Heifer Reproduction
A Challenge with a Payback

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NWNY Team CCE/PRO-DAIRY
“Reproduction is a Luxury Function”

- Priority to become pregnant lies below maintenance & growth
- Heifers fortunately lack stress levels of lactating cattle
Heifer Repro Physiology

- Onset of puberty at 40% of mature BW 550-600# for Holsteins
- 5-12% anestrus at 12 months of age
- 16 hour/day lighting trial saw the onset of puberty one month earlier
- 2006 USDA study - no heat stress impacts
- No metabolic or calving insults
Cow Physiology

- Loss of progesterone into milk or from accelerated liver function after calving
- High BUN’s (>19) appear to be detrimental to fertility in some situations

For lactating cows the loss between conception and Day 28 ~ 25-30%

Figure 1. Pregnancy loss in lactating Holstein cows assessed using transrectal ultrasonography from Day 28 post breeding to calving. Total loss from Day 28 of gestation to calving was 24.7%. (Adapted from Vasconcelos et al., 1997)

Not apparent pattern in heifers
What's Normal Cow Fertility?

• **Fertilization** rates for normal heifers and lactating cows are between 90-92% when insemination timing is correct
• Lactating cows lose about 40% of fertilized “pregnancies” by **day 42**
• If HDR is 100%, both pregnancy and conception rate would average 52%
• Pregnancy loss for heifers is assumed to be better; data is not readily available
Conception Rates

- 2007 NYS all lactating average = 39%
- Range is from 45% for the best 1st lactation performance to 25% for the poorest old cows
- 2006 USDA study of 362,000 heifers averaged 57%; others note 65%
- Using a 65% CR and 92% fertilization rate suggests early pregnancy loss up to 42 DCC at least 27% for heifers!

Ron Butler, Cornell
What’s the important number?

- Pregnancy rate! - the speed at which they get bred
- 55%+ is a level to shoot for
- True PR will be 2-4% below the calculated

examples
80% HDR X 70% CR = 56% PR
or
90% HDR X 60% CR = 54% PR
Management Challenge

• Heifers often out of the visual “flight path” on the farm
• Facilities often not conducive for observing, handling, sorting, catching, marking, vaccinating, monitoring
• Overcrowding, footing and ventilation common
Management Challenge

- Heifers do not have routine disruptions like milking that cluster estrus behavior
- 2X daily heat detection is necessary for results
- Tank to heifer semen time may be an issue leading to fertility problems
Fine Tuning and Balancing

How do we hit management targets when we have such biological variation?

Frame size  BCS  Pen moves  weight  genetics  age  height  rations

Measure, Monitor and Analyze
Breeding Targets

<table>
<thead>
<tr>
<th>BREED</th>
<th>HIP HEIGHT (inches)</th>
<th>WEIGHT (pounds)</th>
<th>HEART GIRTH (inches)</th>
<th>BODY CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein &amp; Brown Swiss</td>
<td>49”-51”</td>
<td>750#-800#</td>
<td>64”-66”</td>
<td>3.0-3.25</td>
</tr>
<tr>
<td>Ayrshire &amp; Guersey</td>
<td>47”-49”</td>
<td>650#-700#</td>
<td>61”-63”</td>
<td>3.0-3.25</td>
</tr>
<tr>
<td>Jersey</td>
<td>43”-45”</td>
<td>550#-600#</td>
<td>58”-60”</td>
<td>3.0-3.25</td>
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</tbody>
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The above targets are more important than age. Insemination at less than 12 months of age is generally avoided. Individual growth patterns within breed will vary by genetics, nutrition and health experience.
“So what’s the matter with using a good bred bull?”

- No proof of genetic transmitting ability
- No rating of calving ease
- One-third have compromised fertility
- Few pre-breeding exams are ever done on dairy herd bulls
- Venereal diseases possible
- Can be dangerous
“So what’s the matter with using a good bred bull?”

- Inaccurate breeding dates
- Pre-calving vaccination program hard to maintain
- Difficult to evaluate breeding program
- Bull interactions in large groups lessens effectiveness (?)
Disease Issues

- **Leptospira** species - late abortions, stillborns, weak newborns
- **Lepto hardjo bovis** - implantation failure, EED (up to 45 DCC?)
- **Neospora caninum** - 5-6 mo abortions (early loss past 45 DCC?), newborn neurological issues
- **Salmonella dublin** - abortions
- **IBR** - abortion storms past 4 months
- **BVD** - infertility, EED, abortion, deformities, persistent infections in calves
Nutrition

• Balanced for growth targets including the micros!
• Fat heifers are prone to infertility and calving difficulty
• Say NO to lots of corn silage!
• Heifers should not be the dumping ground for foul feed
Exogenous Estrogens

- **Zearalenone**
  - A mycotoxin with estrogen like effect on cattle
  - The only one known to directly cause abortion
  - Causes follicular cysts, irregular cycles, mid-cycle heats, false heats in pregnant animals, premature udder development

- **Phytoestrogens**
  - Plant estrogens biologically active in cattle
  - Prime candidate is mature first cutting alfalfa hay or haylage growing in cool wet conditions down longer than usual
  - Same signs as zearalenone without abortions

*Removal of offending feed source results in a return to normal estrus behavior in one week or so.*
“Targeted Breeding”

- Solely designed to shorten and synchronize estrus, not a timed breeding program
- 66% respond 1st shot
- 85% on 2nd
- 90%+ on 3rd
- Originally designed for 11 day intervals

\[2\text{PGF}_2\alpha\]

- \(\text{PGF}_2\alpha\) – Day 0
- Heat Detect – Day 2
- \(\text{PGF}_2\alpha\) all non-inseminated cattle and Heat Detect – Day 14
Progesterone Programs

- EZ-Breed CIDR
- MGA - melengesterol acetate
- Suppress cycle, clear off CL's, begin follicular development “from scratch” at the same time
- CR dependent on heat detection and basic heifer fertility
MGA - Melengesterol Acetate

- Cheap! Pennies per day
- One study increased heifer PR 13% from high 40’s to low 60’s
- Must be able to ID and segregate heifers
- Must feed MGA at prescribed rate (0.5 mg/day/head) for right length of time
- Not many using it

Oral MGA
Heats are less fertile before PGF$_2$α.
Only AI after PGF$_2$α.
- Feed Oral MGA – Start Day 0 until Day 14
- GnRH – Day 25
  (Optional for tighter synchronized in cow group)
- PGF$_2$α – Day 32
- Heat Detect and AI – Day 33 and on

Some appointment breed 72 hours post PG
EZ-Breed CIDR’s  
(Controlled Internal Drug Releasing)

- ~$9.00 each
- Individual approach
- Less facility dependent
- Hormone delivery not dependent on DMI

<table>
<thead>
<tr>
<th>CIDR</th>
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<tbody>
<tr>
<td>Insert CIDR</td>
<td>T</td>
<td>W</td>
<td>Th</td>
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<tr>
<td>Remove CIDR</td>
<td>M</td>
<td>T</td>
<td>W</td>
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<tr>
<td>Heat Detect</td>
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<tr>
<td>Inject PGF₂α</td>
<td>Day 0</td>
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<tr>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>CIDR Removed</td>
<td>Day 6</td>
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<td></td>
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<td></td>
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<tr>
<td>Heat Detect</td>
<td>Days 8-11</td>
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</tbody>
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[Diagam showing the schedule for inserting, removing, and detecting heat with PGF₂α injections.]

What about Ovsynch?

- Extra follicular waves alter response in heifers
- Does not provide the appointment breeding opportunity as in adult cattle
- Relies on conventional heat detection effort
Management Tools

- Visible, documented ID
- Written protocols
- Flexible, accessible record keeping system
- Team approach - vet, herdsman, AI tech
Management Tools

- Convenient areas for restraint and procedures
- Provisions to measure growth
- Appropriate grouping to make rations, breeding, preg checks, vaccinations, etc. work efficiently
Evaluating your program

• When do you start breeding heifers?
• What is your heat detection rate?
• How many services result in pregnancies?
• How many confirmed pregnancies result in a term calf?
• How fast does this all happen?
Don’t forget.....

• Routine, timely preg checks are critical to heifer repro just like it is for cows
• Recheck pregnancies by mid term
• Vaccination programs for reproductive health start during calfhood
• No matter what your threshold for heifer breeding is, heat detection must be intensive and relentless in order to keep the age at first calving distribution in a reasonable range
### Heifer Management Evaluation Snapshot – Two Components

**Replacement Generation Capacity (RGC)**

**Koval Bros. Case Farm**

**Longer Term – Factors Affecting Asset Growth (IHG)**

<table>
<thead>
<tr>
<th>Herd Birth Rate</th>
<th>% Heifers Born</th>
<th>% Heifers DOA (≤ 24 hrs.)</th>
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<tbody>
<tr>
<td>(Freshening events as % avg. cow nos.) 108%*</td>
<td>(Female births divided by all births) 46 – 47% (55 – 60% sexed semen) 49% Koval</td>
<td>(Female births DOA divided by all births) ≤5% (2.2% Koval)</td>
</tr>
</tbody>
</table>

*distorted during Expansion (108% Koval)

<table>
<thead>
<tr>
<th>Annualized Heifer Cull Rate</th>
<th>Age at First Calving (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Heifers died/culled divided by avg. # heifers) ≤3%*</td>
<td>23 ± 2.5 mos. SD (&amp; 82 – 85% Mature Wt.) (23 ± 2.5 Koval)</td>
</tr>
</tbody>
</table>

*distorted during Expansion

24 hrs. → 3 mos. _____
4 mos. → fresh _____ (3% Koval)

*Adapted from Farm Credit’s Business Consultants’ *Heifer Management Index*
Questions