Using cow physiology for designing effective re-breeding programs

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Department of Animal Science
Vermont Veterinary Medical Association, Vermont
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Nuts and bolts of 2+ AI programs

Using ovarian physiology for targeted management

What do we do?

Value of AIE + TAI

Targeted management options

Picking the program that works best
AIE + TAI Programs most Effective for 2+ Al Services

1-anovulation
2-delayed CL reg - pregnancy loss

Giordano et al., (2015)
Stevenson et al., (2014)
AIE + Ovsynch is an effective strategy to manage 2+ AI

- AI
- GnRH
- PGF$_{2\alpha}$
- TAI

Duration: 25 - 32 - 39 d
- 7d
- 56h
- 16h
D32-Resynch + Rectal Palpation Example

ED AI
% cows = 62% - CR = 40% (n=1507)

Estrus detection + AI - 32 ± 3 d

Interbreeding interval 39-45 d

Resynch TAI
% of cows = 37% All CR = 30% (n = 906)
## D32-Resynch + Rectal Palpation Example

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</table>

**Wait Period**: 45
AIE + Ovsynch is an effective strategy to manage 2+ AI

Effective strategy but may not optimize reproductive performance and management!
Maximize Fertility

Minimize interbreeding interval

Treatments for 2+ AI Based on Ovarian Status
Treatments for 2+ AI Based on Ovarian Status

- Improve P/AI of cows with no CL at GnRH or PGF of Resynch
- Reduce interbreeding interval without interfering with AI at detected estrus (AIE) + increase fertility
- Maximize insemination of cows at detected estrus through induction of estrus after non pregnancy diagnosis (NPD)
Reassignment of Cows with NoCL at PGF of Resynch

- **ED+AI**: 32 ± 3 d
- **GnRH**: 7d
- **PGF**: 56h
- **GnRH**: 16h

**CL present**
- P/AI = 30-35%

**No CL**
- P/AI = 10-15%
<table>
<thead>
<tr>
<th>Study</th>
<th>Cows(%)</th>
<th>No CL (n)</th>
<th>CL (n)</th>
<th>P-value</th>
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Reassignment of Cows with NoCL at GnRH of Resynch

CL present
P/AI = 32-38%

No CL
P/AI = 20-25%
P4-Ovsynch with 2 PGF Improves P/Al for No CL* cows

*Includes Cystic cows

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<th>Item</th>
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<th>P4-Ovsynch w/ 2PGF</th>
<th>P-value</th>
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<td>Cows with NO CL at 32 ± 3 d after AI</td>
<td>24.5%</td>
<td>37.1%</td>
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Giordano et al., 2016 JDS 99:2967-2978
Wijma et al., 2017 JDS
Either exogenous or endogenous P4 for No CL cows works well

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<th>P4-Ovsynch</th>
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<td>16-18 h</td>
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**Expected**

P/Al = ~35-40%
Time to Pregnancy Was the same for P4-Ovsynch vs PreG-Ovsynch when used at time of PGF of Resynch
Treatments for 2+ AI Based on Ovarian Status

- Improve P/AI of cows with no CL at GnRH or PGF of Resynch
- Reduce interbreeding interval without interfering with AI at detected estrus (AIE) + increase fertility
- Maximize insemination of cows at detected estrus through induction of estrus after non pregnancy diagnosis (NPD)
AIE is fastest, cheapest, and easiest way to re-breed non-pregnant cows

Re-breedings <30 d after AI
% cows = +60% - reduces interbreeding interval
P/Al = +35-40% - reduces days to preg
NPD 32 ± 3 d

No ovulation before NPD and no CL present form previous AI (anovular o proestrus)

No ovulation after previous AI in spite of normal follicular waves. CL present from previous AI (ovu)

Previous AI
What do cows have on their ovaries 29 to 35 d after AI?

Cows with an active follicle

![Diagram showing follicle size distribution](image)

- Follicle ≥10mm Growing or static phase

Cows with P4 >1 ng/mL

![Graph showing P4 concentration](image)

Days after AI

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<th>32</th>
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Days after AI

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Short-Resynch

PGF PGF GnRH TAI
24 h 32 h 16-18 h

P4-Ovsynch

Progesterone device
GnRH PGF PGF GnRH TAI
7 days 24 h 32 h 16-18 h
Short Resynch + P4-Ovsynch is an Effective Program for 2+ AI Service

Second and greater service

- ~70-75% of cows
- Cows with CL
  - PGF
  - PGF
  - GnRH

- ~25-30% of cows
- Cows without CL

EDAIl 32 ± 3 d

Perez et al. (2020) JDS 103:10769-10783
Either exogenous or endogenous P4 for No CL cows works well

- **Progesterone device**:
  - GnRH
  - PGF PGF
  - GnRH
  - TAI
  - Expected P/AI = ~35-40%

- **P4-Ovsynch**
  - 7 days
  - 24 h
  - 32 h
  - 16-18 h

- **PreG-Ovsynch**
  - 7 days
  - 24 h
  - 32 h
  - 16-18 h
Short Resynch + P4-Ovsynch was Compared to D32-Resynch

(n = 462)

(n = 485)
Summary
- CL cows in Short-Resynch have similar fertility than CL cows in Ovsynch resynch
- NoCL cows treated with P4-Ovsynch have increased fertility
Short Resynch + P4-Ovsynch Reduced Time to Pregnancy

P = 0.04
HR Treat vs Resynch-D32 : 1.21 (1.01 – 1.44)

Median days to pregnancy
Resynch-D32 : 105 (89-120)
Treatment: 89 (74-105)

6.9 pp more pregnant cows for SR+CIDR-Synch than D32-Resynch

Short-Resynch reduced mean days to pregnancy by 11 d

Wijma et al., 2018
D25-Resynch + P4-Ovsynch is an Effective Program for 2+ AI Service

Second and greater service

- ~80-85% of cows (Cows with CL)
- NPD
- PGF
- GnRH
- 24 h
- 32 h
- 16 h
- TAI
- ~15-20% of cows (Cows without CL)

EDA 25 ± 3 d

GnRH 25 ± 3 d

CIDR-synch + 2XPGF

Perez et al. (2020) JDS 103:10769-10783
Lactating dairy cows managed for second and greater artificial insemination services with the Short-Resynch or Day 25 Resynch program had similar reproductive performance.

M. M. Pérez, R. Wijma, M. Scarbolo, E. Cabrera, F. Sosa, E. M. Stikto, and J. O. Giordano

Department of Animal Science, Cornell University, Ithaca, NY 14853

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**Treatment**

<table>
<thead>
<tr>
<th>Item</th>
<th>D25 Resynch + CIDR-Synch</th>
<th>ShortResynch + CIDR-Synch</th>
<th>P-value</th>
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<tbody>
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<td>Cows AI at detected estrus (%)</td>
<td>50 (1,191/2,390)</td>
<td>60 (1,489/2,467)</td>
<td>+10% more cows EDAI before NPD</td>
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</tbody>
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**Diagram**

- **Estrus suppression if uses GnRH?**
- **Cows with CL**
- **Cows without CL**
- **PGFPGF**
- **GnRH**
- **TAI**
- **CIDR-synch + 2XPGF**
- **NPD**
- **AI**

---

+10% more cows EDAI before NPD
# Short Resynch + P4-Ovsynch vs. D25-Resynch + P4-Ovsynch

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<th>Item</th>
<th>Treatment</th>
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<th>ShortResynch + P4-Ovsynch</th>
<th>P-value</th>
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<td>Cows with CL (%)</td>
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<td>76</td>
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<td>P/Al CL at NPD (%)</td>
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<td>33</td>
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<td>(D25-Resynch or Short Resynch)</td>
<td></td>
<td>(410/990)</td>
<td>(243/737)</td>
<td></td>
</tr>
<tr>
<td>P/Al NO CL at NPD (%)</td>
<td></td>
<td>39</td>
<td>44</td>
<td>0.36</td>
</tr>
<tr>
<td>(CIDR-Synch)</td>
<td></td>
<td>(73/188)</td>
<td>(102/232)</td>
<td></td>
</tr>
<tr>
<td>Overall cows pregnant through TAI</td>
<td></td>
<td>43</td>
<td>37</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(483/1,178)</td>
<td>(345/969)</td>
<td></td>
</tr>
</tbody>
</table>

Perez et al. (2020) JDS 103:10769-10783
Short Resynch + P4-Ovsynch vs. D25-Resynch + P4-Ovsynch Led to Similar Pregnancy Dynamics

No difference in time to pregnancy and proportion of cows pregnant at the end of lactation

P = 0.98
HR 0.98 (0.85 – 1.13)

Median days to pregnancy
Short Resynch + CIDR-Synch: 75
D25-Resynch + CIDR-Synch: 74

~1 pp diff. (P>0.05) in PG cows at 210 d after 1st AI

Perez et al. (2020) JDS 103:10769-10783
Preferred for farms that are successful with estrus breedings!!!

Second and greater service

Expected benefits:
- allows normal estrus expression and fewer GnRH treatments
- reduces interbreeding interval for TAI services in cows with CL at NPD
- increases TAI fertility for cows without a CL at NPD
D25 Resynch + P4-Ovsynch

Preferred for farms that are NOT successful with estrus breedings!!!

Expected benefits:
- reduces interbreeding interval for TAI services in cows with CL at NPD and maximizes P/AI
- increases TAI fertility for cows without a CL at NPD
Treatments for 2+ AI Based on Ovarian Status

- Improve P/AI of cows with no CL at GnRH or PGF of Resynch
- Reduce interbreeding interval without interfering with AI at detected estrus (AIE) + increase fertility
- Maximize insemination of cows at detected estrus through induction of estrus after non pregnancy diagnosis (NPD)
AIE is fastest, cheapest, and easiest way to re-breed non-pregnant cows

Re-breedings <30 d after AI
% cows = +60% - reduces interbreeding interval
P/AI = +35-40% - reduces days to preg
Increasing AIE for 2+ AI
Increasing AIE for 2+ AI
Increasing AIE for 2+ AI
Use of PGF at NPD Increases AIE For 2+ AI Services

Key facts:
- Increases cows EDAI after non-pregnancy diagnosis
- Treatment NOT adapted to cow physiological status
- Must use synch protocol after PGF treatment
Use of PGF at NPD Increases AIE For 2+ AI Services

Second and greater service

Key facts:
- increases cows EDAI after non-pregnancy diagnosis
- treatment adapted to cow physiological status
- must use synch protocol after PGF treatment
Use of PGF at NPD Increases AIE For 2+ AI Services

Key facts:
- Increases cows EDAI after non-pregnancy diagnosis
- Treatment adapted to cow physiological status
- Must use synch protocol after PGF treatment
Programs that Increase AIE for 2+ AI Resulted in Similar Performance than AIE + Ovsynch

**PGF + ALACT + TAI** based on Ovarian status versus a Day32 Resynch
- Same time to pregnancy during lactation (Giordano et al., 2015)

**PGF + EDAI + TAI** based on Ovarian status versus Day32 Resynch for CL cows + PreG-Ovsynch for NoCL cows
- Same time to pregnancy during lactation (Masello et al., unpublished)
2+ AI summary

- Basic programs work but may not be most effective

- Have several options to optimize programs based on ovarian physiological status

- Choice of program based on primary goal(s)
  - Maximize P/AI
  - Reduce interbreeding interval + optimize P/AI
  - Maximize proportion of cows AIE
Thank You! Questions?