Estrus Synchronization – Planning for Success

Dr. Daryl Strohbehn
Extension Beef Specialist

<table>
<thead>
<tr>
<th>Treatment</th>
<th>GnRH</th>
<th>PG</th>
<th>GnRH</th>
<th>AI</th>
<th>Days</th>
</tr>
</thead>
</table>
| Ovsynch           | ↑    | ↓    | ↑    |    | 1
| CO-Synch          | ↑    | ↑    | GnRH| ↓  | 7    |
|                   |      |      | PG   |    | 9    |
|                   |      |      | 16-24h|    |      |
| Select Synch      | ↑    |      | PG   |    | 7    |
|                   |      |      | 1    |    |      |

…Heat detection & AI…
There are no secrets to success. It is the result of preparation, hard work and learning from failure.

--General Colin Powell

The road to success is always under construction.

--Unknown
As soon as you think you have reached success… … …

Keep in mind that neither success nor failure is ever final.

--Roger W Babson statistician, columnist
Battlecry: “Fit the Grids”
Increased Spread in Cattle Value

**Feeder Cattle Value**

- 5 - 10 Years Ago: +/- $5 from Average
- Today: +/- $15 from Average

**Fed Cattle Value**

- 5 - 10 Years Ago: +/- $1 from Average
- Today: +/- $10 from Average
So, The Heat is On!

- Having the correct genetics is becoming highly important in meeting industry demands.
- And correct genetics is imperative to achieving premium dollars and enhancing returns on investment.
You Can Use Severe Multi-Trait Selection Criteria with AI

For instance, the bull’s got to be:

- In top 10% for YW EPD
- In top 10% for Marbling EPD
- In top 40% for Milk EPD
- In top 50% for Scrotal EPD
- In top 10% for Ribeye EPD
You Can Use Severe Multi-Trait Selection Criteria with AI

For instance, the bull's got to be:

- In top 10% for YW EPD
- In top 10% for Marbling EPD
- In top 40% for Milk EPD
- In top 50% for Scrotal EPD
- In top 10% for Ribeye EPD

Angus
8 out of 2749 Old proven sires and
13 out of 2522 Young less proven sires

Simmental
4 out of all Sires with progeny

www.iowabeefcenter.org
So what do you have to get your hands around in synchronizing AI?

- CAREFUL Planning & execution of the plan
- Is your herd suited to a synch system?
- Record system
- Labor needs and trade-offs
- Number of times through the chute
- Budgeting for the system costs
- Handling facility capabilities
- Impact on calving distribution?
- Expectations of the synch system
Synchronization Expectations

- Quick Web Search of Recent Results Using Today’s Mainstay Synch Programs
  - 10 Trials with 2,970 females in 34 different experimental groups
  - Average Synch Preg. Rate = 50.5% (8 to 66%)
    » 26% of groups >60% preg. rate
    » 50% of groups 40-60% preg. Rate
    » 24% of groups < 40% preg. Rate
Synchronization Expectations

- Quick Web Search of Recent Results Using Today’s Mainstay Synch Programs
  - 10 Trials with 2,970 females in 34 different experimental groups
    - Average Synch Preg. Rate = 50.5%
    - 26% of groups > 60% preg. rate
    - 50% of groups 40-60% preg. rate
    - 24% of groups < 40% preg. rate

Moral of Story

Don’t expect miracles; do expect variation

» 24% of groups < 40% preg. rate
Conception Rate Formula

(Cow Fertility) x (Heat Detection) x (Semen Fertility) x (AI Technique)

Mess up one of these and kiss successful AI goodbye!
Estrus Synch is an Investment

- Labor
- Facilities
- Management Skill
- Dollars

In round numbers:
- Synch programs can range in budgeted costs from $20 - $40 per female synchronized
Criteria for Evaluating Candidates for Synchronization

- Fertility rate
- Calving distribution
- Cow age
- Body condition score
- Calving success
Calving Distribution
Impact of Days After Calving on % Cycling

Days after calving

% Cycling

www.iowabeefcenter.org
Impact of Cow Age on % Cycling Before Synchronization

Johnson and Stevenson, KSU

Heifers take 20 days longer to cycle....

% Cycling

55% 64%

1st Calvers 2nd Calvers & Older

www.iowabeefcenter.org
Body Condition Score

CS = 4

CS = 6
Body Condition Score

Barometer of your nutrition program.

Major influence on start of cyclicity.

CS = 4

CS = 6
Effect of BCS at breeding on % Cycling

- CS <3.5: 25%
- CS 4-4.5: 40-48%
- CS 5-5.5: 58-72%
- CS 6: 80% or more
Effect of BCS at breeding on % Cycling

Moral to the story. Have them in BCS of 5 to 7.

- CS <3.5
- 25%
- CS 4-4.5
- 40-48%
- CS 5-5.5
- 58-72%
- CS 6
- 80% or more

www.iowabeefcenter.org
Can We Jump Start Non-Cycling Females?

Yes.....

But don’t think you can be the miracle worker!
### Impact of a Progestin on Estrous Response and Synch Preg. Rates

Patterson, et.al.: 2004 NE Applied Repro Conference

<table>
<thead>
<tr>
<th>Heat detect system</th>
<th>Estrous response</th>
<th>Synch preg. rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 shot PG</td>
<td>241/422 = 57%</td>
<td>147/422 = 35%</td>
</tr>
<tr>
<td>MGA-PG 17d.</td>
<td>305/408 = 75%</td>
<td>220/408 = 54%</td>
</tr>
<tr>
<td>MGA-2 shot PG</td>
<td>327/348 = 93%</td>
<td>243/348 = 70%</td>
</tr>
<tr>
<td>MGA-PG 19d.</td>
<td>161/188 = 85%</td>
<td>130/188 = 62%</td>
</tr>
<tr>
<td>MGA Select</td>
<td>275/313 = 88%</td>
<td>195/313 = 62%</td>
</tr>
<tr>
<td>7-11 Synch</td>
<td>142/155 = 93%</td>
<td>101/155 = 65%</td>
</tr>
</tbody>
</table>
Fig. 4: Proportion of Non-cycling First-Calf Heifers Induced to Ovulate by GnRH

Body Condition Score

% Cycling

<4 4.5 5 5.5
Fig. 4: Proportion of Non-cycling First-Calf Heifers Induced to Ovulate by GnRH

Best Case Situation: 50% jump start and that is with **Excellent** Body Condition Score.
Fig. 5: Proportion of Non-cycling Older Cows Induced to Ovulate by GnRH

- <4: 30%
- 4.5: 40%
- 5: 50%
- 5.5: 60%
Impact of a GnRH on Jump Starting
Johnson and Stevenson, 2004

Fig. 5: Proportion of Non-cycling Older Cows Induced to Ovulate by GnRH

Best Case Situation: 55% jump start and that is with Good to Excellent Body Condition Score.
Summary:

- For maximum success rates:
  - Current herd fertility >90% 60-90 days breeding season
  - Best female candidates calve in 1st 42 days of calving season, thus at least 40 days before start of breeding season.
Summary continued

- For maximum success rates:
  - 1st calf heifers need additional recovery time following calving and strong body condition is imperative.
  - On the cow side, minimum Body Condition Score of 4.5
Remember: This is an investment for added genetic improvement; manage it wisely for maximum returns.
Labor Needs & Trade Offs

- Labor centers around feeding routines, cattle roundup, handling through chute, vet type practices, heat detection and AI routines.
- More than one producers have indicated they experienced a shortage of labor at key times in estrus synchronization.
Labor Needs & Trade Offs

- Labor centers around feeding routines.

**Take home message**

Many AI programs compete with other farming routines......think through where is labor supply coming from and will it be available at peak work times.

they experienced a shortage of labor at key times in estrus synchronization.
## Number of chute trips vary with Synch Programs

From IBC Estrus Synch Planner 2004

<table>
<thead>
<tr>
<th>Synchronization System</th>
<th>Number of Chute Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = 1 Injection Prostaglandin (prior estrus detection)</td>
<td>2</td>
</tr>
<tr>
<td>2 = 1 Injection Prostaglandin (no prior estrus detection)</td>
<td>2</td>
</tr>
<tr>
<td>3 = 2 Injection Prostaglandin (no prior estrus detection)</td>
<td>3</td>
</tr>
<tr>
<td>6 = MGA + Prostaglandin System (19 day between)</td>
<td>2</td>
</tr>
<tr>
<td>7 = Select Synch</td>
<td>3</td>
</tr>
<tr>
<td>8 = MGA Select</td>
<td>3</td>
</tr>
<tr>
<td>9 = MGA Select with E-AI and Cleanup AI</td>
<td>3</td>
</tr>
<tr>
<td>10 = CO-Synch System with Fixed-Time AI</td>
<td>3</td>
</tr>
<tr>
<td>12 = 7-11 Synch</td>
<td>4</td>
</tr>
<tr>
<td>13 = OvSynch</td>
<td>4</td>
</tr>
<tr>
<td>14 = Select Synch + CIDR</td>
<td>3</td>
</tr>
<tr>
<td>15 = CIDR - 7th Day Prostaglandin</td>
<td>3</td>
</tr>
<tr>
<td>16 = Select Synch + CIDR with E-AI and Cleanup AI</td>
<td>3</td>
</tr>
<tr>
<td>17 = MGA Select with Fixed-Time AI</td>
<td>3</td>
</tr>
<tr>
<td>18 = 7-11 Synch with Fixed-Time AI</td>
<td>4</td>
</tr>
<tr>
<td>19 = Select Synch with E-AI and Cleanup AI</td>
<td>3</td>
</tr>
<tr>
<td>20 = 7-11 Synch with E-AI and Cleanup AI</td>
<td>4</td>
</tr>
<tr>
<td>22 = CO-Synch + CIDR with Fixed-Time AI - 66</td>
<td>3</td>
</tr>
<tr>
<td>23 = CO-Synch + CIDR with Fixed-Time AI - 54</td>
<td>3</td>
</tr>
<tr>
<td>25 = CIDR - 7th Day Prostaglandin E-AI and Cleanup AI</td>
<td>3</td>
</tr>
<tr>
<td>26 = MGA + PG System (19 day) - E-AI and Cleanup AI</td>
<td>2.3</td>
</tr>
<tr>
<td>27 = MGA + PG System (19 day) - Fixed-Time AI</td>
<td>2</td>
</tr>
</tbody>
</table>
Cattle Handling Facility

- Very good to excellent handling facility is a necessity for a synchronized AI program.
- Think safety! Human and cattle.
- Think cattle flow and efficiency.
- Think location.
Cattle Handling Facility

● Complications
  – Location of facility
    » Many times it is near wintering/calving facilities and nowhere near breeding pastures.
    » Think through cattle management flow prior to synch program.
    » May mean short drylot periods or changing pasture rotations.
Question.

“If I breed them all on the same day won’t I compound my calving season problems next year?”
Question.
The data does not support that. They don’t all calve on the same day.
Calving Distribution of Cows Conceiving to Fixed-Time AI Program, Bader at U. Missouri, JAS, 2005

Location 1

Sire A: 21 day gestation length range

Sire B: 21 day gestation length range
Calving Distribution of Cows Conceiving to Fixed-Time AI Program, Bader at U. Missouri, JAS, 2005

Location 2

Sire C: 16 day gestation length range

Sire D: 20 day gestation length range
Sire E: 18 day gestation length range
Synchronized AI

• Large number of systems
• All with different time sequences

PGF
CIDR
MGA
GnRH
Estrous Synchronization Systems Abound
Each has its own unique timing

MGA/PGF
7-11 Synch
Two shot PGF

CO-synch+CIDR
Hybrid Synch
Select Synch

MGA Select
Hybrid Synch+CIDR
Ov-synch

Presynch
Heat Synch
CIDR/PGF

One shot PGF
Resynch

CO-synch
A huge number exist today.
Each has a unique twist.
Not all systems fit all operations.
Scheduling errors are committed in timing of feed supplements and/or injections.
Comparison of cost/benefit ratio.
Common causes of failure or poor results with synchronization

- Wrong system for the situation
  - More anestrous females than expected
  - Cow system applied to heifers
- Treatment protocol not followed
  - Wrong hormone or wrong intervals
- Unrealistic expectations
A cooperative programming effort between the Iowa Beef Center and the North Central Region Bovine Reproductive Task Force
A Microsoft Excel spreadsheet application

Authors and Programmers:
Dr. Daryl Strohbehn, Iowa State University
Dr. Garland Dahlke, Iowa State University
Mark Dikeman, Formerly with Iowa Beef Center

Co-Authors:
Dr. Rick Funston, University of Nebraska
Dr. Sandy Johnson, Kansas State University
Dr. Darrel Kesler, University of Illinois
Dr. Cliff Lamb, University of Minnesota
Dr. David Patterson, University of Missouri
Dr. George Perry, South Dakota State University
Goal of Synch04
To promote the correct application of research validated synchronization systems.
Features

• 22 Synch Systems
  – Heat detect & AI systems
  – Heat detect & cleanup AI systems
  – Fixed-Timed AI Systems
Features

- Recommendation of various synch systems for cows & heifers
- List of daily activities
- Barn Calendar of Synch System
Features

- Budgeted cost analysis of Synch Systems
- Support materials
What does it do?

- Assists with the challenge of planning and implementing some of the complicated synch systems.
- Eliminates timing errors
  - Injections
  - Start and end dates of MGA feeding
  - CIDR insertions, etc.
What does it do?

• Helps to optimize labor use.
• Allows one to analyze and compare input costs of several synchronization systems.
Inputs

<table>
<thead>
<tr>
<th>Date to start breeding:</th>
<th>8/24/2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of day you want to breed:</td>
<td>10:30 AM</td>
</tr>
<tr>
<td>Detection-Insemination type:</td>
<td>1</td>
</tr>
<tr>
<td>Estrus synchronization system:</td>
<td>6</td>
</tr>
</tbody>
</table>

Select number from list of recommended systems below.

Estimated number of times through the working facility, including AI.

Estrus synchronization system:

- **1** = Estrus Al
- **2** = Estrus Al & Clean-up Al
- **3** = Fixed-Time Al

**Cow Systems**

- **7** = Select Synch
- **8** = MGA Select
- **14** = Select Synch + CIDR

**Less Preferred Systems**

- **1** = 1 Injection Prostaglandin (prior estrus detection)
- **2** = 1 Injection Prostaglandin (no prior estrus detection)
- **3** = 2 Injection Prostaglandin (no prior estrus detection)
- **6** = MGA + Prostaglandin System (19 day between)
- **12** = 7-11 Synch
- **15** = CIDR - 7th Day Prostaglandin

**Heifer Systems**

- **1** = 1 Injection Prostaglandin (prior estrus detection)
- **6** = MGA + Prostaglandin System (19 day between)
- **15** = CIDR - 7th Day Prostaglandin

**Less Preferred Systems**

- **3** = 2 Injection Prostaglandin (no prior estrus detection)

Notice there are recommended and less preferred Synch systems for Cows and Heifers.

Only 4 inputs are needed for the program to do the Synch Calendar.
### Estrus Synchronization Planner

**Producer Name:** Best Cowman  
**Address:** 123 Farm Lane  
**Town:** Anywhere, USA  
**Phone Number:** 999/123-4567

**Date to start breeding:** 6/1/2005  
**Prepared by:** Iowa Beef Center  
**Start of Calving Season:** 3/3/2006  
**Phone Number:** 515/294-BEEF

Those 4 INPUTS result in the development of this Barn Calendar.

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
</tr>
</tbody>
</table>

5/1/2005  
5/2/2005  
5/3/2005  
5/4/2005  
5/5/2005  
5/6/2005  
5/7/2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* MGA @ 0.5 mg/hd/day</td>
<td>* Many females in heat next 4 days. DO NOT BREED!</td>
</tr>
</tbody>
</table>

5/15/2005  
5/16/2005  
5/17/2005  
5/18/2005  
5/19/2005  
5/20/2005  
5/21/2005

5/22/2005  
5/23/2005  
5/24/2005  
5/25/2005  
5/26/2005  
5/27/2005  
5/28/2005

5/29/2005  
5/30/2005  
5/31/2005  
6/1/2005  
6/2/2005  
6/3/2005  
6/4/2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* Detect Estrus &amp; Breed</td>
<td>* Detect Estrus &amp; Breed</td>
<td>* Detect Estrus &amp; Breed</td>
<td>* Detect Estrus &amp; Breed</td>
<td>* Detect Estrus &amp; Breed</td>
<td>* Detect Estrus &amp; Breed</td>
<td>* Detect Estrus &amp; Breed</td>
</tr>
</tbody>
</table>

[www.iowabeefcenter.org](http://www.iowabeefcenter.org)
Inputs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (example)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head in group:</td>
<td>100</td>
</tr>
<tr>
<td>PG ($/dose):</td>
<td>$2.50</td>
</tr>
<tr>
<td>GnRH ($/dose):</td>
<td>$3.00</td>
</tr>
<tr>
<td>CIDR ($/insert):</td>
<td>$9.00</td>
</tr>
<tr>
<td>Semen ($/unit):</td>
<td>$14.00</td>
</tr>
<tr>
<td>Lbs Fed/Day</td>
<td></td>
</tr>
<tr>
<td>Roughage:</td>
<td>20 $0.025</td>
</tr>
<tr>
<td>Grain:</td>
<td>4 $0.040</td>
</tr>
<tr>
<td>MGA supplement:</td>
<td>1 $0.200</td>
</tr>
<tr>
<td>Other supplement:</td>
<td>0.25 $0.150</td>
</tr>
<tr>
<td>Heat detection cost ($/hr):</td>
<td>$10.00</td>
</tr>
<tr>
<td>Man-hours per day:</td>
<td>2</td>
</tr>
<tr>
<td>Yardage $/hd/day:</td>
<td>$0.20</td>
</tr>
<tr>
<td>Al technician ($/hd):</td>
<td>$9.00</td>
</tr>
<tr>
<td>Trip charge ($/trip):</td>
<td>$15.00</td>
</tr>
</tbody>
</table>

Program Inputs for Cost Comparisons of Synchronization Systems. Either use the defaults or supply your own costs.
16 = Select Synch + CIDR with E-AI and Cleanup AI

CIDR Days 1 - 8

1

8

11

GnRH

PG

GnRH

Cleanup AI 72-84 hrs after PG

Detect Heat & AI Days 8 to 11

Treatment day
Synch04 Availability

From the Iowa Beef Center and participating states.

Cost: $25 per CD, plus $10 shipping and handling

Order Address:

Iowa Beef Center
337 Kildee Hall, ISU
Ames, IA  50011
Summary

- The percentage of beef cattle AI’d is predicted to substantially increase with the advent of sexed semen.
- Current surveys indicate that fewer than 5% of the beef cows in the United States are AI bred and only half of the cattlemen that practice AI use any form of estrus synchronization.
- Historically the inability to predict estrus time for individual females in a group often made it impractical to use AI because of labor required for heat detection.
- The development of Fixed-Time synchronization methods of AIing beef cows and heifers will increase the adoption of AI.
Summary

- This presentation is not intended to be either positive or negative on synchronized AI.
- But rather its purpose is to assist producers in thinking through the options associated with estrus synchronization and what it takes to be successful.
- Least cost genetic improvement is what we all want.
- Whether synchronization fits a herd is dependent on many factors:
  - Labor
  - Herd as a candidate for synchronized AI
  - Chute time & facilities adequacy
  - Cost of bulls vs AI