

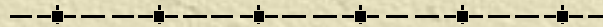


Estrous Synchronization: A New Era

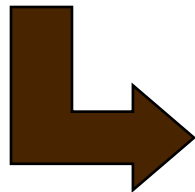
Ryon S. Walker

University of Minnesota Extension Service

Grand Rapids, MN



Cow's Reproductive Cycle



**Reproductive
Tract**



**Follicles and
New Corpus
Luteum**



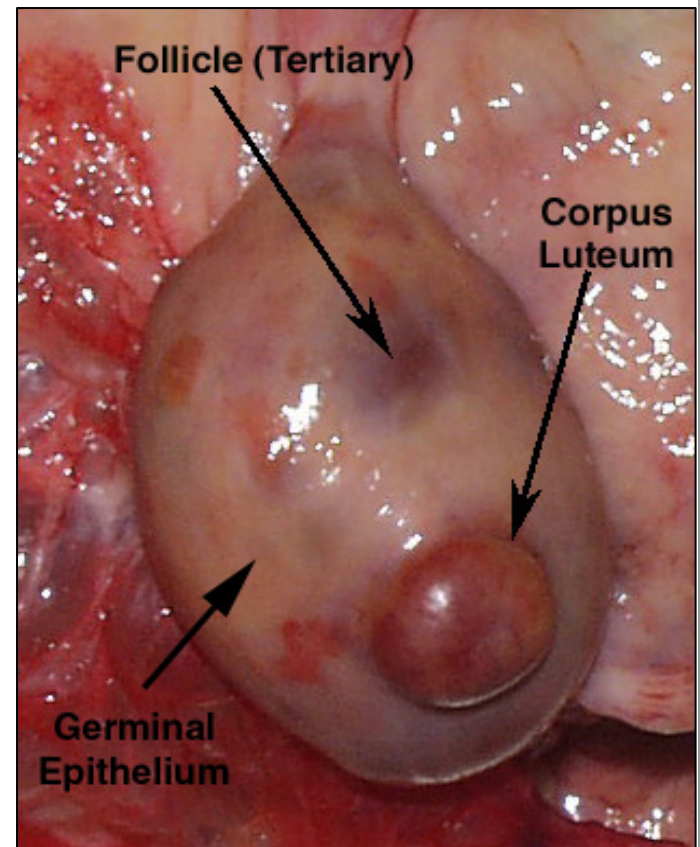
**Mature Corpus
Luteum**



PHYSIOLOGY 101

Hormones

- ✧ Gonadotropin Releasing Hormone (GnRH)
 - Produced by hypothalamus
 - Stimulates release of LH and FSH
- ✧ Luteinizing Hormone (LH)
 - Produced by posterior pituitary
 - Acts on follicles - LH surge causes ovulation
- ✧ Follicle Stimulating Hormone (FSH)
 - Produced by posterior pituitary
 - Acts on follicles - stimulates follicle growth
- ✧ Estrogen
 - Secreted by follicles
 - Responsible for estrous behavior
- ✧ Progesterone
 - Secreted by corpus luteum (CL)
 - CL develops at site of ovulation
 - Suppresses estrous activity
- ✧ Prostaglandin $F_{2\alpha}$ (PG)
 - Secreted by uterus
 - Causes regression of CL



✦ Less than 12% of beef producers in the U.S. use estrous synchronization.

✦ Less than 14% of beef producers in the US use artificial insemination.

(NAHMS, 1998)

✦ Why?

- Doesn't work
- Cost
- Lack facilities
- Complicated
- *#1 Reason - "Time and Labor."*

Benefits of Synchronization

- ✦ Tighter breeding and calving season
- ✦ Decreased time needed for estrous detection
- ✦ Allows more time for postpartum recovery
- ✦ Induces estrous cycles in anestrous cows/prepubertal heifers
- ✦ Introduce new genetics
- ✦ Improved calf uniformity and calf performance



Classes of Synchronization Drugs

✦ 1) Progestins

✦ 2) Prostaglandins

✦ 3) GnRH

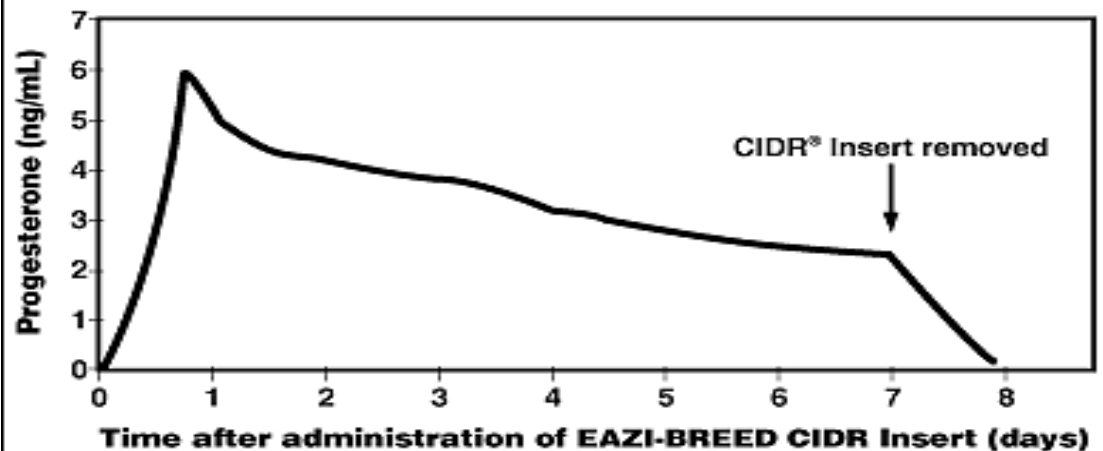


Progestins

- ✦ Prevents estrus from occurring
- ✦ Exhibit estrus 2-5 days after progestin removal
- ✦ Administration:
 - Oral administration (MGA)
 - Controlled Internal Drug Release (CIDR)



Figure 1.
**Progesterone levels as the result
of administering EAZI-BREED™ CIDR® Insert**



Prostaglandins – PGF_{2α}

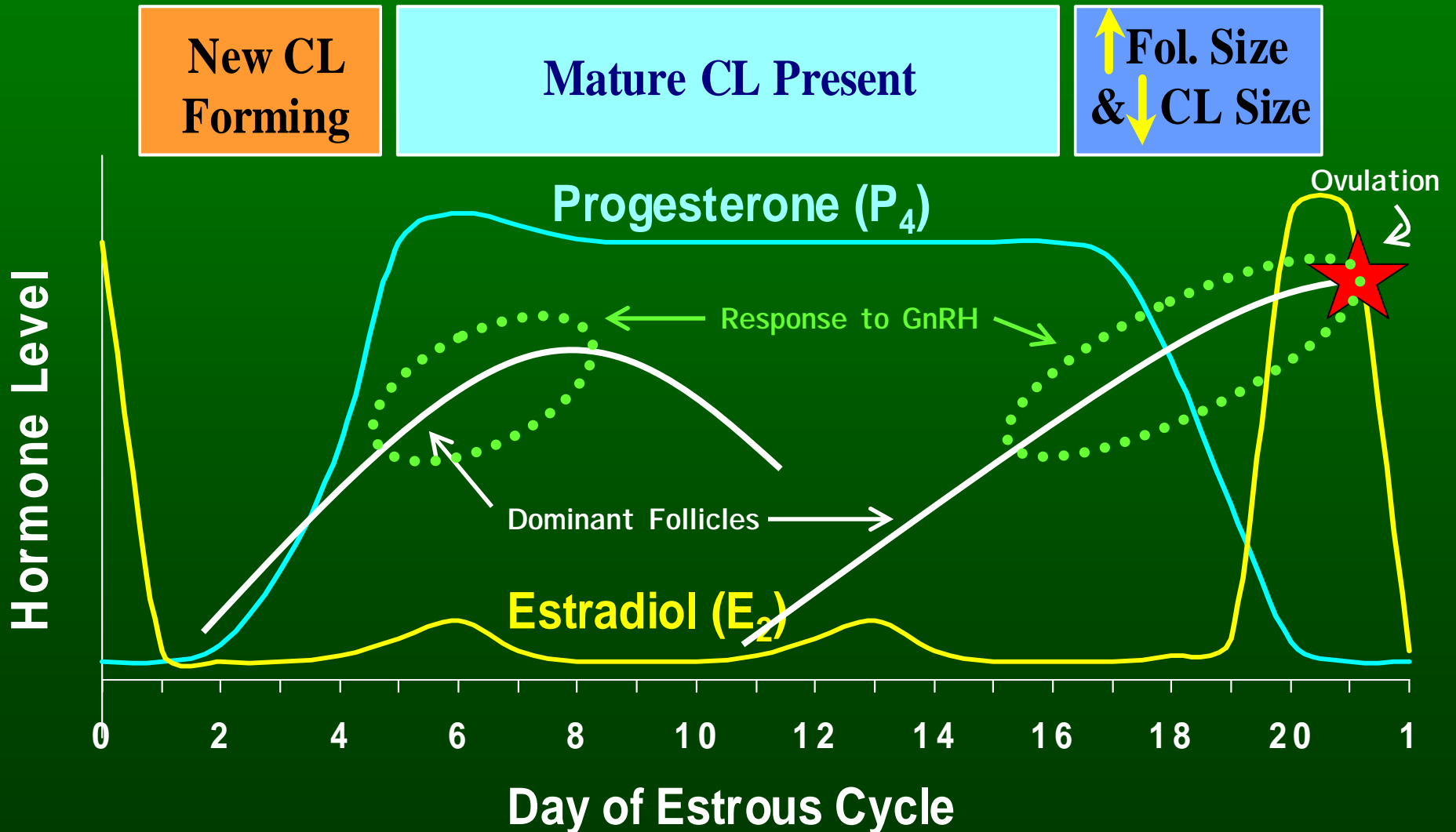
- ✦ Regresses CL – only during luteal phase
- ✦ Stops progesterone block on estrogen and LH release so follicle can mature and ovulate.
- ✦ Cattle with a functional CL at time of PG injection will exhibit estrus 2 to 7 days later.

GnRH

- ✦ Ovulation or regression of dominant follicle
- ✦ Causes release of LH and FSH
- ✦ Ovulates follicles ≥ 10 mm in diameter

Alternating domination of either:

- Luteal Phase (d 1-18) - Progesterone from CL
- Follicular Phase (d 18-21) - Estrogen from Follicle



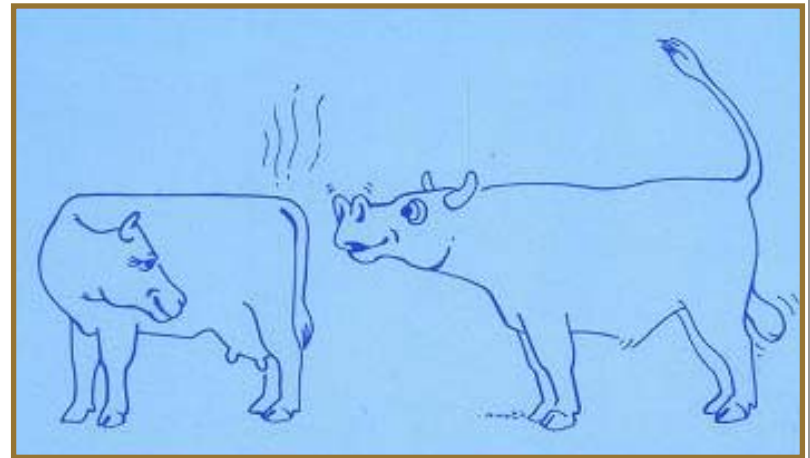
Synchronization Methods

using Artificial Insemination

✦ Heat Detection

✦ Fixed-time AI (TAI)

✦ Heat Detect & Timed AI (TAI)



Estrous Synchronization Protocols

- ✦ 1 inj. PG (prior estrus detection)
- ✦ 1 inj. PG (no prior estrus detection)
- ✦ 2 inj. PG (no prior estrus detection)
- ✦ MGA + PG System (19 d)
- ✦ Select Synch
- ✦ MGA Select
- ✦ MGA Select w/ E-AI
- ✦ CO-Synch System w/ TAI
- ✦ 7-11 Synch
- ✦ OvSynch
- ✦ Select Synch + CIDR
- ✦ CIDR + PG (day 7)
- ✦ Select Synch + CIDR w/ E-AI
- ✦ MGA Select w/ TAI
- ✦ 7-11 Synch w/ TAI
- ✦ Select Synch w/ E-AI
- ✦ 7-11 Synch w/ E-AI
- ✦ CO-Synch + CIDR w/ TAI-66 h
- ✦ CO-Synch + CIDR w/ TAI-54 h
- ✦ CIDR + PG (day 7) w/ E-AI
- ✦ MGA + PG (19 d) w/ E-AI
- ✦ MGA + PG (19 d) w/ TAI

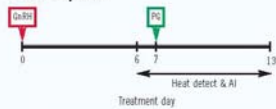
Standard Estrous Synchronization Protocols for Beef Cows and Heifers

BEEF COW SYNCHRONIZATION PROTOCOLS

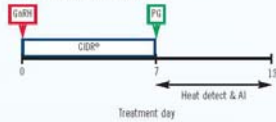
BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Heat Detection

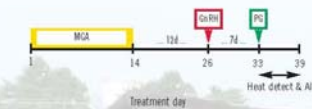
Select Synch



Select Synch + CIDR®

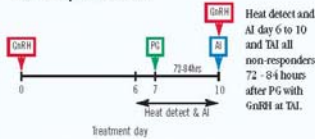


MGA® Select

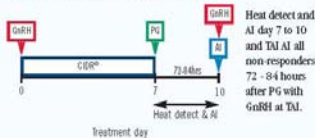


Heat Detect & Timed AI (TAI)

Select Synch & TAI



Select Synch + CIDR® & TAI

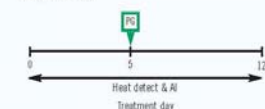


MGA® Select & TAI

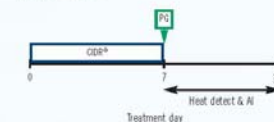


Heat Detection

1 Shot PG



CIDR® - PG

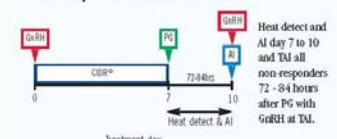


MGA® - PG

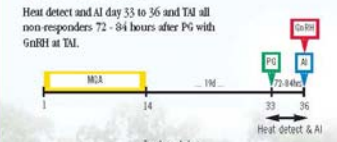


Heat Detect & Timed AI (TAI)

Select Synch + CIDR® & TAI



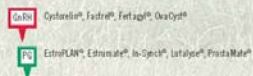
MGA® - PG & TAI



Comparison of Protocols for Beef Cows

Protocol	East	Labret
Heat Detection		
Select Synch	Low	Medium/High
Select Synch + CIDR®	High	Medium
MGA® Select	Medium	Medium/High
Heat Detection & TAI		
Select Synch	Low	Medium/High
(TAI non-responders 72-84 hours after PG)		
Select Synch + CIDR®	High	Medium
(TAI non-responders 72-84 hours after PG)		
MGA® Select	Medium	Medium/High
(TAI non-responders 72-84 hours after PG)		
Fixed-time AI (TAI)		
CO-Synch + CIDR®	High	Medium
(TAI 60 ± 6 hours after PG with GnRH at TAI)		
MGA® Select	Medium	High
(TAI 72 ± 2 hours after PG with GnRH at TAI)		

* The times listed for "Fixed-time AI" should be considered as the approximate average time at insemination. This should be based on the number of cows to inseminate, labor, and facilities.



North Central Region Bovine Reproduction Task Force

Fixed-time AI (TAI)

CO-Synch + CIDR®

Perform TAI at 60 ± 6 hours after PG with GnRH at TAI.



MGA® Select

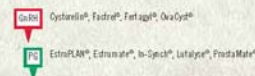
Perform TAI at 72 ± 2 hours after PG with GnRH at TAI.



Comparison of Protocols for Beef Heifers

Protocol	East	Labret
Heat Detection		
1 Shot PG	Low	High
CIDR® - PG	Medium	Medium
MGA® - PG	Low	Low/Medium
Heat Detection & TAI		
Select Synch + CIDR®	High	Medium
(TAI non-responders 72-84 hours after PG)		
MGA® - PG	Medium	Medium
(TAI non-responders 72-84 hours after PG)		
Fixed-time AI (TAI)		
CO-Synch + CIDR®	High	Medium
(TAI 54 ± 2 hours after PG with GnRH at TAI)		
MGA® - PG	Medium	Medium
(TAI 72 ± 2 hours after PG with GnRH at TAI)		

* The times listed for "Fixed-time AI" should be considered as the approximate average time at insemination. This should be based on the number of cows to inseminate, labor, and facilities.

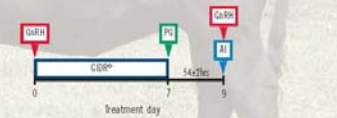


North Central Region Bovine Reproduction Task Force

Fixed-time AI (TAI)*

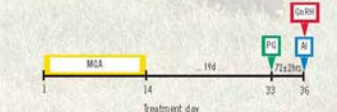
Co-Synch + CIDR®

Perform TAI at 54 ± 2 hours after PG with GnRH at TAI.



MGA® - PG

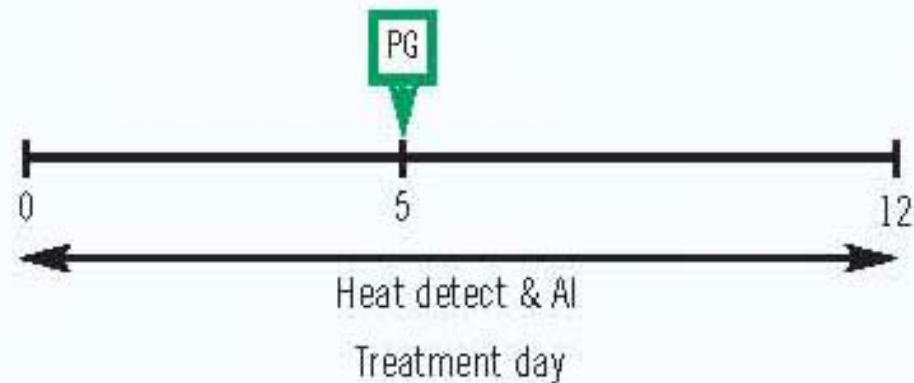
Perform TAI at 72 ± 2 hours after PG with GnRH at TAI.



BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Heat Detection

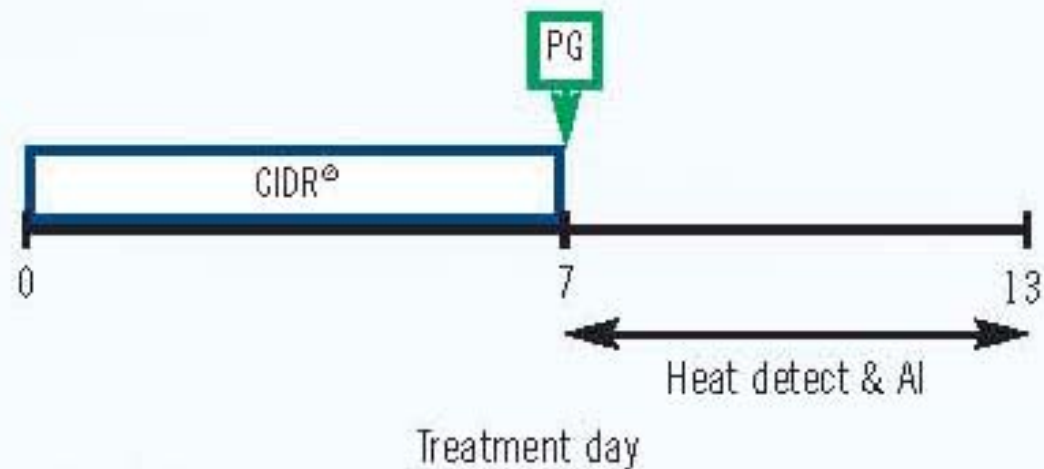
1 Shot PG



BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Heat Detection

CIDR[®] - PG

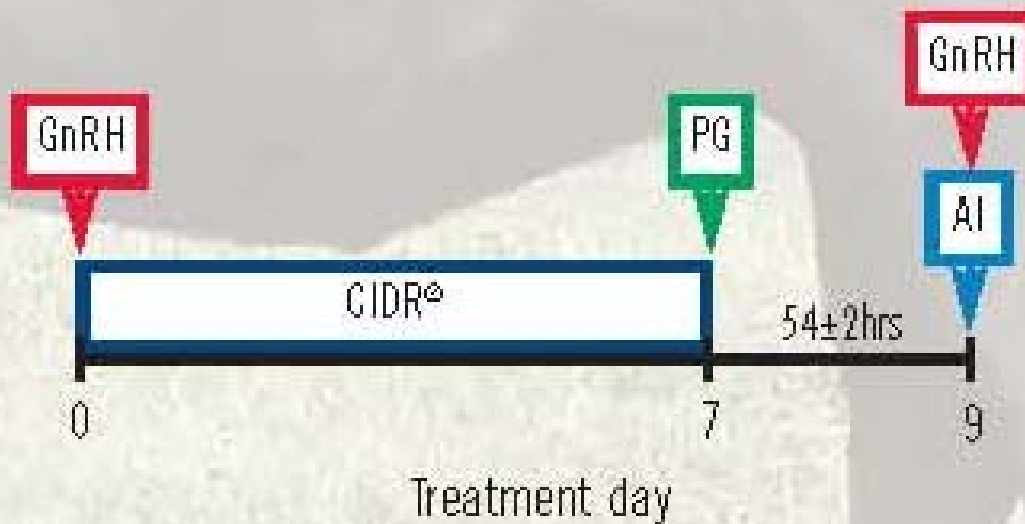


BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Fixed-time AI (TAI)*

Co-Synch + CIDR®

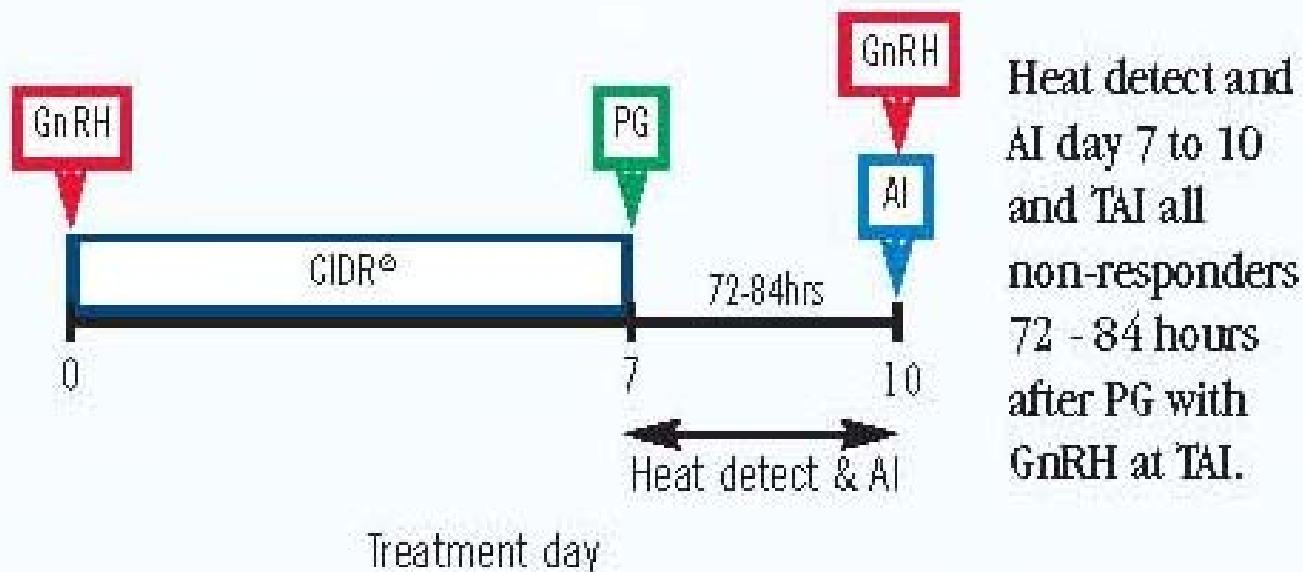
Perform TAI at 54 ± 2 hours after PG with GnRH at TAI.



BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Heat Detect & Timed AI (TAI)

Select Synch + CIDR® & TAI



BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Heat Detection

MGA[®] - PG

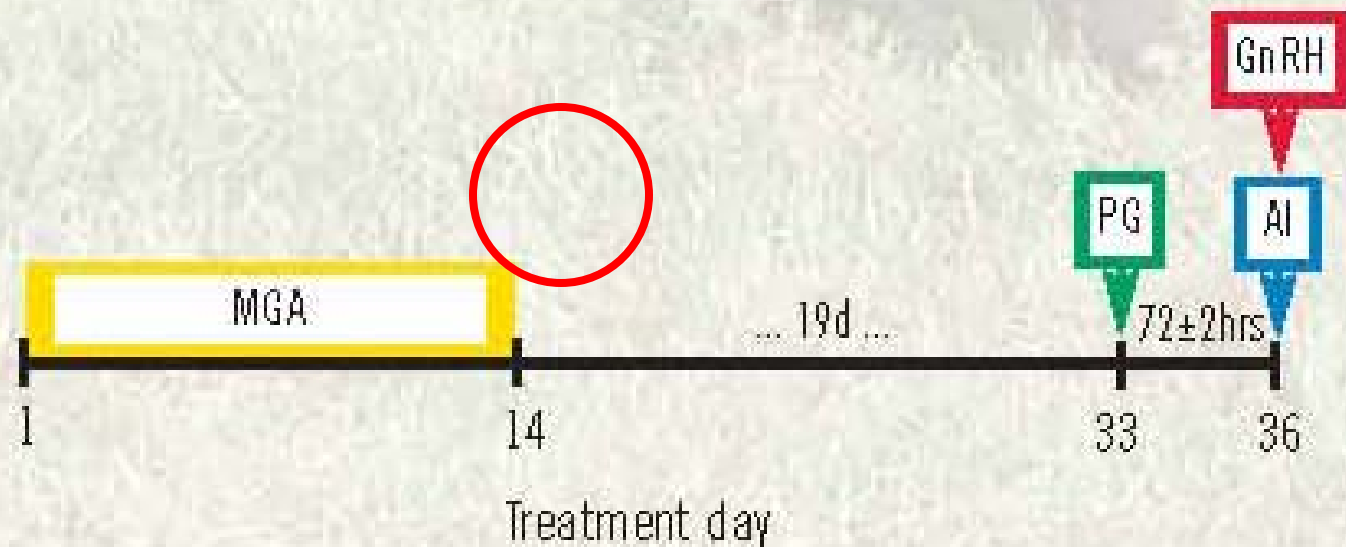


BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Fixed-time AI (TAI)

MGA[®] - PG

Perform TAI at 72 ± 2 hours after PG with GnRH at TAI.

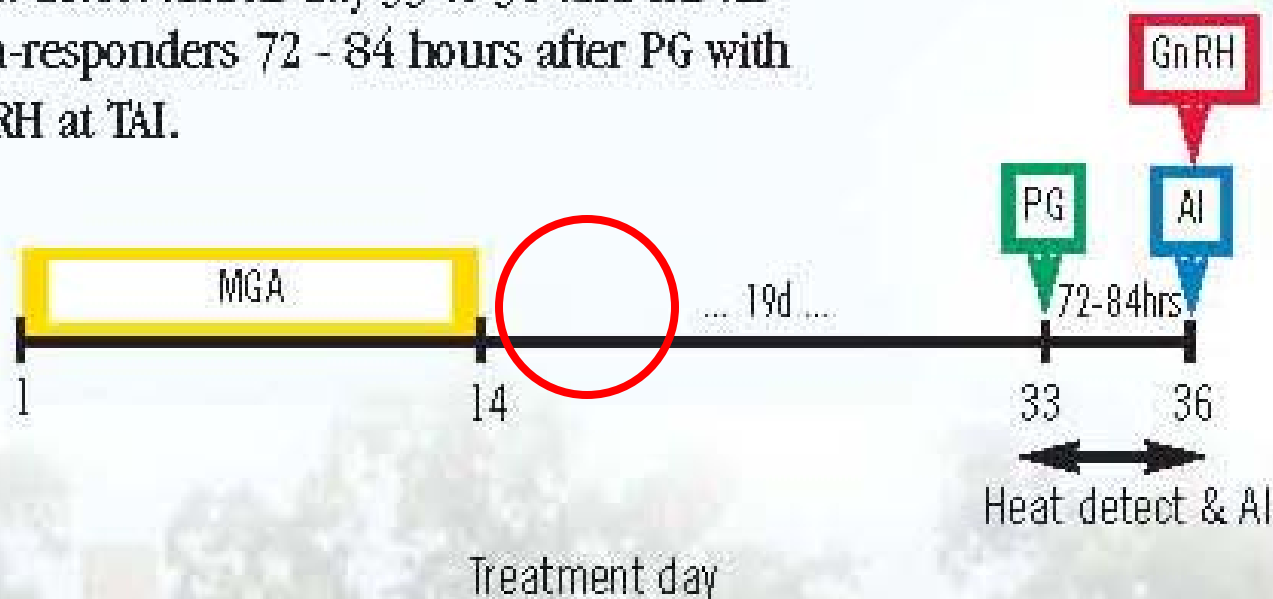


BEEF HEIFER SYNCHRONIZATION PROTOCOLS

Heat Detect & Timed AI (TAI)

MGA[®] - PG & TAI

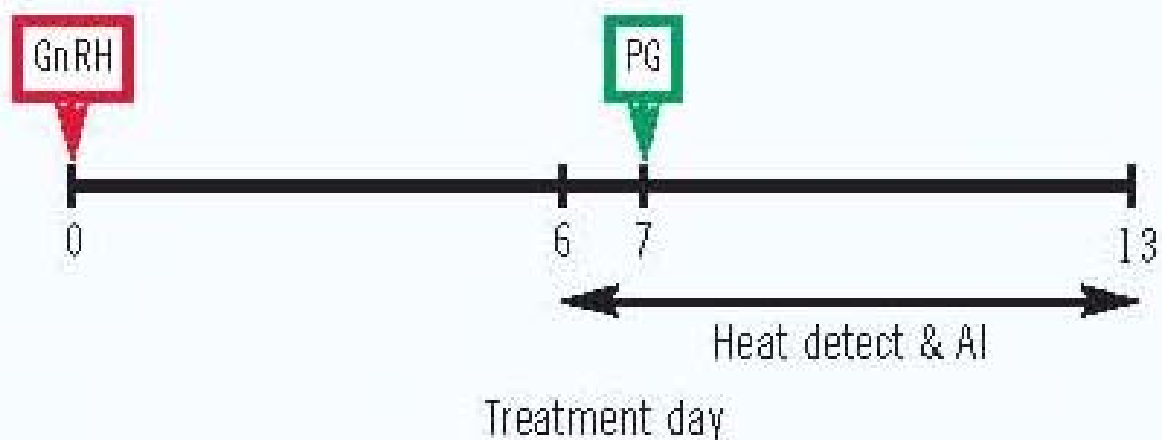
Heat detect and AI day 33 to 36 and TAI all non-responders 72 - 84 hours after PG with GnRH at TAI.



BEEF COW SYNCHRONIZATION PROTOCOLS

Heat Detection

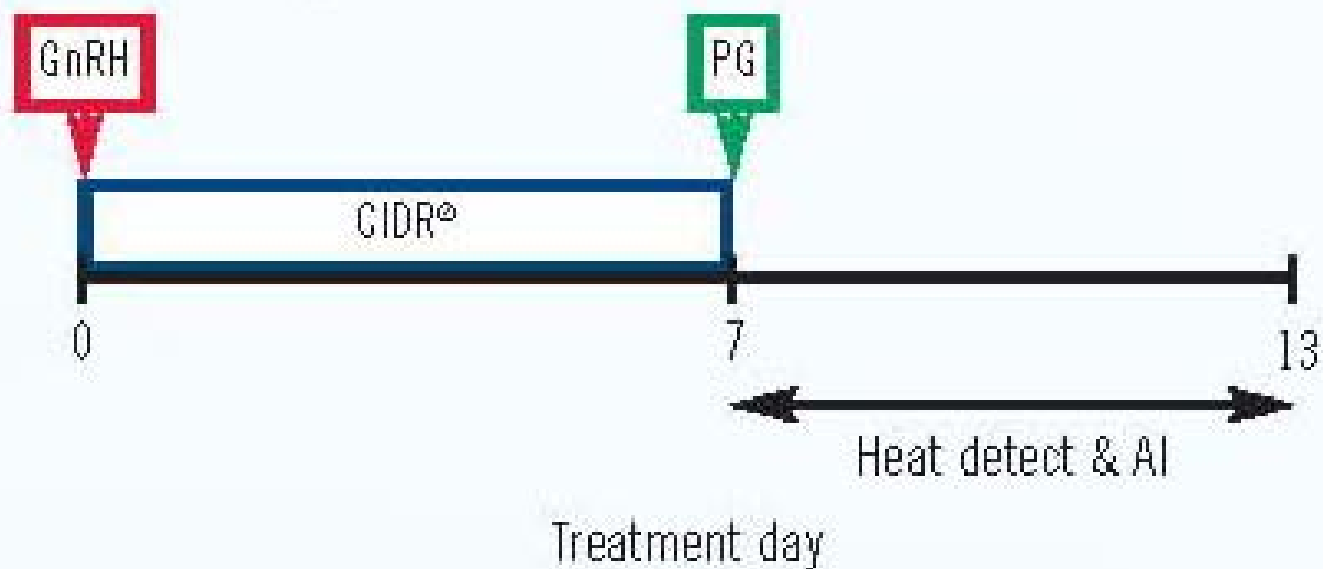
Select Synch



BEEF COW SYNCHRONIZATION PROTOCOLS

Heat Detection

Select Synch + CIDR®

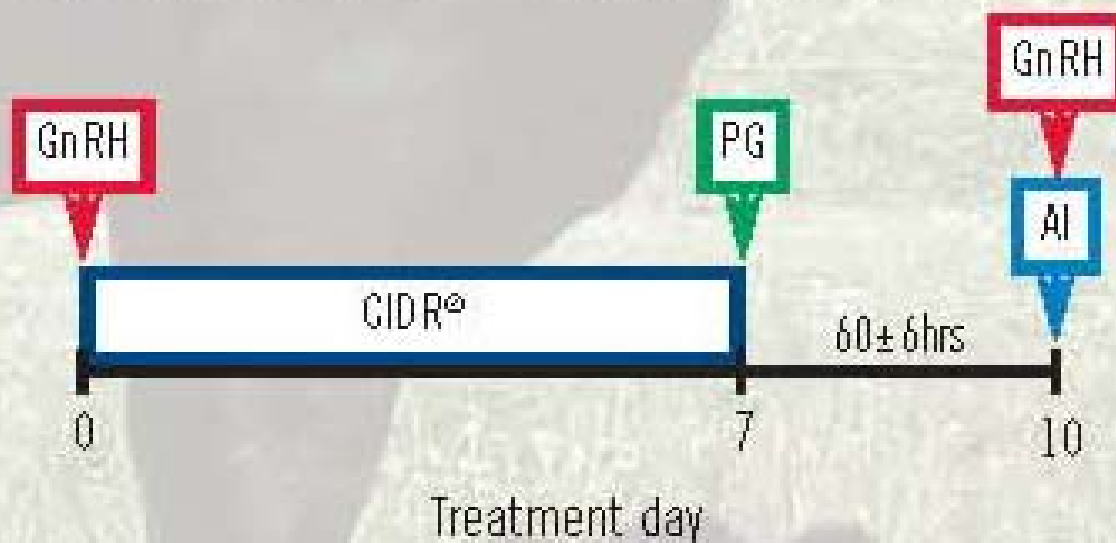


BEEF COW SYNCHRONIZATION PROTOCOLS

Fixed-time AI (TAI)

CO-Synch + CIDR®

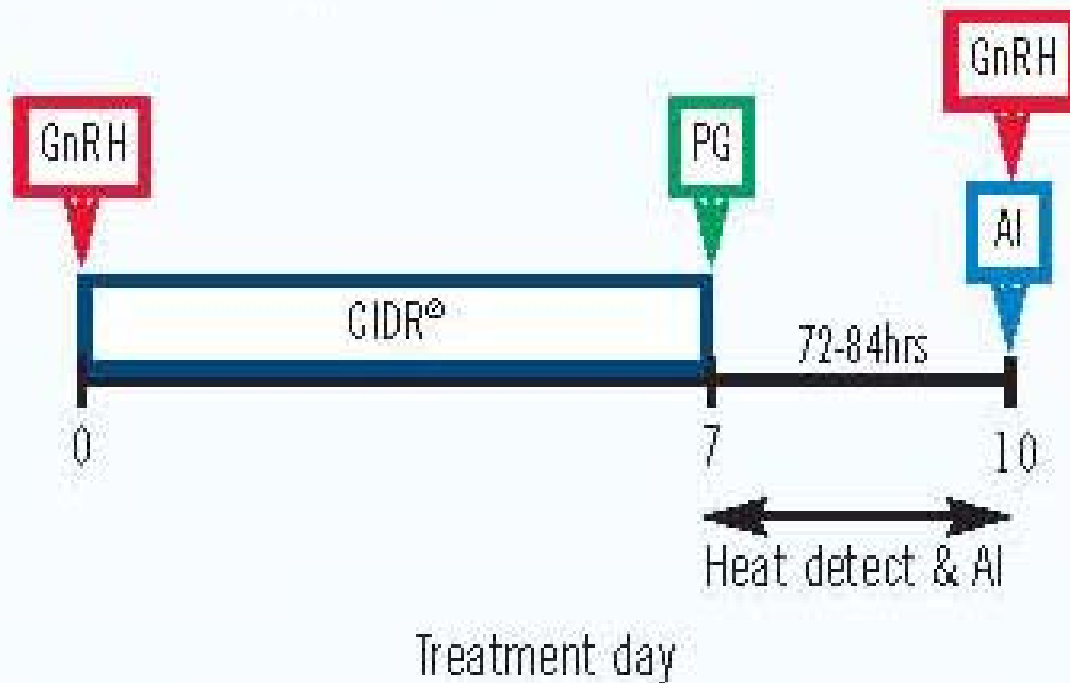
Perform TAI at 60 ± 6 hours after PG with GnRH at TAI.



BEEF COW SYNCHRONIZATION PROTOCOLS

Heat Detect & Timed AI (TAI)

Select Synch + CIDR® & TAI



Heat detect and AI day 7 to 10 and TAI AI all non-responders 72 - 84 hours after PG with GnRH at TAI.

BEEF COW SYNCHRONIZATION PROTOCOLS

Heat Detection

MGA[®] Select

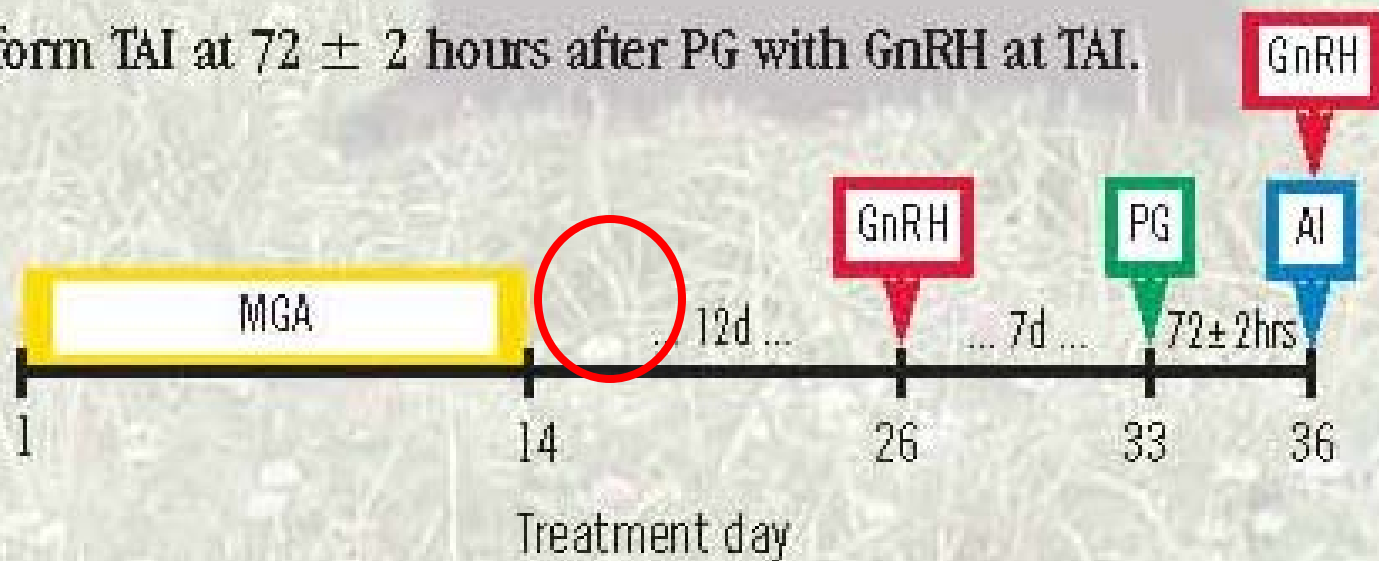


BEEF COW SYNCHRONIZATION PROTOCOLS

Fixed-time AI (TAI)

MGA[®] Select

Perform TAI at 72 ± 2 hours after PG with GnRH at TAI.

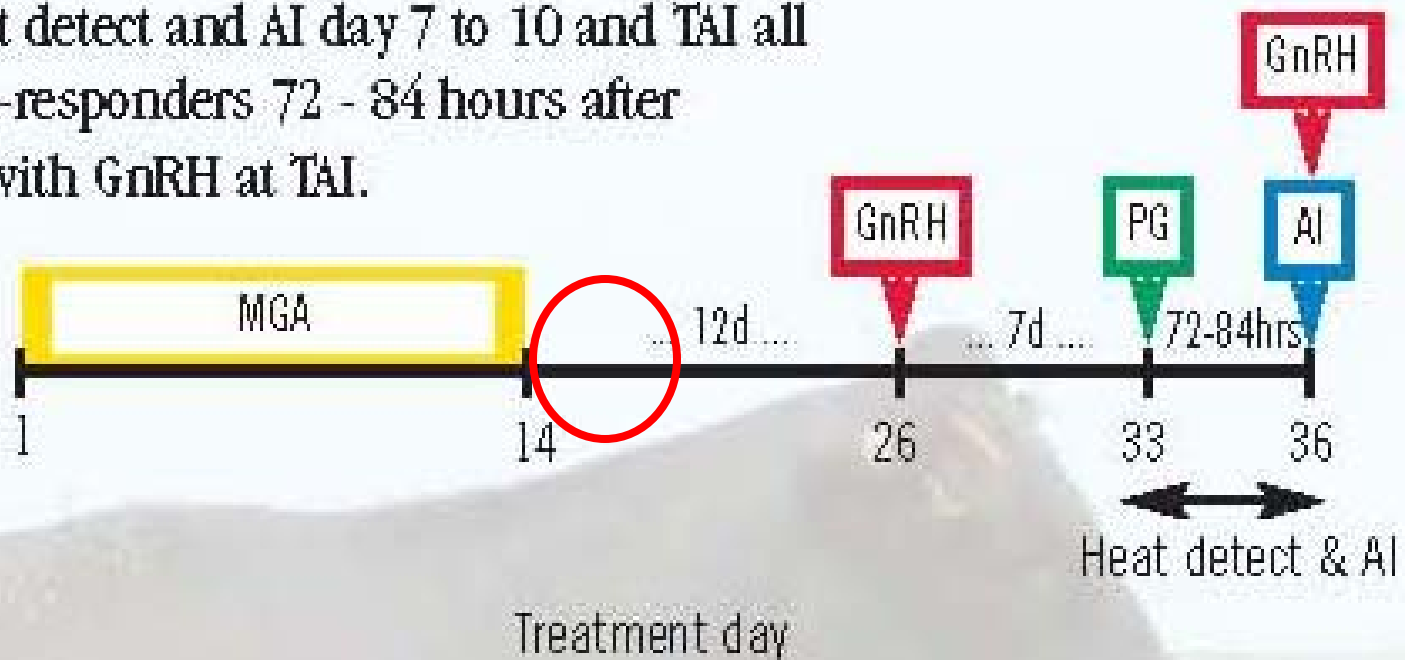


BEEF COW SYNCHRONIZATION PROTOCOLS

Heat Detect & Timed AI (TAI)

MGA[®] Select & TAI

Heat detect and AI day 7 to 10 and TAI all non-responders 72 - 84 hours after PG with GnRH at TAI.



Estrus Synchronization Planner

Inputs

Synch - 0

Date to start breeding:	8/24/2004	(Example: 6/1/2004)
Time of day you want to breed:	10:30 AM	
Detection-Insemination type:	1	1 = Estrus AI, 2 = Estrus AI & Clean-up AI, 3 = Fixed-Time AI
Estrus synchronization system:	6	Select number from list of recommended systems below.
	2	Estimated number of times through the working facility, including AI.

Heat detect & Breed

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

Heat detect & Breed

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)
- 14 = Select Synch + CIDR

10/22/2004 9:27

Estrus Synchronization Planner

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

6 = MGA + Prostaglandin System (19 day between)

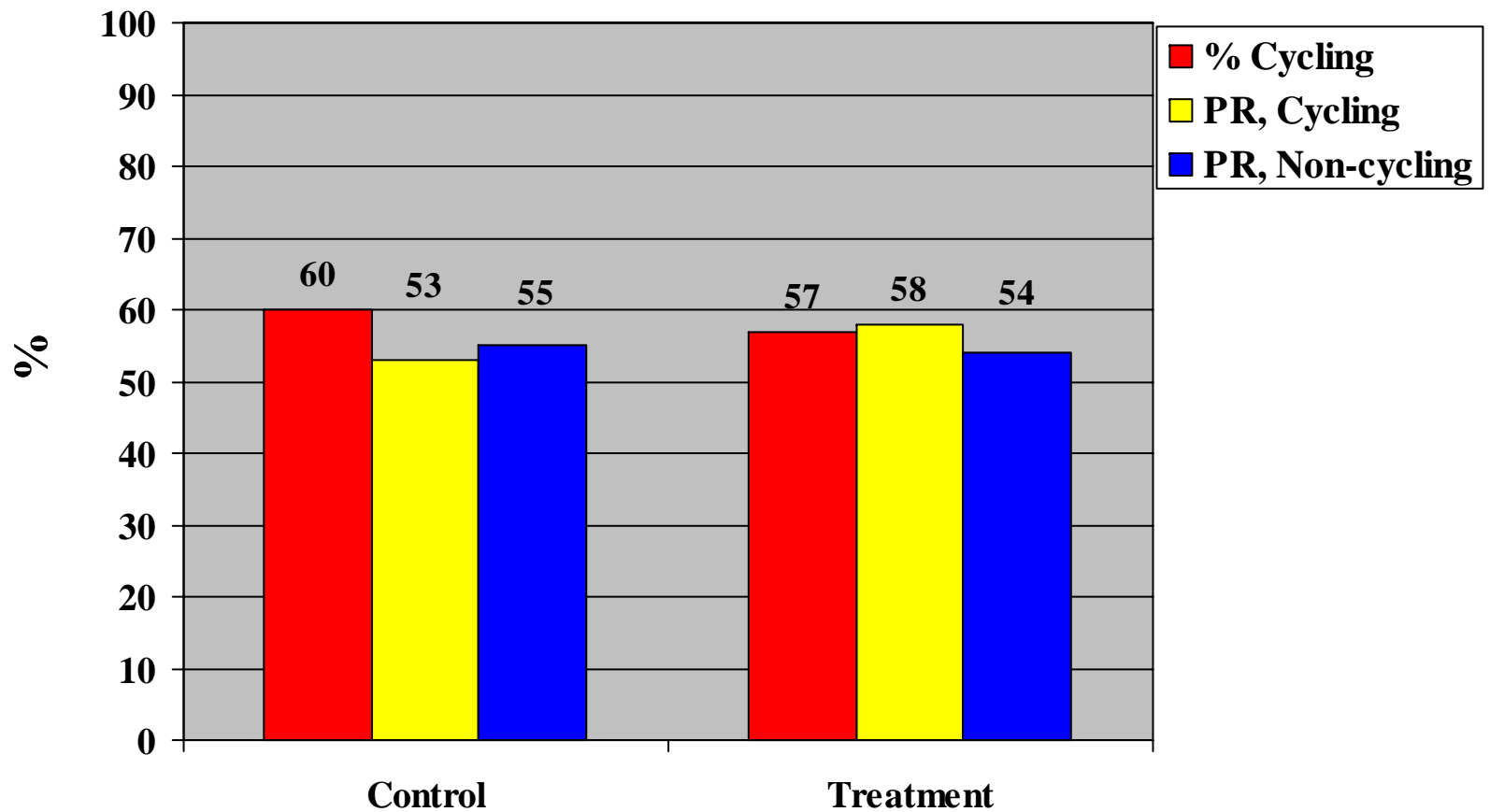
Date to start breeding: 6/1/2005
Start of Calving Season: 3/9/2006

Prepared by: Iowa Beef Center
Phone Number: 515/294-BEEF



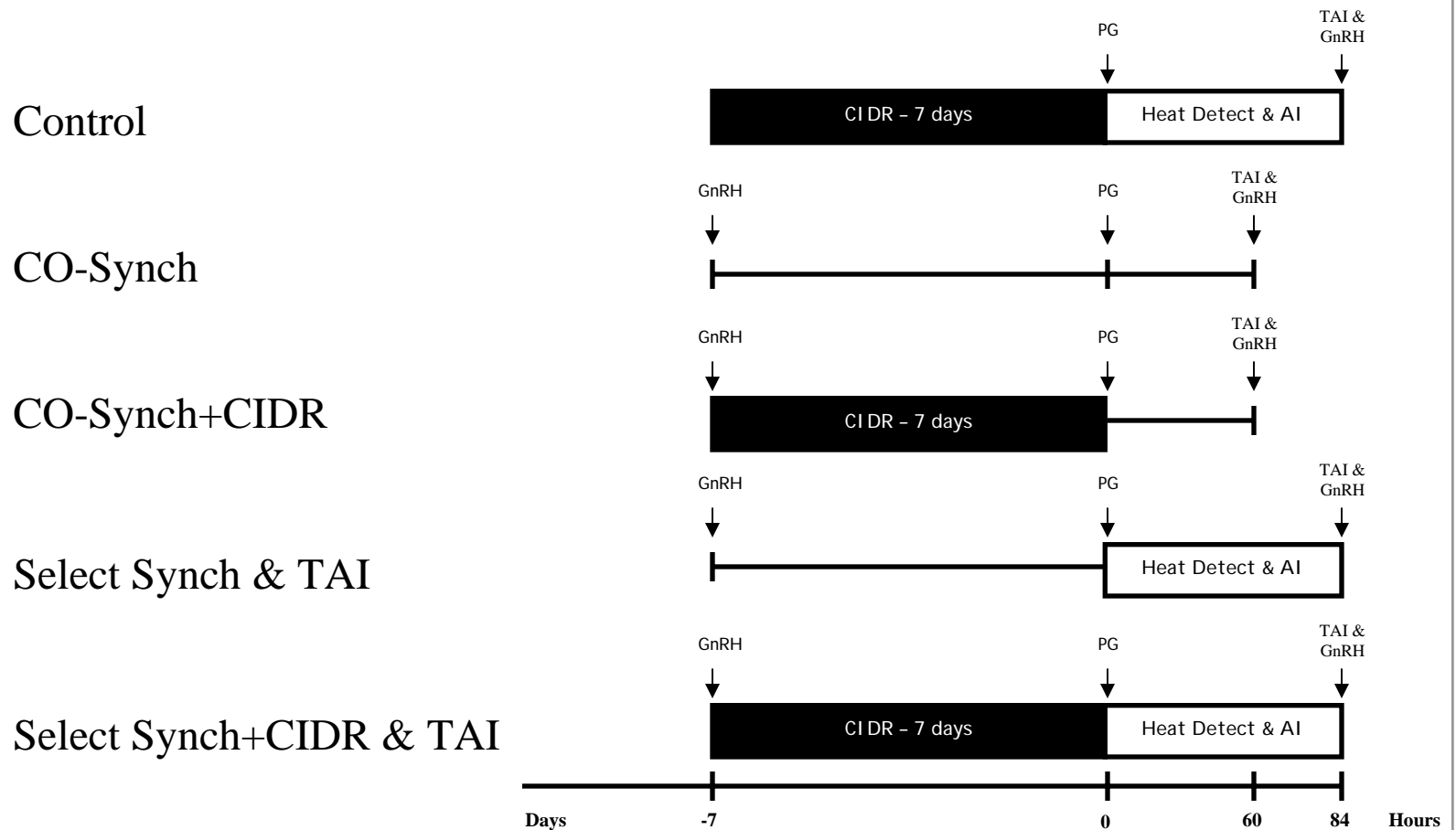
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
4/24/2005	4/25/2005	4/26/2005	4/27/2005	4/28/2005	4/29/2005	4/30/2005
					* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day
5/1/2005	5/2/2005	5/3/2005	5/4/2005	5/5/2005	5/6/2005	5/7/2005
* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day
5/8/2005	5/9/2005	5/10/2005	5/11/2005	5/12/2005	5/13/2005	5/14/2005
* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day	* MGA @ 0.5 mg/hd/day		* Many females in heat next 4 days. DO NOT BREED!
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
			* Detect Estrus & Breed * Inject PG - all females	* Detect Estrus & Breed	* Detect Estrus & Breed * Peak Estrus	* Detect Estrus & Breed
6/5/2005	6/6/2005	6/7/2005	6/8/2005	6/9/2005	6/10/2005	6/11/2005
* Detect Estrus & Breed	* Detect Estrus & Breed	* Turn in Bull Power				

Multi-State Western CIDR Study (Beef Heifers)

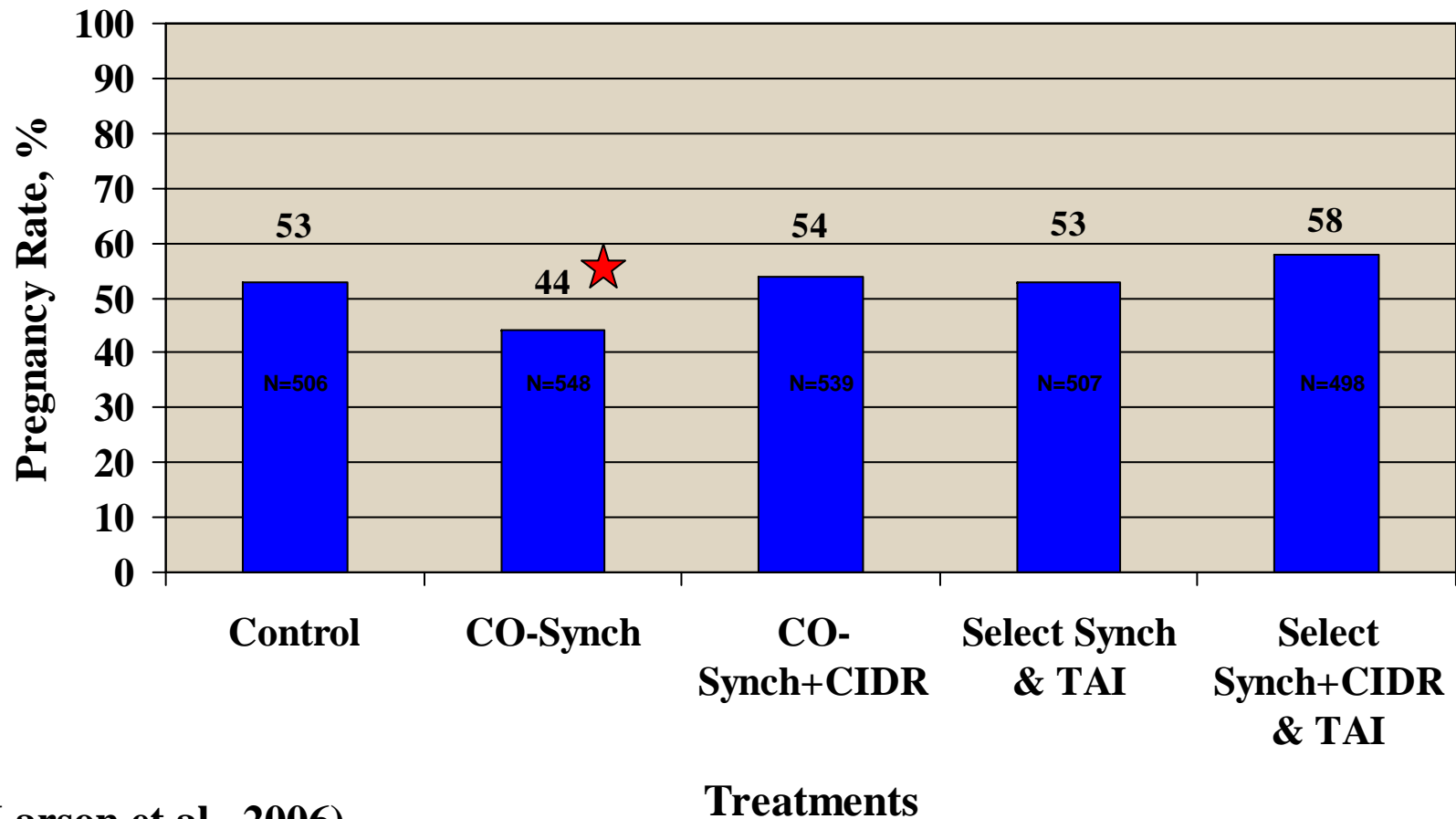


(Walker et al., 2005)

Multi-State Eastern CIDR Study (Beef Cows)



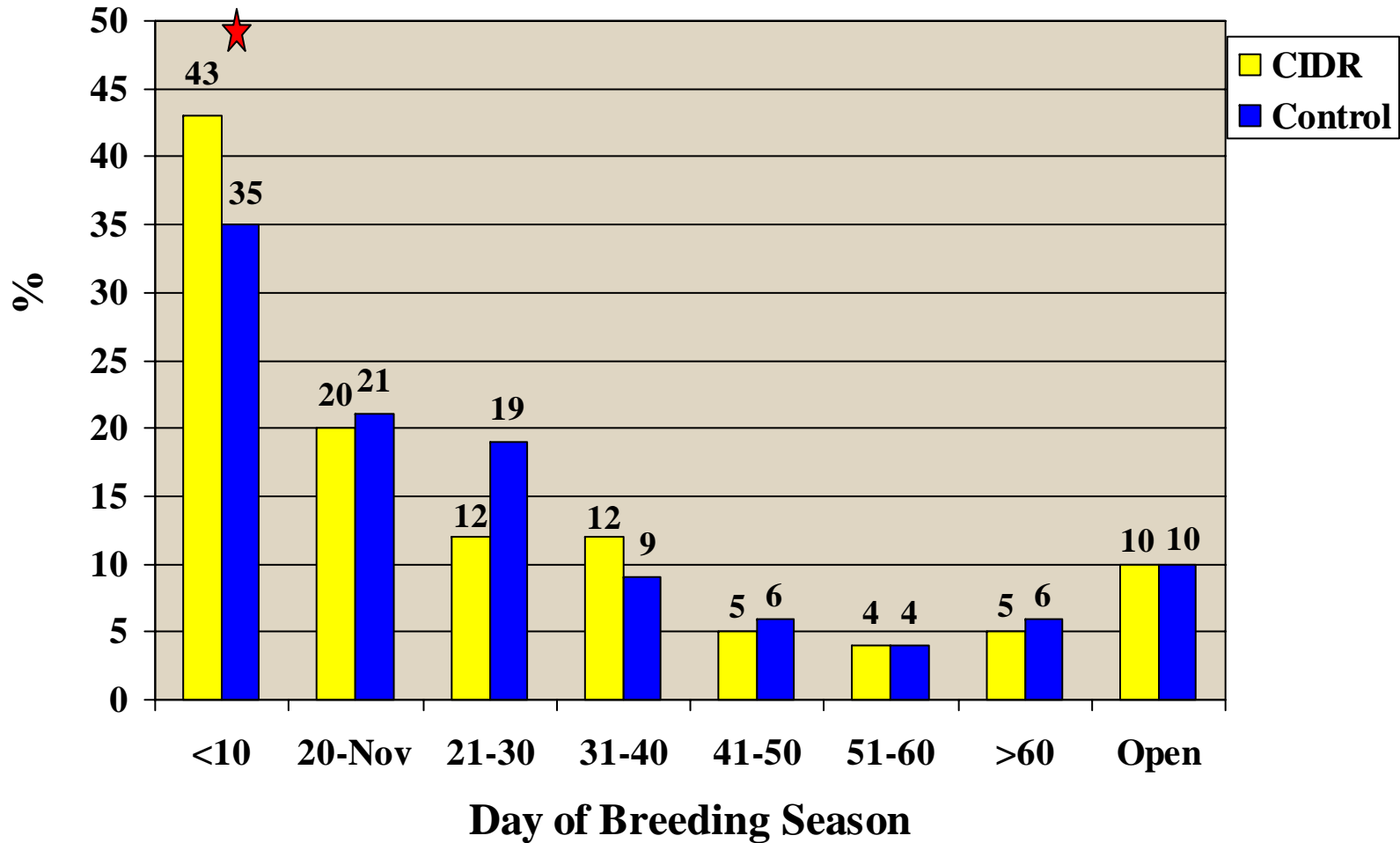
Multi-State Eastern CIDR Study (Beef Cows)



(Larson et al., 2006)

Bull Breeding Study

Pregnancy Rates by Day of Season



Ask yourself questions?

- ✦ How committed are you to using estrous synchronization?
- ✦ Are you breeding heifers, first-calf heifers or mature cows?
- ✦ What type of body condition are your cows/heifers in?
- ✦ How long is your calving season?
- ✦ Do you have the time and labor to heat detect and AI?
- ✦ If AI, what outcome do you want to achieve after breeding?
- ✦ If you use fixed-time AI:
 - do you have the help and resources to handle all cattle in one day?
 - do you have the facilities to work the number of cattle you would synchronize at any one time?
- ✦ Is cost a priority or is getting females pregnant a priority?

Decision Making

- ✦ Utilize the “*Benefits of Synchronization*” to establish and manage goals for your operation!
- ✦ Having goals should force you to ask questions about your breeding program and which protocol to use!

Does it Pay?

✦ Synchronized vs Non-synchronized cows

- Synchronized calves – average 13 days older
- Synchronized calves – average 21 pounds heavier
 - (Schafer et al., 1990)

✦ Fall of 2005

– 500 wt (\$125/cwt) - \$26.25/calf

✦ Recovers the cost for those calving from synchronization

Questions???

