Successful breeding programs involve a coordinated effort between the mare owner, stallion owner and the veterinarian(s). A variety of management techniques can be utilized successfully (especially when using live cover or fresh semen). Mare management has to be increased when utilizing cooled-shipped semen or frozen semen.

Effective estrous detection program helpful. Palpation and ultrasonography used to predict day of ovulation and detect abnormalities of the ovaries and uterus. Many mares bred successfully without any veterinary assistance. Problem mares are a different story….
EQUINE BREEDING MANAGEMENT
Breeding Options:
- Pasture breeding
- Hand breeding
- Artificial Insemination
  Fresh Semen
  Cooled-Transported Semen
  Frozen Semen

EQUINE BREEDING MANAGEMENT
Pasture Breeding:
- Estrous cycle not monitored
- Mating not controlled (may not even be observed)
- Date of ovulation and potential foaling dates not accurately known
- In many instances pregnancy examinations not performed (mare is assumed to be pregnant)

EQUINE BREEDING MANAGEMENT
Hand Breeding:
- Mare evaluated by teasing and/or palpation
- Stallion and mare handled during breeding event
- Mare live covered every other day while in estrus or as needed relative to hormone therapy
  hCG
  GnRH (deslorelin)
ARTIFICIAL INSEMINATION
› Semen collection provides an opportunity to evaluate the semen prior to insemination

SEMEN EVALUATION
- Semen Volume
- Sperm Motility
- Sperm Concentration

BREEDING MANAGEMENT
Goals:
› Detect ovarian or uterine abnormalities prior to breeding
› Predict day of ovulation
› Determine when to breed, order semen or thaw semen
› When to induce ovulation (if needed)
› Confirm that ovulation has occurred
› Evaluate uterine response to breeding
› Administer treatments (if needed)
PREDICTION OF OVULATION

- Number of days in heat (5-7 days)
- Growth rate of largest follicle (3-5 mm/day)
- Size of largest follicle
- Palpation and ultrasound image
- Uterine edema pattern
- Hormone administration

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PREDICTION OF OVULATION

- Uterine edema score is related to estradiol (E₂) levels
- Edema peaks 1-2 days prior to ovulation

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HUMAN CHORIONIC GONADOTROPIN (hCG)

**Guidelines:**

- Follicle ≥ 35 mm
- Mare in estrus 2-3 days
- Dose – 1,500 to 2,500 IU
- Route: IV or IM
- Ovulation in ~36 hours
DESLORELIN (GnRH agonist)

Guidelines:
- Follicle ≥ 35 mm
- Mare in estrus 2-3 days
- Dose – 1.5 mg
- Route: IM
- Ovulation in ~40 hours

OVULATION

Tear in Wall  Follicle Collapsing  Collapsed Follicle

CORPUS LUTEUM FORMATION

Fresh Ovulation  Corpus Hemorrhagicum  Corpus Luteum
FRESH SEMEN

Goal:

- Inseminate within 48 hours prior to ovulation
- **Option 1** - Start breeding on the second day of heat, and breed every other day until the mare goes out of heat
  - Average of 2.5 inseminations per cycle
- **Option 2** - Inseminate mare once based on prediction of ovulation and hormone therapy (i.e. hCG or deslorelin administration)

FRESH SEMEN

- Insemination dose is 500 million progressively motile sperm
- Dilute to 25 million PMS/ml in semen extender
  - 20 ml insemination volume
- Or dilute 1:1 to 1:3 with extender

COOLED-TRANSPORTED SEMEN

Goals:

- Inseminate within 24 - 48 hours prior to ovulation
- Utilize only one shipment of semen
  - Expensive to ship
  - Rebreeds not always possible
COOLED-TRANSPORTED SEMEN

- Tease mare to determine when she comes into heat
- Examine mares by ultrasonography beginning on second day of heat
- Order semen when a dominant follicle reaches 35 to 40 mm in diameter
- Use hCG or Deslorelin to induce ovulation at a predictable time
  - hCG – 36 hrs
  - Deslorelin – 40 hrs

ORDERING SEMEN

- Early and effective communication is a key to a successful outcome with cooled-transported semen
- Know semen collection dates for stallion in advance
- Common stallion collection schedules:
  - Any day
  - Every other day
  - Even days vs. Odd days
  - M, W, F (Sat)
  - As needed

ORDERING SEMEN

Options for semen shipment

- Overnight courier service (FedEx, UPS, etc)
  - Less expensive
  - Appropriate for most stallions
  - Delivery on schedule most of the time
  - Problem: mare may ovulate by time semen arrives
- Counter-to-counter shipment
  - More expensive
  - May be required for some stallions
  - May be needed if mare is close to ovulation
ORDERING SEMEN

- Call for semen when a dominant follicle reaches 35 to 40 mm in diameter
- Use hCG or GnRH to induce a predictable ovulation at a predictable time
- Administer hCG or GnRH either:
  - When semen is ordered
  - After semen arrives
- Administration of hCG or GnRH at time semen is ordered will decrease the interval from insemination to ovulation
- However, if semen is not collected or does not arrive on schedule, the mare may ovulate without being bred

COOLED-TRANSPORTED SEMEN

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COOLED-TRANSPORTED SEMEN

Semen Management:
- Special semen extenders commonly used
- Individual stallions may require a specific extender
- Test cool may be beneficial
- Hold a dose back and look at motility the next day

Shipping Containers:
- Many containers commercially available
- Multiple-use vs. disposable
**COOLED-TRANSPORTED SEMEN**

**Semen Management:**
- Two breeding doses commonly shipped
- Each dose should contain 1 billion progressively motile sperm when packaged
- Number of motile sperm will often be significantly less after shipment

**COOLED-TRANSPORTED SEMEN**

**Insemination Options:**
- Inseminate both doses when semen arrives
- Inseminate one dose when semen arrives and one dose later that day or early the next day

**COOLED-TRANSPORTED SEMEN**

**Optimal decision may depend on:**
- Individual stallion semen characteristics
- Mare age, parity status
- Uterine health
COOLED-TRANSPORTED SEMEN

*Problem* Mares:
- Time insemination closely
- Inseminate one or both doses when semen arrives
- Lavage uterus and administer oxytocin 4-6 hours after insemination
- Do not inseminate a second time

Semen Evaluation:
- Important to warm up aliquot of semen and examine under a microscope at time of insemination

Insemination:
- Prewarming prior to insemination is not necessary
- Deposit semen into uterus using standard techniques

Common Problems (Associated with Stallion):
- Inability to obtain semen
- Poor quality semen
- Receiving semen collected 48 hrs previously
- Reordering semen if mare does not ovulate
- Lack of stallion (or mare) information in shipment
COOLED-TRANSPORTED SEMEN

Common Problems (Associated with Mare):
- Failure of ovulation
- Accumulation of uterine fluid following insemination
- Semen lost in transport
- Stallion collection schedule does not line up with potential ovulation date of the mare
  - M, W, F collection schedule
  - Horse show/event

FROZEN-THAWED SEMEN

Goal:
- Inseminate within 12 hours prior to and/or within 6 to 8 hours after ovulation
- If only one dose of frozen semen is available, it is utilized immediately after ovulation is detected

FROZEN-THAWED SEMEN

- Examine mares by palpation and ultrasonography
- Begin examinations on the second day of estrus
- Time the ovulation
  - Use of hCG or GnRH can reduce number of examinations required
FROZEN-THAWED SEMEN

**hCG Protocol (2 doses of semen available):**
- Administer hCG at 12:00 pm (noon)
- U/S next morning; AI if ovulated
- U/S and AI at 4:00 - 6:00 pm
- Mare should ovulate at 12:00 am (midnight)
- U/S ± AI at 8:00 am (40 hrs after hCG)

*Times can be adjusted to suit farm management*

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**Deslorelin (GnRH) Protocol (one dose available):**
- Administer Deslorelin at 8:00 pm
- U/S next morning and evening
- AI if ovulated
- U/S the following morning
- Mare should ovulate at ~ 12:00 pm (noon)
- Inseminate pre- and/or post-ovulation appropriately

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**Thawing Protocol:**
- Thaw frozen semen following the directions provided by the person who froze the semen
- Typical thaw procedure:
  - 37°C water bath for 30 seconds*
FROZEN-THAWED SEMEN

Semen Parameters:
- 800 million sperm per insemination dose
- Post-thaw motility should be at least 30%

Semen Management:
- Draw up 1 ml or air into insemination pipette,
- Then draw up thawed semen

Insemination Protocol:
- Traditional technique
  - Inseminate into uterine body
- Deep Horn Insemination
  - Inseminate into uterine horn on the same side as the preovulatory follicle
  - Manipulation of pipette per rectum is necessary
Mares can be bred with very limited numbers of motile spermatozoa. Insemination performed near tip of uterine horn or directly onto the utero-tubular junction (UTJ) is used if sperm numbers are very limited. 

**Sperm Numbers:**
- Traditional Insemination – 500 million PMS
- Low Dose Insemination – 5 to 20 million PMS (1 - 5 % of the traditional dose)

**Techniques:**
- Transrectally guided pipette – sperm are deposited at tip of uterine horn near UTJ
PREGNANCY RATES

<table>
<thead>
<tr>
<th>Semen Type</th>
<th>Expected Pregnancy Rates (per cycle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Semen</td>
<td>50 – 60+ %</td>
</tr>
<tr>
<td>Cooled Semen</td>
<td>45 - 55 %</td>
</tr>
<tr>
<td>Frozen Semen</td>
<td>30 - 45 %</td>
</tr>
</tbody>
</table>

Pregnancy affected significantly by stallion, mare and reproductive management