

New Technologies in Artificial Insemination for Profitable Beef: WIIFM



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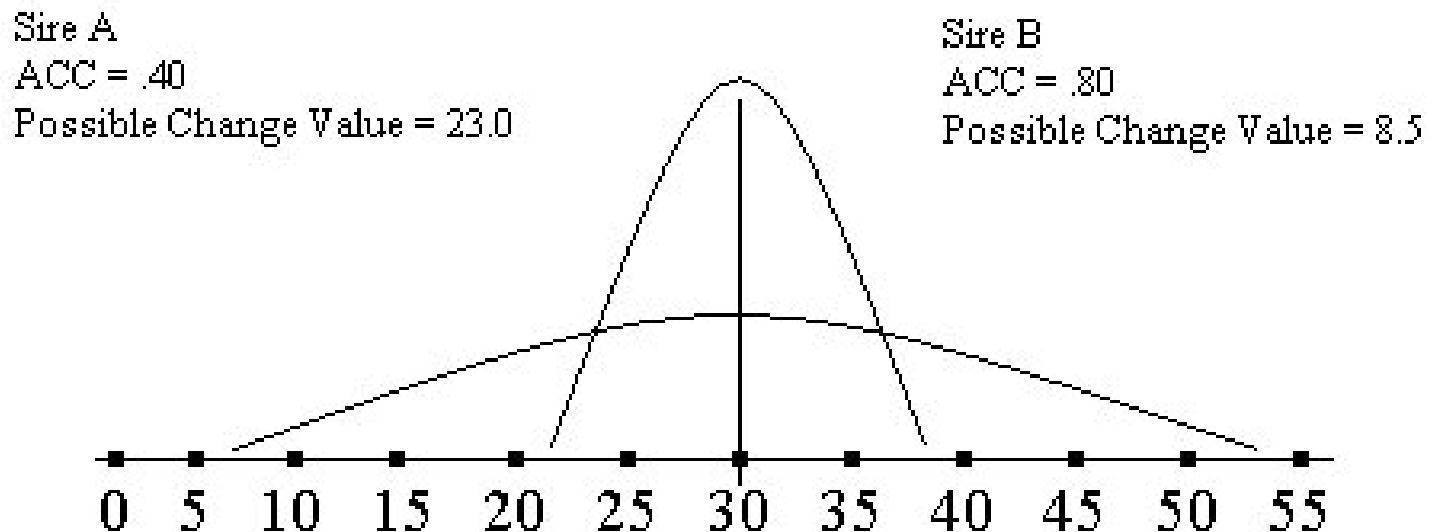


Why AI?

- Take advantage of superior genetics
- Increased selection accuracy



Accuracy Illustrated



Graph credits: American International Charolais Association <http://charolaisusa.com>

Why AI?

- Take advantage of superior genetics
- Increased selection accuracy
- Calving ease
- Reduce bull requirements
- Disease control
- Easier crossbreeding
- Cost ?

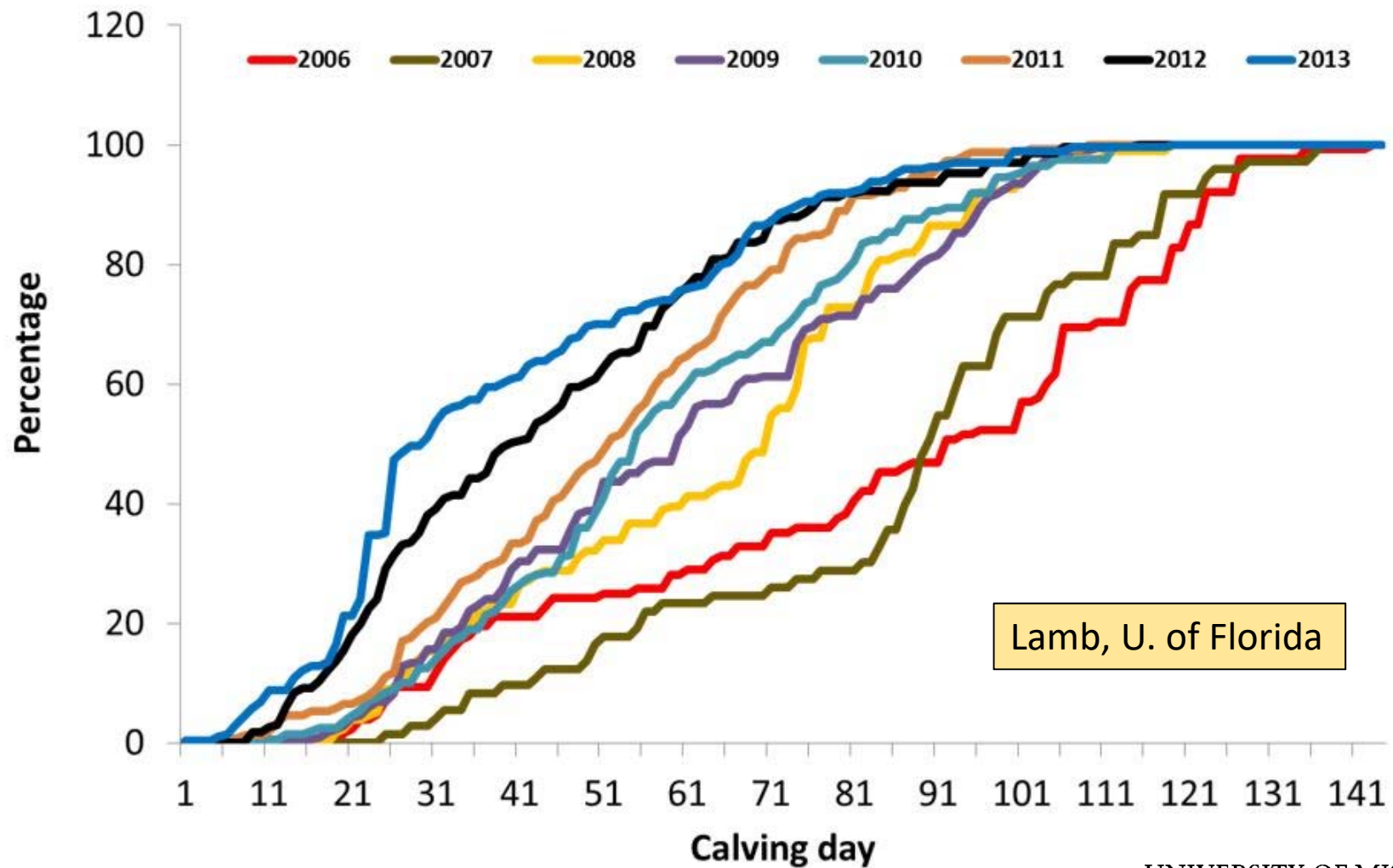


Why Use Estrus Synchronization?

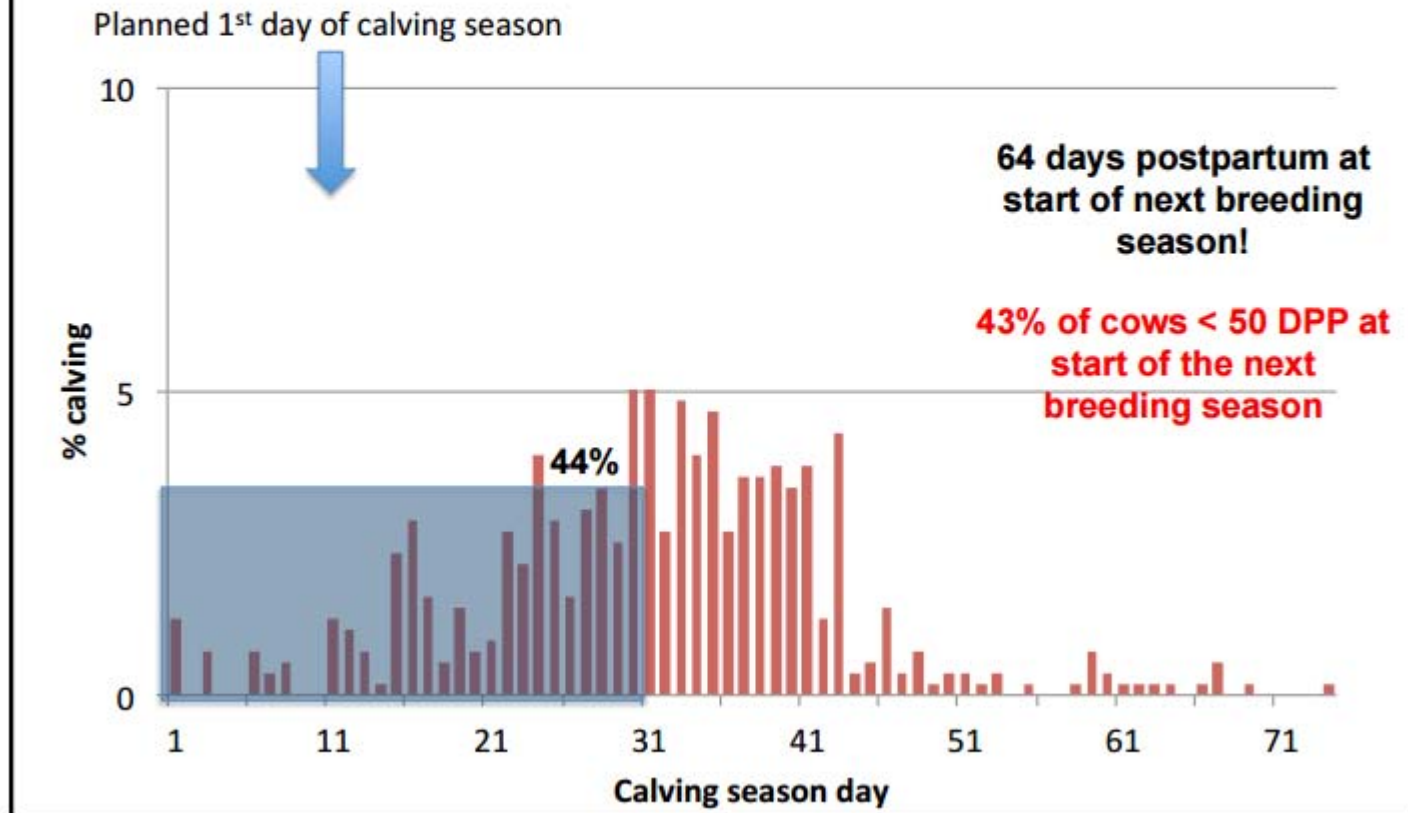
- Makes AI in beef herds more manageable
- Shorten AI breeding season
- More cows become pregnant earlier
- Tighter grouping of calves
- Older and heavier calves at weaning
- Beneficial effects on the next breeding season
- Greater opportunities to conceive



Effect of TAI on Calving Dates

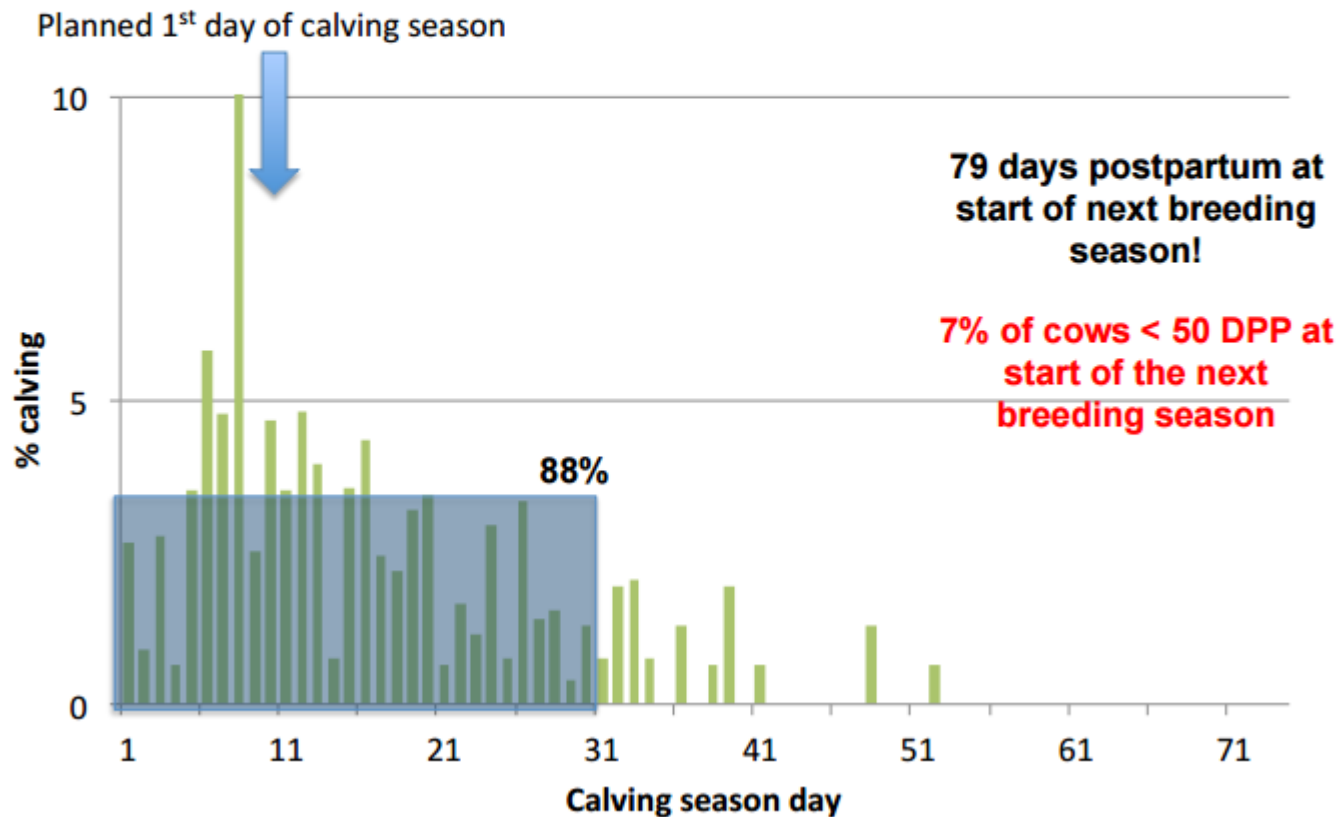


CALVING DISTRIBUTION AFTER EXPOSURE TO BULLS



Lamb, U. of Florida

CALVING DISTRIBUTION AFTER EXPOSURE TO AI AND ES



Lamb, U. of Florida

How many do we really want at one time?



Rule of Thumb on Calving Distribution

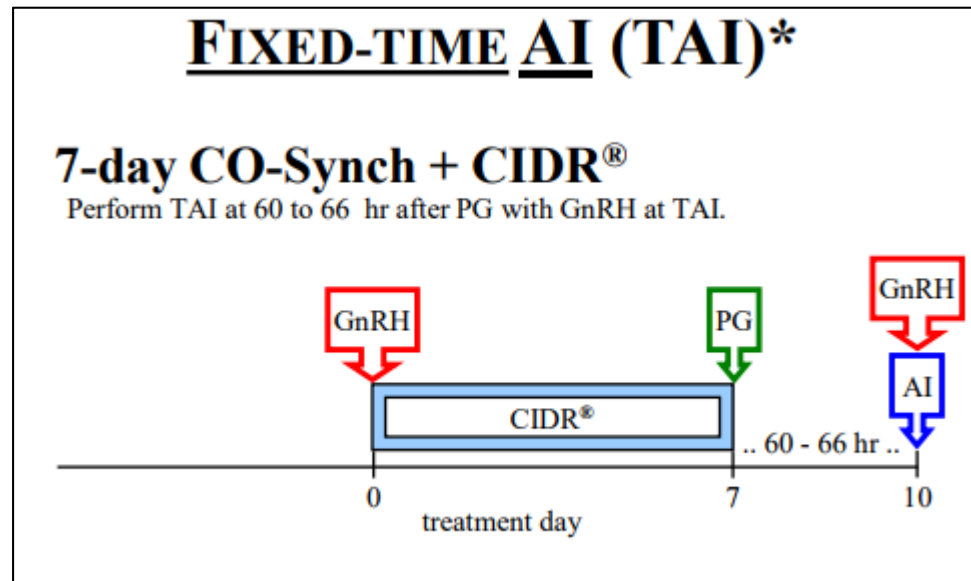
- On the peak day of calving season, **20%** is the maximum number of calves born to cows that conceived to the same sire on the same day of the breeding season
-

- **Example:** If 100 cows are bred in one day and 60% achieve pregnancy then:

$$100 \times .60 \times .20 = 12 \text{ calves born at peak of season}$$

So, how do we make it happen?

Synchronization Protocols



Bovine Estrous Cycle

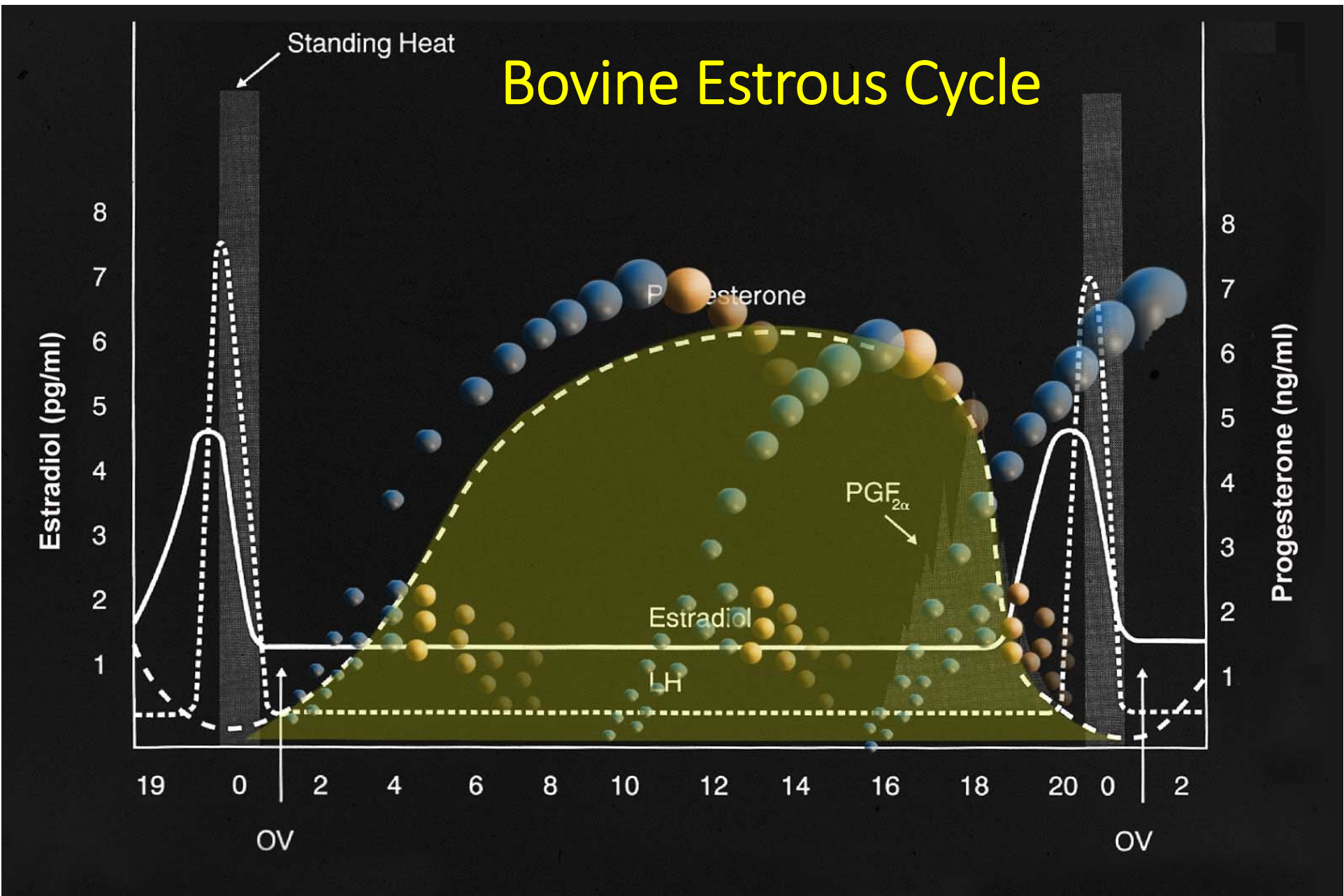


Image credits: LORI (Library Of Reproduction Illustrations)

Bovine Estrous Cycle

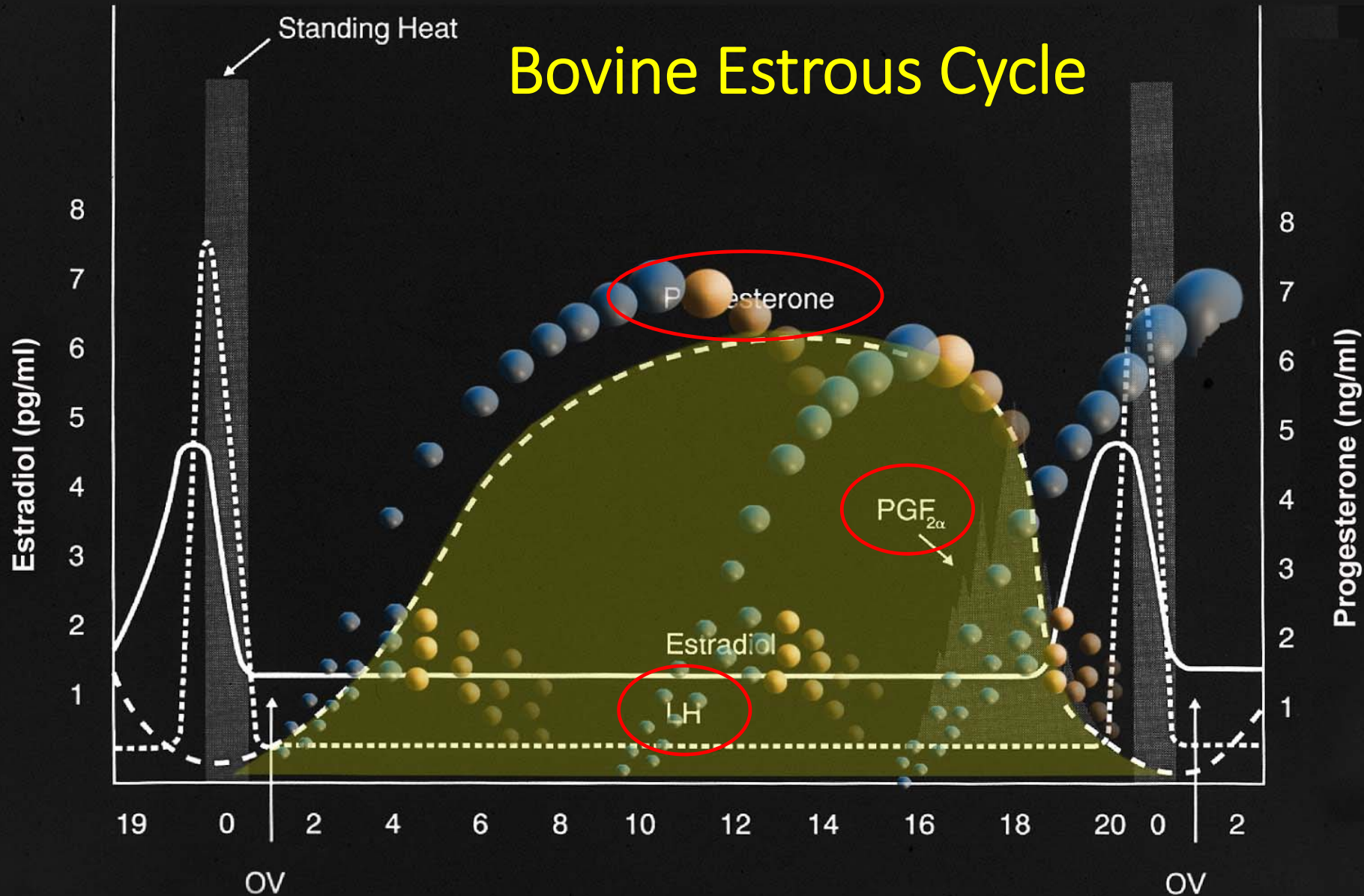


Image credits: LORI (Library Of Reproduction Illustrations)

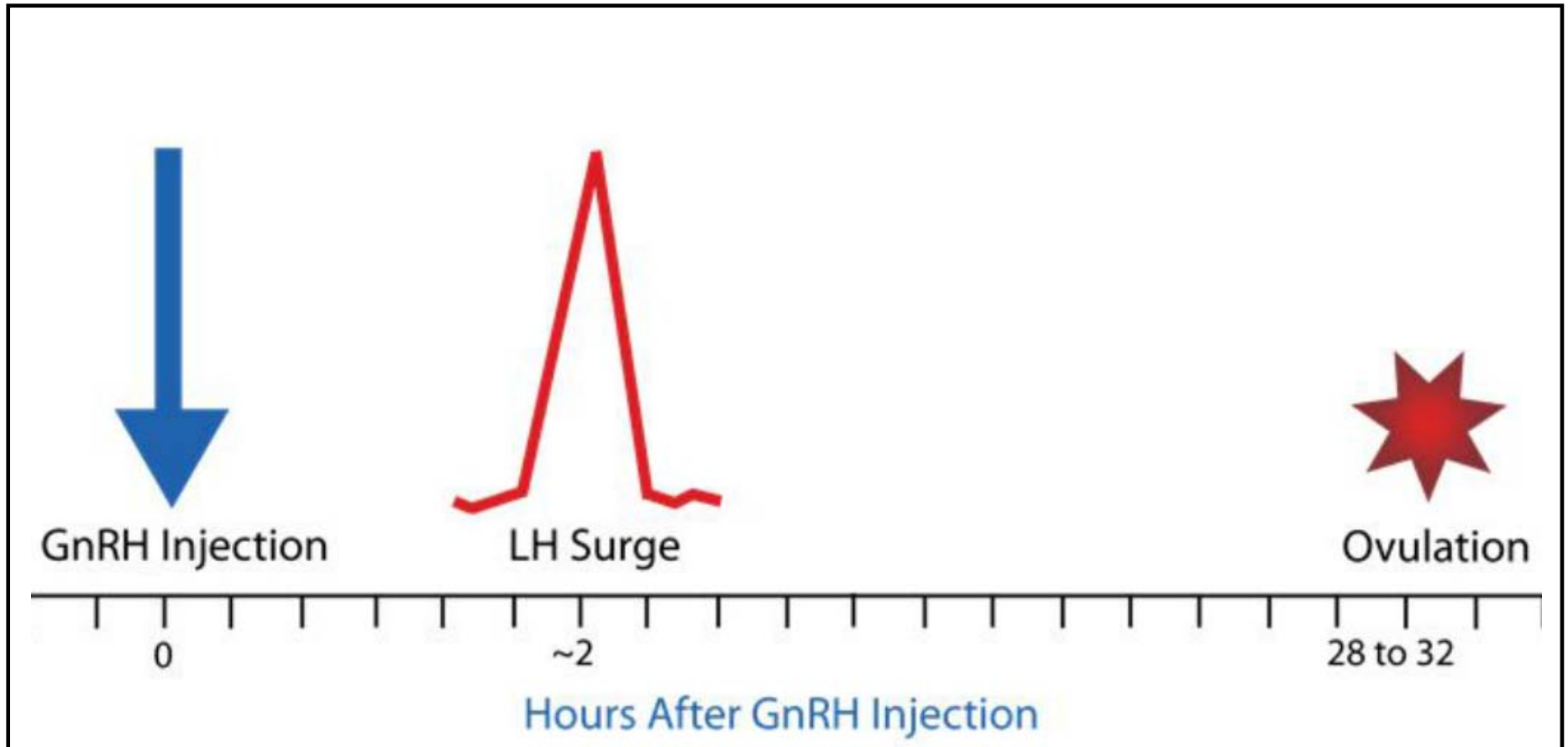
Hormones used in Estrus Synchronization Protocols

- GnRH (Gonadotropin Releasing Hormone)
- Progestins
 - MGA (Melengestrol acetate)
 - CIDR Implants (Controlled Internal Drug Release)
- Prostaglandin

GNRH

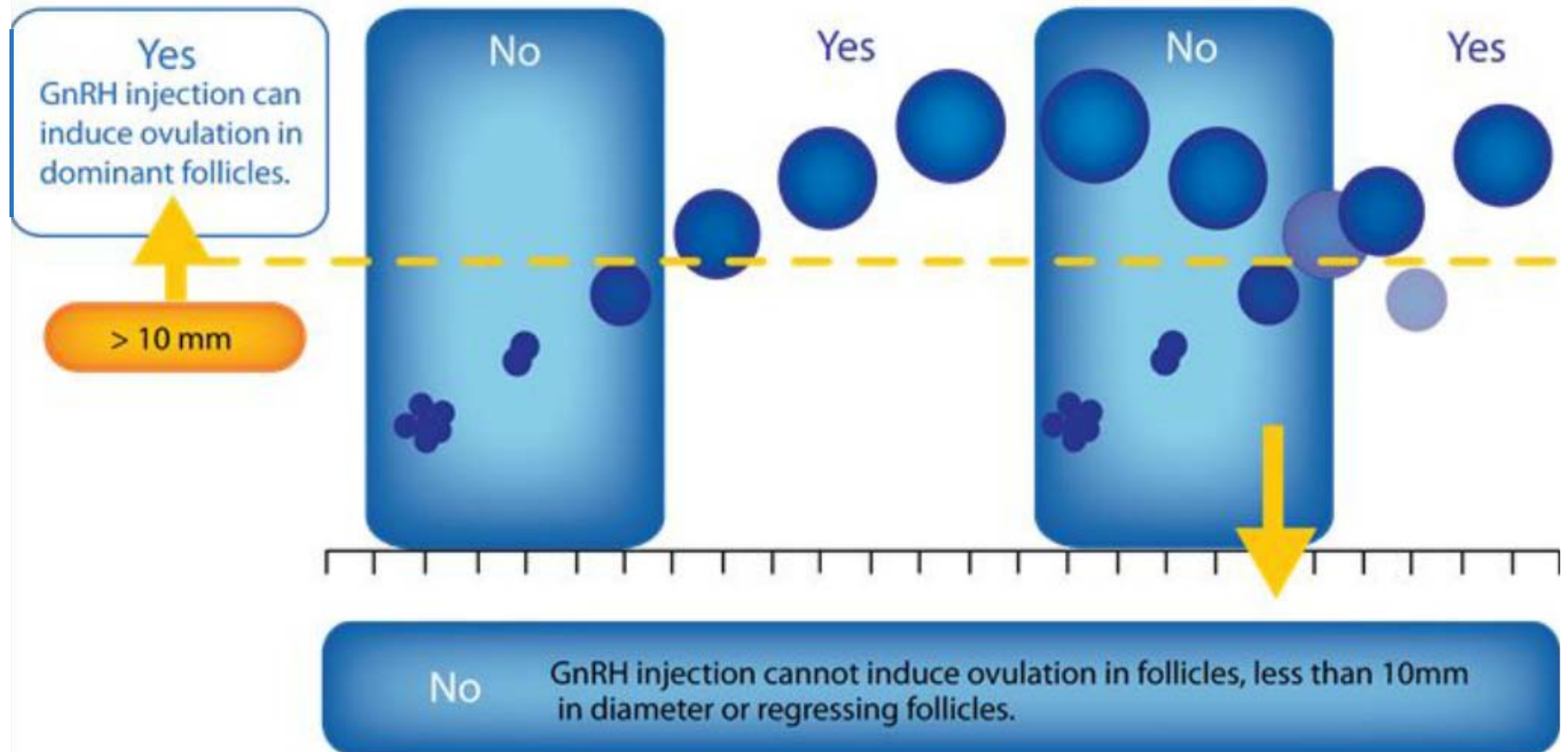
- Stimulates secretion of LH.
LH in turn induces ovulation
- Functions in synchronization protocols
 - Synchronize follicular waves
 - Induce ovulation
 - Induce formation of an accessory CL

How Does GnRH Induce Ovulation?



- GnRH induces an LH surge within about 2 hours following administration
- Ovulation will then be induced approximately 28-32 hours after GnRH administration
- Estrus may or may not be expressed

When Can GnRH Induce Ovulation During a Follicular Wave?



GNRH Products

- Cystorelin[®]
- Factrel[®]
- Fertagyl[®]
- OvaCyst[®]
- GONAbreed[®]
- ≈ \$3.00/dose



Progestins

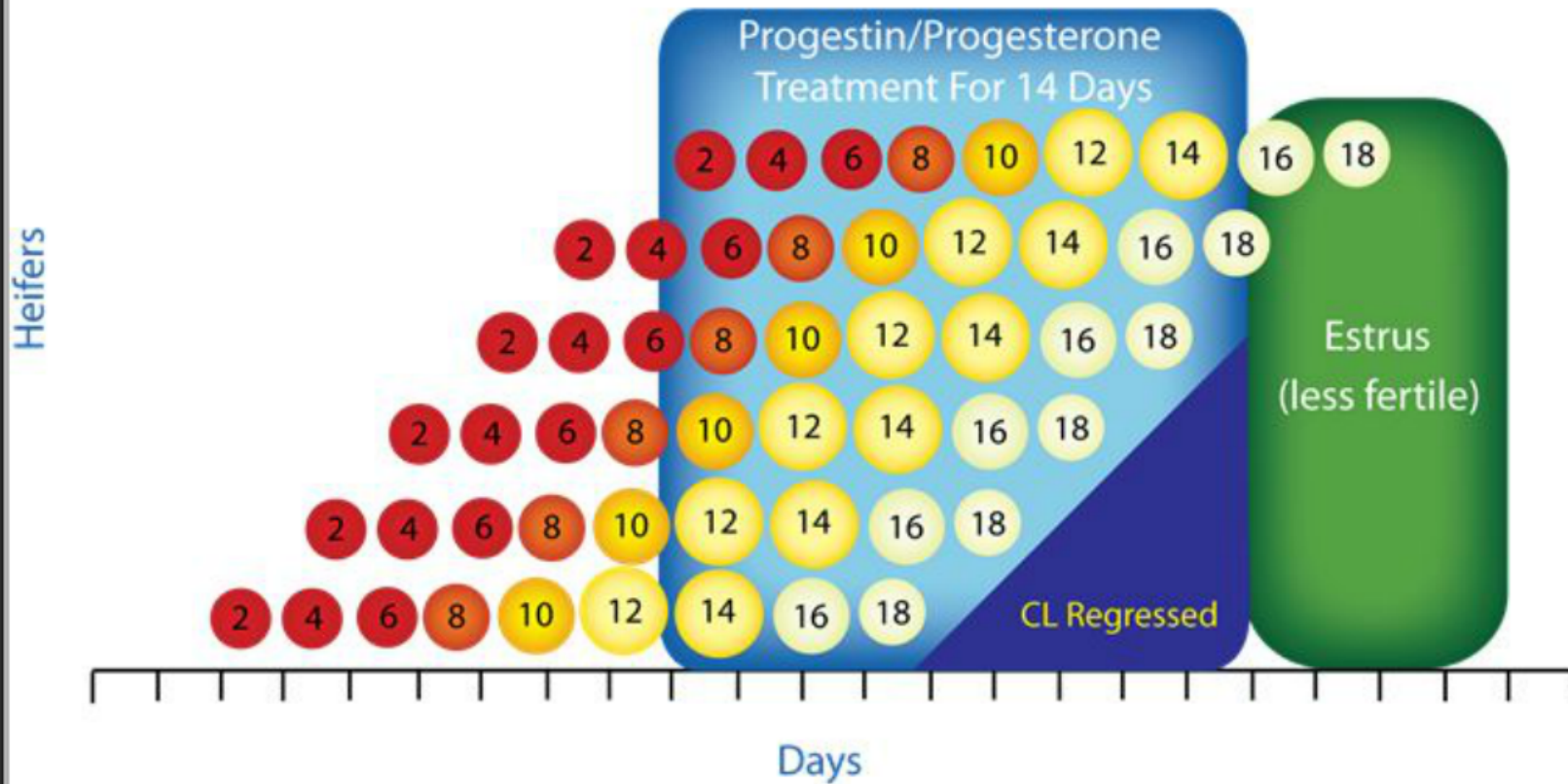


- Progestins are compounds that have the same biological action as progesterone
- Progesterone - secreted by CL
- Inhibits estrus
- Inhibits ovulation
- Prepares reproductive tract for pregnancy
- Maintains pregnancy

Progestin/Progesterone Role in Estrus Synchronization

- Manage the luteal phase
- Suppress estrus
- Suppress ovulation
- Induce estrus and ovulation in non-cycling heifers and cows
 - In most herds non-cycling cows/heifers are present when synchronization drugs are administered
 - Presence of progesterone will “kick-start” cyclicity in a large portion of anestrus animals

Progestin/Progesterone Based Programs



Each row is a different heifer

Each circle represents a corpus luteum and the number inside the circle represents the day of the estrous cycle.

Progestin Products use in Estrus Synchronization Protocols

- MGA (Melengestrol Acetate)
- CIDR implants



MGA

- Feed additive
- Fed at the rate of .5mg MGA in 3-5 lb. of carrier once daily
- Feeding recommendations
 - Allow heifers to carrier prior to addition of MGA
 - Do not top dress on other feeds
 - Provide adequate bunk space - 18" to 24" per animal
- **Cost - about \$1.00 per heifer** for 14 day period

MGA is FDA approved for:

- Heifers intended for breeding to suppress estrus
 - Heifers intended for slaughter to increase weight gain, improve feed efficiency, and suppress estrus
-

- Use of MGA as part of any estrus synchronization protocol in beef cows constitutes an extra label use and is prohibited by law.

CIDR Implants

- A nylon intravaginal insert impregnated with progesterone and designed for easy insertion and removal
- \approx \$11 to \$12/dose

CIDR Implants

CIDR Insertion

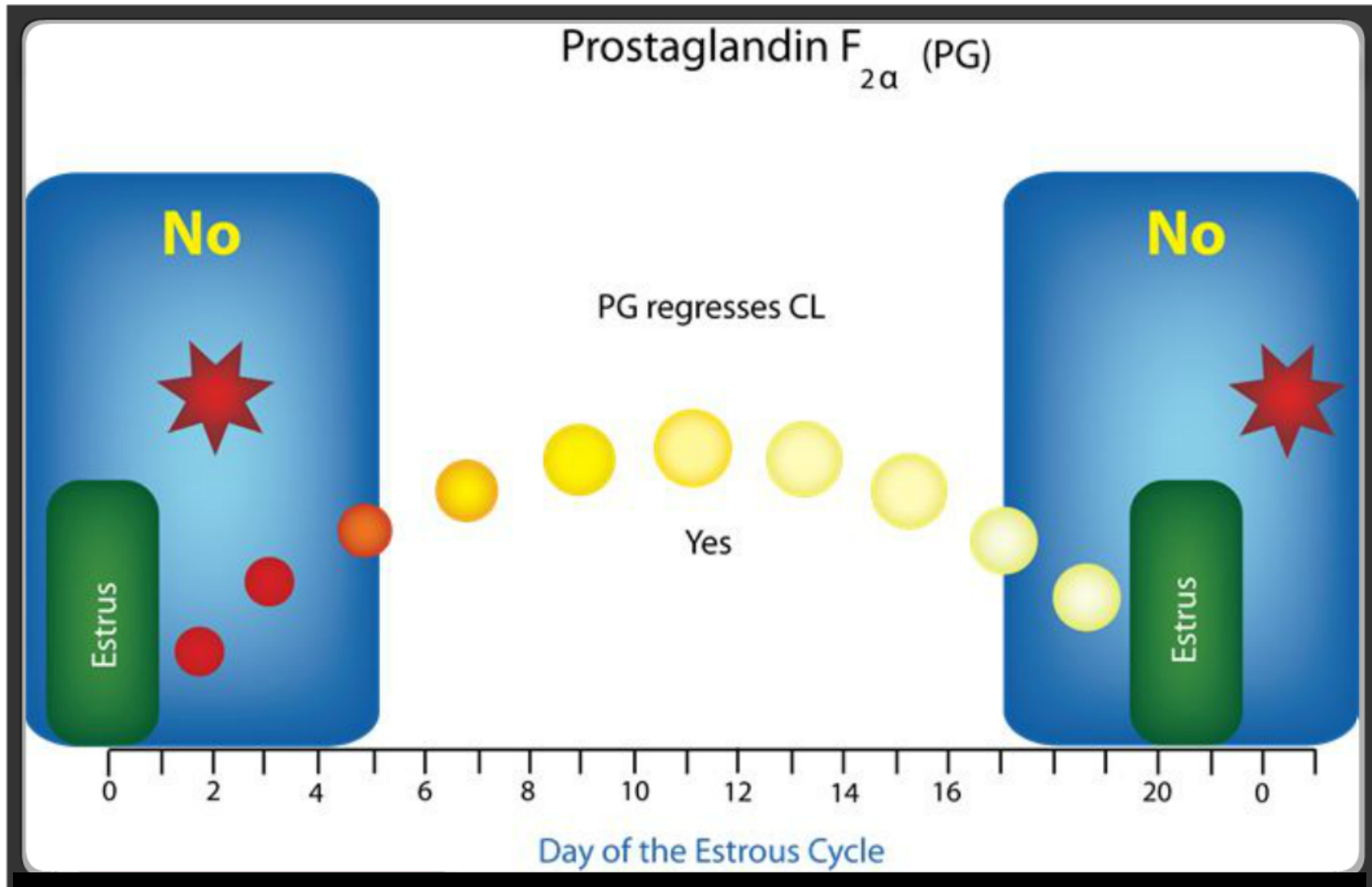
- Latex gloves should be worn when handling CIDRs
- Gloves and applicator should be thoroughly washed by using a two bucket rinse of Nolvasan or Chlorhexidine solution diluted in clean water
- Vulva and surrounding area should be cleaned with Nolvasan solution prior to insertion of lubricated CIDR applicator
- CIDR is removed by gently pulling the plastic tail

Prostaglandin

- Prostaglandin is produced by the endometrium of the uterus.
- Main biological function is to induce regression of the CL in non-pregnant females



Function and Influence of Prostaglandin



A single injection of PG will induce premature CL regression between days 6 and 17 of the estrus cycle.

Prostaglandin Products

- Lutalyse®
- Estrumate®
- Synchsure™
- Prostamate®
- estroPLAN®
- ≈ \$3.00/dose



Things to Remember about Prostaglandin

- PG is only effective if a CL is present
 - Not effective in anestrus cows
- Will not induce estrous cyclicity
- Only effective during days 6 - 17 of estrus cycle
- Prostaglandin can induce abortion - **do not use on pregnant cows**

Points to Consider when Injecting Synchronization Drugs - GNRH & Prostaglandin

- Injections should be given IM
- Wear latex gloves when administering PG to prevent absorption through your skin
- Use an 18 gauge 1½ inch needle
- Change needles frequently
- Make sure injection site is free of manure and dirt
- Always follow manufacturer's recommended dosage and administration procedures

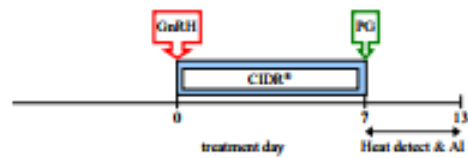
BEEF COW PROTOCOLS - 2018

HEAT DETECTION

Select Synch



Select Synch + CIDR*



PG 6-day CIDR*

Heat detect and AI days 0 to 3. Administer CIDR to non-responders and heat detect and AI days 9 to 12. Protocol may be used in heifers.



HEAT DETECT & TIME AI (TAI)

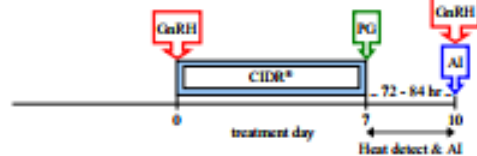
Select Synch & TAI

Heat detect and AI day 6 to 10 and TAI all non-responders 72 - 84 hr after PG with GnRH at TAI.



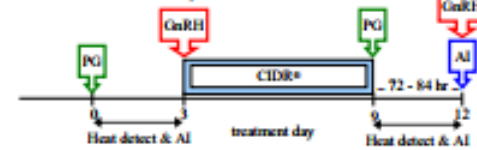
Select Synch + CIDR* & TAI

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



PG 6-day CIDR* & TAI

Heat detect & AI days 0 to 3. Administer CIDR to non-responders & heat detect and AI days 9 to 12. TAI non-responders 72 - 84 hr after CIDR removal with GnRH at AI. Protocol may be used in heifers.



FIXED-TIME AI (TAI)*

7-day CO-Synch + CIDR*

Perform TAI at 60 to 66 hr after PG with GnRH at TAI.



5-day CO-Synch + CIDR*

Perform TAI at 72 ± 2 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.

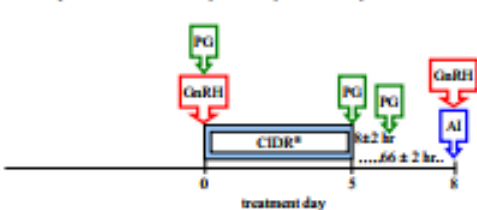


FIXED-TIME AI (TAI)*

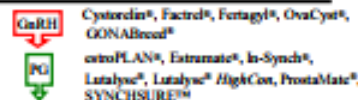
for *Bos Indicus* cows only

PG 5-day CO-Synch + CIDR*

Perform TAI at 66 ± 2 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.



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



Protocols

Factors to Consider when Choosing an AI Protocol

- Possible AI pregnancy outcome
- Cyclicity status
- Facilities
- Dry lot versus pasture
- Breeding plan
- Labor



Cow Protocols

- Heat detection protocols
 - Select Synch
 - Select Synch + CIDR
 - PG 6-day CIDR



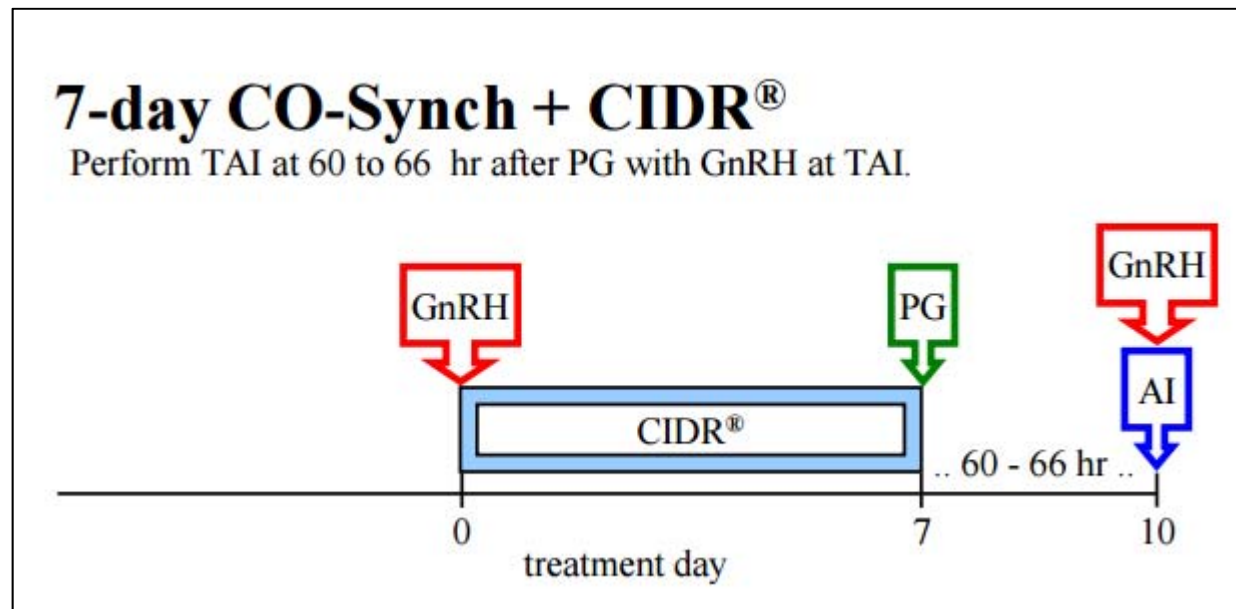
Cow Protocols

- Fixed-time AI (TAI) protocols
 - 7-day CO-Synch + CIDR
 - 5-day CO-Synch + CIDR
 - PG 5-day CO-Synch + CIDR

Bos Indicus

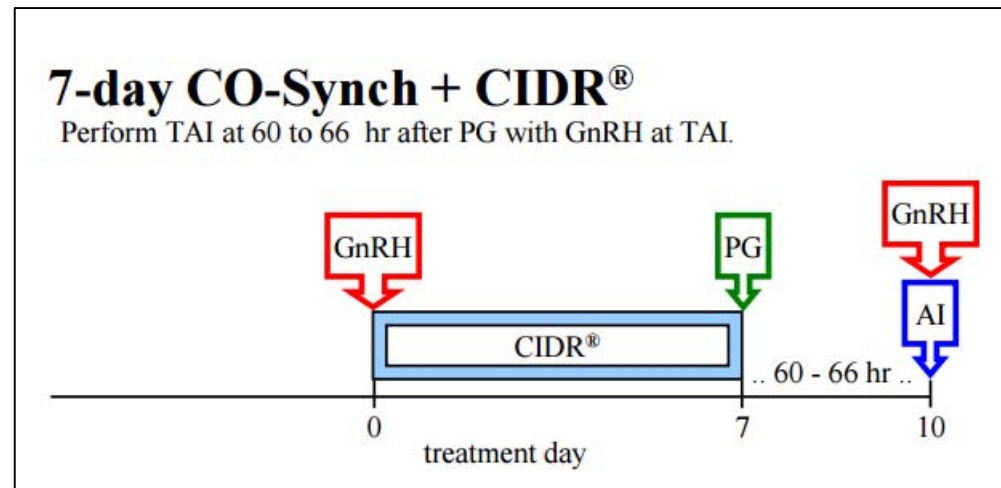


7-day CO-Synch + CIDR[®]



7-day CO-Synch + CIDR[®]

Advantages/Disadvantages



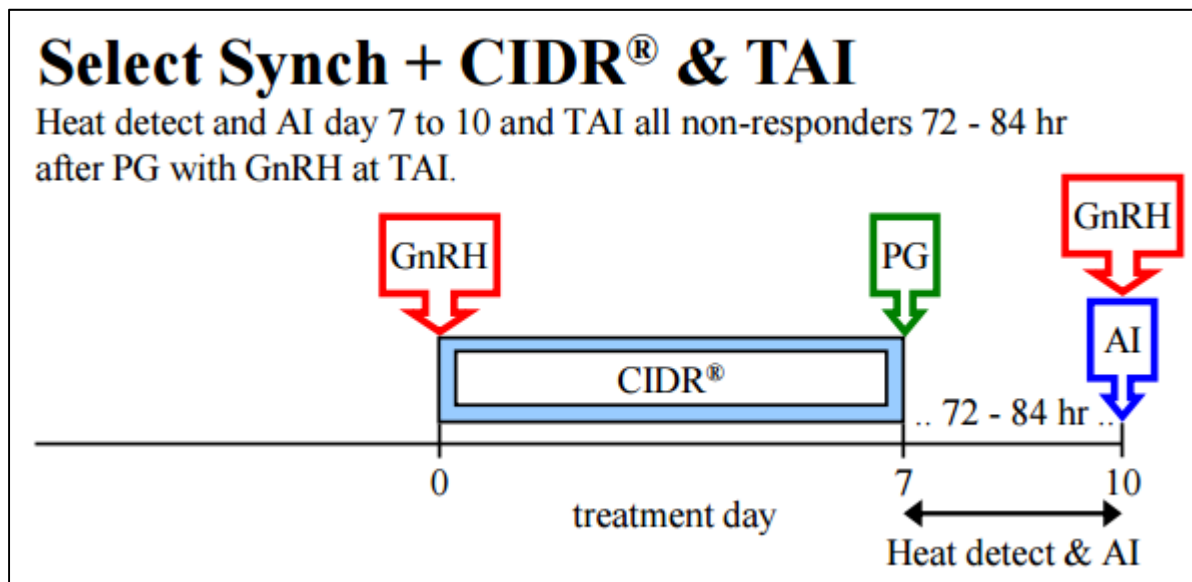
- Advantages

- Can induce cyclicity in postpartum anestrous cows
- Overall treatment length is short
- No estrus detection is required

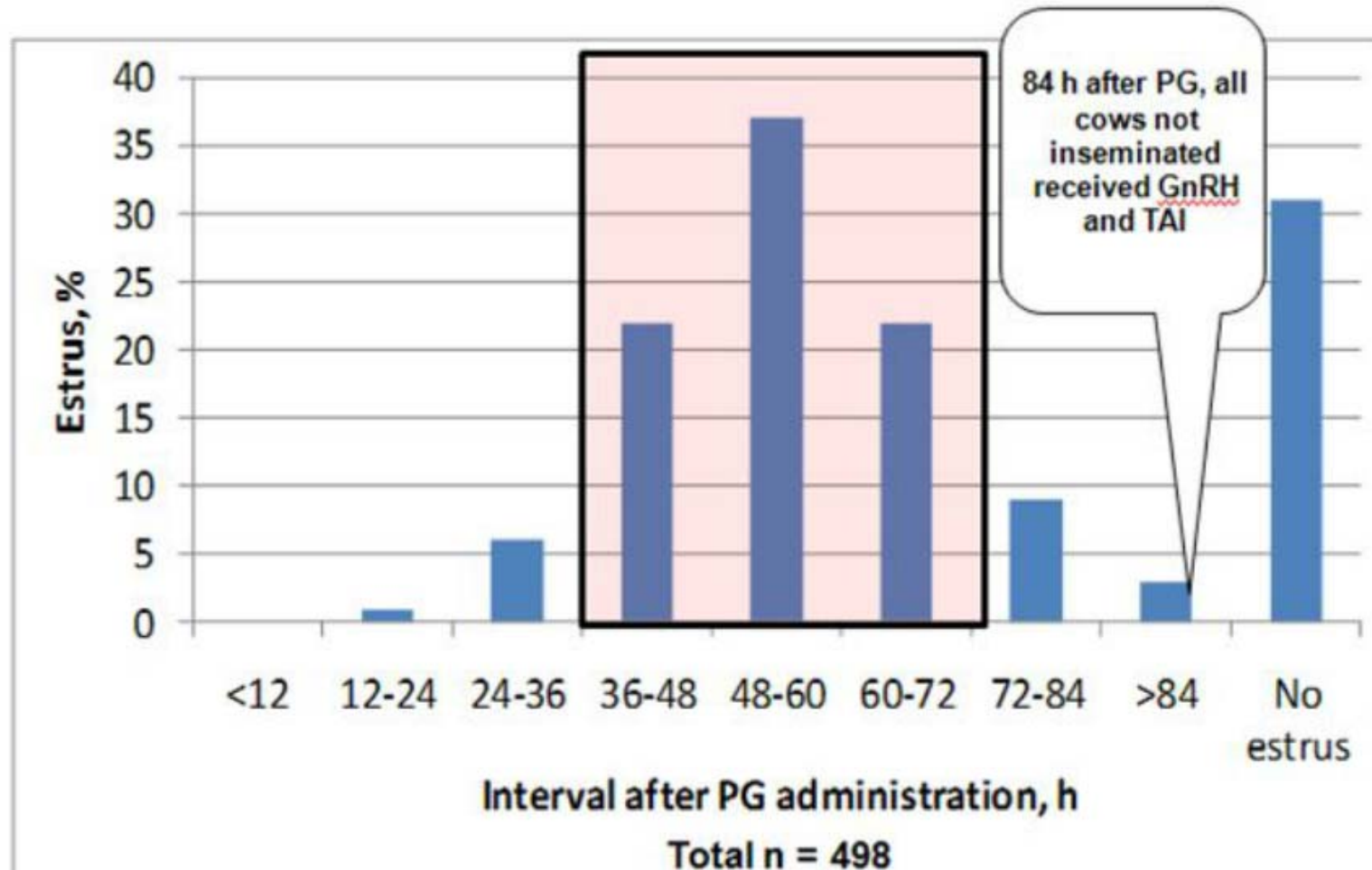
- Disadvantages

- Labor required for CIDR insertion and removal
- More risk involved - must pay attention to timing

Select Synch + CIDR[®] & TAI



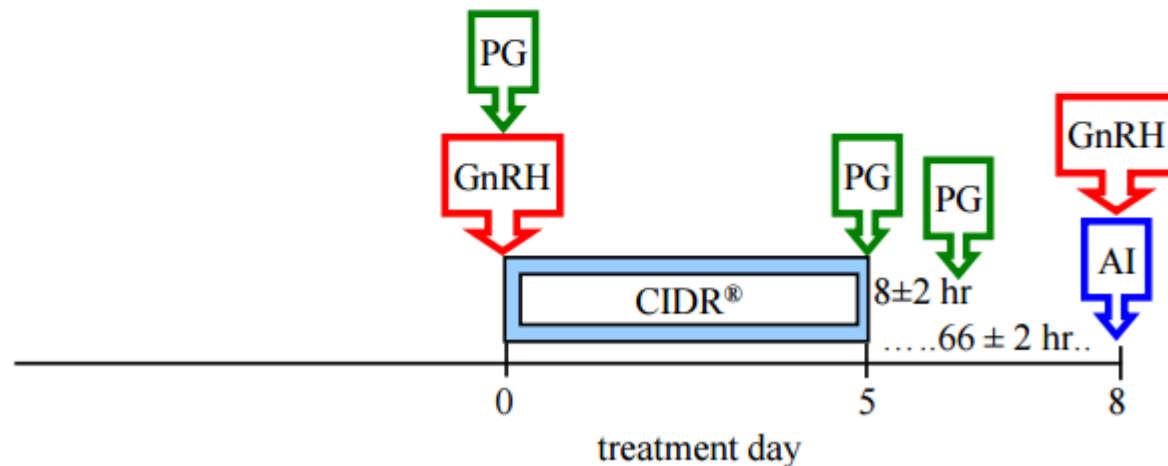
Estrus Response to Select Synch + CIDR[®] & TAI



FIXED-TIME AI (TAI)* for *Bos Indicus* cows only

PG 5-day CO-Synch + CIDR[®]

Perform TAI at 66 ± 2 hr after CIDR removal with GnRH at TAI.
Two injections of PG 8 ± 2 hr apart are required for this protocol.



Comparison of Protocols

Heat detection	No. of cows	Time of AI	Pregnancy rate
Select Synch	528	--	45% <small>BRTF, 2008</small>
Select Synch + CIDR	514	--	50% <small>BRTF, 2008</small>
Heat detection & TAI	No. of cows	Time of TAI	Pregnancy rate
Select Synch	507	84 h	53% <small>Larson et al., 2006</small>
Select Synch + CIDR	498	84 h	58% <small>Larson et al., 2006</small>
Fixed-time AI	No. of cows	Time of FTAI	Pregnancy rate
7-day CO-Synch + CIDR	7028	66 h	62% <small>Patterson et al., 2010</small>
5-day CO-Synch + CIDR	2189	72 h	62% <small>Johnson et al., 2010</small>

Heifer Protocols

- Heat Detection Protocols
 - 1 shot PG
 - 7 day CIDR-PG
 - MGA-PG

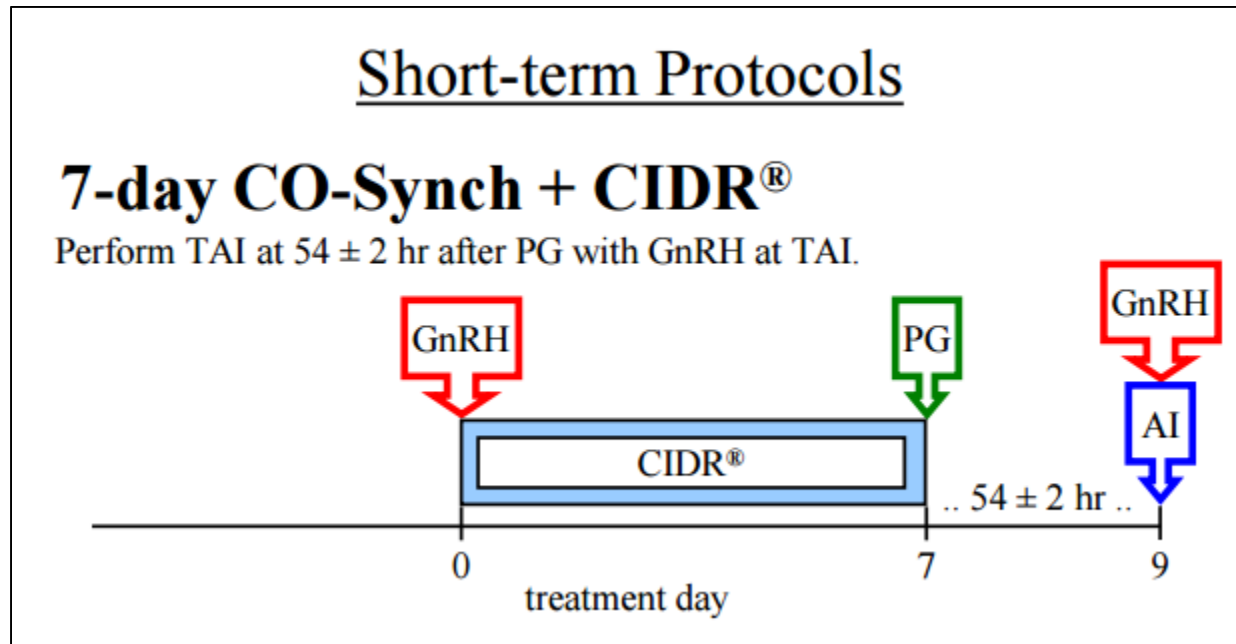


Heifer Protocols

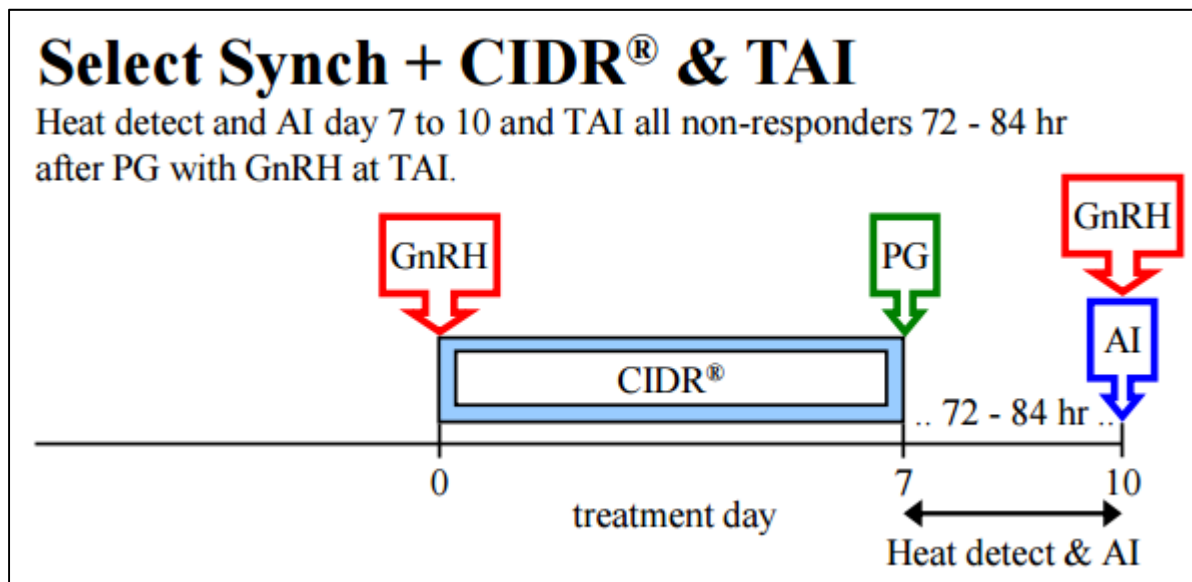
- Fixed-time AI (FTAI)
 - 7 Day CO-Synch + CIDR
 - MGA-PG
 - 14-day CIDR-PG



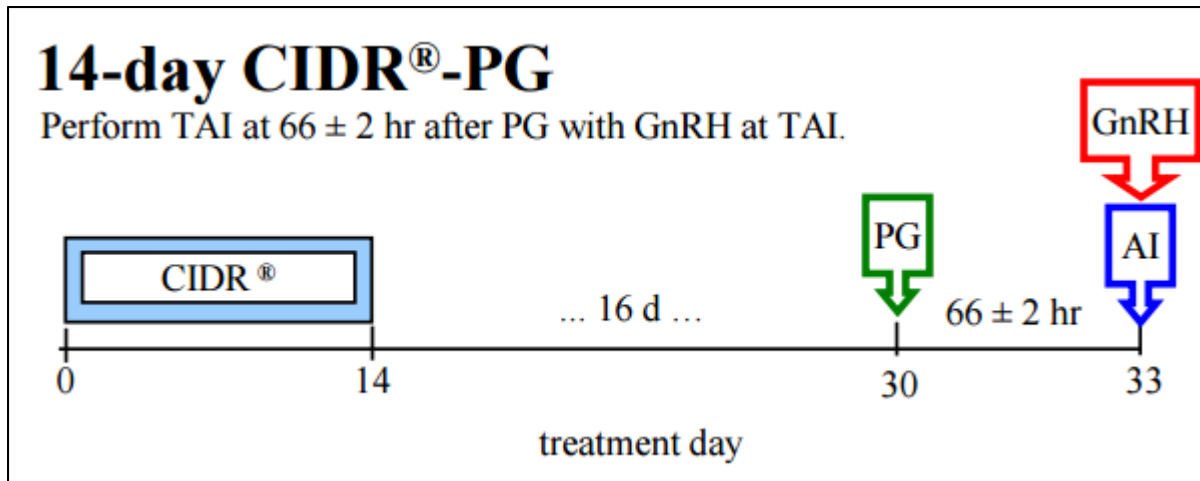
7-day CO-Synch + CIDR[®]



Select Synch + CIDR[®] & TAI



14-day CIDR[®]-PG

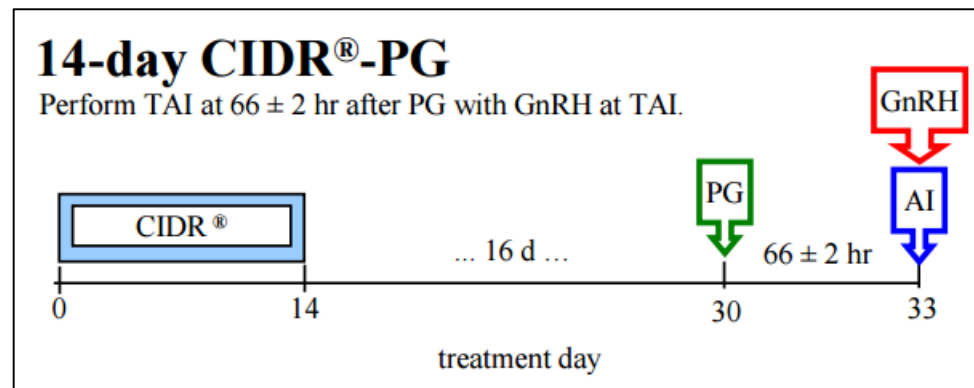


14-day CIDR[®]-PG

Advantages/Disadvantages

- Advantages

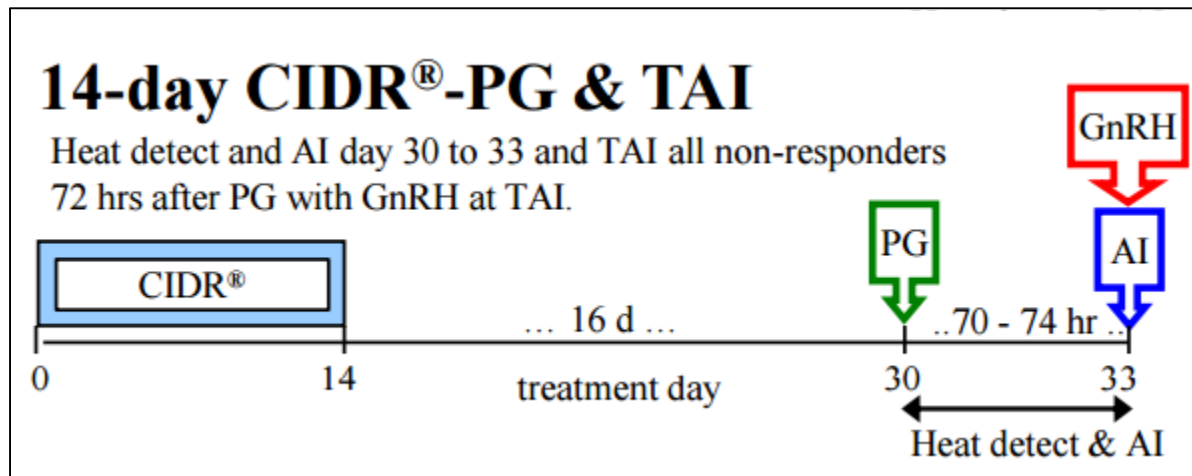
- Can induce cyclicity in peripubertal heifers*
- No estrus detection required
- Consistent results



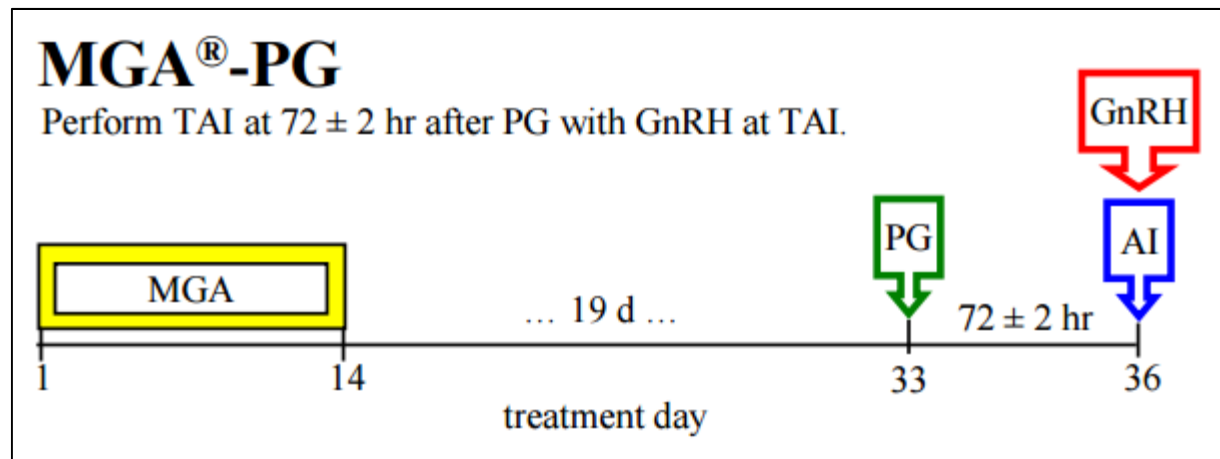
- Disadvantages

- Length of the treatment protocol
- Requires proper planning
- More risk involved - you must pay attention to timing and details

14-day CIDR[®] -PG & TAI



MGA[®]-PG

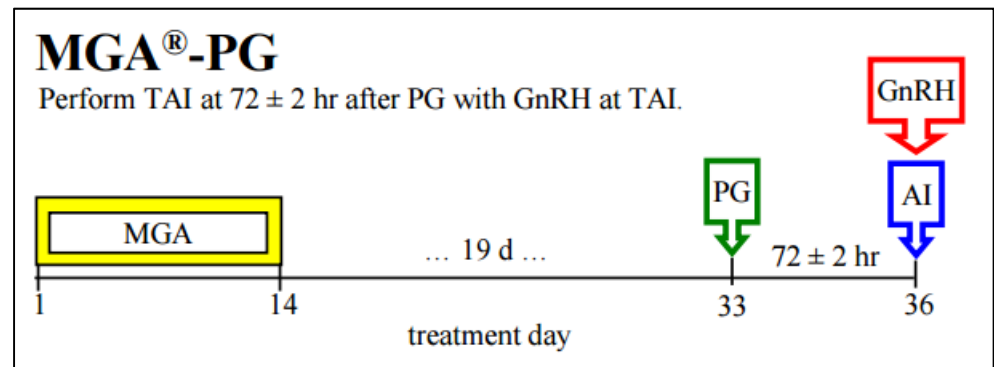


MGA[®] -PG

Advantages/Disadvantages

- Advantages

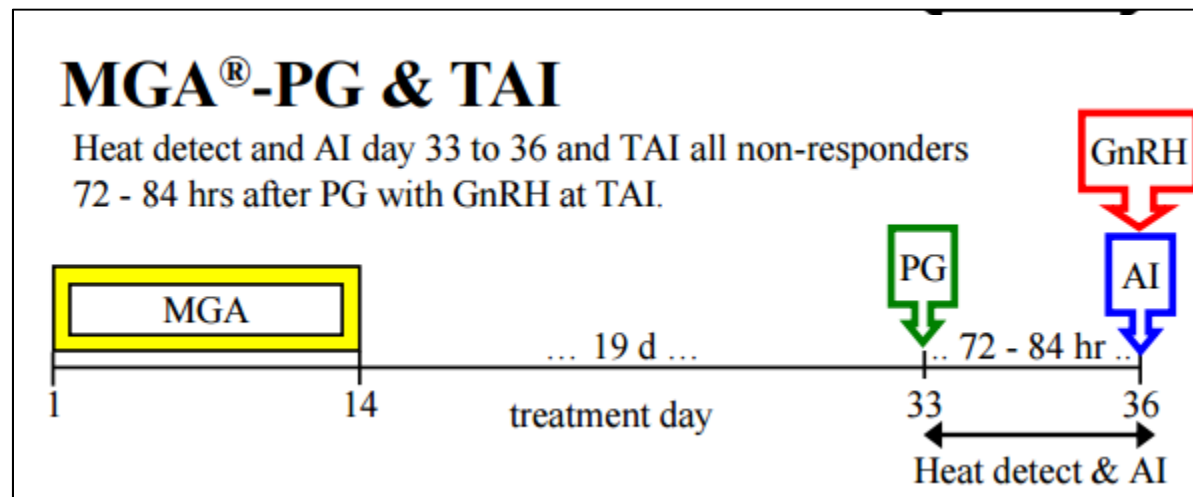
- Can induce cyclicity in peripubertal heifers*
- Less expensive than CIDR
- No estrus detection is required



- Disadvantages

- Heifers must consume adequate amounts of MGA daily
- Overall treatment is 36 days which requires proper planning
- More risk involved - you must pay attention to timing and details

MGA-PG & TAI



Comparison of Protocols

Heat detection	No. of heifers	Time of AI	Pregnancy rate
1 Shot PG	2700	--	45 % <small>BRTF, 2008</small>
7-day CIDR-PG	147	--	51 % <small>BRTF, 2008</small>
MGA-PG	1302	--	59 % <small>BRTF, 2008</small>
Heat detection & TAI	No. of heifers	Time of TAI	Pregnancy rate
Select Synch + CIDR	504	84 h	57 % <small>Lamb et al., 2006</small>
MGA-PG	1826	72 h	56 % <small>BRTF, 2008</small>
14-day CIDR-PG	79	72h	62 % <small>BRTF, 2010</small>
Fixed-time AI	No. of heifers	Time of FTAI	Pregnancy rate
CO-Synch + CIDR	340	54 h	52 % <small>BRTF, 2008</small>
MGA-PG	158	60 h	47 % <small>Johnson & Day, 2006</small>
14-day CIDR-PG	734	66 h	63 % <small>Patterson et al., 2010</small>



Bull Investment - Annual Bull and Per Cow Cost Calculator

Partial Budget

Natural Service Sire Costs

Bull Maintenance Costs	\$600.00
Average Purchase Cost of Bull	\$4,000.00
Useful Life	4
Salvage Value	\$105.00
Salvage Weight, Lb.	1,800
Interest Rate Used, %	6.0

Cowherd Related Costs

Number Of Cows In The Herd	34
Expected Price Of Weaned Calf, Per Cow	\$165.00

Artificial Insemination Related Costs

Additional Labor	\$4.10
Facilities & Equipment	\$0.00
Estrous Synch Products	\$13.08
Semen	\$18.00
Artificial Insemination Technician	\$5.00

Decision Rule

Gain/Loss Per Exposed Cow	\$69.17
Gain/Loss Per Herd	\$2,351.78

Derived Inputs

Increased Returns	\$64.17	Decreased Returns	\$0.00
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<http://nfrec.ifas.ufl.edu/ai-cowculator/>



Resources



Authors:

- | | |
|------------------------|-----------------------|
| Dr. G. Cliff Lemb | Derren D. Henry |
| Dr. Nicolar DiLoreanzo | Vitor R.G. Mercadante |
| Dr. John Rodgers | Paula M. Mercadante |
| | Francine Mezzier |



Estrus Synchronization Planner

synch 16.3

Producer Name: _____
 Address: _____
 Town: _____
 Phone Number: _____
 Group: _____
 Prepared by: _____
 Phone Number: _____

Inputs

Tips

Breed Type: 1=Bos taurus, 2=Bos indicus influence

System Type: 1=Estrus AI, 2=Estrus AI & Clean-up AI, 3=Fixed-Time AI

Synchronization Protocol: select number from lists below

Date to start breeding:

Time of day you want to breed:

1
2
16
12/16/2015
5:55 PM

Output

Expected Calving Date:	9/22/2016
CIDR removal:	12/16/15 5:55 PM
Trips Through Chute	3
Head Worked per hour (AI)	60

http://www.iowabeefcenter.org/estrus_synch.html

Footnote for Calendar Printout:

Alternative System 1:	29
Alternative System 2:	
<i>Select number from lists below.</i>	

Heat detect & Clean-up AI Cow Protocols

- 16 = Select Synch + CIDR with E-AI and Cleanup AI
- 19 = Select Synch with E-AI and Cleanup AI
- 33 = PG 6 Day CIDR with E-AI and Cleanup AI

Less Preferred Systems

- 25 = 7 Day CIDR+PG with E-AI and Cleanup AI

Heat detect & Clean-up AI Heifer Protocols

- 16 = Select Synch + CIDR with E-AI and Cleanup AI
- 26= MGA + PG with E-AI and Cleanup AI
- 31=14 Day CIDR+PG with E-AI and Cleanup AI
- 33 = PG 6 Day CIDR with E-AI and Cleanup AI

Less Preferred Systems

- 25 = 7 Day CIDR+PG with E-AI and Cleanup AI

Facilities

- **Facilities must be adequate to confine and handle cattle**

- ***This is not an option***



- **Must be able to catch them to breed them**
- **Good handling facilities reduce stress on both man and beast and increase your odds of success**

Facilities Options



Head Chute



Palpation Rail

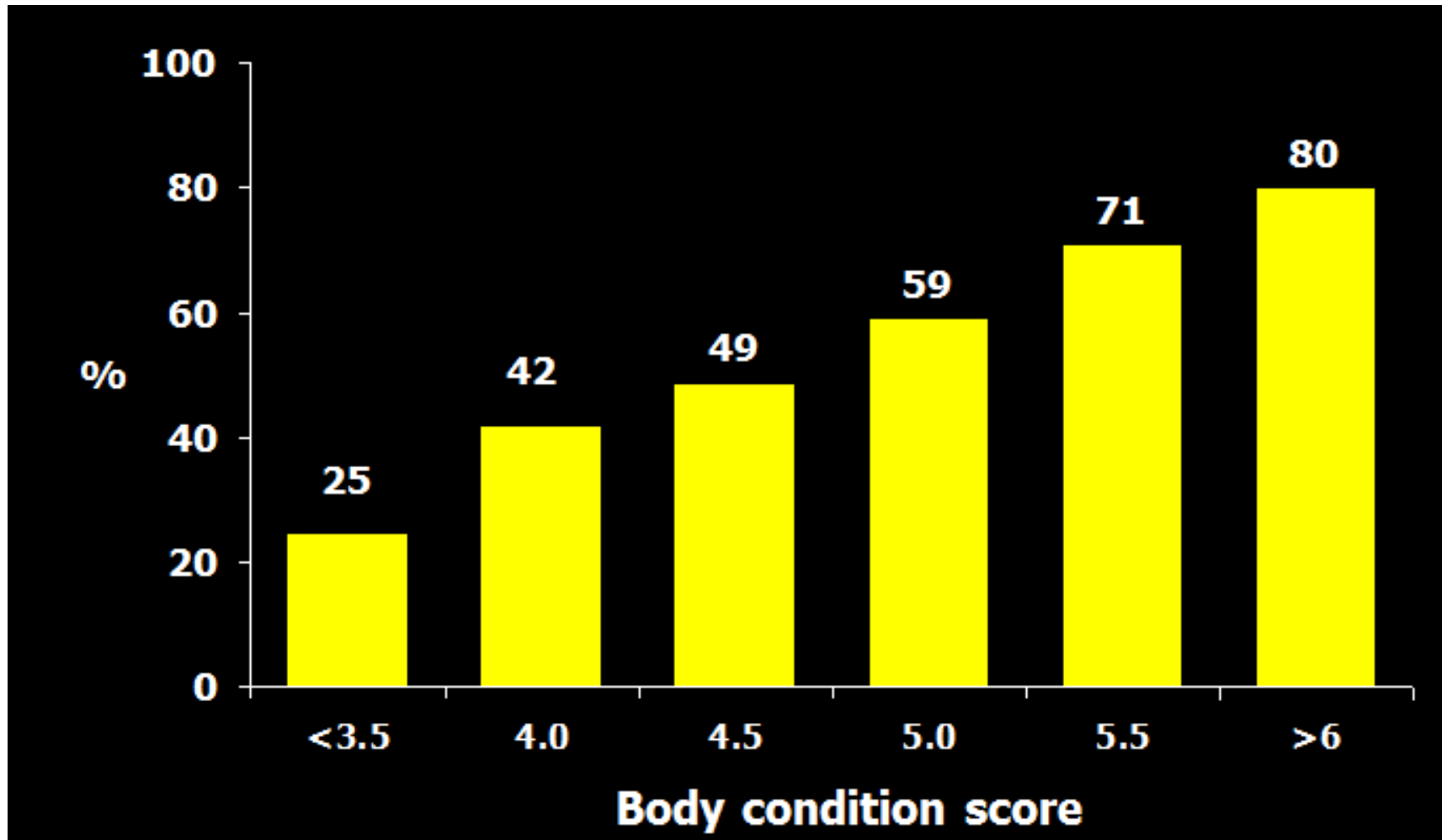
Headlocks



Portable Breeding Barns

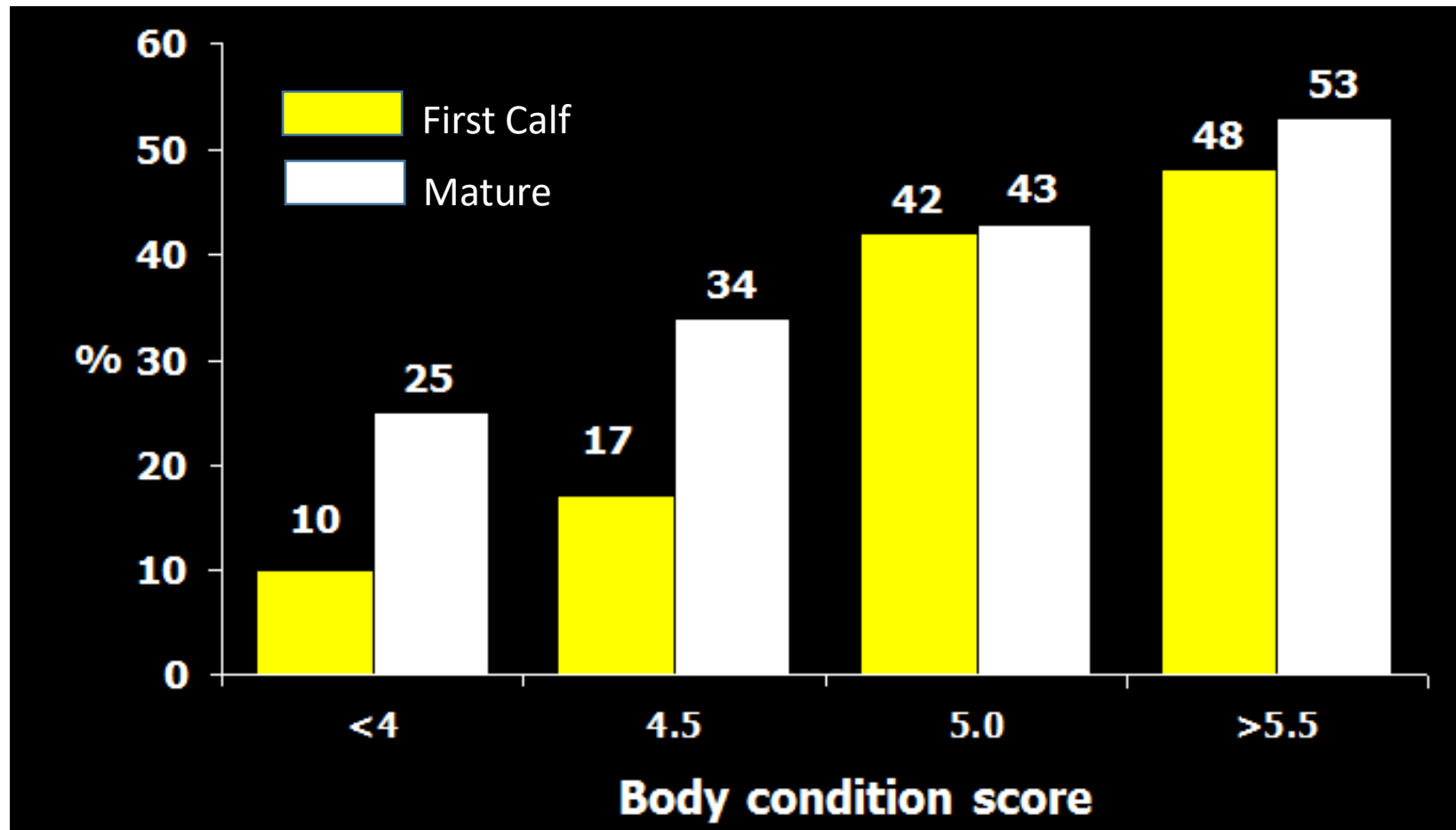


Effect of Body Condition on Cyclicality



(Stevenson et al, 2004)

Effect of Parity and Body Condition on Ovulation Rates



(Stevenson et al, 2004)

Body Condition Score 5



BCS 4 and 5



BCS 5



BCS 4

BCS 5 and 6



BCS 5



BCS 6

Herd Health

- No vaccines should be given to naive cattle within 30 days of breeding.
- Vaccination should ideally take place 45 to 60 days prior to breeding.

ID & Record Keeping

- Identification is a must
- Records allow for better management and provide the only real means for evaluating the success of your AI program
 - Heat dates
 - Breeding dates
 - Pregnancy check
 - Calving dates
 - Parentage



Any Questions?

