ARTIFICIAL INSEMINATION IN HORSES

I haven't the heart to tell her he's only available for artificial insemination.
Advantages

- Able to breed more mares to a popular stallion
- Facilitates breeding at the optimal time
- Allows use of transported or frozen semen
- Reduces bacterial contamination of the uterus
- Increases safety
- Encourages frequent evaluation of the semen
Estrus Detection

Teasing daily or every other day
Records

Sometimes charts are used

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>JAZZ</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>MARY</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>H</td>
</tr>
<tr>
<td>ANA</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>CINDY</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>QUEEN B</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>NORMA</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>KWIKY</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>JENNY</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>SWEET KATE</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>CHILLY</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>HOLLY</td>
<td>H</td>
<td>R</td>
<td>R</td>
<td>O</td>
</tr>
</tbody>
</table>
Estrus Detection

Indifferent - No corpus luteum but not in heat
Estrus Detection

Not in heat - corpus luteum present
Estrus Detection

In heat
Estrus Detection

Ultrasonography

CL present - not in heat
Estrus Detection

Ultrasonography

Large follicle, no CL, endometrial edema - in heat
Control of the Estrous Cycle

Progestogens - Regumate® (altrenogest)

- Orally at 0.044 mg/kg/day for 15 days
- Prostaglandins at the end of treatment
- Estrus begins 3-5 days after end of treatment
- Does not control the time of ovulation well
Two doses of 5-10 mg Lutalyse or 100-250 µg Estrumate IM or SC, 15 days apart

Or one dose when a CL is detected

Results in luteolysis but does not control follicular growth or time of ovulation

Often causes transient sweating or even mild colic
Control of Ovulation During Estrus

Prolonged LH surge is required

- Human chorionic gonadotropin (hCG) - long-acting LH product
  - 2000-3300 IU, IM or IV when follicle is ≥3.5 cm in a cycling mare
  - Induces ovulation within 36-48 hrs
  - Results in antibody production and is therefore less effective if used multiple times
Control of Ovulation During Estrus

Long-acting GnRH products are required

- Ovuplant® (deslorelin) implant
  - Administer when follicle is $\geq 3.0$ cm in a cycling mare
  - Induces ovulation within 36-48 hrs
  - Suppresses FSH after ovulation
    - extends length of estrous cycle in mares that don’t conceive, unless removed
  - Expensive
Control of the Estrous Cycle and Ovulation

Progesterone and estradiol 17β (P&E)

- 150 mg progesterone and 10 mg estradiol 17β IM, daily for 10 days
  - Suppresses ovulation and follicular growth
  - At end of treatment, all follicles are small
- Prostaglandins on last day of treatment
- HCG 8 days later (day 8) if follicle is ~3.5 cm
- AI the afternoon of following day (day 9)
- ~80% ovulate in early morning of day 10
Timing of Insemination

Routinely:

- Breed every second day while in heat or
- Breed every second day during heat, after largest follicle becomes 3.5 cm in diameter
- In both cases, breeding often occurs Monday-Wednesday-Friday
Semen Collection

Artificial vaginas

Colorado model
Missouri model
Semen Collection

Use an estrous mount mare or phantom mare
Semen Handling

Filter or aspirate gel
Semen Evaluation

Volume, motility, concentration and morphology
Semen Extenders

- Most are based on the ‘Kenney formula’
  - Glucose + non-fat milk powder + water
- INRA 96 also available
Semen Extension

- Keep semen warm (~33-37°C)
- Add extender slowly, at same temperature as semen
Semen Extension and Cooling

- Optimal extended concentration is 25-50 sperm/ml extended semen
- Minimal extension rate should be 2 parts extender:1 part semen
- Cooling rate to ~20°C can vary
- Cooling rate from ~20°C to 5°C must be slow
Semen Cooling and Storage

Equitainer

- Cools semen at optimal rate
- Best for prolonged shipping or shipping in extreme temperatures
- Usually maintains semen quality for up to 48 hrs
- Expensive
Semen Cooling and Storage

Equitainer

Use water jacket at same temp as semen if volume <80 ml
Semen cooling and Storage

Less expensive systems

- Very practical
- Cools semen at a satisfactory rate
- Maintains temperature at least 24 hrs depending on conditions
Semen Cooling and Storage

Less expensive systems
Semen Shipping

Checking storage capability

- Extended semen should be stored in shipping containers and motility checked daily for up to 3 days
- This should be done at least once for every stud to make sure his semen can achieve satisfactory results after shipping
Insemination Dose

To optimize pregnancy rates

- Requires 200-500 million motile spermatozoa inseminated into a satisfactory uterine environment as close as possible to ovulation.
- Twice the above dose is usually shipped to account for loss of viability over time.
Insemination Techniques

Preparation
Insemination Techniques

Preparation
Insemination Techniques

Anatomy
Insemination Techniques
Timing of Insemination with Frozen-thawed Semen

Necessary to inseminate close to ovulation

- Inseminate <12 hrs before or <6 hrs after ovulation
- Inseminate 24 & 40 hrs after the largest follicle reaches 3.5 cm diameter and hCG treatment
- Inseminate every 24 hrs after the largest follicle reaches 3.5 cm diameter, until ovulation occurs
Frozen Semen

Thawing
Frozen Semen

Thawing

- Use processor’s instructions

- Default
  - 0.5 ml straws - at least 30 sec in a 37°C water bath
  - 2.5, 4 or 5 ml straws - 42-45 sec in a 50°C water bath
Frozen Semen

Preparation
Frozen Semen

Minitube System for Insemination Using 5 ml Straws
Frozen Semen

Minitube System for Insemination Using 0.5 ml straws
Frozen semen

Some important factors

- Fertility of frozen-thawed semen is highly variable among stallions
- Success also depends on
  - Fertility of the mare
  - Overall breeding management
- Endometritis is more common after breeding with frozen-thawed semen
  - Check mare ~24 hrs post-AI and treat if necessary
Questions?