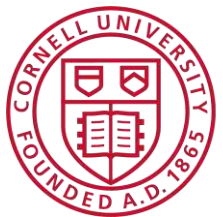


Using cow physiology for designing effective re-breeding programs

Julio Giordano, DVM, MS, PhD

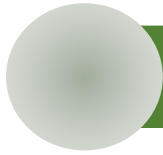
**Dairy Cattle Biology and Management Laboratory
Department of Animal Science**

Vermont Veterinary Medical Association, Vermont
February 4th, 2023

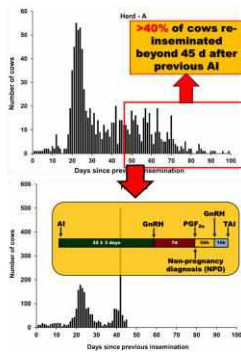


Cornell CALS
College of Agriculture and Life Sciences

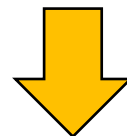
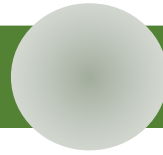
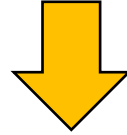
Nuts and bolts of 2+ AI programs



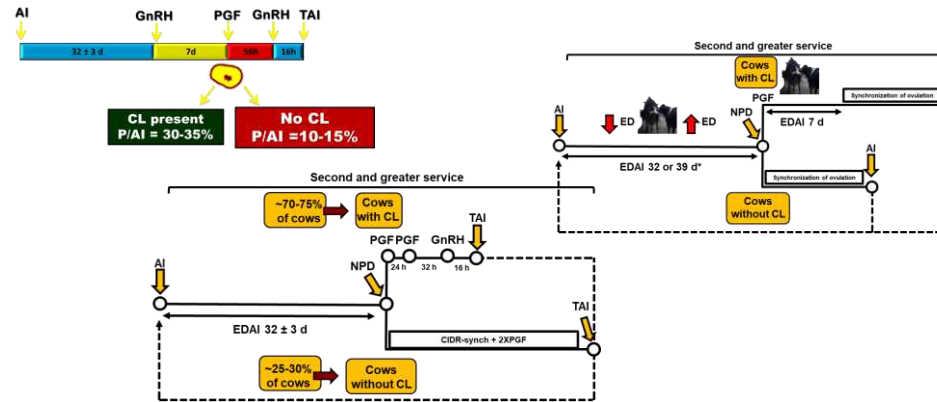
Value of AIE + TAI



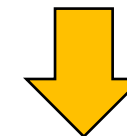
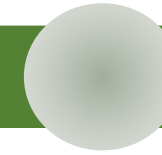
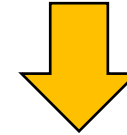
Using ovarian physiology for targeted management



Targeted management options



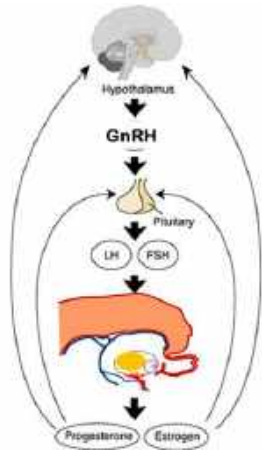
What do we do?



Picking the program that works best

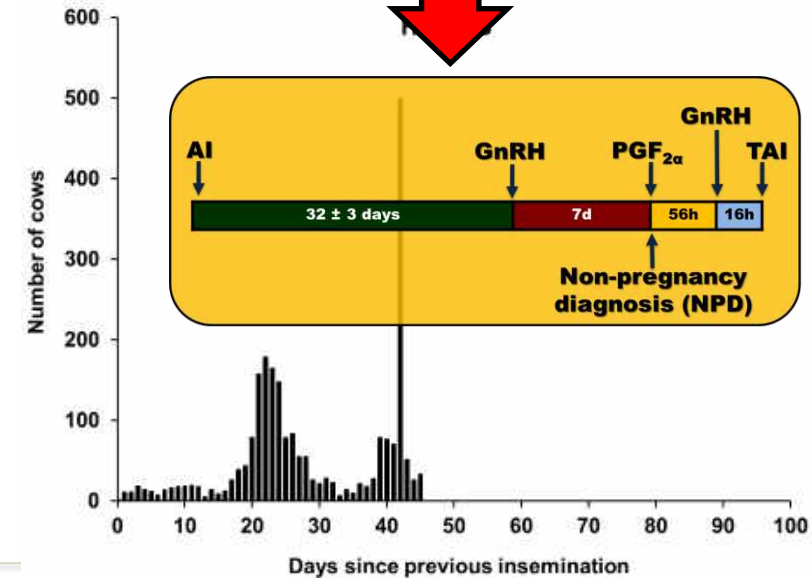
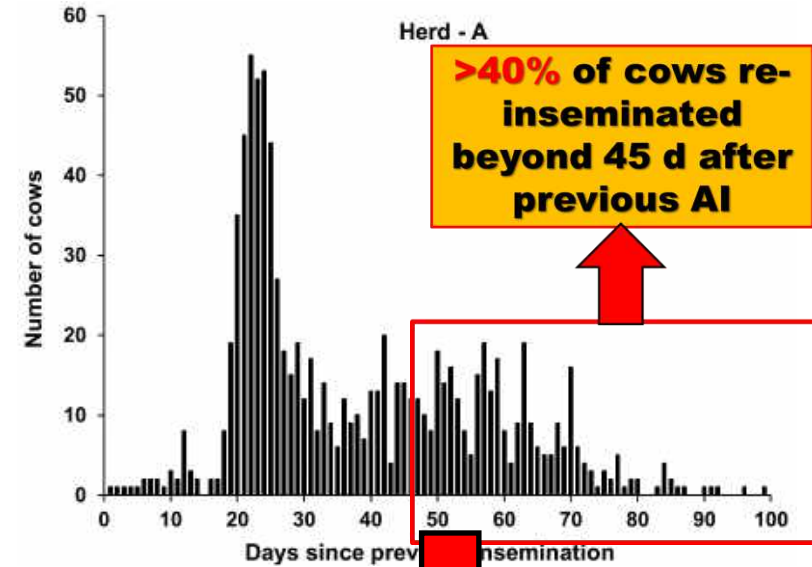


AIE + TAI Programs most Effective for 2+ AI Services

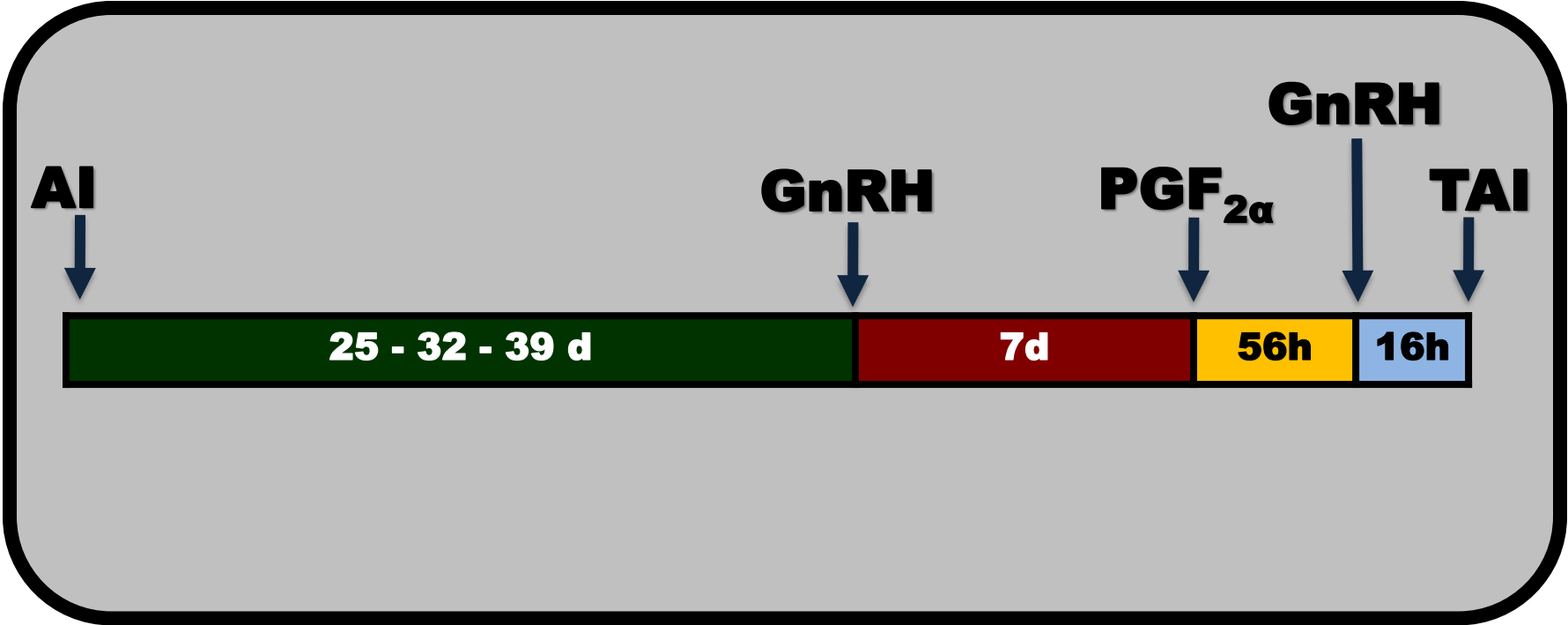


1-anovulation
2-delayed CL reg
- pregnancy loss

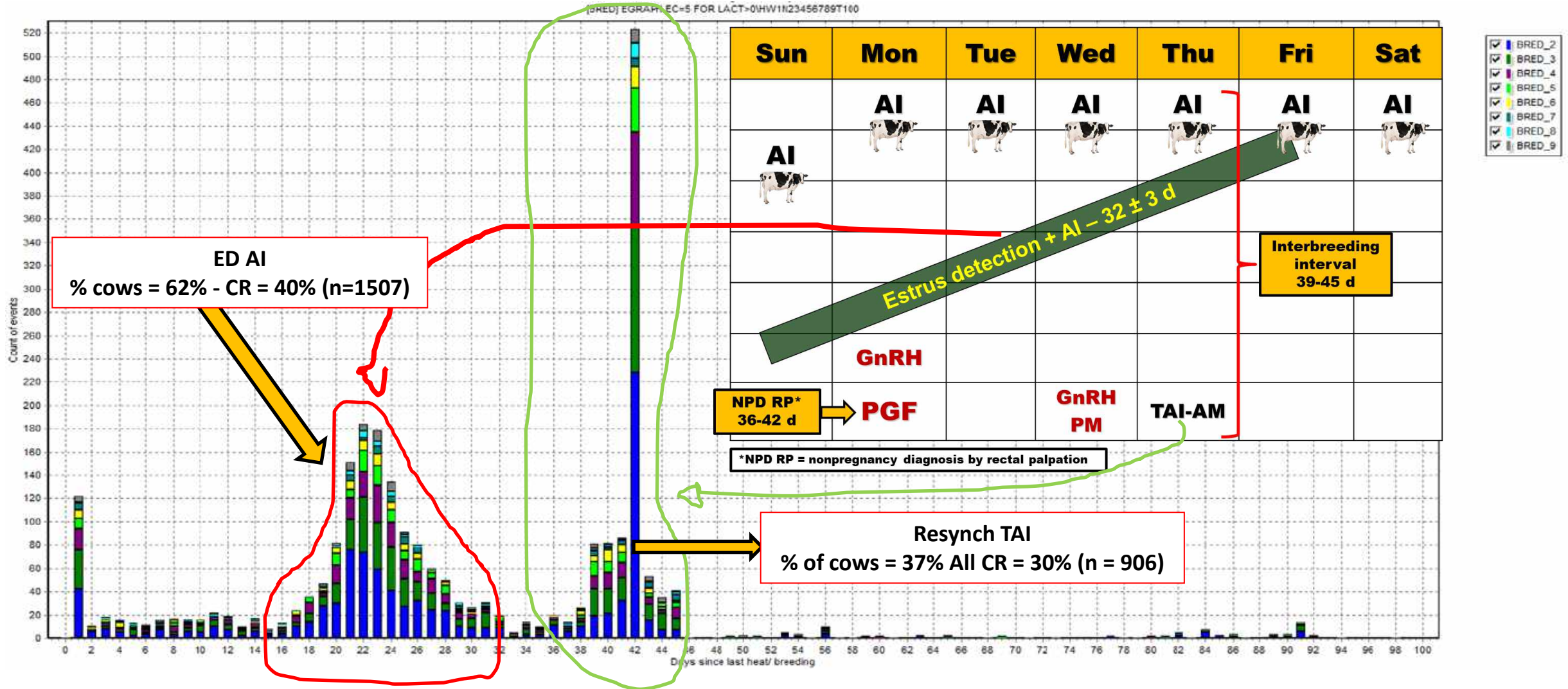
Giordano et al., (2015)
 Stevenson et al., (2014)



AIE + Ovsynch is an effective strategy to manage 2+ AI



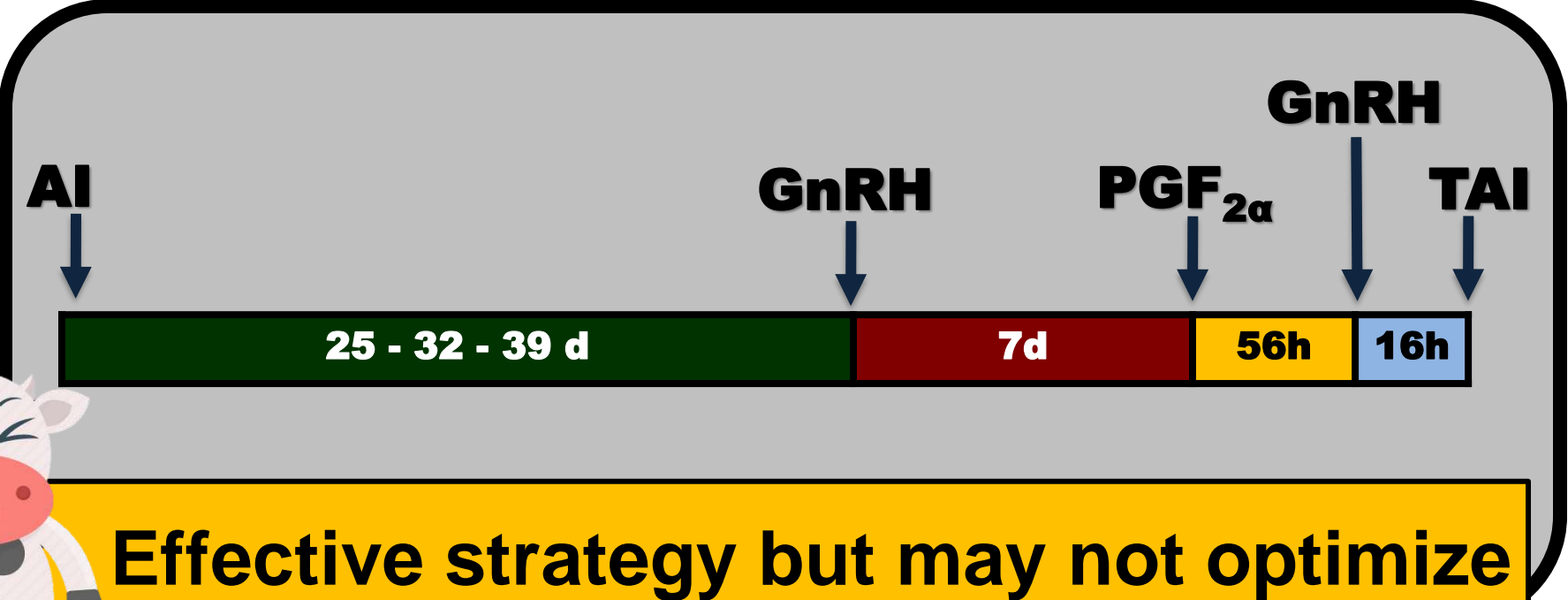
D32-Resynch + Rectal Palpation Example



D32-Resynch + Rectal Palpation Example

Date	Br Elig	Bred	Pct	Pg Elig	Preg	Pct	Aborts
8/25/11	175	121	69	171	45	26	4
9/15/11	176	122	69	168	47	28	10
10/06/11	153	105	69	148	52	35	5
10/27/11	123	92	75	119	33	28	4
11/17/11	109	77	71	102	25	25	3
12/08/11	112	66	59	104	28	27	4
12/29/11	107	78	73	104	29	28	4
1/19/12	120	86	72	115	46	40	3
2/09/12	108	72	67	103	32	31	1
3/01/12	105	69	66	102	25	25	1
3/22/12	116	68	59	112	25	22	0
4/12/12	125	85	68	123	34	28	2
5/03/12	141	99	70	136	39	29	4
5/24/12	153	86	56	149	37	25	2
6/14/12	165	118	72	163	52	32	2
7/05/12	157	107	68	152	38	25	0
7/26/12	136	95	70	0	0	0	0
8/16/12	105	80	76	0	0	0	0
Total	2145	1451	68	2071	587	28	49
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**

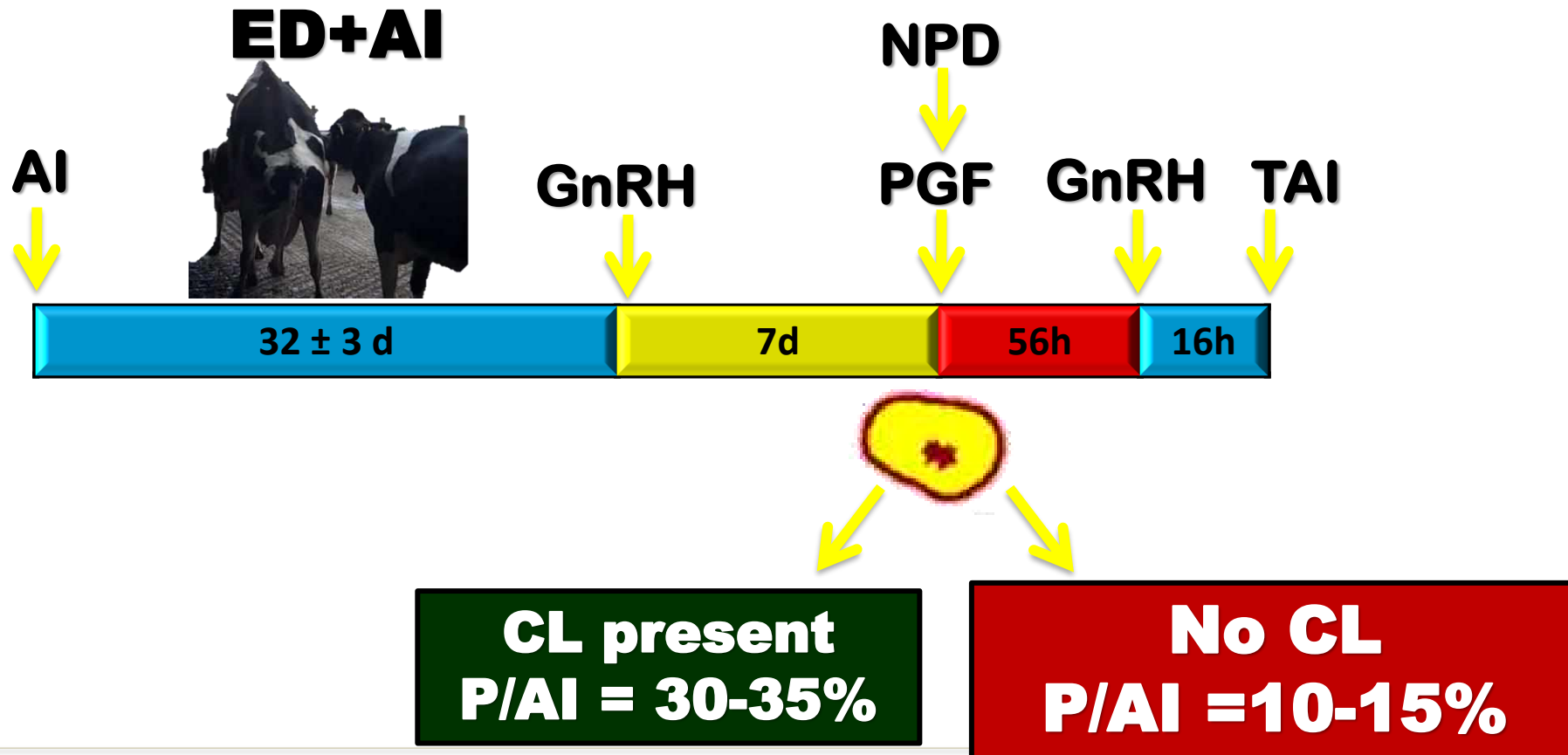
The complex block contains a title, two images, and a connecting arrow. The title is 'Treatments for 2+ AI Based on Ovarian Status'. The first image shows a close-up of a pinkish, fleshy ovary. The second image shows a hand using a yellow ultrasound probe on a device with a screen. A yellow arrow points from the ovary image to the ultrasound image.

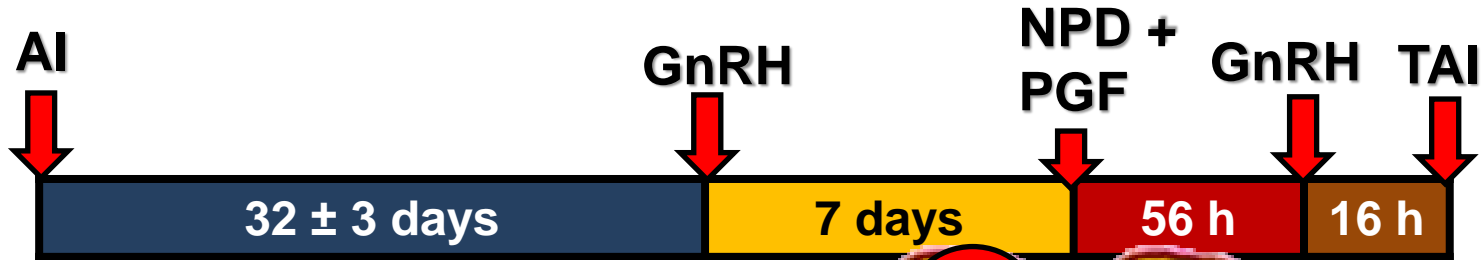
Treatments for 2+ AI Based on Ovarian Status



- ✔ 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

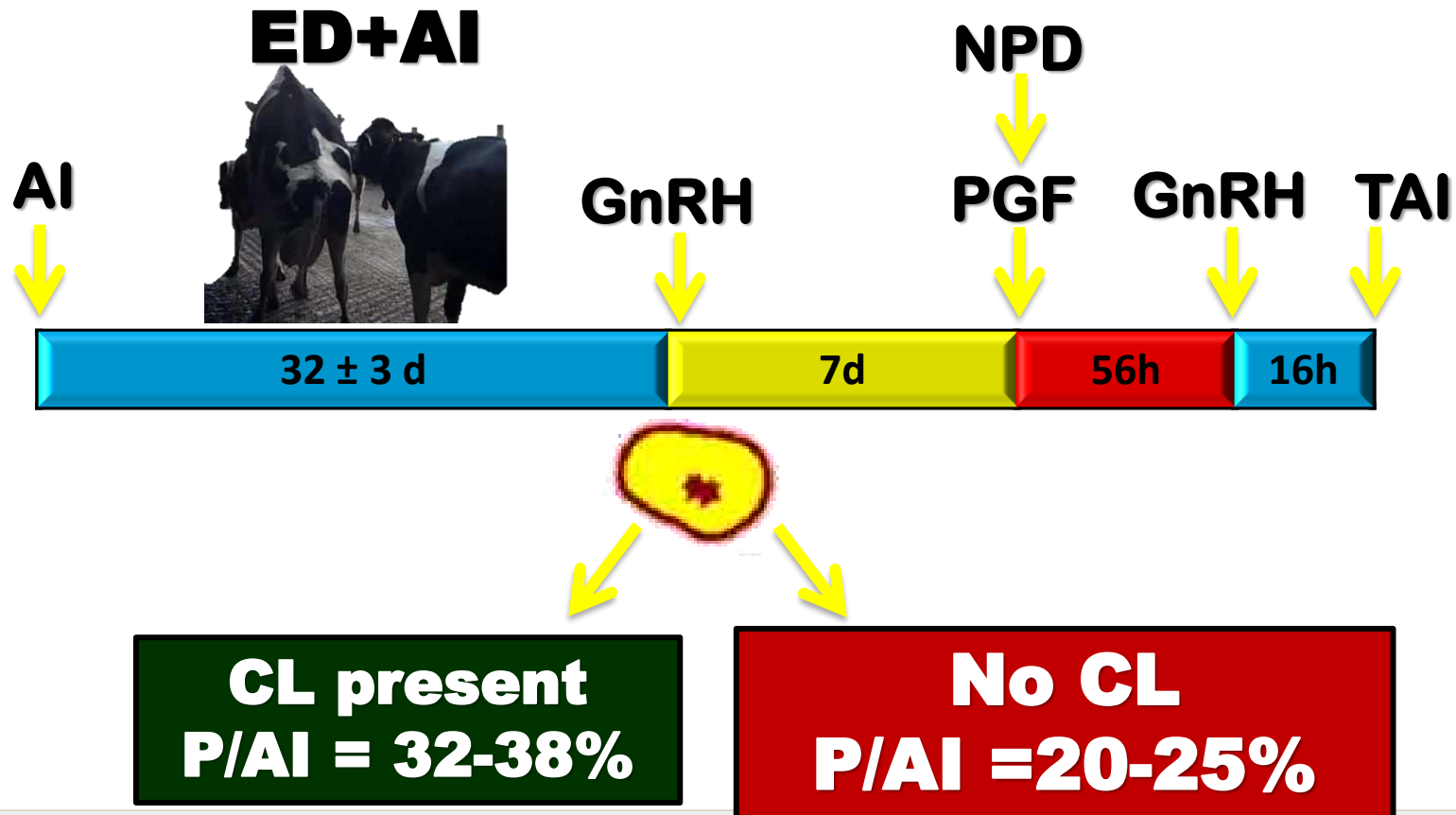




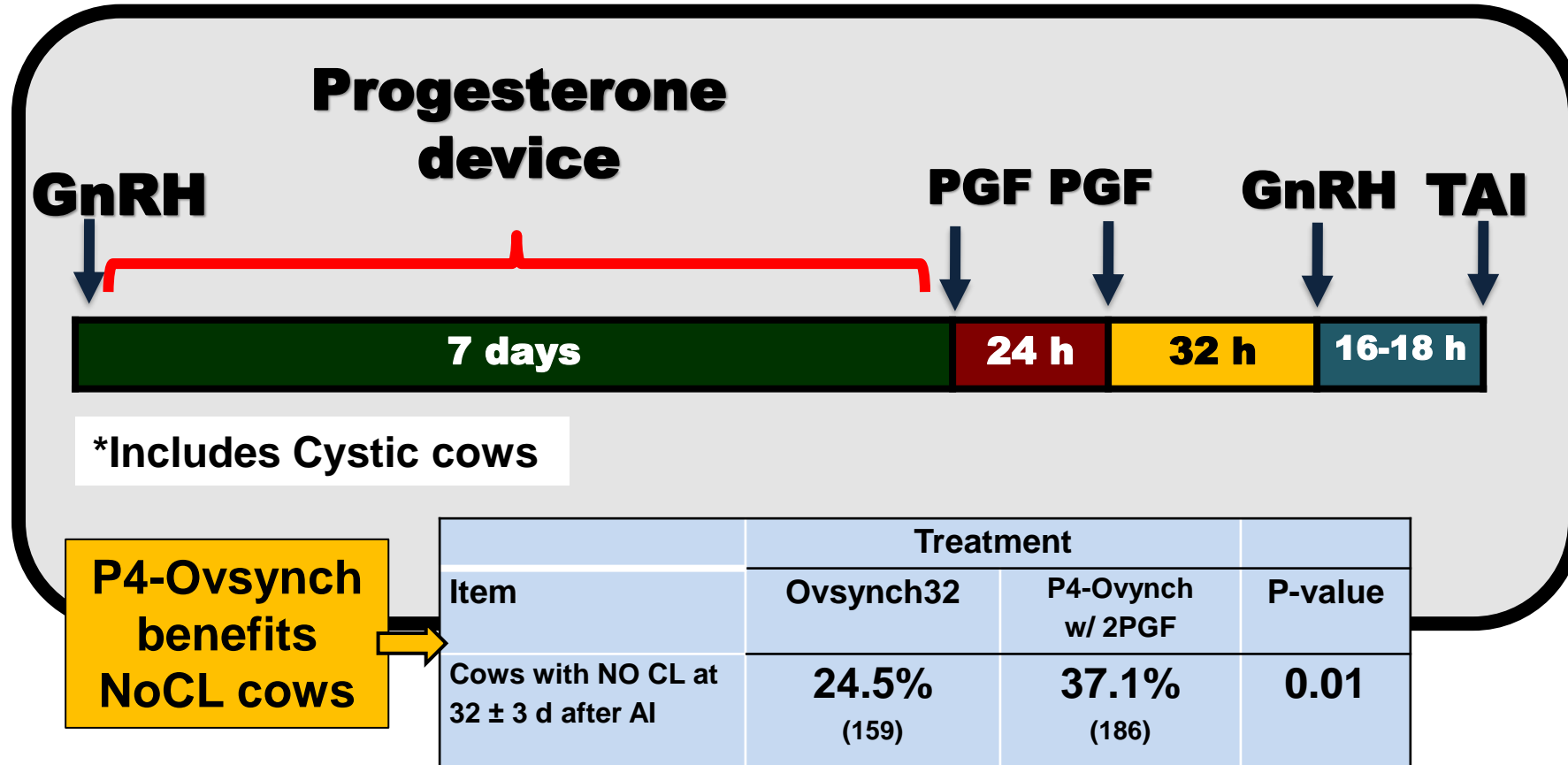
**~50%
Reduction
in fertility**

Study	Cows(%)	Pregnancies per AI, % (n/n)		P-value
		No CL	CL	
Giordano et al., 2012	34.8 (73/210)	9.6 (7/73)	35.8 (49/137)	<0.001
Giordano et al., 2013	22.4 (41/183)	17.1 (7/41)	30.3 (43/142)	0.08
Lopes Jr. et al., 2013	31.6 (61/193)	32.8 (20/61)	41.6 (55/132)	0.21
Fricke et al., 2003	24.2 (29/120)	10.0 (3/29)	28.0 (26/91)	0.04
Stevenson & Tiffany, 2004	24.1 (45/187)	14.6 (7/45)	32.9 (47/142)	<0.001
Chebel et al., 2003	-	16.7	30.1	0.13
Overall	27.9 (249/893)	17.7 (44/249)	34.2 (220/644)	<0.001

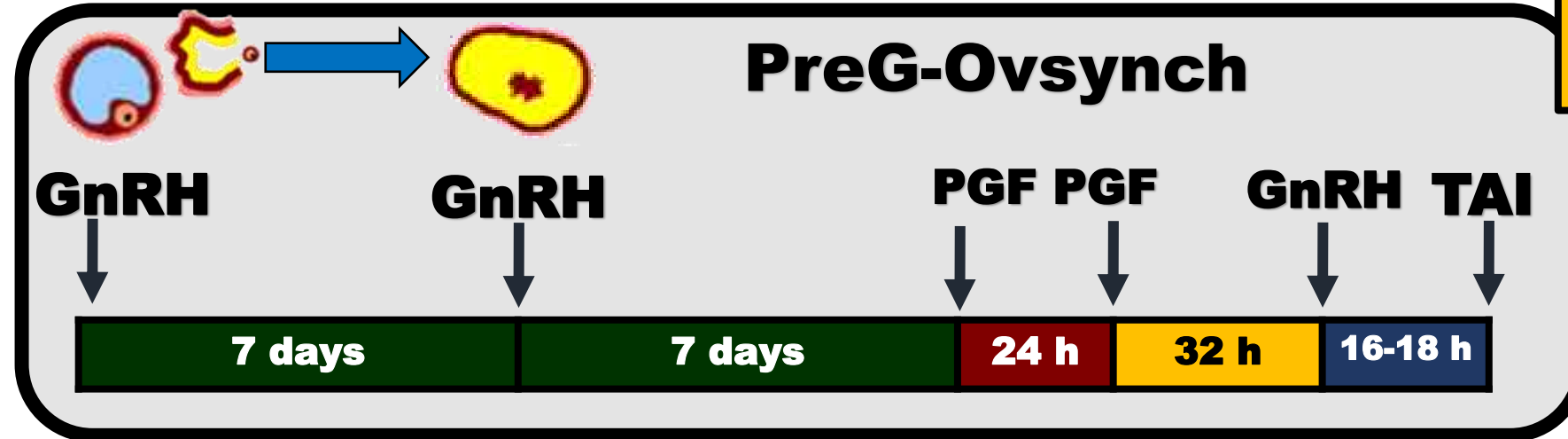
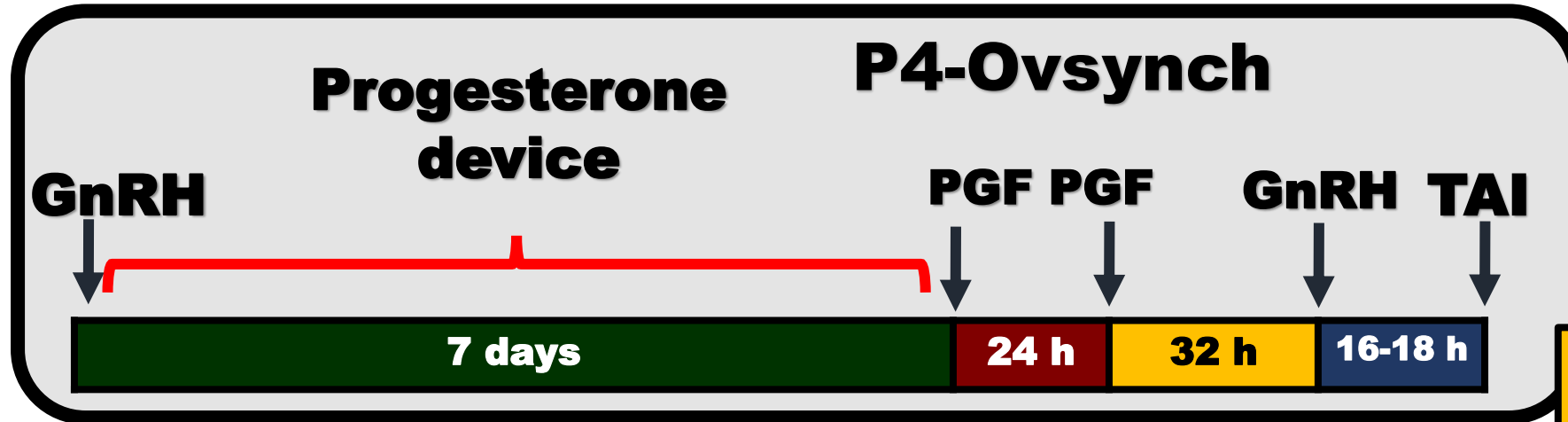
Reassignment of Cows with NoCL at GnRH of Resynch



P4-Ovsynch with 2 PGF Improves P/AI for No CL* cows

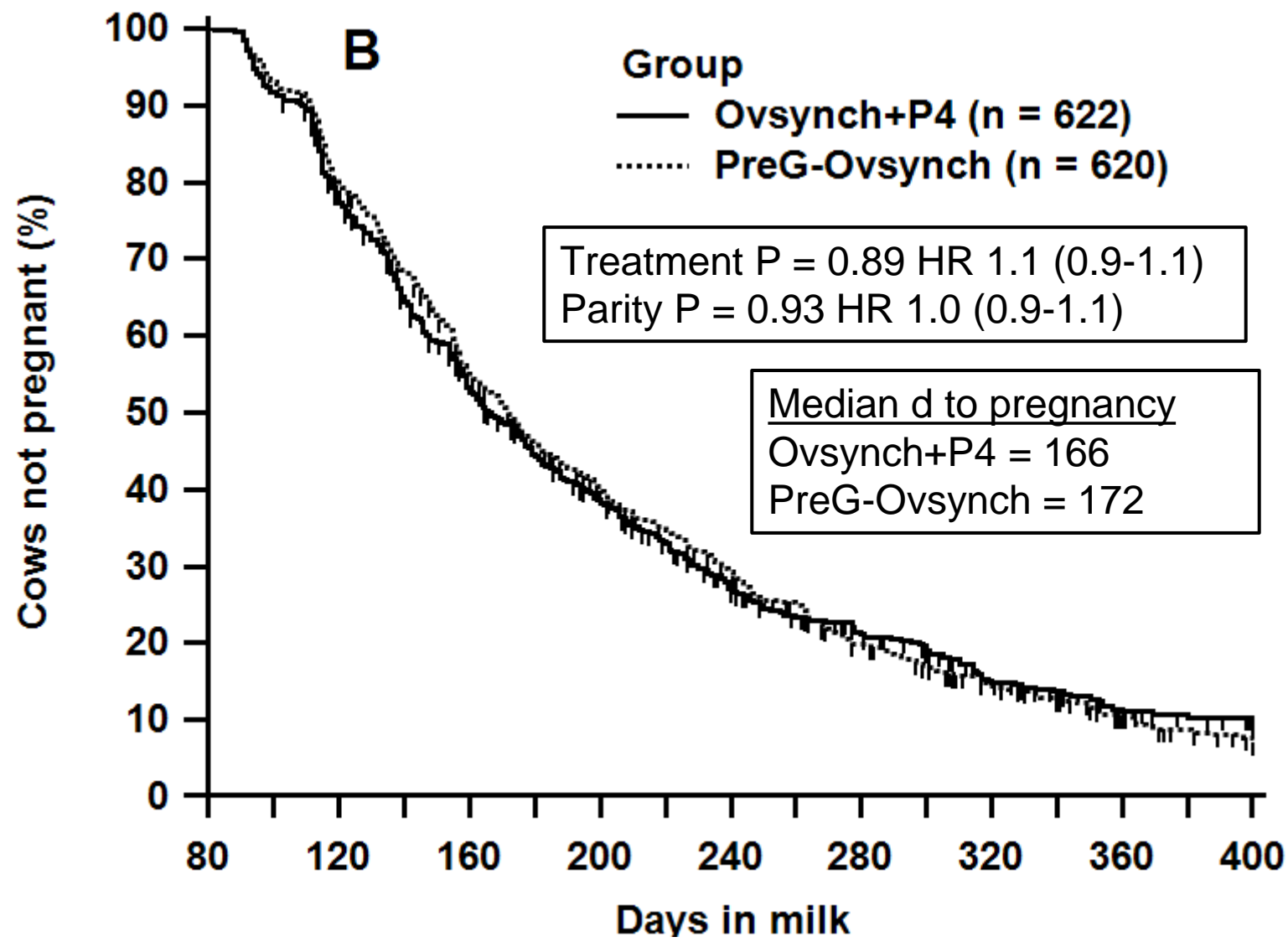


Either exogenous or endogenous P4 for No CL cows works well



**Expected
P/AI = ~35-40%**

Time to Pregnancy Was the same for P4-Ovsynch vs PreG-Ovsynch when used at time of PGF of Resynch



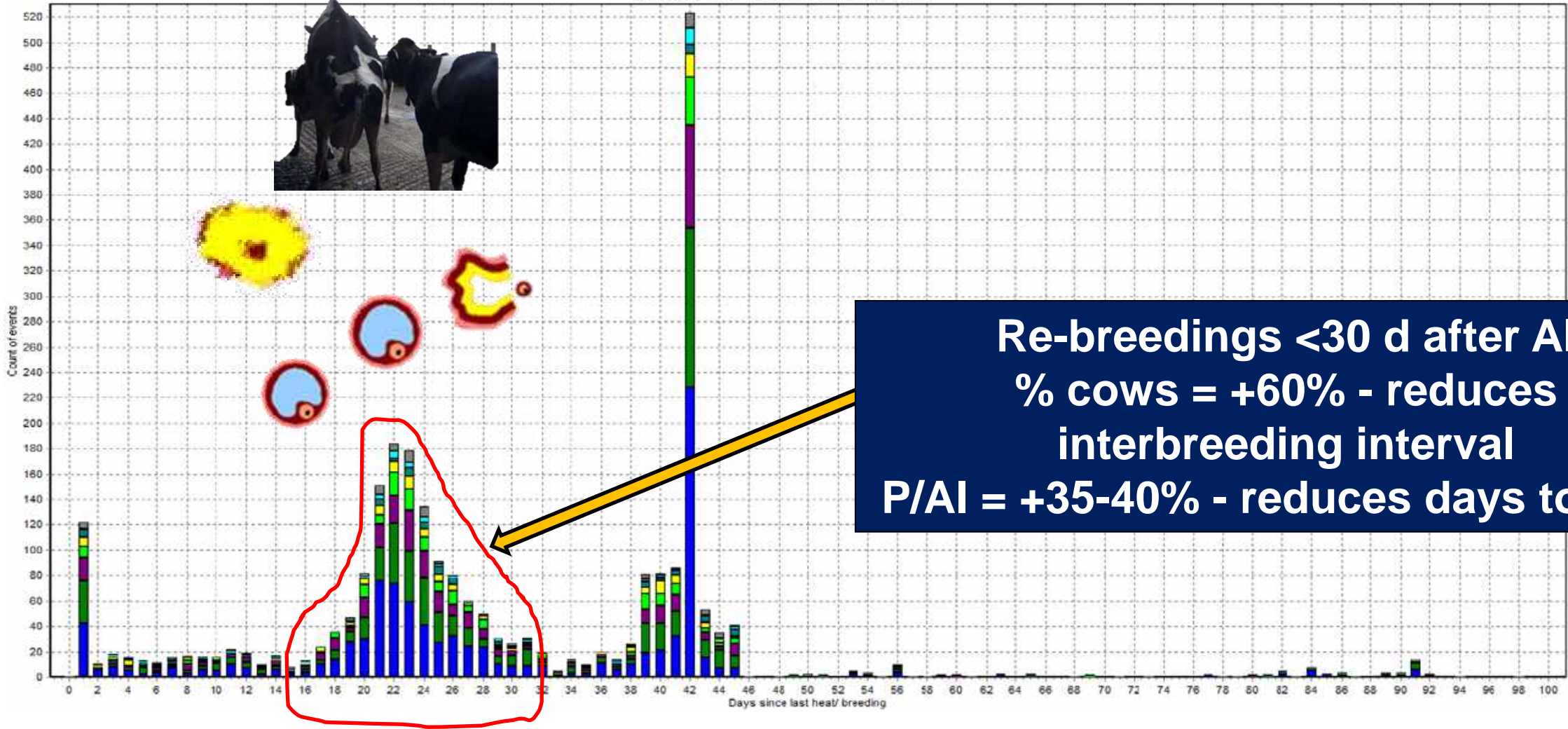
Treatments for 2+ AI Based on Ovarian Status



- ✔ 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)

AI is fastest, cheapest, and easiest way to re-breed non-pregnant cows

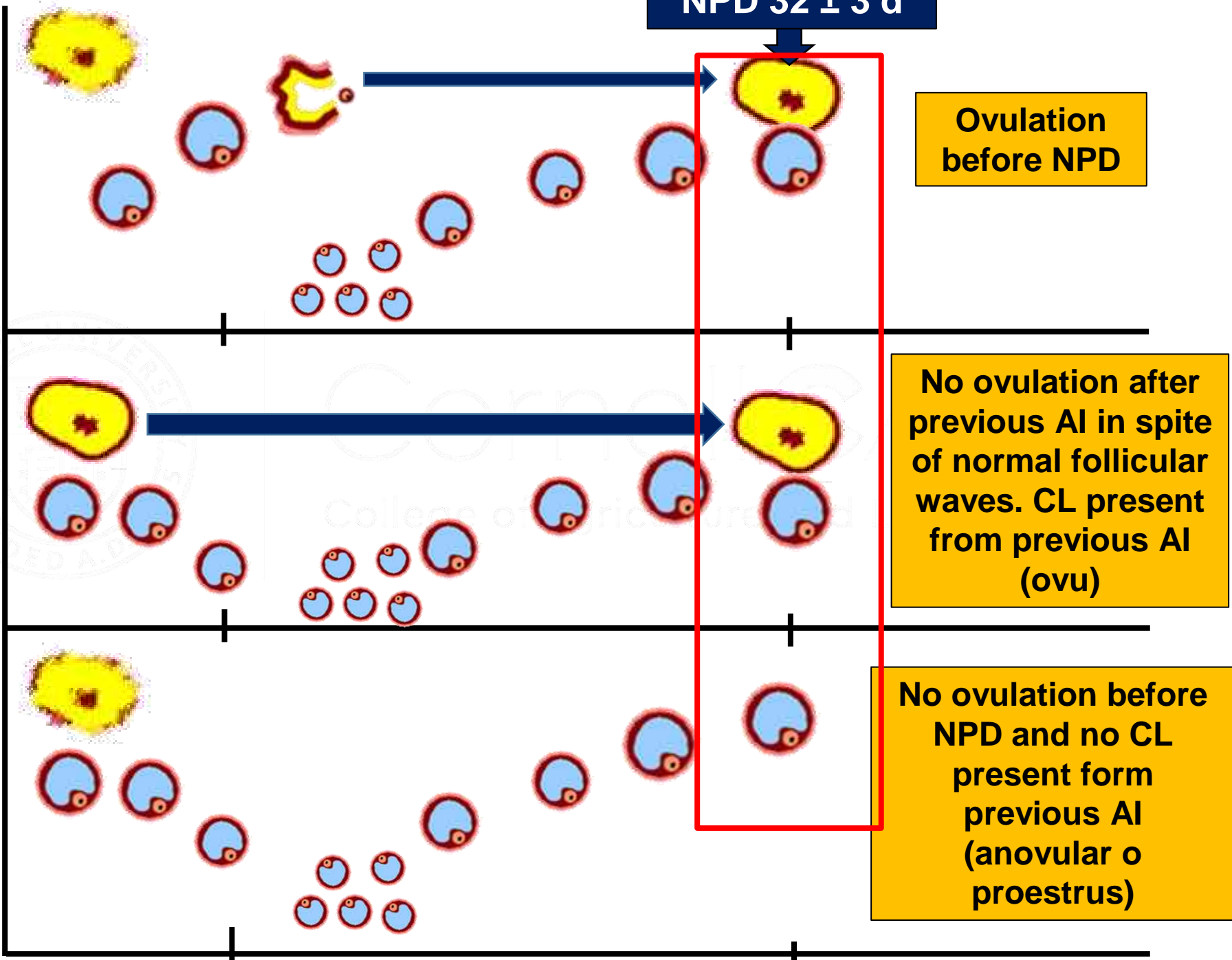
[BRED] EGRAPH EC-5 FOR LACT>0|HW1N23456789T100



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

Previous AI

NPD 32 ± 3 d

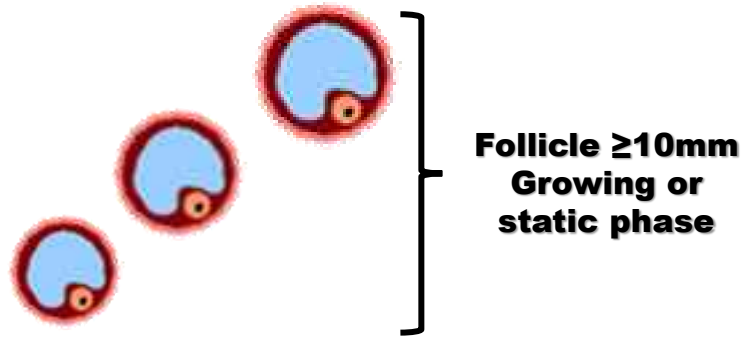


Ovulation before NPD

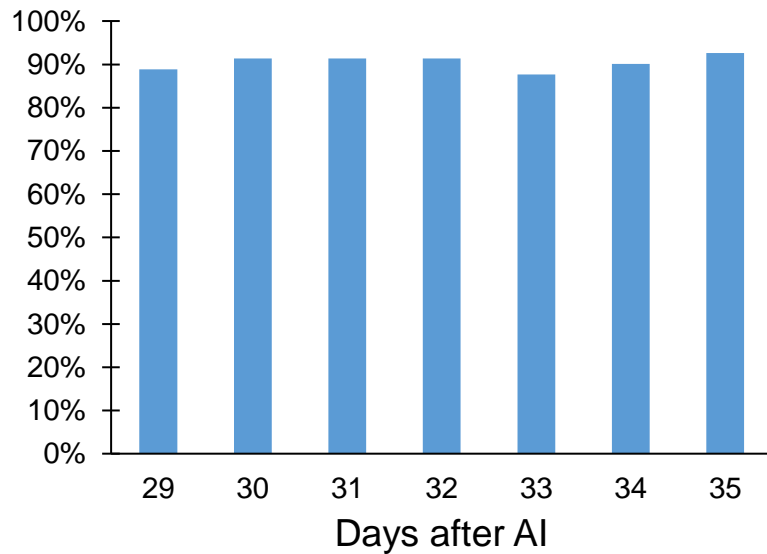
No ovulation after previous AI in spite of normal follicular waves. CL present from previous AI (ovu)

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

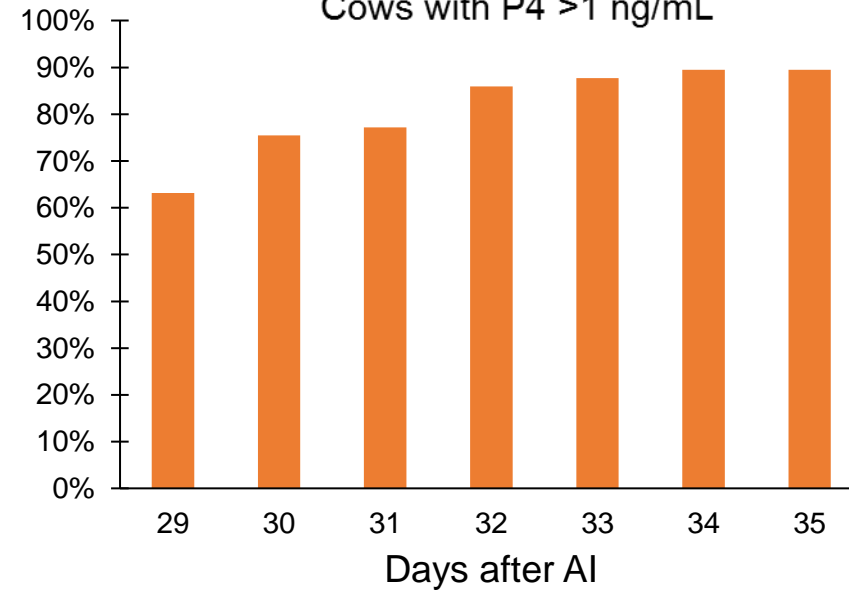
What do cows have on their ovaries 29 to 35 d after AI?



Cows with an active follicle

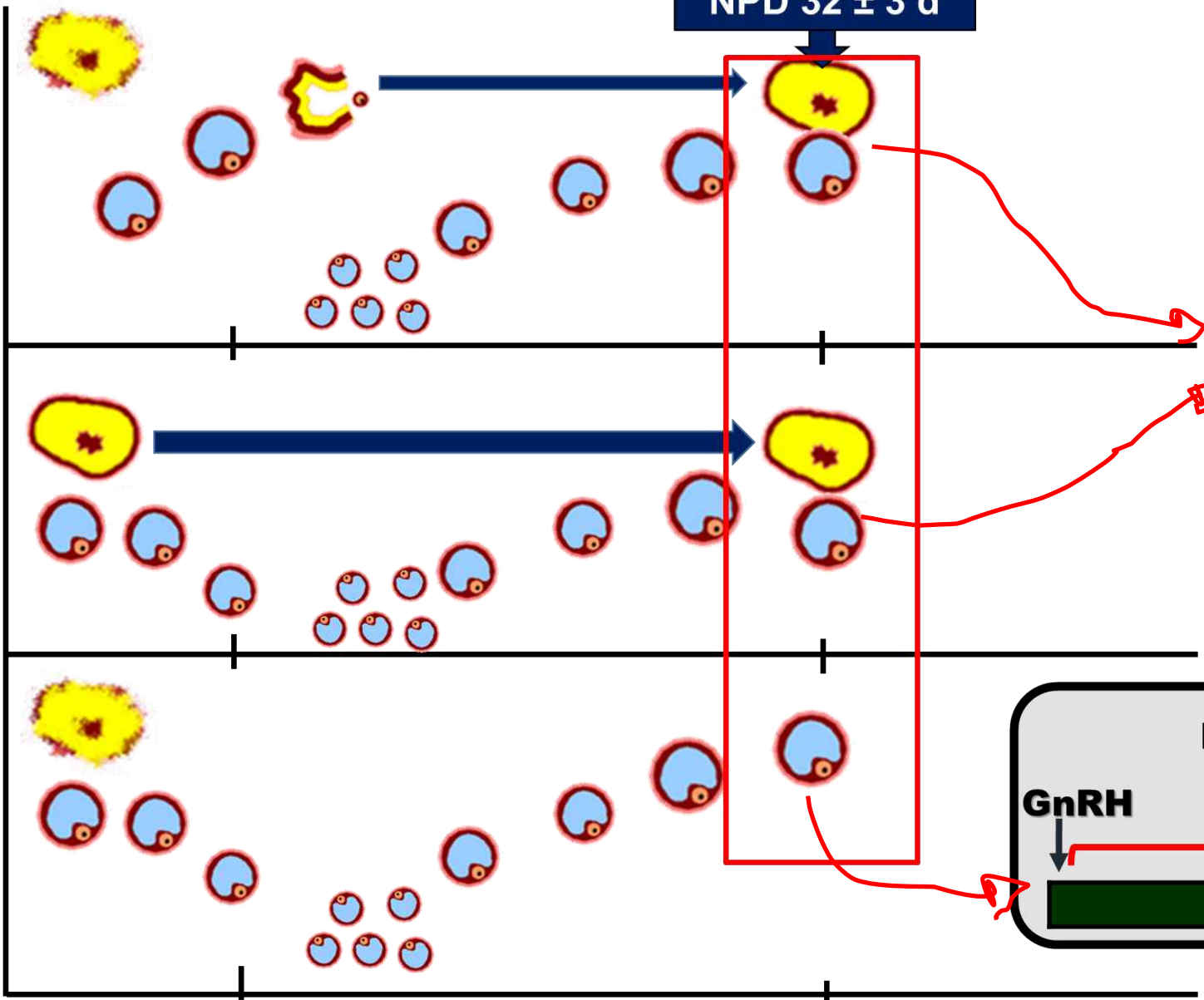


Cows with P4 >1 ng/mL

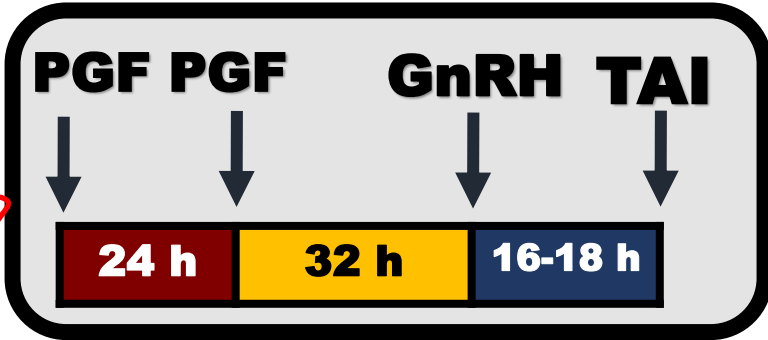


Previous AI

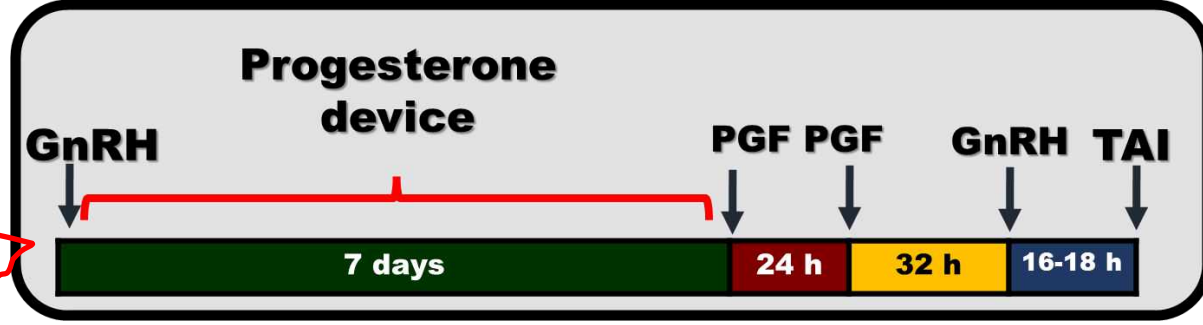
NPD 32 ± 3 d



Short-Resynch

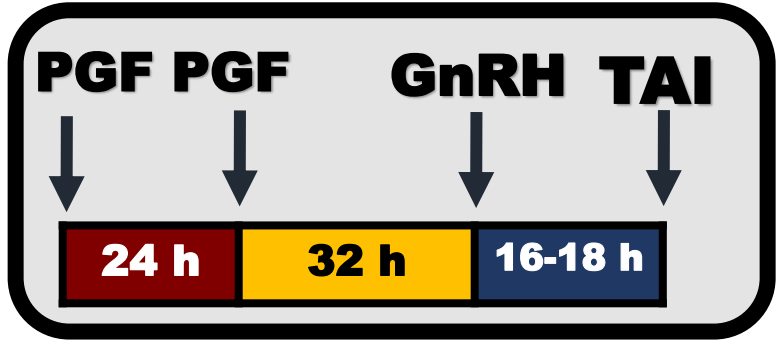
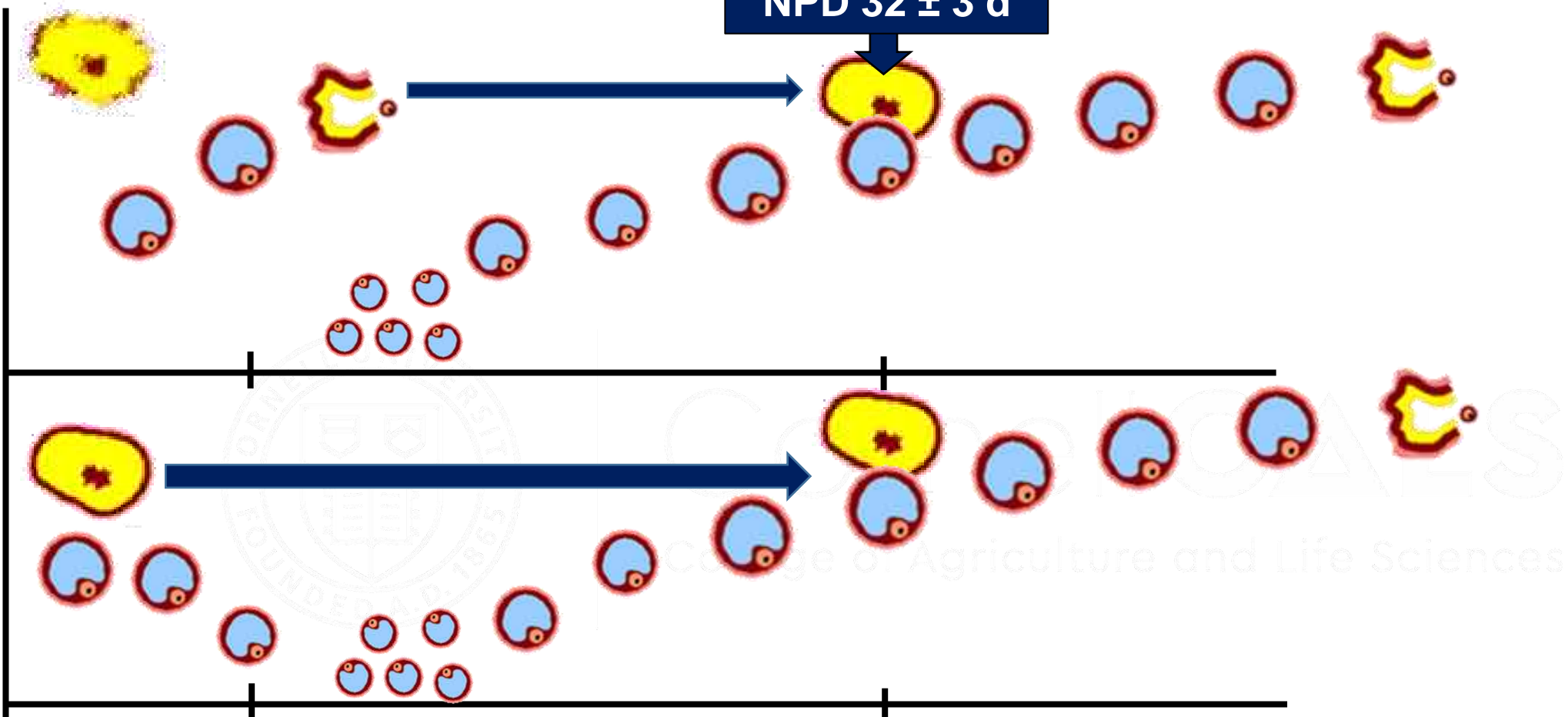


P4-Ovsynch



Previous AI

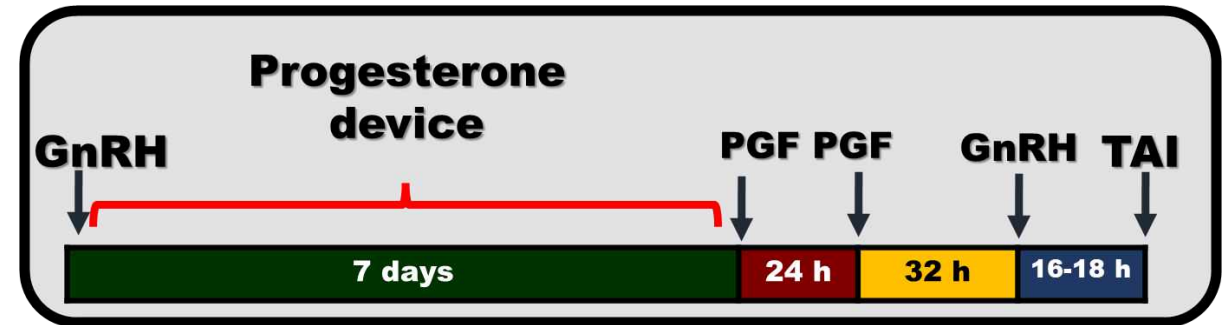
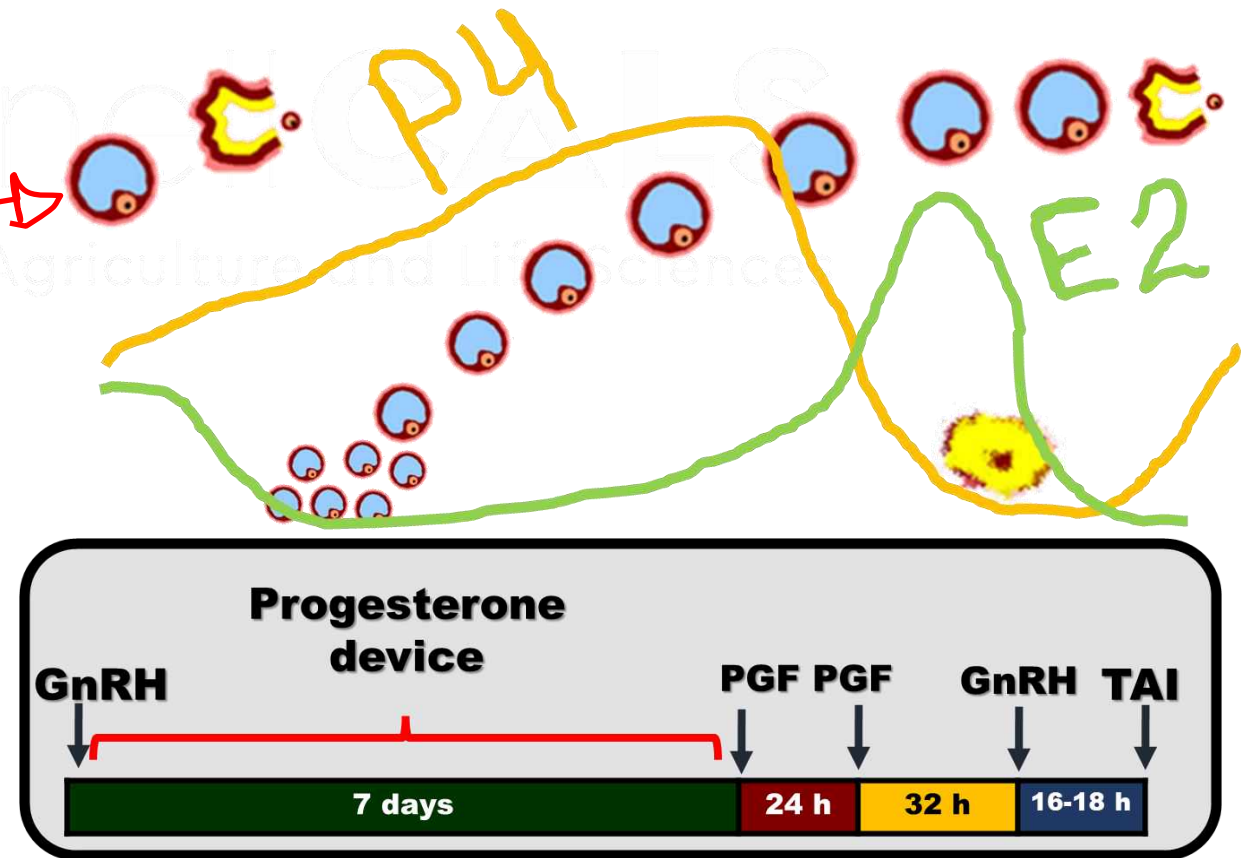
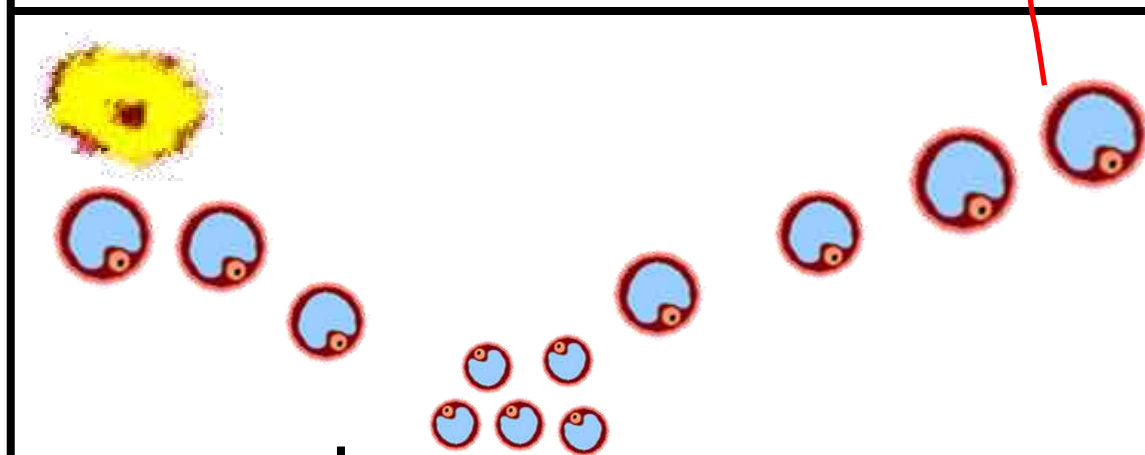
NPD 32 ± 3 d



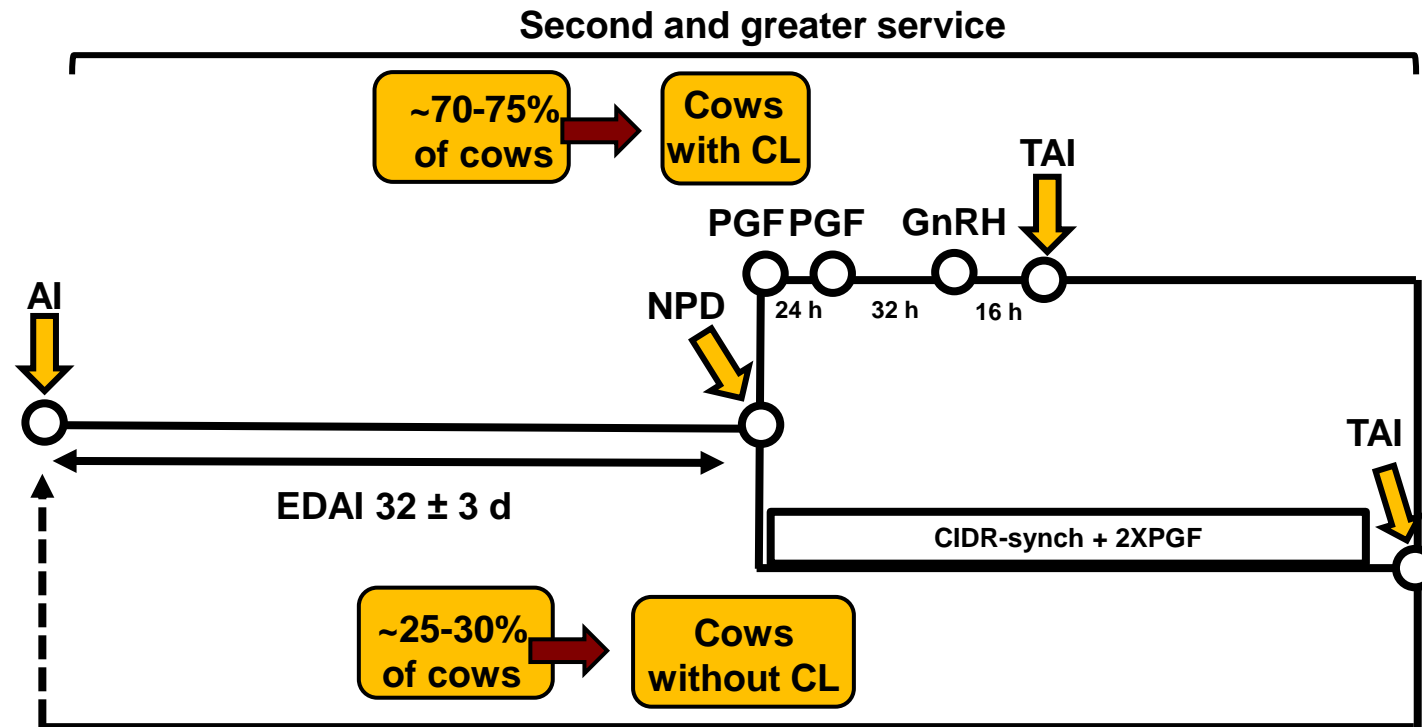
Previous AI



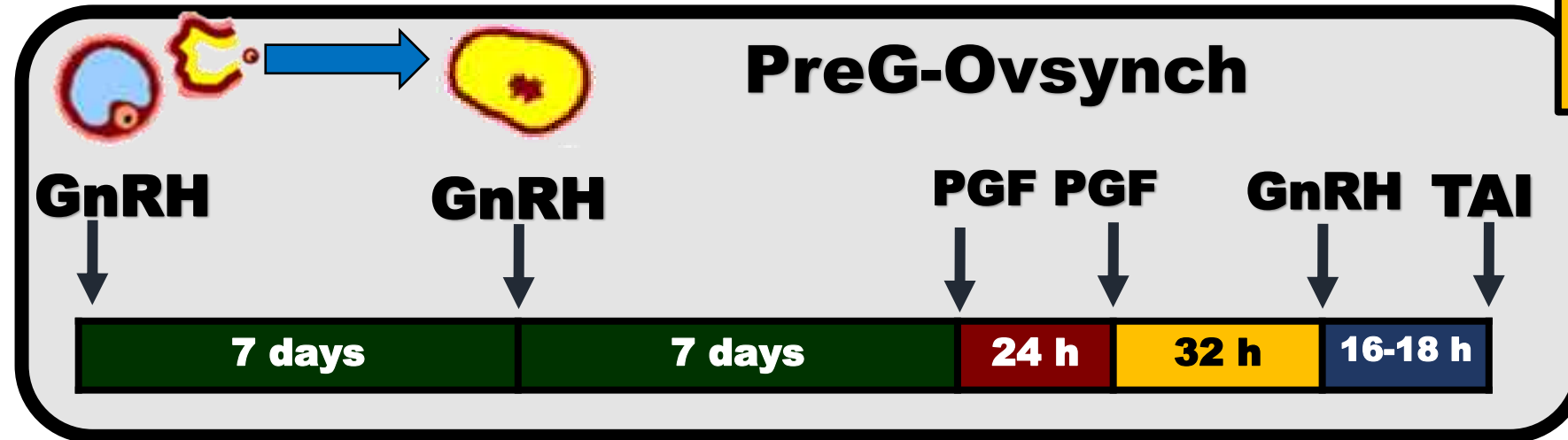
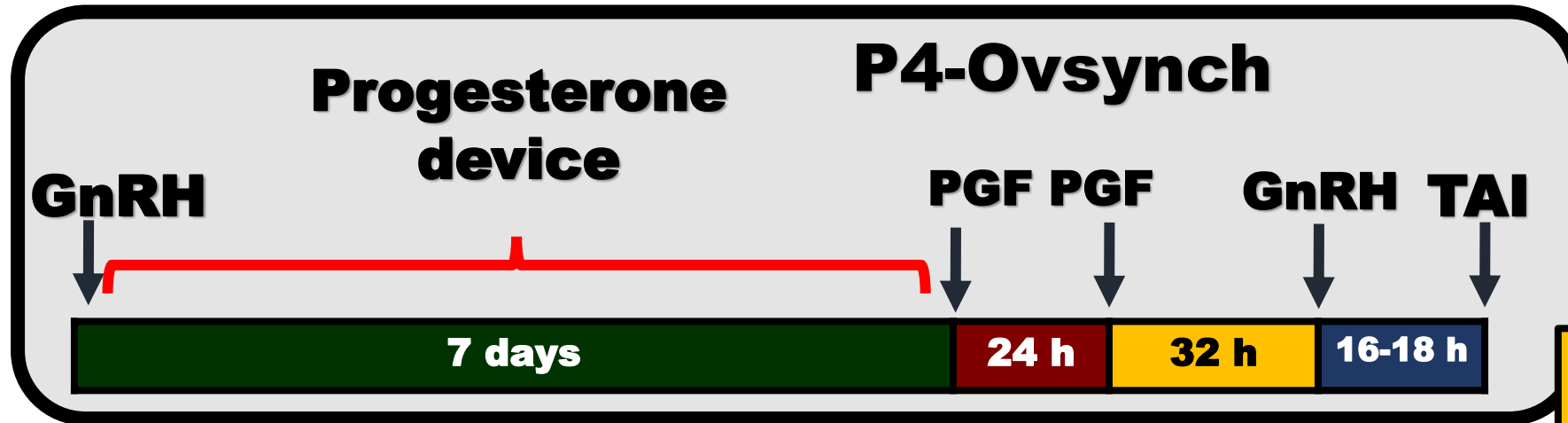
College of Agriculture and Life Sciences



Short Resynch + P4-Ovsynch is an Effective Program for 2+ AI Service

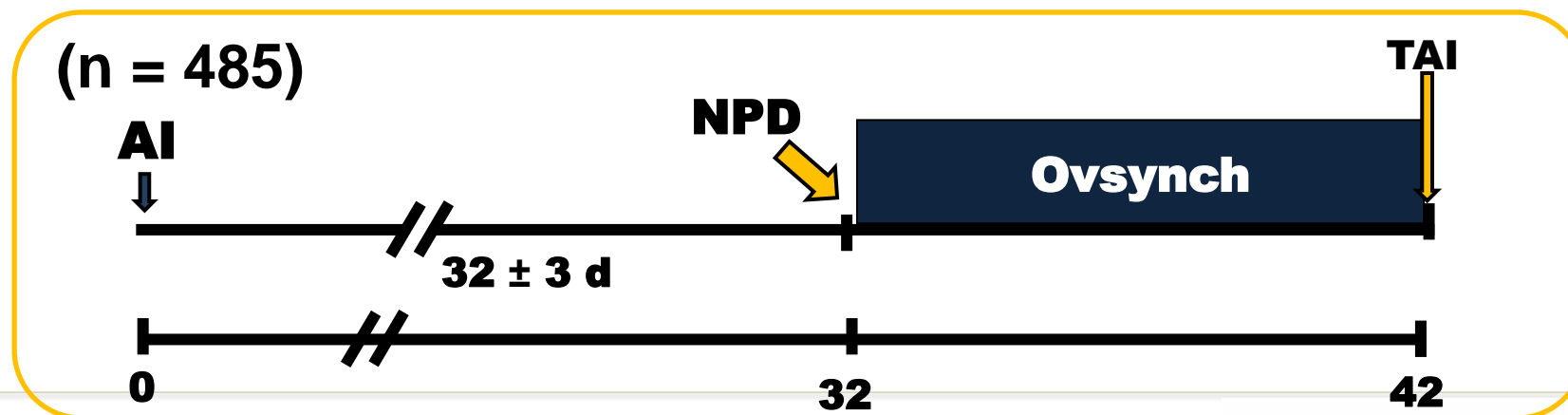
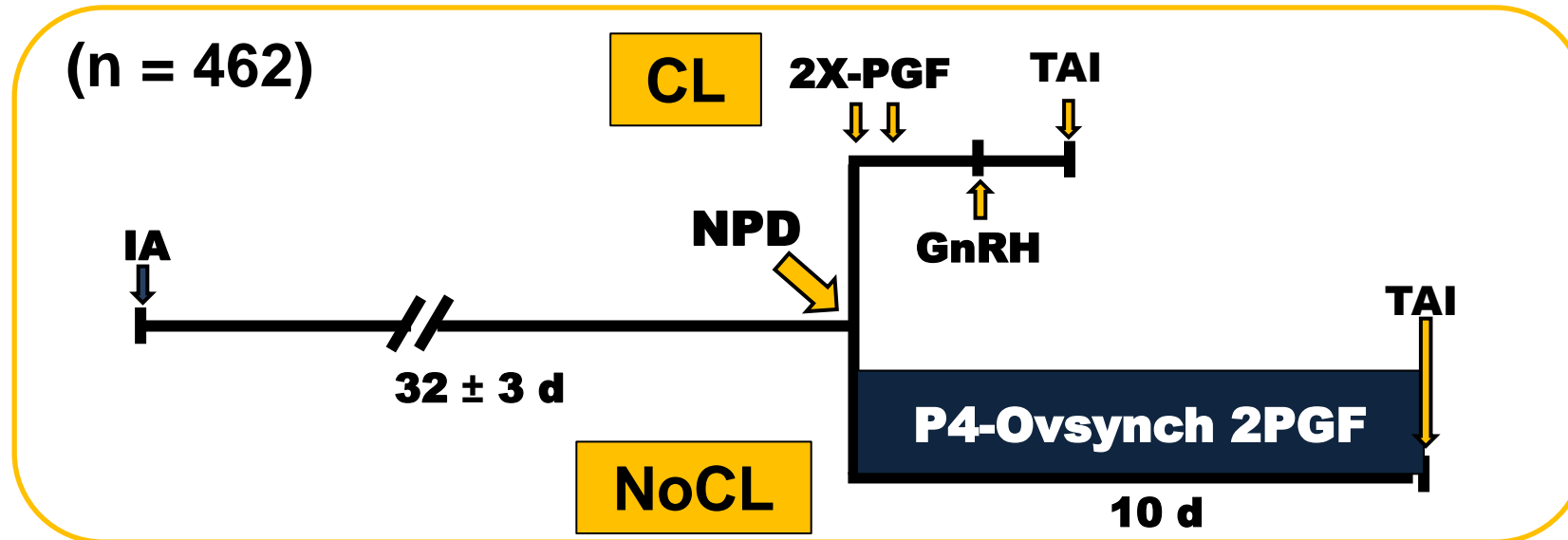


Either exogenous or endogenous P4 for No CL cows works well

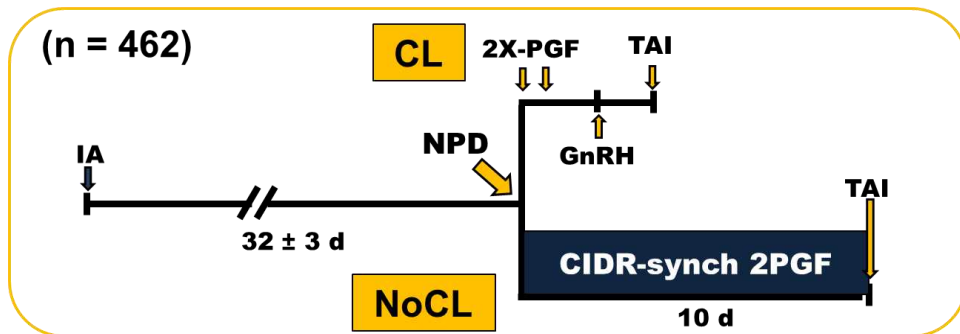


**Expected
P/AI = ~35-40%**

Short Resynch + P4-Ovsynch was Compared to D32-Resynch



Pregnancies per AI - Short Resynch + P4-Ovsynch vs D32-Resynch

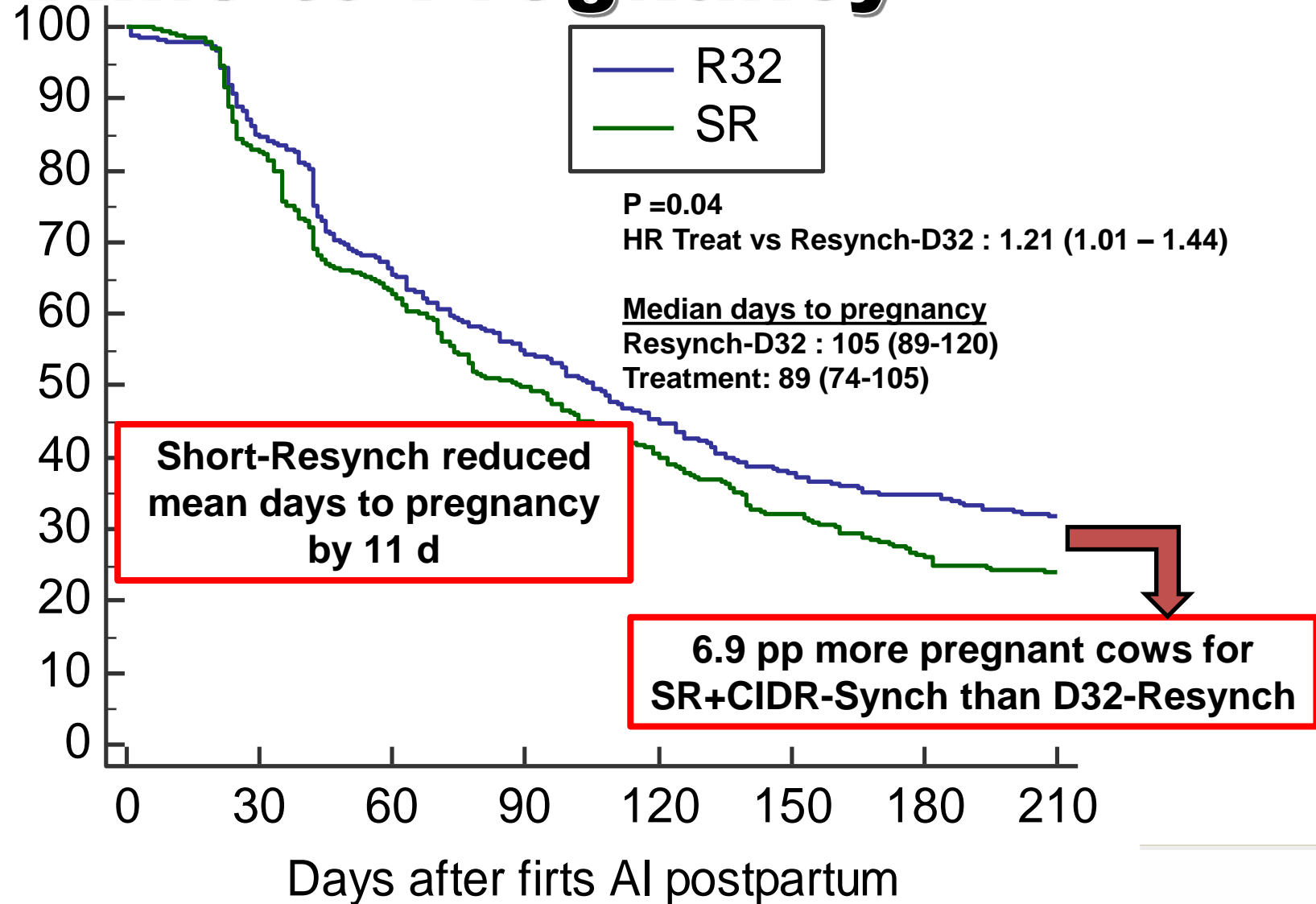


Item	Treatment		P-value
	Control (Ovsynch32)	Treatment (Short Resynch)	
Cows with a CL at PregCheck	32.0% (391)	31.8% (481)	0.97
Cows with NO CL at PregCheck	24.5% (159)	37.1% (186)	0.01
Overall	29.8% (561)	33.3% (667)	0.18

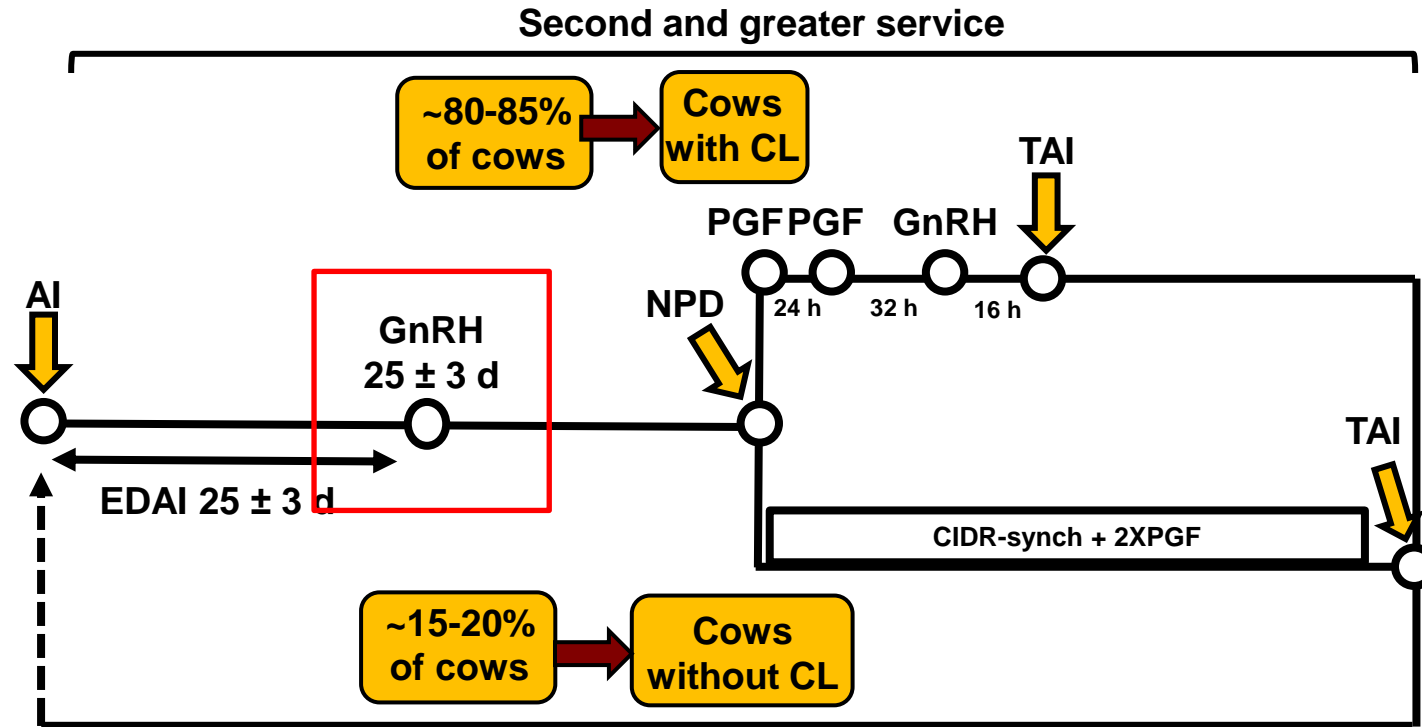
Summary

- **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



D25-Resynch + P4-Ovsynch is an Effective Program for 2+ AI Service

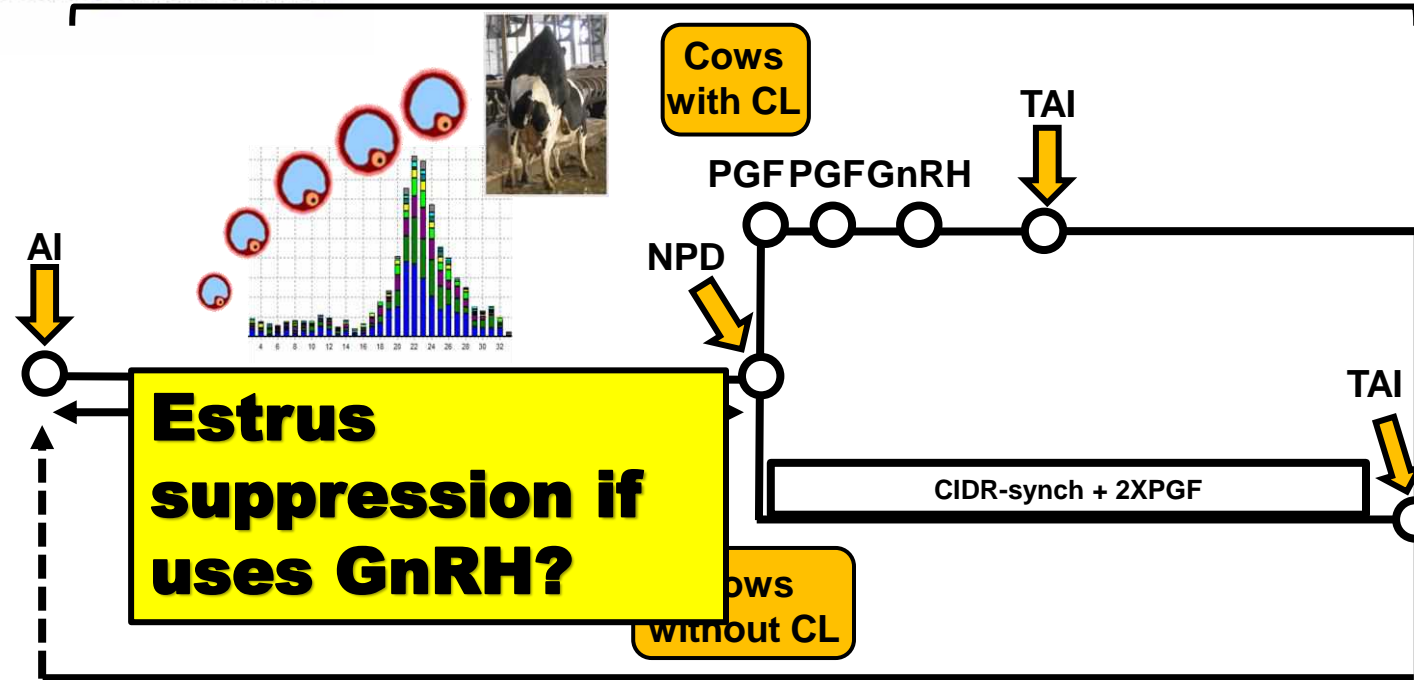




Lactating dairy cows managed for second and greater artificial insemination services with the Short-Resynch or Day 25 Resynch program had similar reproductive performance

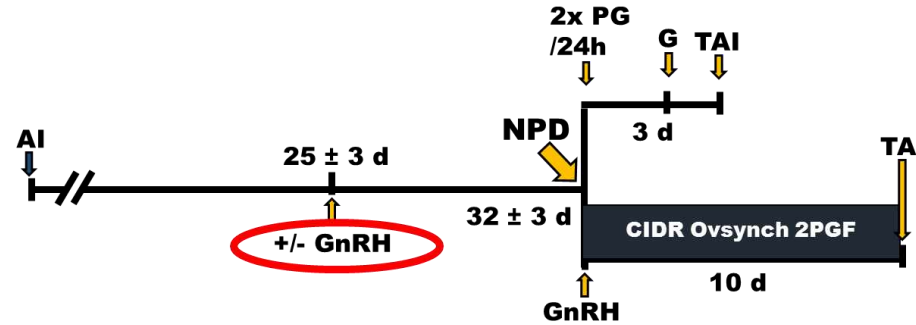
M. M. Pérez,* R. Wijma,* M. Scarbolo, E. Cabrera, F. Sosa, E. M. Sitko, and J. O. Giordano†
 Department of Animal Science, Cornell University, Ithaca, NY 14853

Second and greater service



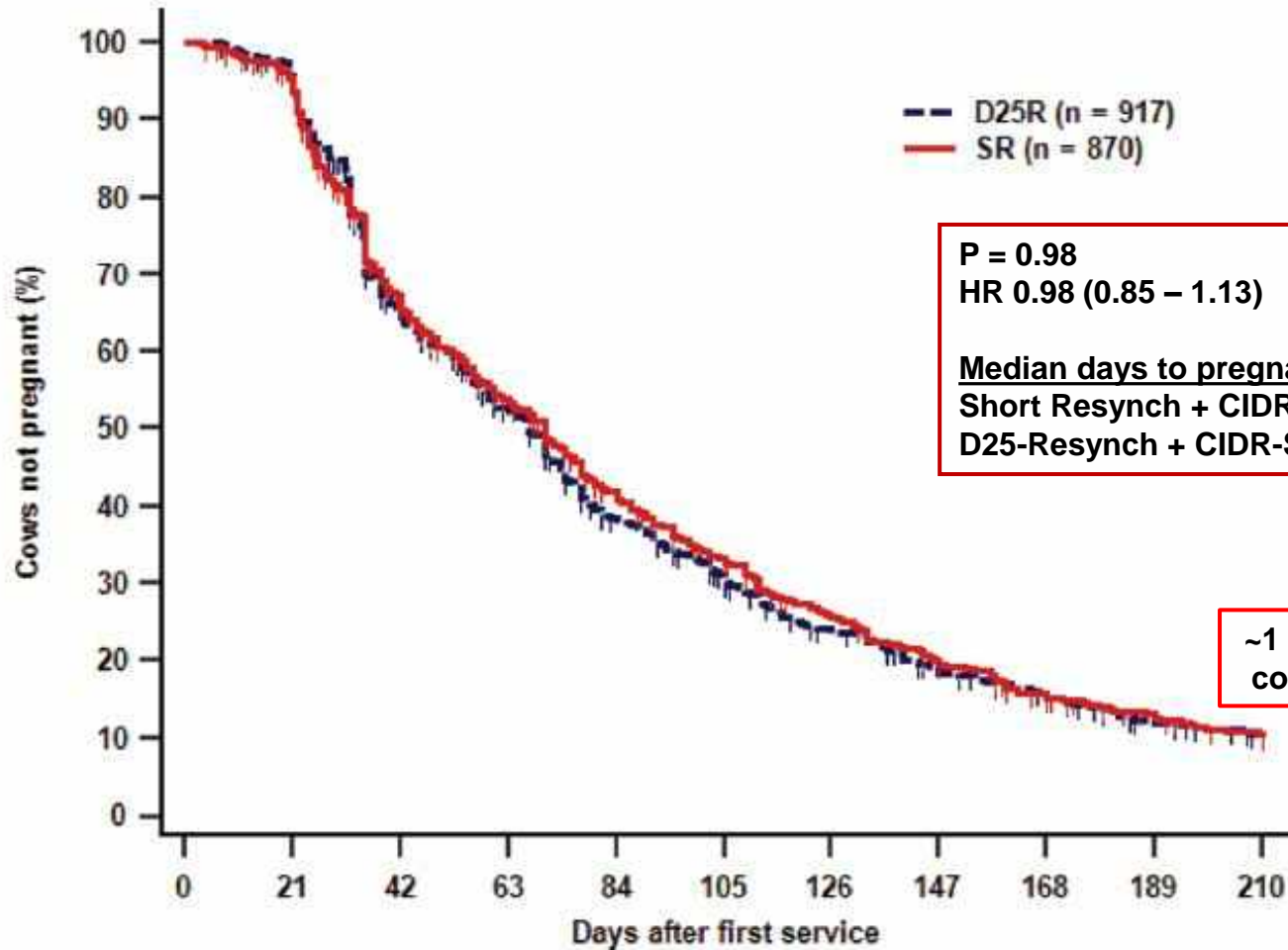
Item	Treatment		P-value
	D25 Resynch + CIDR-Synch	ShortResynch + CIDR-Synch	
Cows AI at detected estrus (%)	50 (1,191/2,390)	60 (1,489/2,467)	+10% more cows EDAI before NPD

Short Resynch + P4-Ovsynch vs. D25-Resynch + P4-Ovsynch



Item	Treatment		P-value
	D25-Resynch+ P4-Ovsynch	ShortResynch + P4-Ovsynch	
Cows with CL (%)	84 (990/1,178)	76 (737/969)	0.01
P/AI CL at NPD (%) (D25-Resynch or Short Resynch)	41 (410/990)	33 (243/737)	0.01
P/AI NO CL at NPD (%) (CIDR-Synch)	39 (73/188)	44 (102/232)	0.36
Overall cows pregnant through TAI	43 (483/1,178)	37 (345/969)	0.01

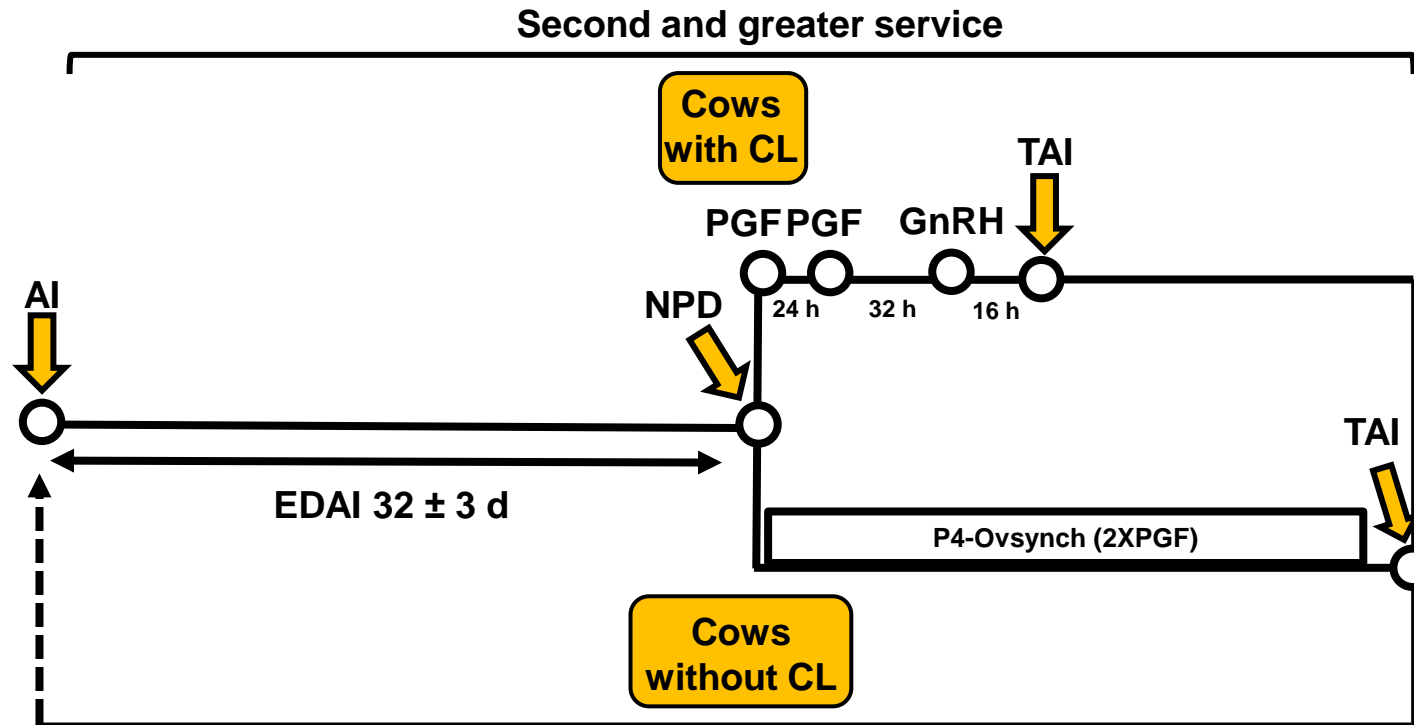
Short Resynch + P4-Ovsynch vs. D25-Resynch + P4-Ovsynch Led to Similar Pregnancy Dynamics



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

Short Resynch + P4-Ovsynch

Preferred for farms that are successful with estrus breedings!!!

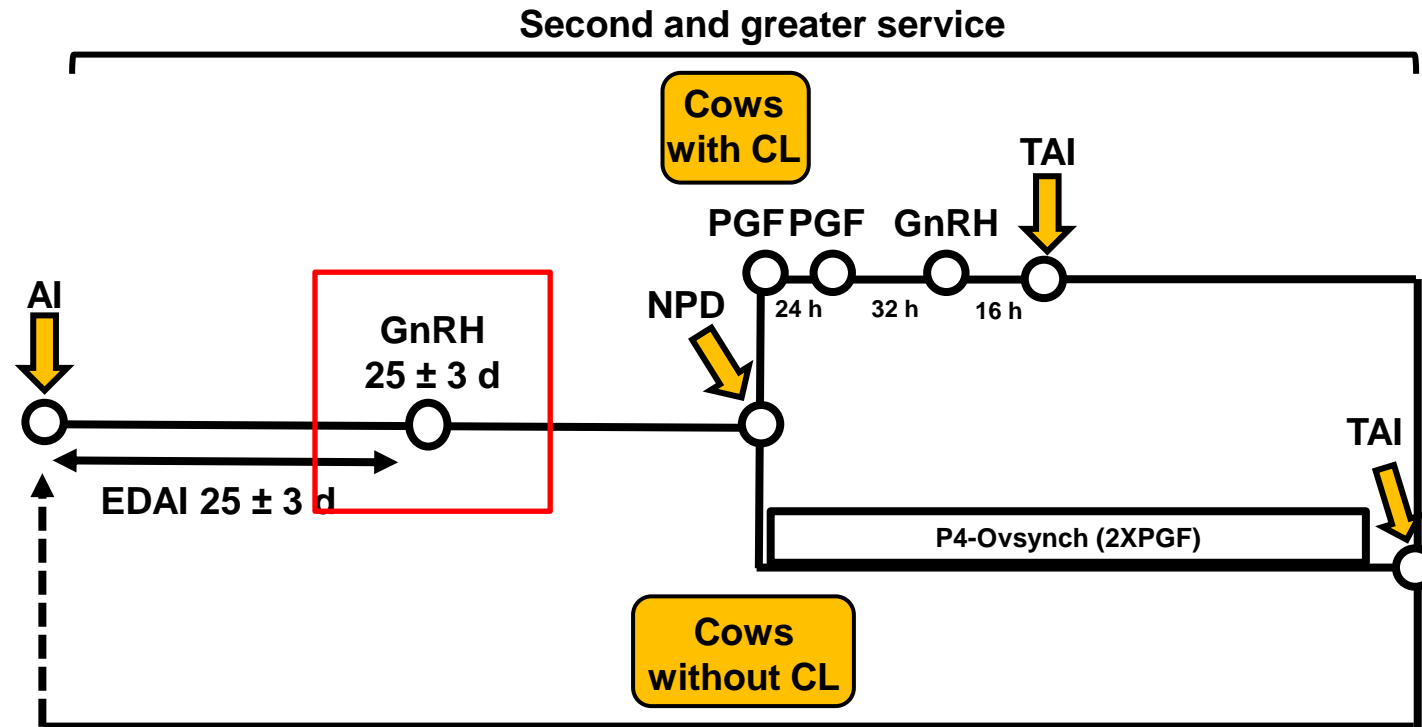


Expected benefits:

- 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

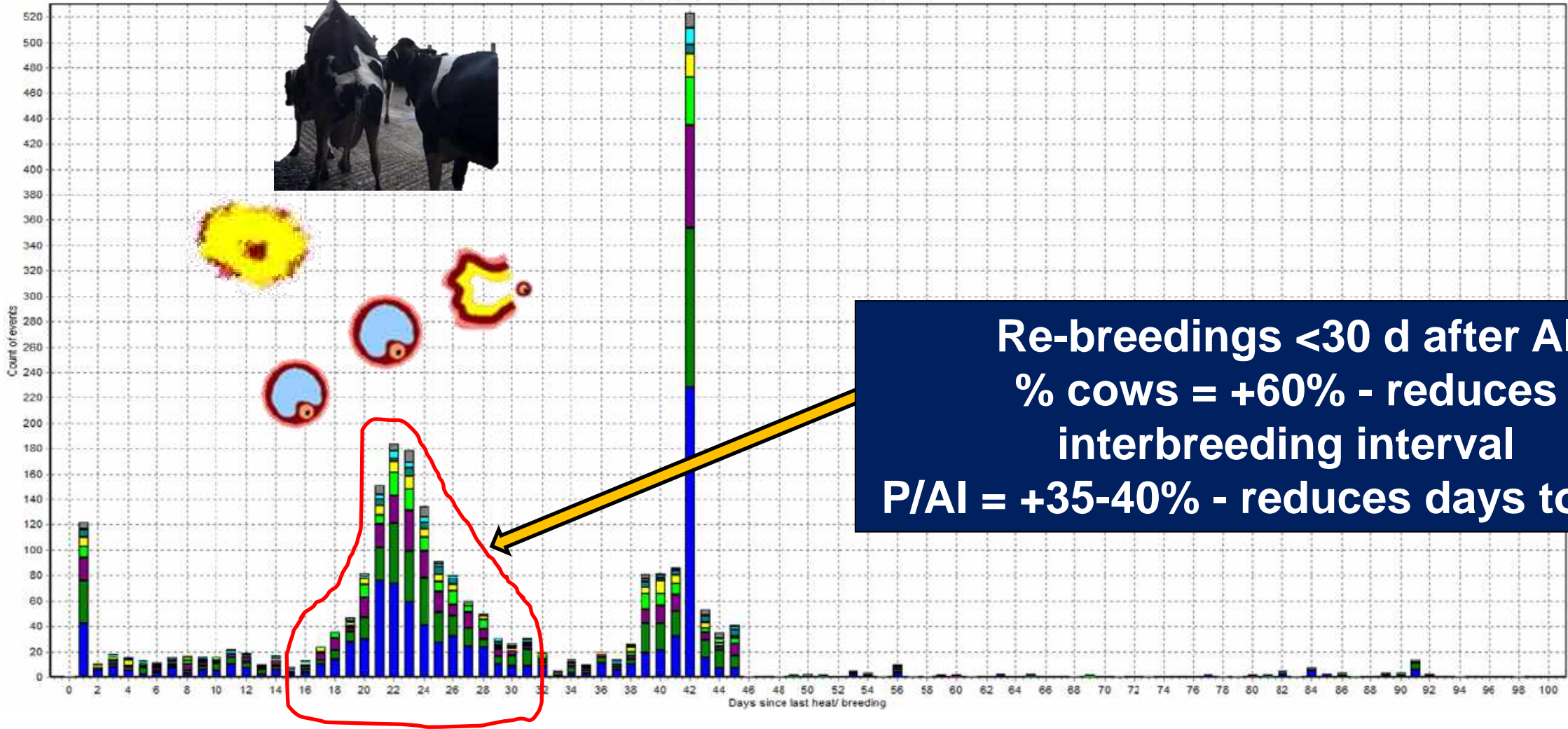
Based on Ovarian Status



- ✔ **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)**

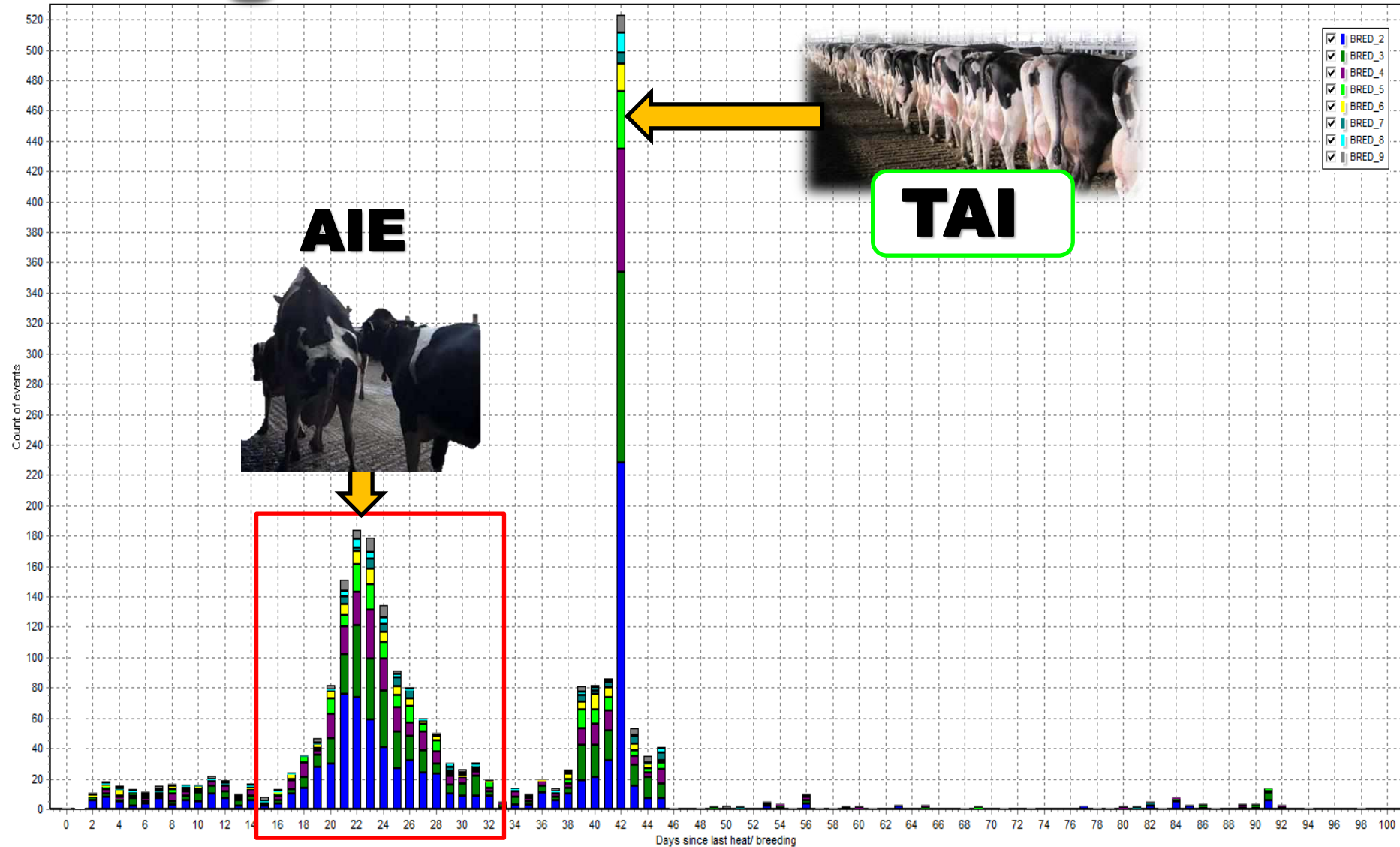
AI is fastest, cheapest, and easiest way to re-breed non-pregnant cows

[BRED] EGRAPH EC-5 FOR LACT>0|HW1N23456789T100



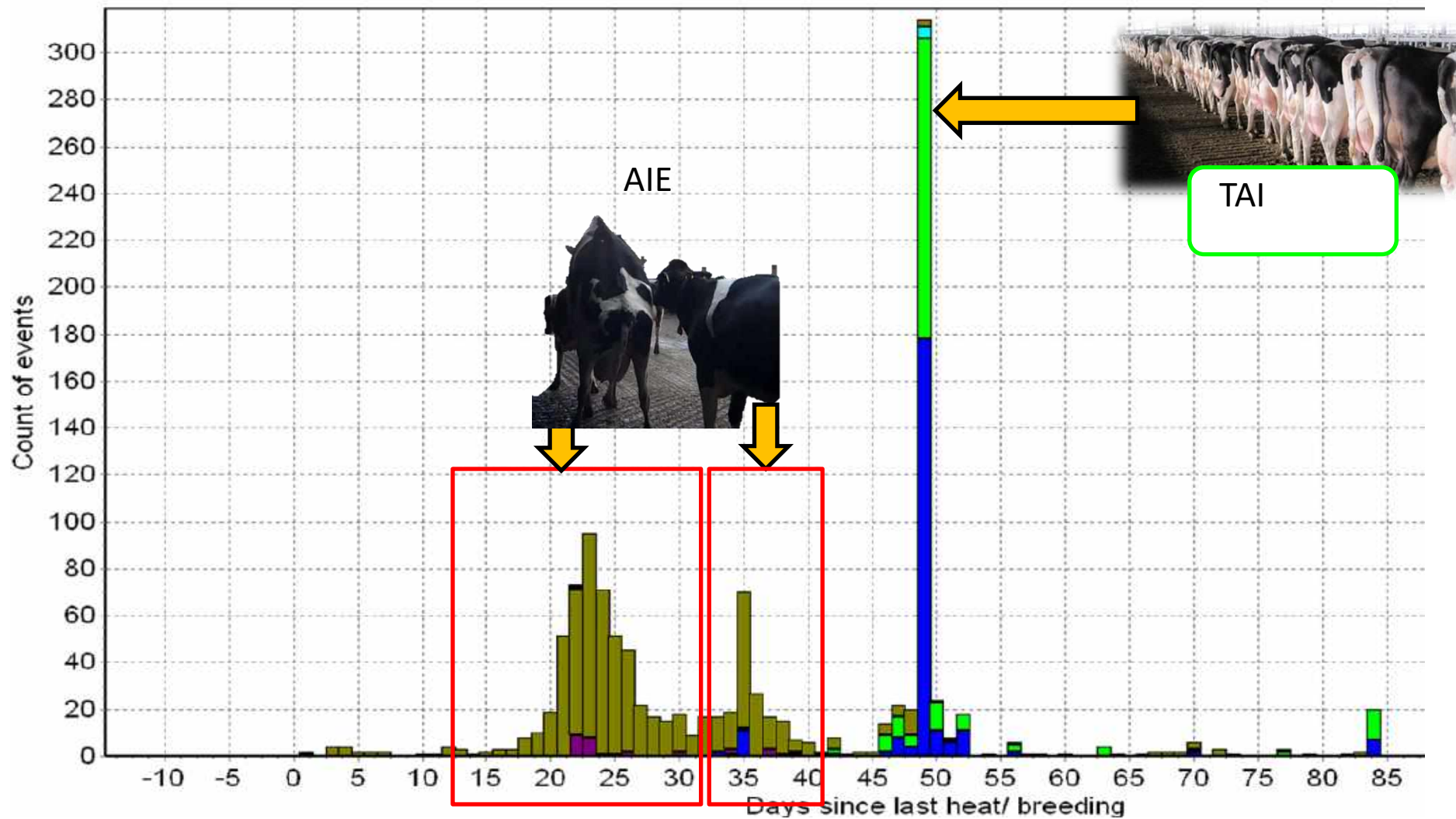
Re-breedings <30 d after AI
% cows = +60% - reduces
interbreeding interval
P/AI = +35-40% - reduces days to preg

Increasing AIE for 2+ AI

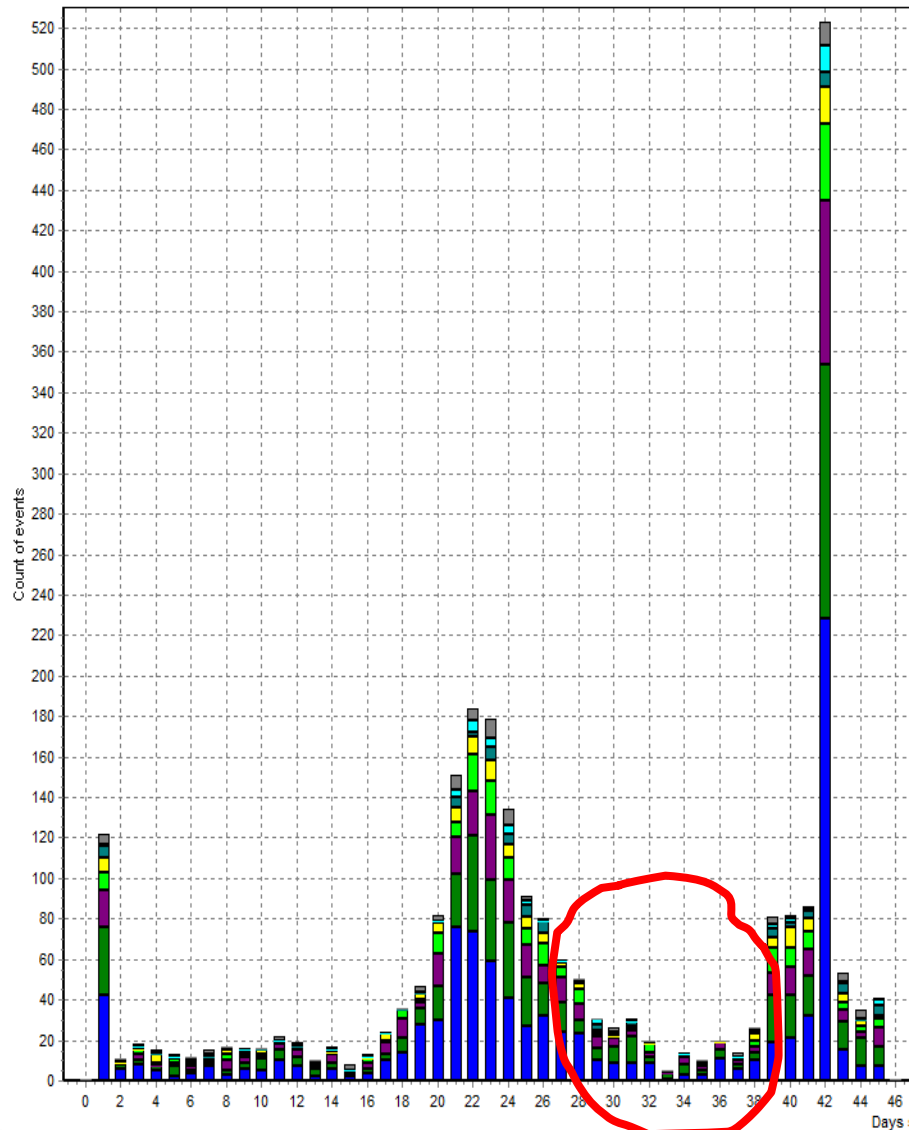


Increasing AIE for 2+ AI

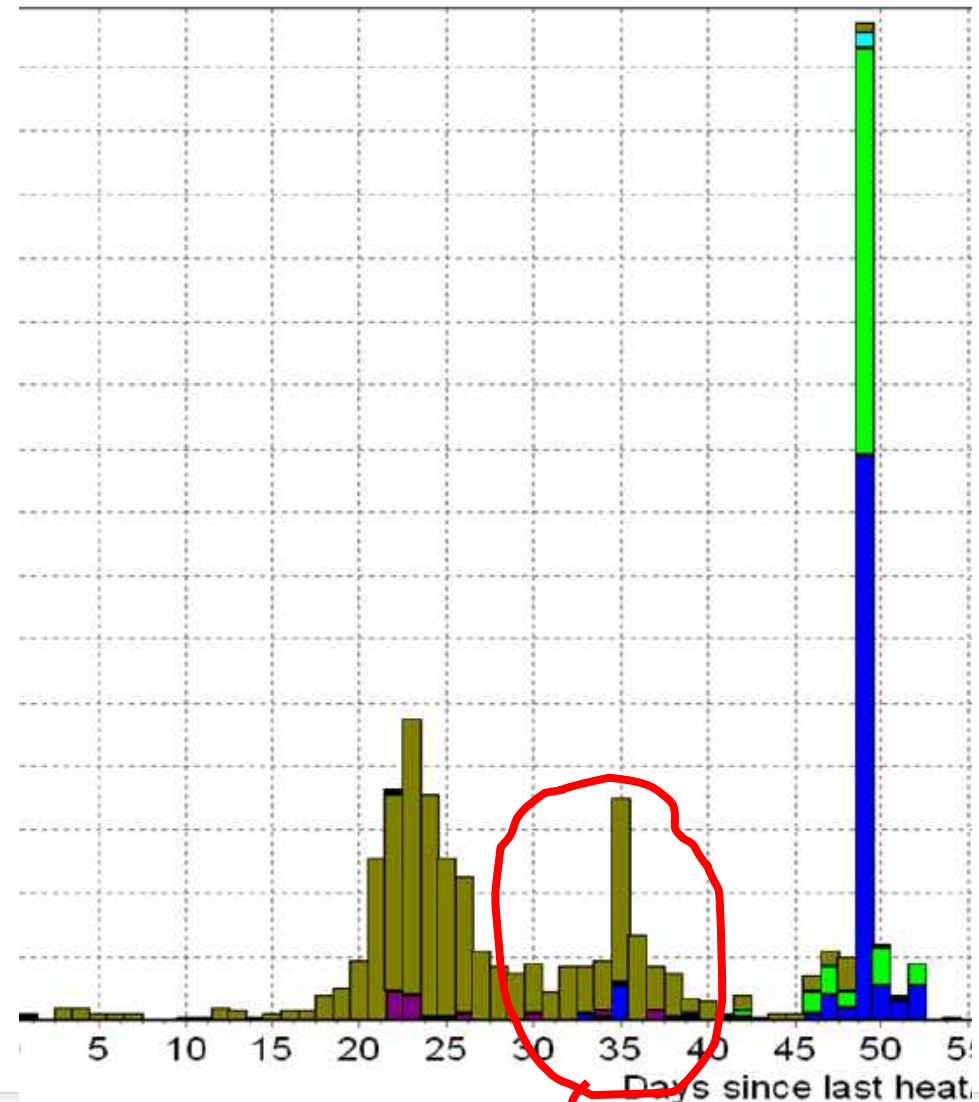
EGRAPH BRED FOR LACT>0 1HW1N2345T100



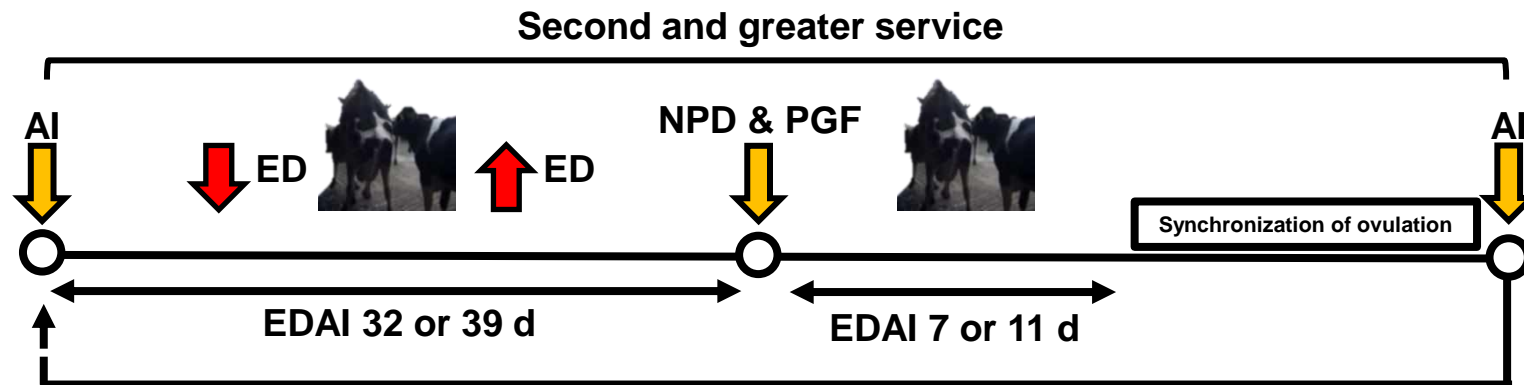
Increasing AIE for 2+ AI



EGRAPH BRED FOR LACT>0 (M)



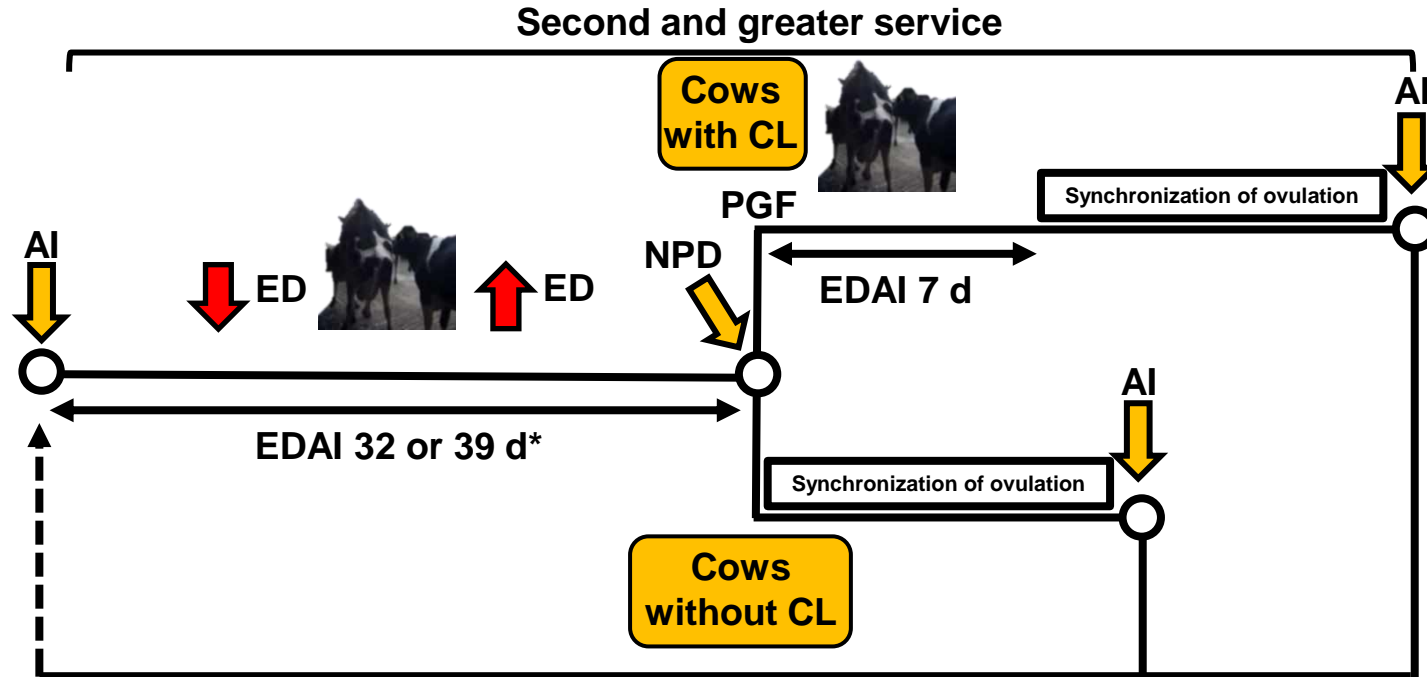
Use of PGF at NPD Increases AIE For 2+ AI Services



Key facts:

- increases cows EDAI after non-pregnancy diagnosis**
- treatment NOT adapted to cow physiological status**
- must use synch protocol after PGF treatment**

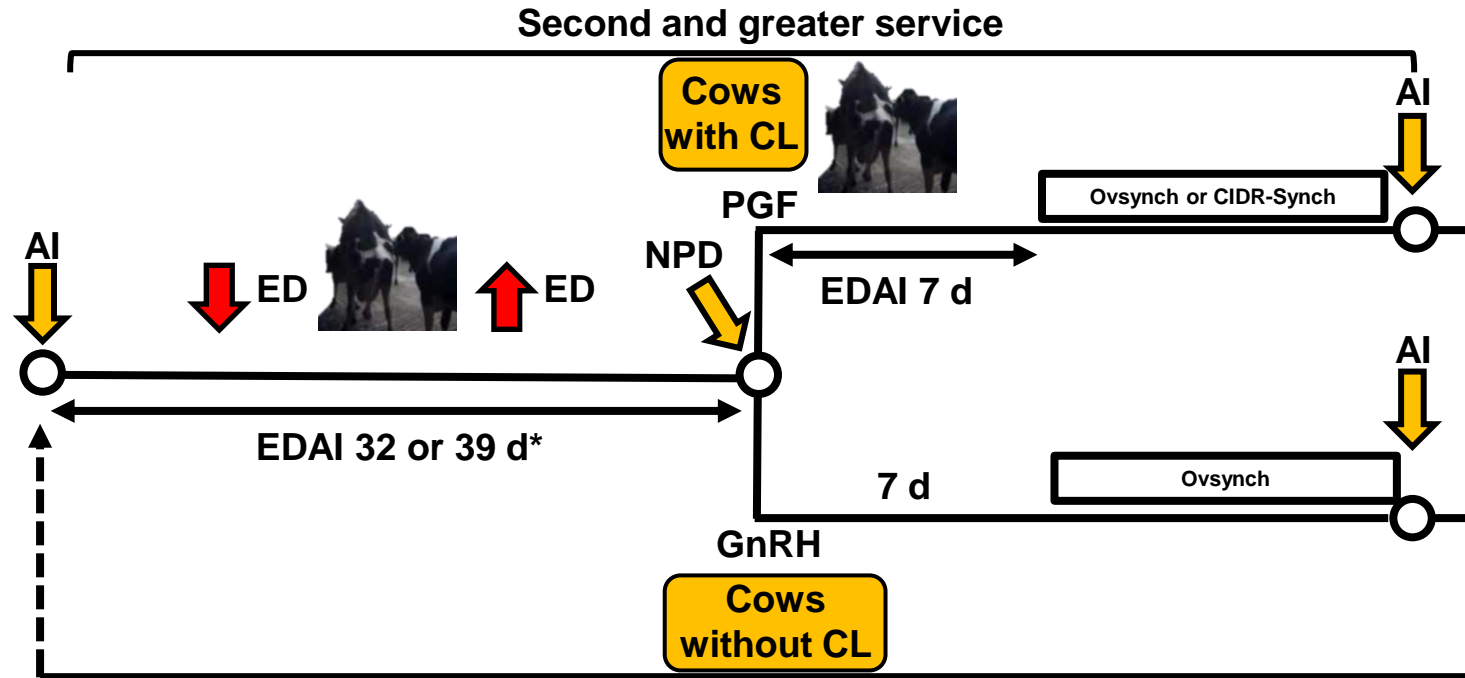
Use of PGF at NPD Increases AIE For 2+ AI Services



Key facts:

- increases cows EDAI after non-pregnancy diagnosis**
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Use of PGF at NPD Increases AIE For 2+ AI Services



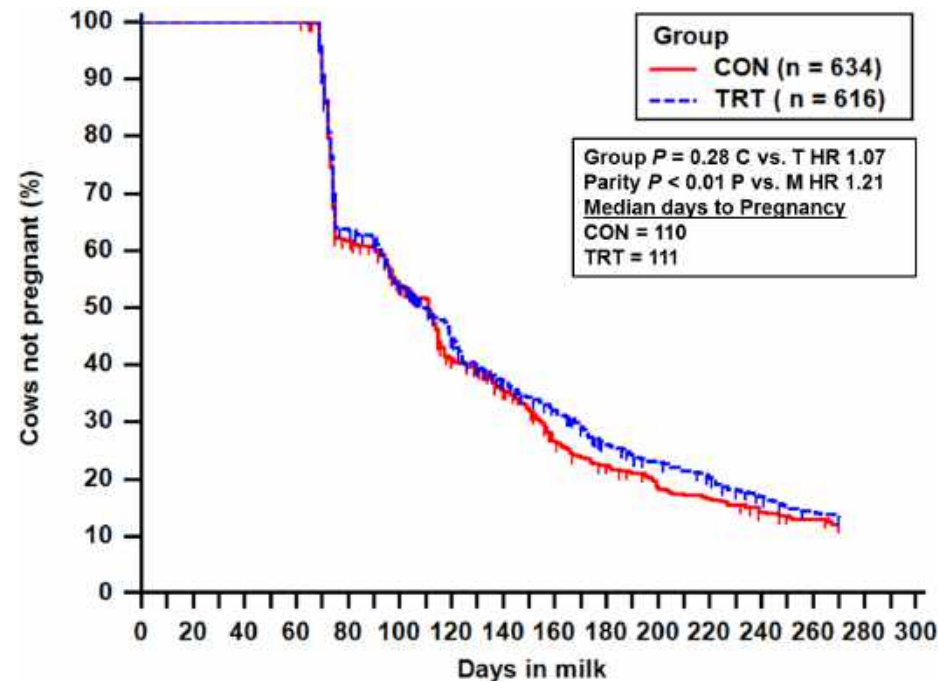
Key facts:

- 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

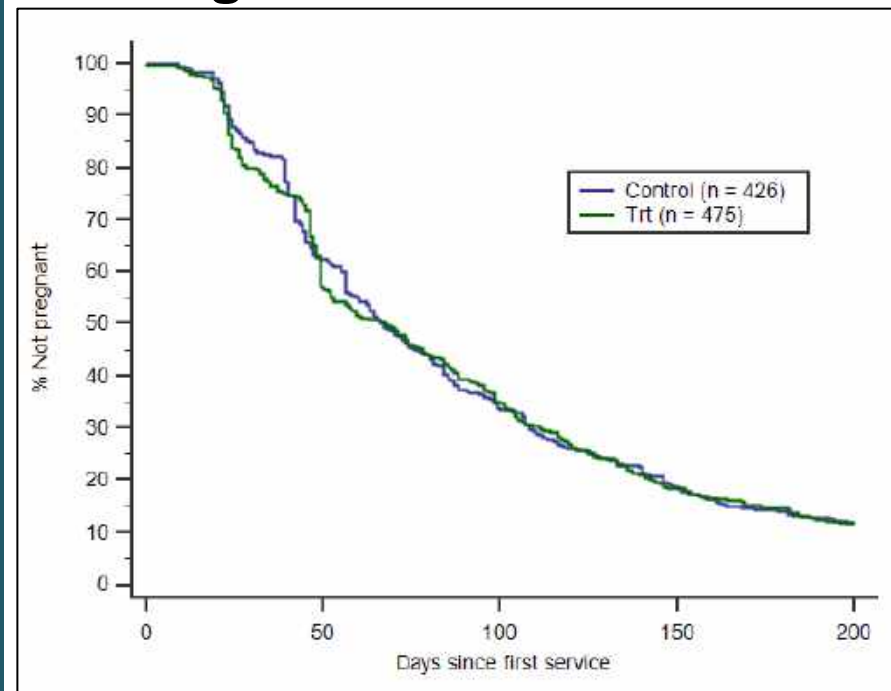
PGF + AIACT + TAI based on Ovarian status versus a **Day32 Resynch**

- 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?

