Reproduction
AI Versus Natural Service

Artificial Insemination
- Advantages
  - sires of high genetic potential
  - elimination of reproductive diseases
- Disadvantage
  - heat detection

Why Natural Service?
- Heat detection
- Conception rate?
- Herd size

* If pregnancy rate is above 20%, an economic return from natural service may not be realized

Bull Selection
- Pass a breeding soundness test
- Use bulls good enough for AI sampling
- Genetic loss = 700 lbs/yr ($91/cow/yr)

Bull Management
- 14 to 30 months of age
- Control of VD is essential
  - trichomonosis
- 1:25 to 1:30 bull:cow
- Ration
  - high energy, high mineral diets
- Safety

Cow Management
- 60 d VWP
- Pregnancy check 40 to 60 d after exposed to bull
- Determination of days pregnant is essential and most accurate when determined <90 d
- Vaccinate for vibriosis
Level of Natural Service Use

- Varies from 0 to 100%
- A combination of AI and natural service is most common
- Clean-up bull (AI then natural service)
  - open cows placed with bull after predetermined days in milk

Estimated Relative Conception Rates (ERCR)

- Differences in fertility exists between bulls
- Collected on 1st services by DRMS
- Rankings –3, -2, -1, 0, 1, 2, 3 ($2/pt)

<table>
<thead>
<tr>
<th>Bull</th>
<th>ERCR</th>
<th>Price</th>
<th>Adj Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orion</td>
<td>5</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Elation</td>
<td>4</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>Decision</td>
<td>-3</td>
<td>25</td>
<td>19</td>
</tr>
<tr>
<td>Bellwood</td>
<td>-4</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

Reproduction

Synchronization Schemes

1. Take heat detection out of equation
   - PR = HDR X CR
   - PR = 1 X 40 = 40%
2. Confine heat detection to 2 – 3 days
   - PR = 80 X 40 = 32%

Synchronization Programs

- Prostaglandin (Lutalyse, Estrumate)
  - $2.50/shot
- GnRH (Cystroelin, Fertagyl, Factrel)
  - $5.00/shot (1/2 dose $2.50/shot)
- Targeted Breeding
- Modified Targeted Breeding
- Timed AI (TAI)
  - Ovsynch
  - Presynch

Follicular Wave
Targeted Breeding™

- **First AI**
  - CR (%) | HDR (%) | PR (%)
  - Jobst et al. (2000) | 43.7 | 76.0 | 33.2
  - Pursley et al. (1997) | 46.3 | 48.5 | 22.5

CR = Conception Rate
HDR = Heat Detection Rate
PR = Pregnancy Rate

Modified Targeted Breeding

- First Service and Timed Programs
  - PR = 26% for cows 60 – 75 DIM versus PR = 43% for cows > 75 DIM (Pursley et al., 1997), significant
  - PR = 36% for cows 60 – 75 DIM versus PR = 47% for cows > 75 DIM (Pursley et al., 1998), trend

Ovsynch

- **Ovsynch Pregnancy Rates**

<table>
<thead>
<tr>
<th>Cows (n)</th>
<th>PR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burk et al. (1996)</td>
<td>171</td>
</tr>
<tr>
<td>Jobst et al. (2000)</td>
<td>209</td>
</tr>
<tr>
<td>Moreira et al. (1999)</td>
<td>264</td>
</tr>
<tr>
<td>Nebel, (unpublished)</td>
<td>209</td>
</tr>
<tr>
<td>Pursley et al. (1997a)</td>
<td>156</td>
</tr>
<tr>
<td>Pursley et al. (1997b)</td>
<td>333</td>
</tr>
<tr>
<td>Stevenson et al. (1999)</td>
<td>115</td>
</tr>
<tr>
<td>Stevenson (unpublished)</td>
<td>272</td>
</tr>
<tr>
<td>Total/Average</td>
<td>1810</td>
</tr>
</tbody>
</table>
Ovsynch in a 100 Cow Cyclic Herd

<table>
<thead>
<tr>
<th>Day of Cycle</th>
<th>Herd Distribution</th>
<th>Expected PR</th>
<th>Cows Pregnant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 4</td>
<td>20%</td>
<td>20%</td>
<td>4</td>
</tr>
<tr>
<td>5 to 10</td>
<td>30%</td>
<td>50%</td>
<td>15</td>
</tr>
<tr>
<td>11 to 16</td>
<td>30%</td>
<td>20%</td>
<td>6</td>
</tr>
<tr>
<td>17 to 20</td>
<td>20%</td>
<td>50%</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>--</td>
<td><strong>35%</strong></td>
</tr>
</tbody>
</table>

(Thatcher et al., 2000)

Follicular Wave

Presynch

- 90% of cows between day 5 – 12 of estrous cycle, PR = 48%

Presynch Pregnancy Rates

<table>
<thead>
<tr>
<th>Florida</th>
<th>Kansas</th>
<th>Virginia</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovsynch</td>
<td>Presynch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Florida</th>
<th>Kansas</th>
<th>Virginia</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 362</td>
<td>n = 273</td>
<td>n = 209</td>
<td>n = 278</td>
</tr>
<tr>
<td>n = 322</td>
<td>n = 264</td>
<td>n = 212</td>
<td>n = 44</td>
</tr>
</tbody>
</table>

HeatWatch vs Presynch

OSU Study

Days to First Service

<table>
<thead>
<tr>
<th>Treatment x Breed</th>
<th>P &lt; 0.01</th>
<th>Holstein</th>
<th>Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td>HeatWatch</td>
<td>100</td>
<td>74</td>
<td>77</td>
</tr>
<tr>
<td>Presynch</td>
<td></td>
<td>75</td>
<td>76</td>
</tr>
</tbody>
</table>
Evaluate Performance in Four Areas

1. Management policy and philosophy
2. Heat detection
3. Conception rate
4. Herd health

To access why long calving intervals exist, one must evaluate the above four areas.
Management Policy and Philosophy

- Days to first breeding
  - **Level** | **Interpretation**
  - 60 to 75 | excellent
  - 76 to 82 | adequate
  - 83 to 90 | slight problem
  - 91 to 100 | moderate problem
  - >100 | severe problem
- Transition, nutrition, vaccinations, disease

Heat Detection Rate (HDR)

- # of heats observed/total # of heats
  - **Level** | **Interpretation**
  - >70 | excellent
  - 61 to 70 | adequate
  - 51 to 60 | slight problem
  - 41 to 50 | moderate problem
  - <40 | severe problem

- Heat Detection Rate (HDR)
  - # of breedable heats =
    - (avg days open - VWP + 11)/21
  - **HDR (%)** =
    - # heats detected / # breedable heats
    - breedings per conception / # breedable heats

Conception Rate (CR)

- Measurement of
  1. semen quality and handling
  2. fertility of cows
  3. timing of insemination
  4. heat detection (were cows actually in heat?)
  5. inseminator expertise (semen placement)

Conception Rate (CR)

- First service CR
  - **Goal** = 45% (Actual = 42%)
  - **Intervention** = 30%
- CR all services
  - **Goal** = 40% (Actual = 43%)
  - **Intervention** = 30%
  - **Average** = 40% cows and 65% heifers

Conception Rate (CR)

- **Breedings/conception** | **CR** | **Interpretation**
  - <1.8 | >56 | excellent
  - 1.8 to 2.0 | 50 to 56 | adequate
  - 2.0 to 2.3 | 43 to 50 | slight problem
  - 2.3 to 2.8 | 36 to 43 | moderate problem
  - >2.8 | <36 | severe problem
Reproductive Failure in Dairy Cattle

<table>
<thead>
<tr>
<th>Cause</th>
<th>% of 1st Service Failures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical abnormality</td>
<td>2</td>
</tr>
<tr>
<td>Ovulation failure</td>
<td>2</td>
</tr>
<tr>
<td>Lost or ruptured ova</td>
<td>5</td>
</tr>
<tr>
<td>Fertilization failure</td>
<td>13</td>
</tr>
<tr>
<td>Embryonic mortality</td>
<td>15</td>
</tr>
<tr>
<td>Fetal mortality</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
</tr>
</tbody>
</table>

Days Open

- Days between parturition and pregnancy
- Goal = 115 – Intervention = 160

<table>
<thead>
<tr>
<th>Level</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 to 100</td>
<td>excellent</td>
</tr>
<tr>
<td>101 to 117</td>
<td>adequate</td>
</tr>
<tr>
<td>118 to 130</td>
<td>slight problem</td>
</tr>
<tr>
<td>131 to 145</td>
<td>moderate problem</td>
</tr>
<tr>
<td>&gt;145</td>
<td>severe problem</td>
</tr>
</tbody>
</table>

Herd Health

- Sanitation and postpartum care
- Vaccination program
  - Bangs
  - Lepto
  - IBR
  - Vibrio

Heifers

- High conception rate (65%)
- Possible high heat detection rate
  - 12 h estrus, 24 mounts
- High pregnancy rate
- Bred by 15 mo (13 mo) to calve at 24 mo

Prebreeding Cows

- Insure a healthy, clean uterus
- Postpartum Vet check
- Balanced ration
- Record all heats
  - cow needs to be on 3rd or higher heat
- Cows need to cycling normally when they enter breeding group

Breeding Group

- Bred all cows on 1st service after VWP
  - 2 services/conception in good herds
  - 1.5 services/conception is achievable
- Palpation
  - How often?
- Heat detection
- Timing of insemination
- Preg check by 45 days
### Benchmarks

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Goal</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days Open</td>
<td>115</td>
<td>160</td>
</tr>
<tr>
<td>Calving Interval, mo</td>
<td>13</td>
<td>14.5</td>
</tr>
<tr>
<td>Days to 1st Service</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>CR 1st Service, %</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>CR all Services, %</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>HDR, %</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Repro Culls/lact, %</td>
<td>&lt;5</td>
<td>10</td>
</tr>
<tr>
<td>Abortions, %</td>
<td>&lt;15</td>
<td>20</td>
</tr>
</tbody>
</table>

### Reproductive Diseases

- Brucellosis (Bang's) - abortions
- Vibriosis (venereal disease) - early embryonic death
- Leptospirosis - abortions
- Bovine Viral Diarrhea (BVD) - abortions
- Infectious Bovine Rhinotrachetis (IBR) - abortions

### Reproductive Problems

- Retained Placenta - Se & Vit E, difficult calving, milk fever
- Dystocia - calving difficulty
- Anestrus - irregular heat cycle
- Silent estrus - lack of physical signs
- Metritis - inflammation of uterus
- Cystic ovaries - in sufficient LH
- All lead to extended calving interval