

Breeding Your Mare Using Artificial Insemination

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Introduction

- A procedure in which a tube is inserted into through the cervix to deposit a sample of sperm directly into the uterus. It has been used in many different species worldwide for centuries with good success, although the each species presents its own reproductive challenges.
- AI versus Natural Cover/Service
 Natural cover is breeding a stallion with a mare, which can be supervised, controlled, or left up to the horses (throw a stallion in a paddock with a mare(s)).

Artificial Insemination	Natural Cover
Pros: - Safe for mare & stallion (disease, injury) - Controlled environment - Larger selection of stallions to choose from	Pros: - less labor intensive - natural limit on number of mares a stallion can breed - <i>sometimes</i> less expensive
Cons: - More labor intensive (can be more expensive) - Genetic over-breeding possible (Impressive) - Not accepted by TB registry (Jockey Club)	Cons: - Less safe for mare and stallion (disease & injury) - Transport of mare (+/- foal) to stallion - Less selection of stallions (limited by distance)

Procedure

1. Breeding Soundness Examination

- Determines the mare's suitability for breeding and/or causes for infertility
 - Good to do for maiden mares, especially if they are older
 - A must for mares that have aborted or are infertile (difficult to get in foal)
 - Best done when mare is in "heat" or estrus - cervix relaxed so easy to pass swabs or instruments through in into uterus for diagnostics
- Complete history of mare, detailed reproductive history
 - All foalings, abortions, breedings, major medical and surgical treatments
- Complete physical examination - Some diseases affect reproductive success (Cushings)
- Reproductive examination
 - External conformation of genitalia
 - Certain perineal conformation predisposes to abnormalities that decrease reproductive success (pneumovagina, urovagina, etc)
 - Vaginal speculum examination - Assess vagina & cervix for abnormalities
 - Rectal examination (palpation & ultrasound)
 - Assess reproductive structures, determine stage of estrus
- Additional diagnostics as necessary
 - Uterine culture (+/- lavage) - determine if abnormal bacteria present in uterus
 - Uterine biopsy (+/- lavage) - useful for determining % chance of producing a live foal
 - Uterine cytology (+/- lavage) - diagnosing chronic or low-grade endometritis
 - Blood draw - hormonal assays - diagnosis of ovarian tumors

2. Pick out the stallion, contact breeder, sign contract, etc.

- Best to visit the stallion and breeding facility
- Before your mare is cycling so everything is ready when she is ready

- Have all stallion information ready for the vet when it is time to breed - where semen is coming from, what days they collect the semen, how much time until the semen can get to the mare from when it is ordered
- Make sure stallion owner/manager has good reputation and is experienced with semen shipment - references are very important!

3. Cycling the mare

- Puberty of horses is around 12-24 months of age
- Two Types of Cycles - Seasonal cycles (yearly) & Estrous (monthly) cycles

1. Seasonal Cycle = yearly cycle

Mare = long-day seasonally polyestrous breeders
 (spring/summer/early fall season) (multiple estrus cycles)
 Winter - short days - ovarian activity shuts down - no cycling = ANESTRUS
 Spring - days longer - ovarian activity starts - cycling starts = Irregular or prolonged estrus receptivity = TRANSITION PHASE
 Mid-late spring to Early fall - days long - regular ovarian cycles of activity = OVULATORY PHASE - "normal" estrous cycles
 Fall - days shorter - ovarian activity decreases = TRANSITION to ANESTRUS

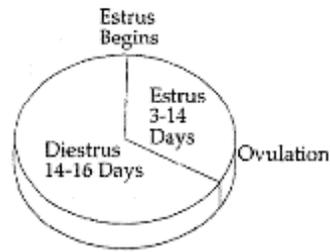
Seasonality in the Mare



2. Estrous Cycle = 21 day cycle = interval from one ovulation to the next:

Stage & Length of Cycle	Substage of Cycle	Ovarian Activity	Behavior to Stallion
Estrus (4-8 days)	Early Estrus	Follicles developing	Some receptivity
	Late Estrus	Dominant follicle(s) mature	Strong receptivity
	Ovulation	Egg is released & follicle collapses	Receptive
Diestrus (12-16 days)	Early Diestrus	Follicle becomes Corpus Hemorrhagicum (CH)	Rejects
	Mid Diestrus	CH becomes Corpus Luteum (CL)	Rejects
	Late Diestrus	Follicles begin developing	Rejects

The Mare's Estrous Cycle



4. Timing the insemination

- Best time to inseminate = within 24 hours before ovulation
- Thus, must know the mare's cycles - requires watching mare closely & keeping track of cycles on a calendar
 - Estrus Detection
 - Teasing mare with stallion
 - More reliable but requires having a stallion around
 - Can be dangerous & requires experienced handler
 - Observing mare daily - Less reliable, sometimes will miss signs of estrus ("heat")
 - Signs of Estrus ("heat")
 - "Winking" of vulva
 - Frequent urination or squatting to urinate
 - More docile (sometimes)
 - Ears held to the side (relaxed)
 - Vocalization (squealing)
- When receptive to stallion (early estrus)
 - Veterinary examination of mare followed by exams every day
 - Monitor changes in uterus, size of follicles, etc. for signs of impending ovulation
 - When the dominant follicle is $>$ or $=$ 35 mm, order semen +/- give ovulatory induction agent (ensures ovulation within 72 hours)
 - Inseminate once semen arrives and every 24 hours until ovulation occurs
- Issues:
 - failure to ovulate at correct time (have to order another semen dosage) or wait until next cycle
 - ovulates early or with too small of follicle ($<$ 35mm)
 - poor semen quality (motility, debris, dead sperm, etc)

5. Insemination

- Simple procedure with slight variations based on practitioner's preference.

 1. Rectal exam - evaluate follicles, uterus, cervix for optimum timing
 2. Prep mare - wrap & tie tail to side, wash perineal area
 3. Sterile or clean sleeve - sterile non-spermicidal lube - AI pipette - semen in syringe
 4. Pass AI pipette/catheter through cervix into uterus, attach syringe, inject semen
 5. Follow-up w/rectal exam next day to see if ovulated, repeat as needed until ovulation

6. Pregnancy diagnosis

- Very important to have performed by a veterinarian!!! Only licensed veterinarians may make an actual diagnosis of pregnancy.
- 14-16 days after ovulation is best time to diagnose - can easily prevent twin pregnancy b/c embryos not attached to uterus yet.

Twins are dangerous because:

1. Often do not survive and end up being aborted, which risks the mare's future fertility and can lead to placentitis and toxemia
2. If do end up being born, often small and weak. Predisposed to health issues as neonates.
3. High incidence of dystocia - can end both the foal(s) and the mares life

- If not pregnant - can rebreed if timing is right for individual. Wait until next cycle (less than week later).

7. Follow-up care for the mare

- If pregnant @ 14-16 days - re-examine at 25-35 days. This is important for several reasons:

1. Early Embryonic Death occurs before 40 days post-fertilization. ~24% of equine pregnancies result in EED. Causes are speculative and probably multi-factoral. No way to tell that loss has occurred unless she returns to estrus (not reliable) or ultrasound shows not pregnant.
2. If twins seen @ 14-16d check and one twin was "reduced", need to make sure that only one embryo remains. After 40 days, if twins are still present and you decide to terminate the pregnancy, the mare will not return to estrus until about 120 days post-ovulation (endometrial cups prevent return to estrus). Thus, you most likely will lose the "breeding season" for that year.
3. At day 24 you can see the heartbeat and thus assess fetal viability.

- Proper nutrition/care important - Website: www.foalcare.com

- If history of pregnancy loss, good idea to supplement w/progesterone (Regumate) for at least 90 days.

- Vaccination for Equine Herpesvirus-1 (EHV-1) at 5-7-9 months pregnant

- Vaccination for Equine Herpesvirus-1 & 4 (EHV-1 & 4), Eastern & Western Equine Encephalomyelitis (EEE/WEE), West Nile Virus (WNV), Tetanus, Rabies, Influenza at 4-8 weeks before due date

Infertility

- Unable to conceive or carry a fetus to full term or failure to produce a viable useful offspring
- Function of:
 - Age of mare - after 12 years old significantly lower fertility
 - Health of mare and stallion - nutrition, vaccination, etc.
 - Management of mare and stallion - estrus detection, stress, collection methods
 - Physiological effects - semen quality, normal cycles, uterine environment
- Investigating the cause of infertility
 - Stallion - Semen characteristics, history of breeding
 - Look at sperm numbers and their progressive motility. Determine their longevity after cool storage and transport. Look for high numbers of dead sperm and abnormal sperm.
 - Determine if stallion has produced healthy offspring in other mares and when was the last time he produced a live foal.
 - Mare - Regularity of cycles, uterine environment, hormone levels
 - Investigation of infertility should at least include a rectal palpation and ultrasonography. Further testing may be needed depending on these findings and the history of the mare.
 - Irregular cycling and failure to cycle

- If mare has never cycled before a congenital or chromosomal abnormality could be present. This may require a blood draw and genetic testing sent out to a specialty lab. Treatment may not be possible for some abnormalities.
- If mare has not cycled this year she may be in the transitional stage of her cycle. This may be treated by increasing the hours of daylight exposure (put under lights) or hormone therapy.
- If mare has irregular cycles, there may be multiple causes, each of which has a specific therapy. Ovarian tumors, persistent corpus luteum, anovulatory follicles are just examples of the many causes of irregular cycles. Some therapies include hormones or exposure to a stallion.
- No fertilization or loss of embryo before 14-16 days
 - Hard to determine which of the above cases is responsible for failure to get pregnant
 - Most common cause is endometritis (inflammation of the lining of the uterus). Special diagnostic tests include uterine culture, cytology, and/or biopsy. Treatment includes serial uterine flushes and oxytocin administration. Depending on the mare's conformation, it may be advisable to perform a Caslick's surgery.
- Pregnant at 14-16 day check then loose embryo after 40 days
 - In addition to endometritis, failure of endometrial glands, cervical incompetence, and progesterone insufficiency can be responsible for early pregnancy loss. Diagnosis and treatments are similar to those used for endometritis, except progesterone hormone assay is often included. Prevention may include administration of progesterone for at least 90 days post-breeding.
- Loss of pregnancy after 150 days and up to 300 days = abortion
 - Most common cause is twinning, but can also be due to infectious causes (bacterial/viral/fungal) or other non-infectious causes (stress, placental insufficiency, etc.)
 - Many times do not find exact cause.
 - Best to have vet examine mare after abortion. Also, save fetus and placenta for examination.

Conclusions

Artificial Insemination is a safe way to have your mare bred in a controlled environment with the stallion of your selection. Breeding and raising horses is a serious undertaking requiring money, time, and hard work. Responsible breeding is essential to prevent unwanted horses, thus careful planning and consideration by horse owners when they are considering breeding is encouraged. Because of the time of ovulation is unpredictable, it is best to have serial ultrasound evaluations performed by your veterinarian when inseminating the mare. Multiple variables may effect the success of the insemination, such as quality of the semen, timing of ovulation, and breeding soundness of the mare. After insemination, pregnancy diagnosis by ultrasound at 14-16 days is very important to determine the pregnancy status of the mare and prevent twins. Additional follow-up care includes vaccinations, proper nutrition, and veterinary examinations at 25-30 days of pregnancy.

Resources

Knottenbelt DC, et al. *Equine Stud Medicine and Surgery*. Saunders, 2003.

www.foalcare.com

www.thehorse.comwww.vetmed.lsu.edu/eiltslotus/theriogenology-5361/equine_index.htm
www.extension.org/pages/29355/new-reproductive-technologies-for-horse-breeding-programs