinc plus a high quality protein and forage diet.

Weaning may take place as early as 3 months however most experts agree that a foal weaned between the ages of 6 to 9 months are better adapted emotionally and physically. Weaning methods are often dependent on a number of factors including farm facilities and individual opinions. Some may choose to abruptly wean the foal by suddenly removing the foal from the mare, separating them out of sight and hearing. This can be very stressful for both mare and foal. Other options include group weaning where foals are placed together and mares removed from the group as well as interval weaning, where mare and foal are separated for increasing periods of time over a number of days. The best options for weaning must take into account the foal being in appropriate body condition and health at time of weaning, the most effective ways to minimize stress and maximize safety for the foal and mare.

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