

Reproductive Management in Beef Herds

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**Reproduction is the
single most
important factor
affecting
profitability!**

PROFITABILITY OF BEEF **PRODUCTION**

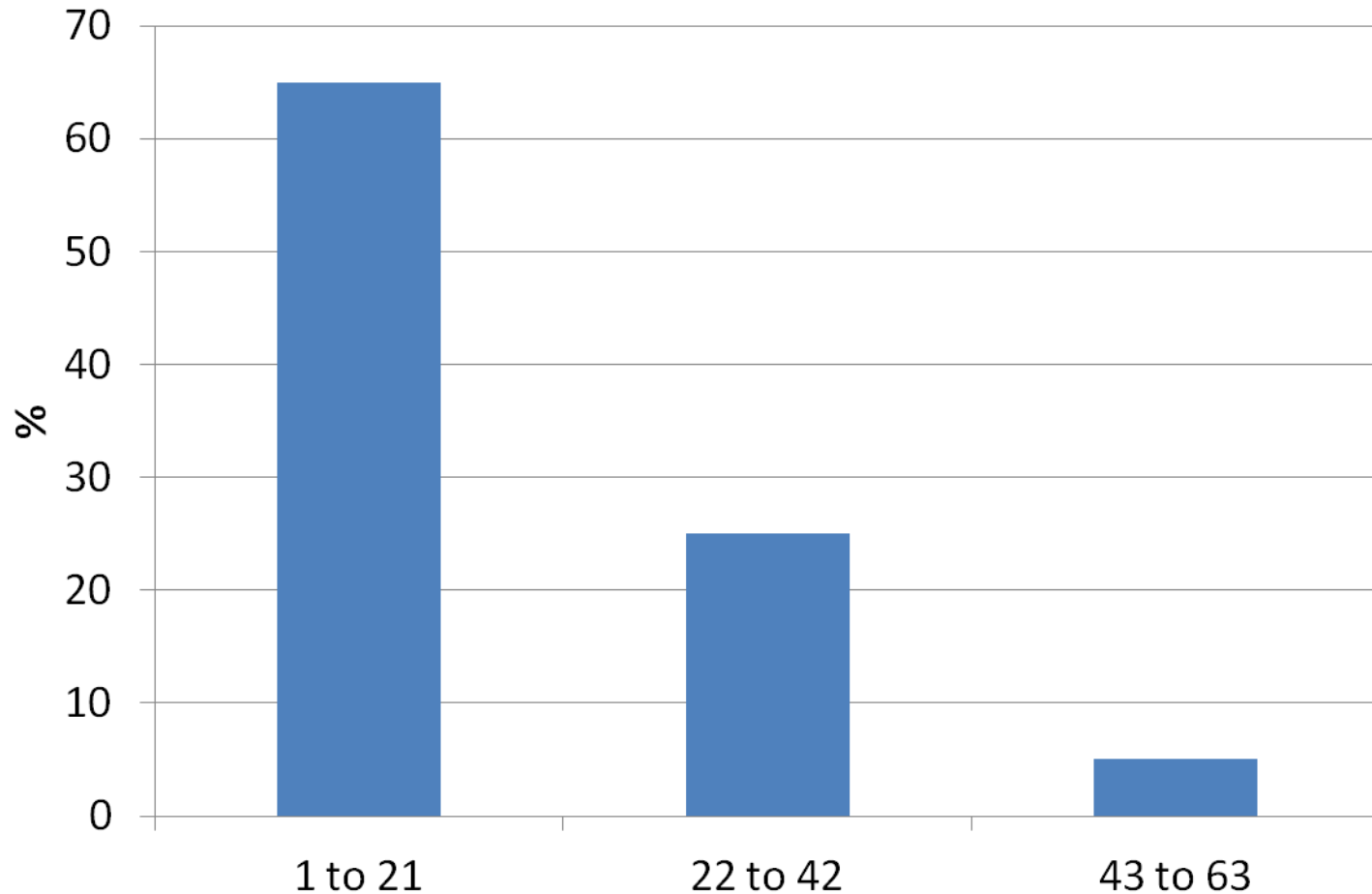
Reproduction is **5X** more important than **Growth Rate.**

Reproduction is **10X** more important than **Carcass Quality.**

CAUSES OF DECREASED PROFITABILITY

- 1. Percentage of non-pregnant cows**
- 2. Late born calves**
- 3. Loss of calves at birth**

CALVING DISTRIBUTION



CALVING DISTRIBUTION AND PROFIT

- **Survey of 2,713 cow-calf producers in north-central Alberta.**
- **Decreasing length of calving season was best gross opportunity for increasing profit (\$23/head).**
- **Economic impact of changing calving distribution from 29 to 49% calving in the 1st 21 days was \$ 39/head.**

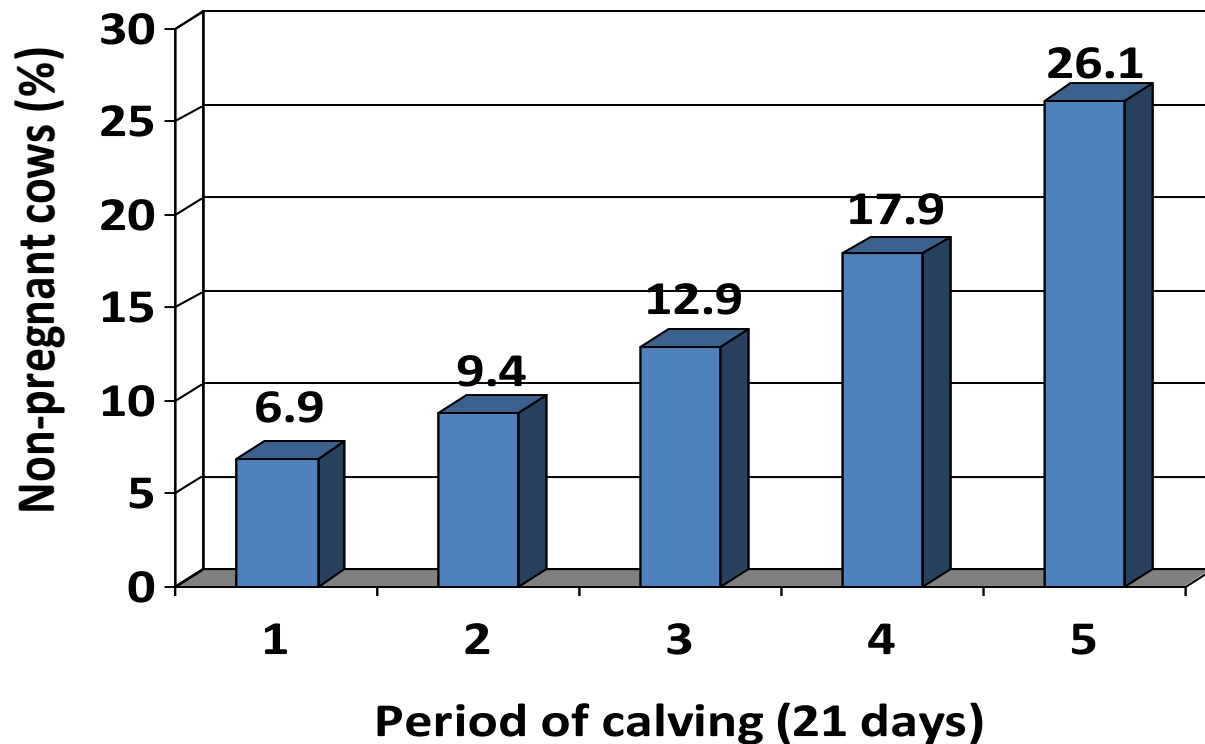
Time of calving affects feedlot performance

	Period of calving (21 days)		
Steers (n=661)	1	2	3
Weaning weight, kg	234	220	198
Feedlot ADG, kg/día	1.6	1.6	1.6
Carcass weight, kg	371	364	350
Marbling score	574	554	527
Yield grade	3.0	2.8	2.6
Choice, %	84	83	73
Carcass value, USD	\$1632	\$1600	\$1542

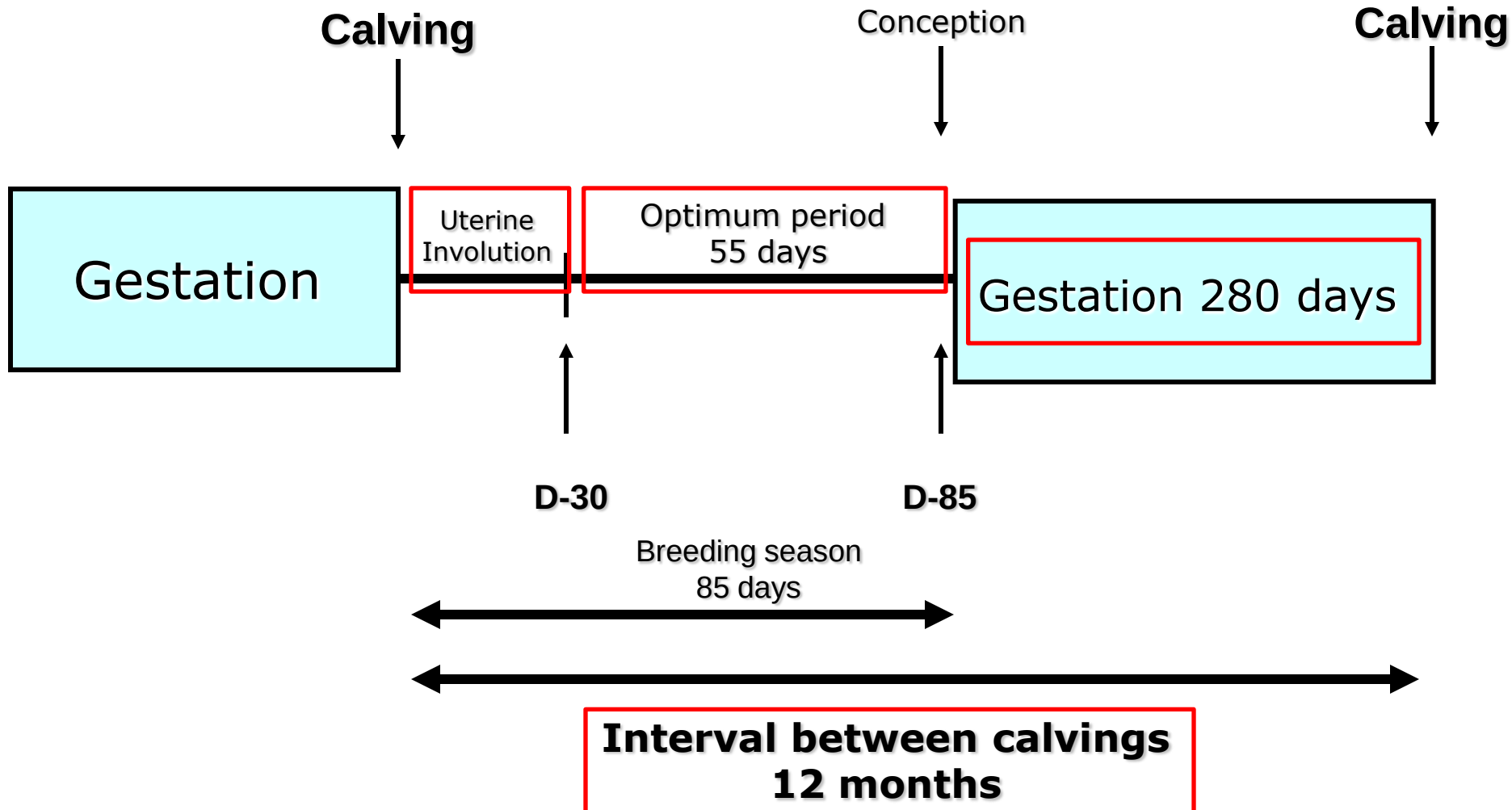
Time of calving affects heifer progeny

	Period of calving (21 days)		
Heifers (n=1019)	1	2	3
Weaning weight, kg	220	214	197
Prebreeding weight, kg	297	293	277
Cycling, %	70	58	38
Breeding ADG, kg	0.70	0.74	0.77
Pregnancy rate, %	90	86	78
Calved in first 21 d, %	81	69	65

Effect of calving date on the number of cows calving the following year



Calving Interval



ANESTROUS CONDITION

- ❖ **NUTRIENT INTAKE PREPARTUM**
- ❖ **NUTRIENT INTAKE POSTPARTUM**
- ❖ **SUCKLING**

BODY CONDITION SCORE

- ❑ BCS CAN BE USED TO PREDICT BODY FATS STORES**
- ❑ 9-POINT SCALE**
1= EMACIATED; 9 = OBESE
- ❑ 36-45 Kg BW equals one condition score**

BODY CONDITION SCORE 4



BODY CONDITION SCORE 5



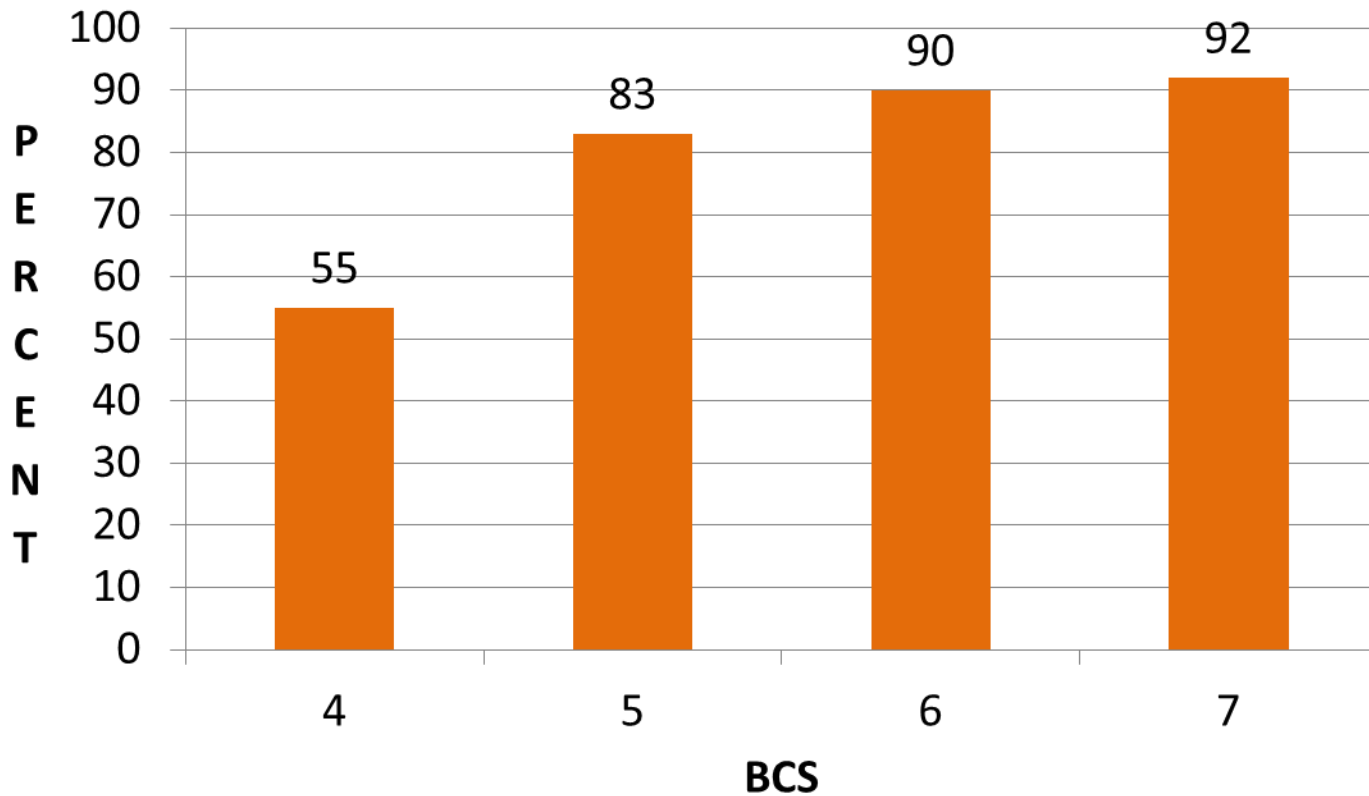
BODY CONDITION SCORE 6



BODY CONDITION SCORE 7



EFFECT OF BCS ON OVERALL PREGNANCY RATE **(90 DAYS BREEDING SEASON)**



BCS ON ANESTROUS INTERVAL **(LATE WINTER/EARLY SPRING CALVING)**

BCS		
<5	≥ 5	Reference
61 ± 2	49 ± 2	Richards et al., 1986
89 ± 6	53 ± 4	Looper et al., 2002
93 ± 6	63 ± 6	Lents et al., 2002
81 ± 4	55 ± 4	DIFF 26 days

Percent of beef cows in heat at different intervals after calving

	Days after calving						
Age of cows	40	50	60	70	80	90	100
5 years or older (%)	55	70	80	90	90	95	100
2 and 3 years (%)	15	30	40	65	80	80	90

EFFECT OF BCS AT CALVING ON PERFORMANCE OF FIRST CALF COWS

	BCS		
CRITERIA	4	5	6
N	73	107	60
Cow BW (Kg)	338 ^a	375 ^b	424 ^c
Calf BW	28.9 ^a	30.4 ^b	32.4 ^c
Dystocia score	1.2	1.2	1.2
205 d weight, kg	187	193	198
Pregnancy rate	56 ^a	80 ^{bw}	96 ^{bx}

ab P<0.05
xw P=0.07

Spitzer et al., 1995

INFLUENCE OF POSTPARTUM NUTRITION ON PERFORMANCE OF THIN FIRST CALF COWS

Moderate = 0.45 kg/d – High = 0.90 kg/d

CRITERIA	Nutrition treatments	
	Moderate	High
BCS at calving	4.1	4.4
BCS at breeding	4.3	5.2*
Daily gain, kg/d	0.2	1.5*
Days to first estrus, d	120	100*
Size of ovulatory follicle, mm	13.5	14.8*
Pregnancy to first AI	58	76**

*** P<0.01; ** P<0.05**

Ciccioli et al., 2003

**Re-breeding young-
first calf cows is a
big challenge!**

What can be done?

Sort cows:

- by BCS (thin or moderate)
- by Age (young or mature)
- At 6 mo. of pregnancy
- At calving

**Feed them to achieve desired
BCS!**

EFFECT OF 48 HOUR CALF REMOVAL ON COWS **SHOWING ESTRUS AND CONCEIVING**

	First 21 days of breeding		
	No. of cows	Bred	Pregnant
CONTROL	52	31%	17%
CALF REMOVAL	52	62%	44%



Smith et al., 1979

INFLUENCE OF EARLY WEANING ON BW AND REPRODUCTIVE PERFORMANCE OF THIN FIRST CALF COWS

24-30 mo.; weaned 6-8 weeks and exposed to bulls for 90 days

ITEMS	TREATMENTS	
	Suckled	Early weaned
No.	32	31
BW at calving, kg	316 ± 7	309 ± 5
BW change, kg (calving-breeding)	-7 ± 10	15 ± 14*
Calving to conception, d	90 ± 3	73 ± 4*
Pregnancy rate, %	59	97

*** P<0.05**

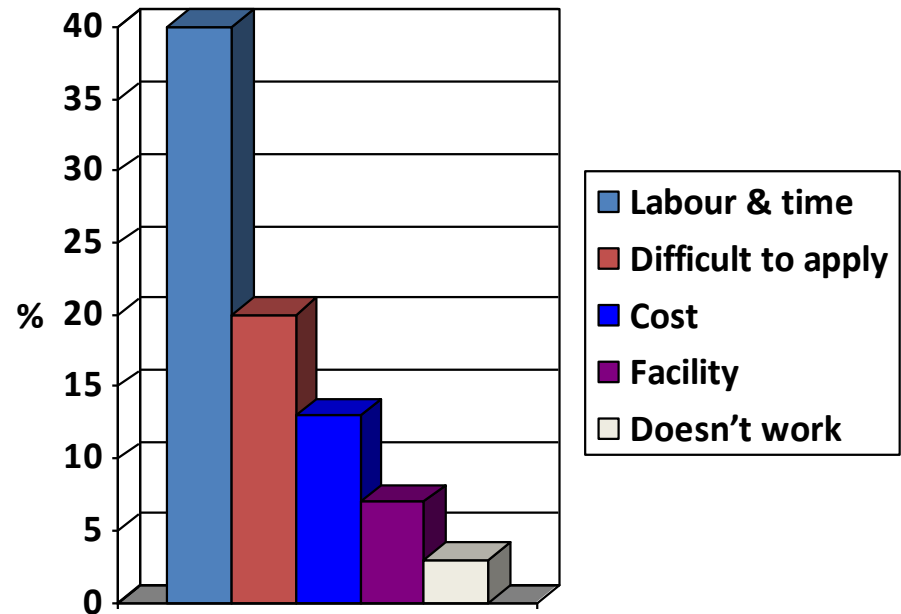
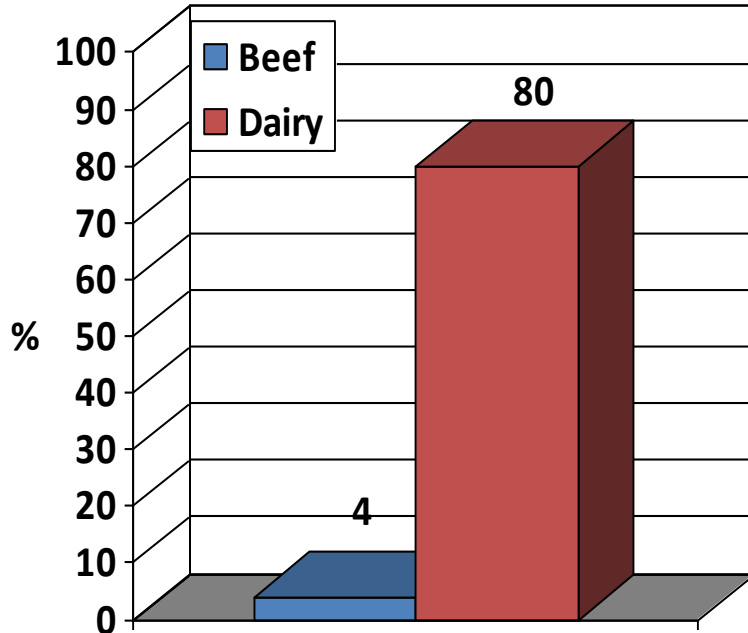
Lusby et al., 1981

**AI: One of the beef
industry's most under
utilized technology**

BEEF SEMEN SOLD (units)

	1993	2012	Change
USA	1.117.798	1.670.000	+66.9%
BRASIL	1.874.996	7.440.000	+252%

Reasons for the low adoption of AI in beef herds in USA



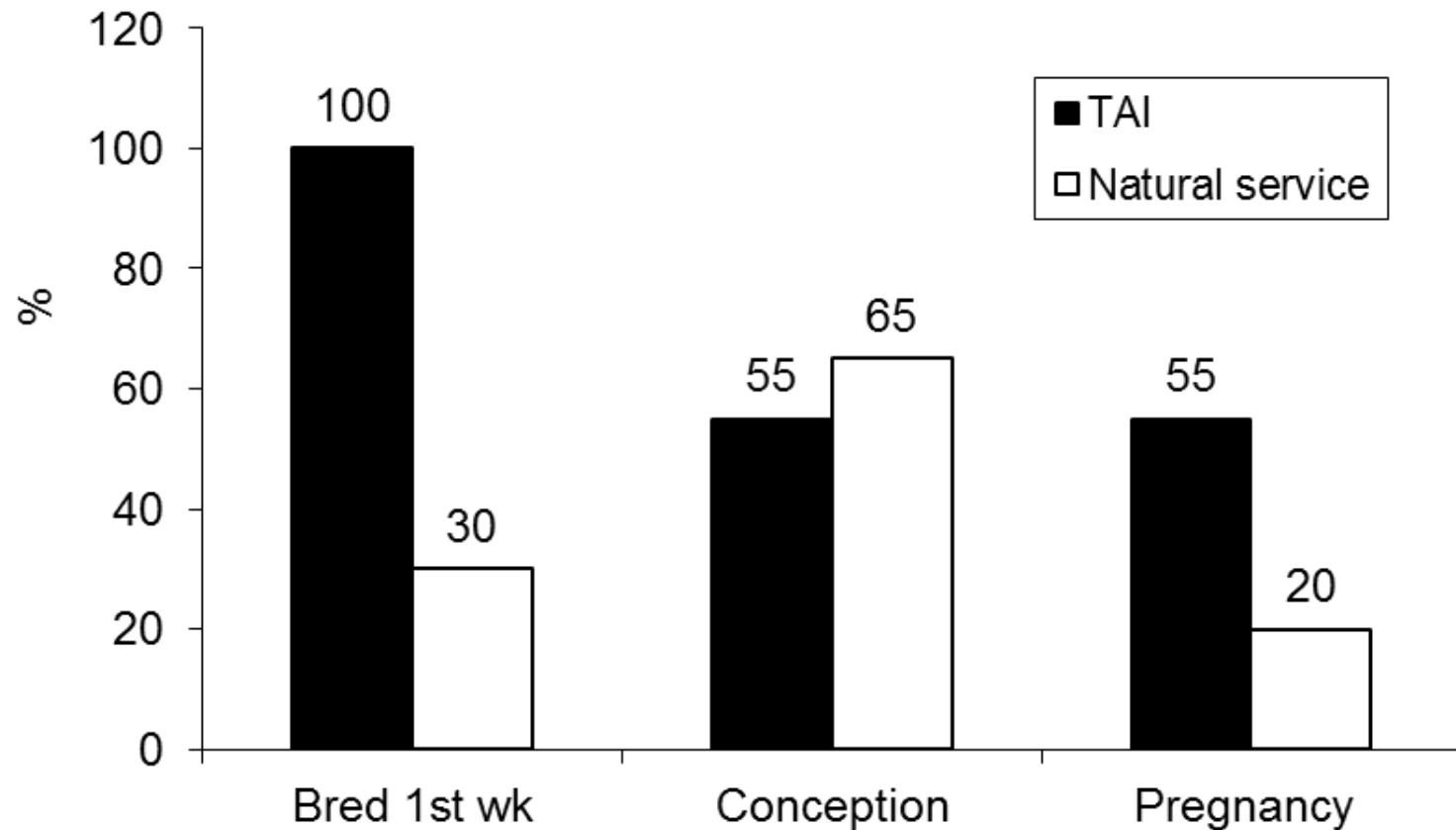
Cost of Natural service (Bull/4 years)

Purchase	\$3,000	\$4,000	\$5,000	\$6,000
Slaughter value	-\$1,500	-\$1,500	-\$1,500	-\$1,500
Difference	\$1,500	\$2,500	\$3,500	\$4,500
Maintenance/year	\$1,000	\$1,000	\$1,000	\$1,000
Vet bill/year	\$100	\$100	\$100	\$100
Death (10%/year)	\$1,200	\$1,600	\$2,000	\$2,400
Total Cost	\$7,100	\$8,500	\$9,900	\$11,300
No. calves	112	112	112	112
Cost per calf	\$63.39	\$75.89	\$88.40	\$100.89

Timed-AI programs: Cost per pregnancy based on 100 heifers

	CIDR/EB	CIDR/OVS	CIDR/COS7	CIDR/COS5	CIDR/COS5M
Drugs	\$ 26.5	\$ 30.0	\$ 30.0	\$ 35.0	\$ 26.5
Labour	\$ 300	\$ 300	\$ 240	\$ 300	\$ 240
Semen & AI	\$ 2500	\$ 2500	\$ 2500	\$ 2500	\$ 2500
P/AI	65%	55%	50%	65%	60%
Cost per pregnancy	\$ 83.8	\$ 105.5	\$ 114.8	\$ 96.9	\$ 89.8

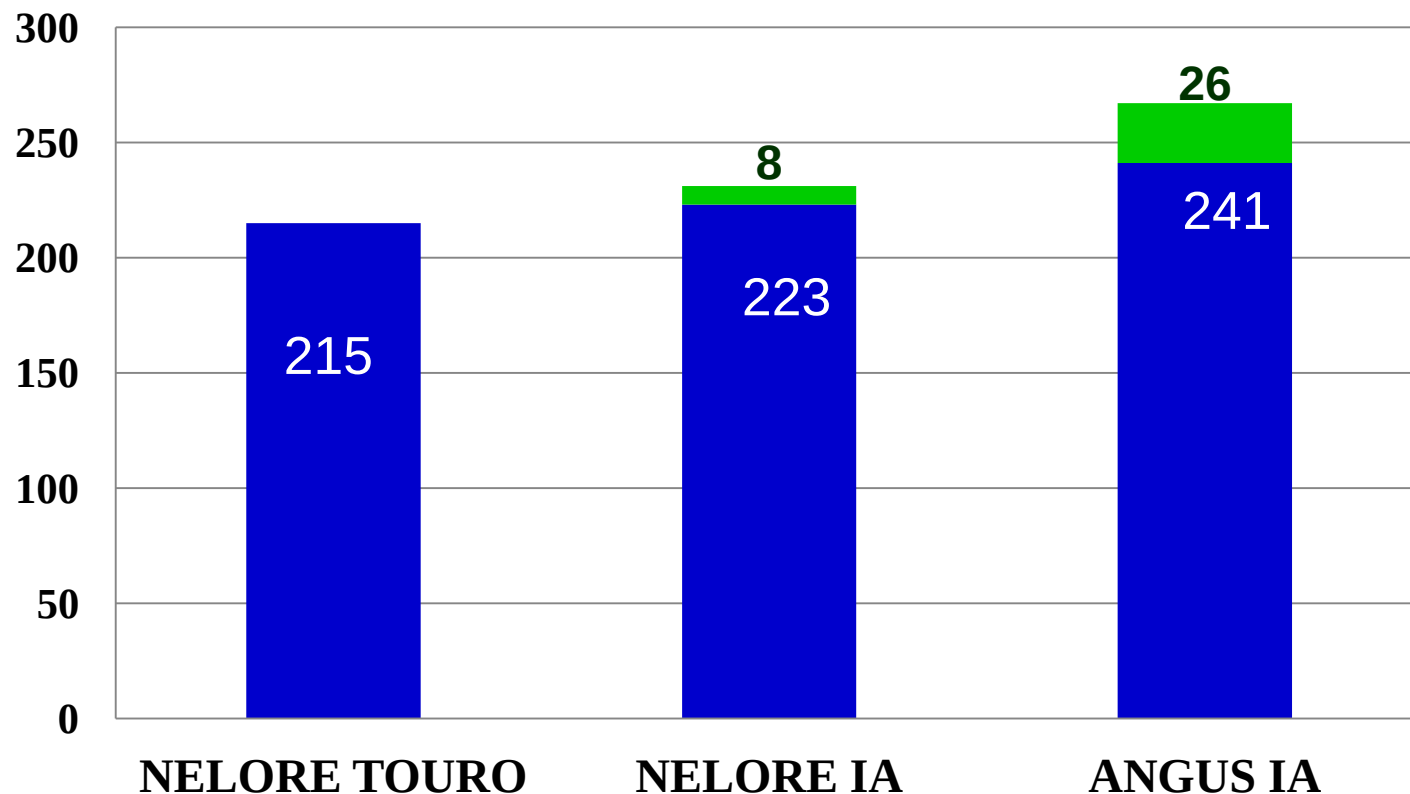
TAI vs. Natural service: Percentage of animals conceiving in the first week of the breeding season



TAI vs. Natural service **(Study 1)**

	Groups		Difference
	TAI	Natural service	
Cows	251	109	---
Calving, %	90	81	9
Calved first 30 days, %	85	62	23
Weaning,%	88	79	9
Average age at weaning, days	210	200	10
Weaning weight, kg	262	230	32
Weaning weight of exposed cow, kg	231	181	50

Weaning weight of male calves (adjusted 240 days)

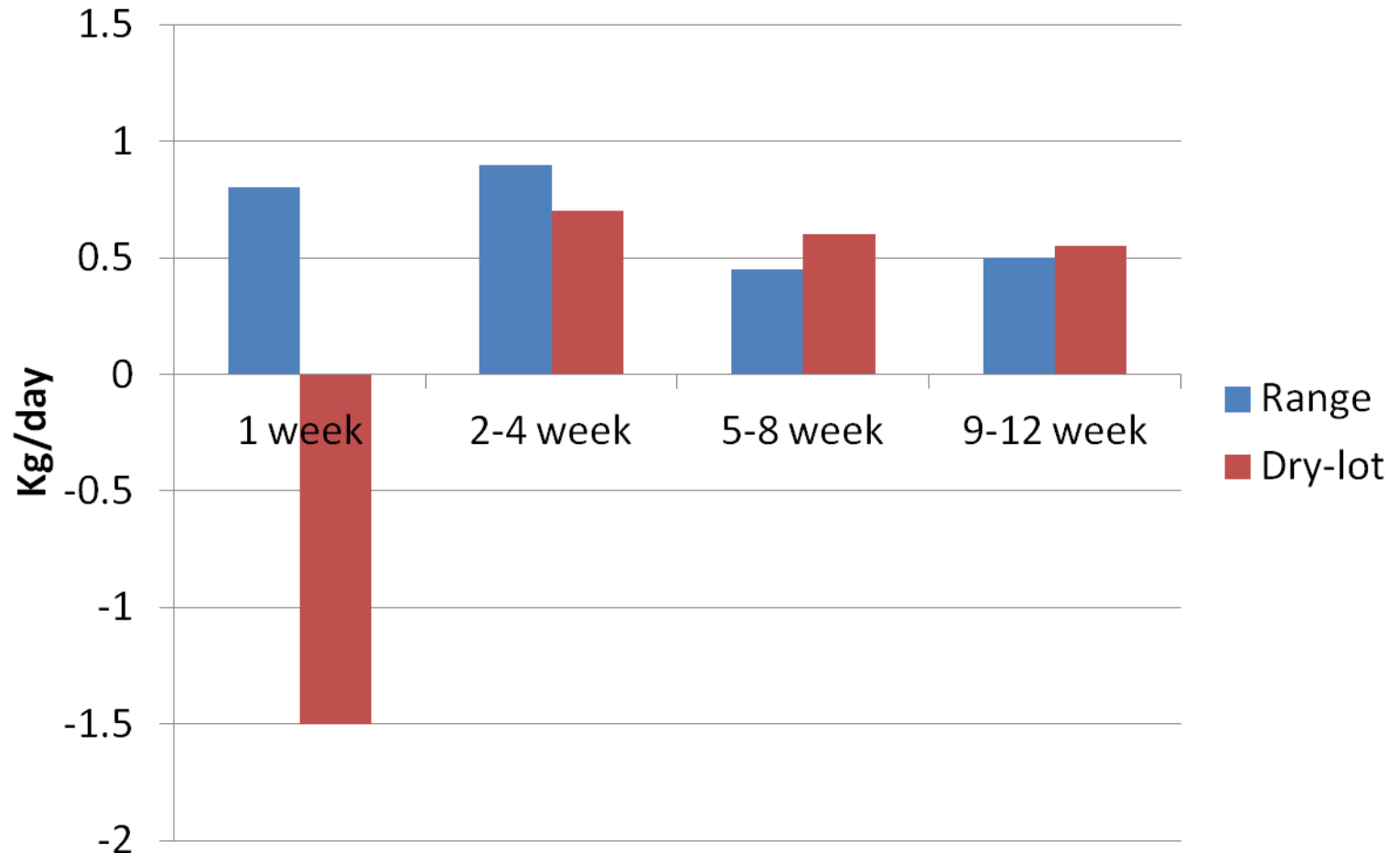


Responsable técnico: Luciano Penteado; cortesia del Dr. Baruselli, USP, Brasil

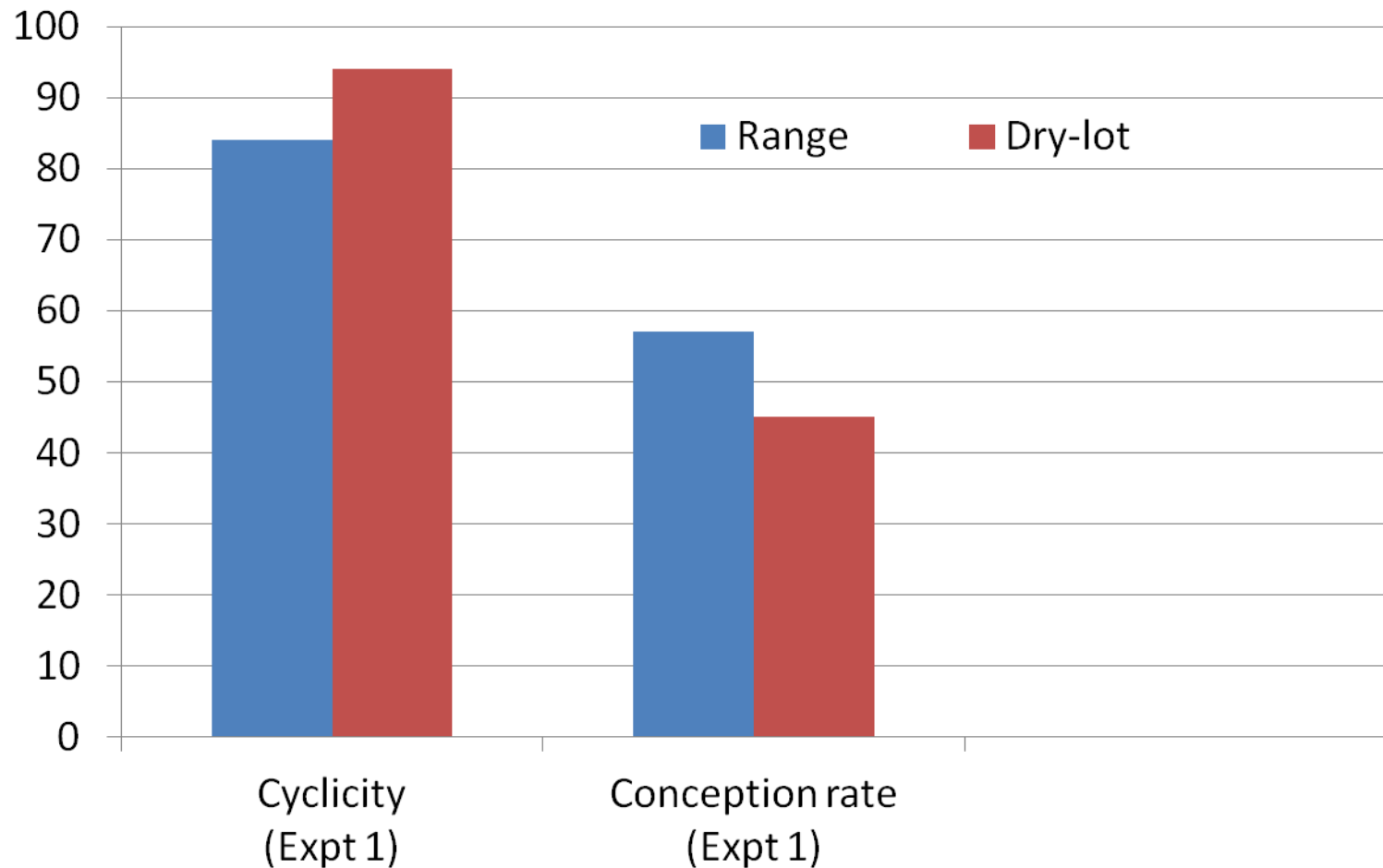
Factors that affect fertility in an AI program

- 1. Nutrition (BCS)**
- 2. Record: Age, postpartum interval**
- 3. Anestrous**
- 4. Compliance**
- 5. Weather**

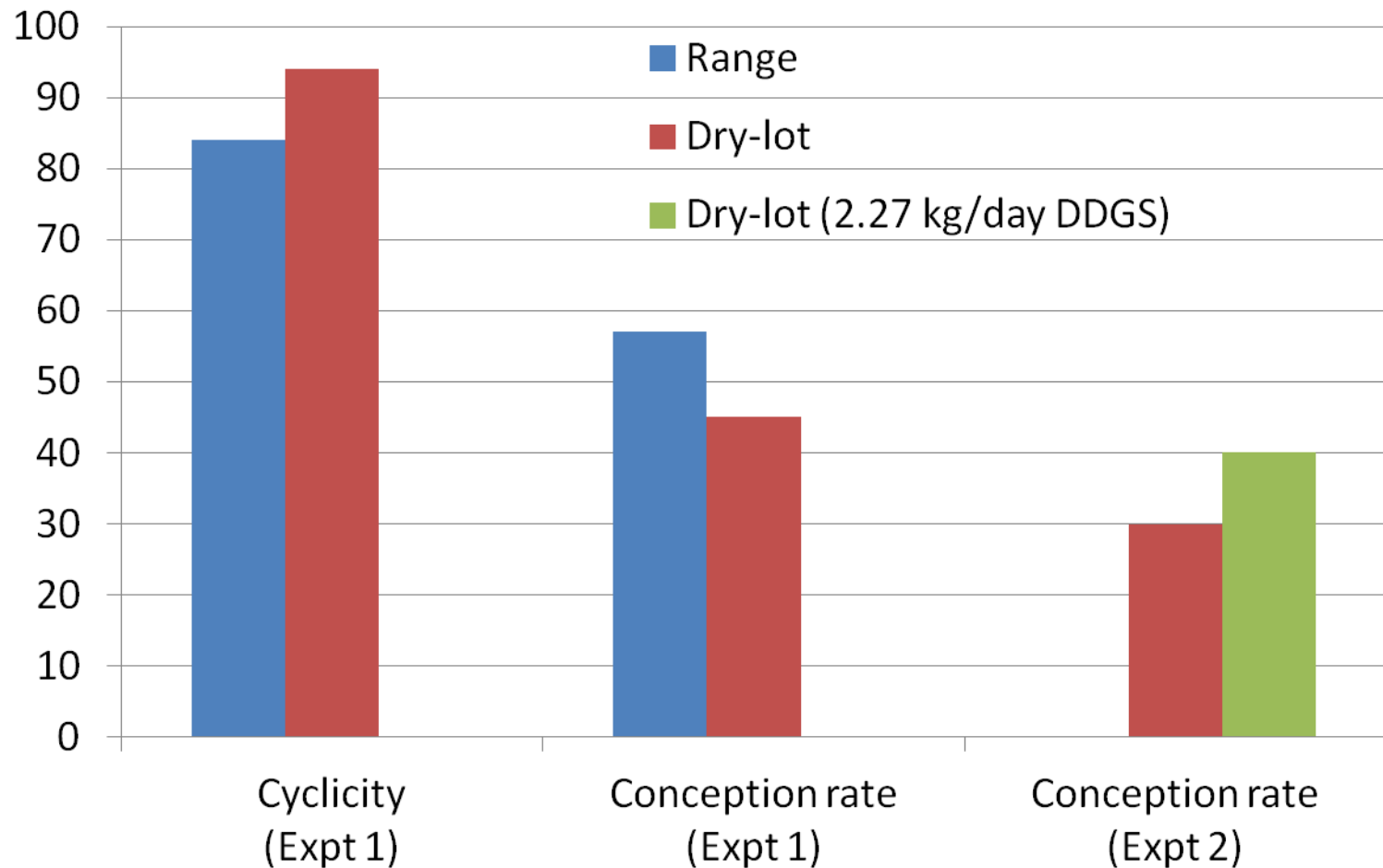
AVERAGE DAILY GAINS (KG/DAY) OF HEIFERS DEVELOPED IN RANGE OR DRY-LOT AFTER MOVED TO A PASTURE



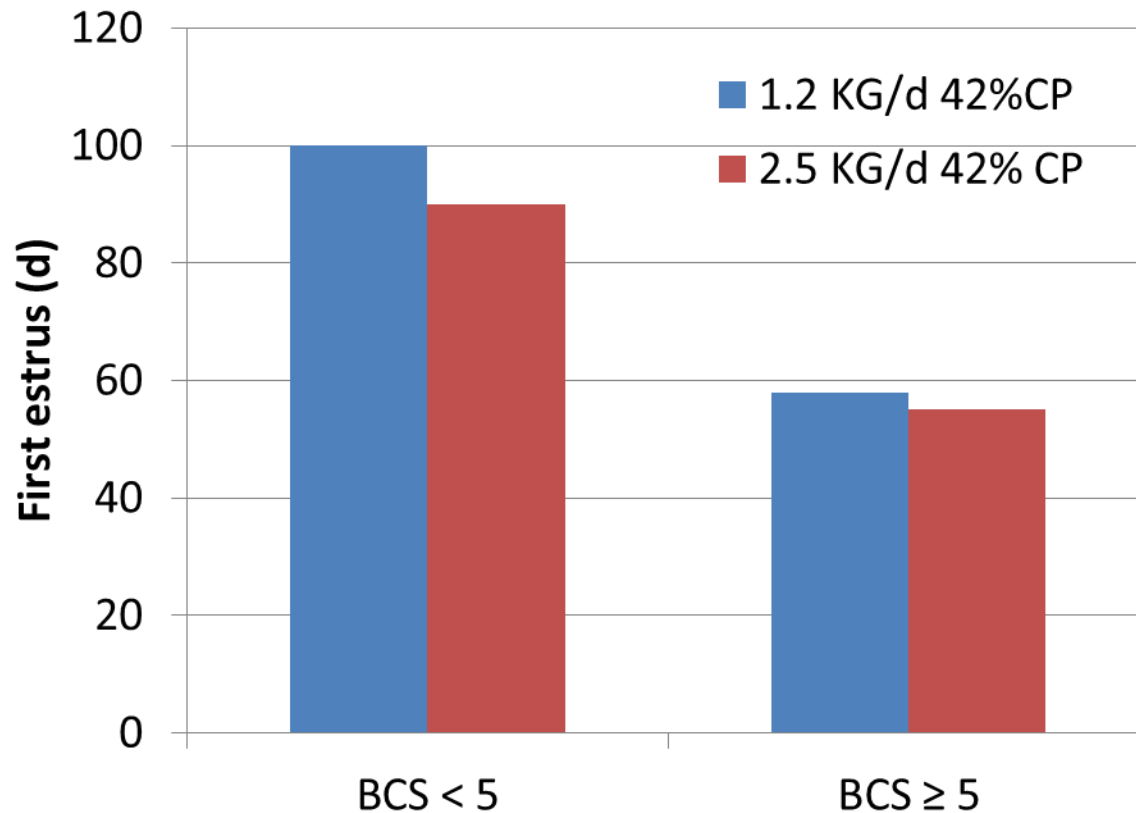
REPRODUCTIVE PERFORMANCE OF HEIFERS DEVELOPED IN RANGE OR DRY-LOT AFTER MOVED TO A PASTURE



REPRODUCTIVE PERFORMANCE OF HEIFERS DEVELOPED IN RANGE OR DRY-LOT AFTER MOVED TO A PASTURE

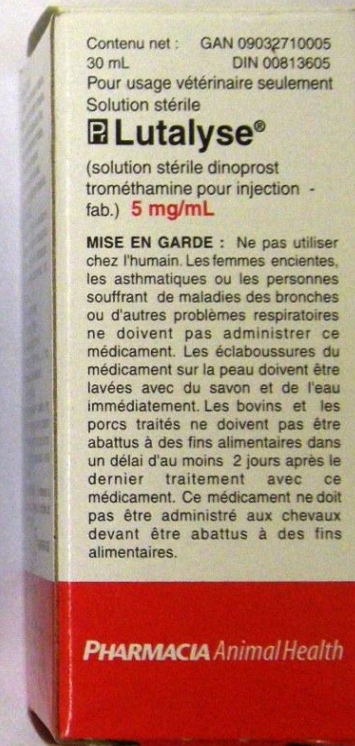
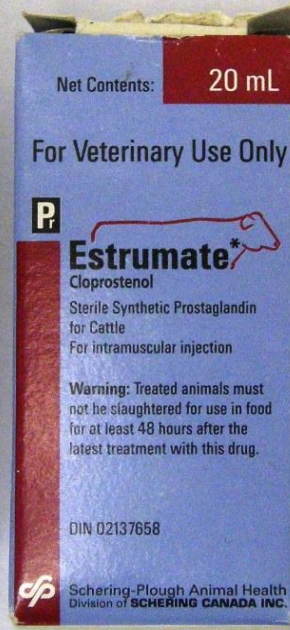
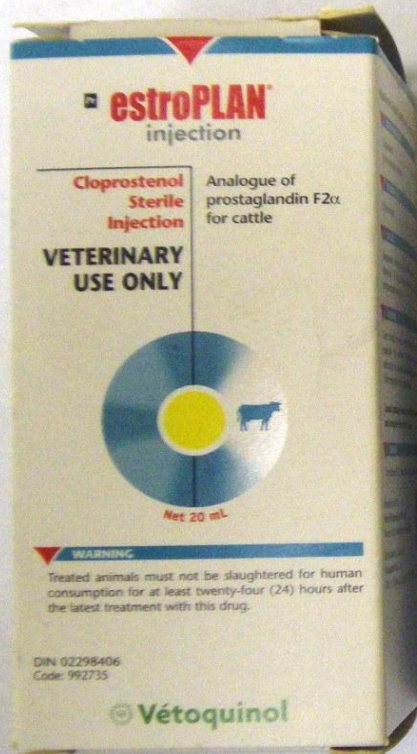


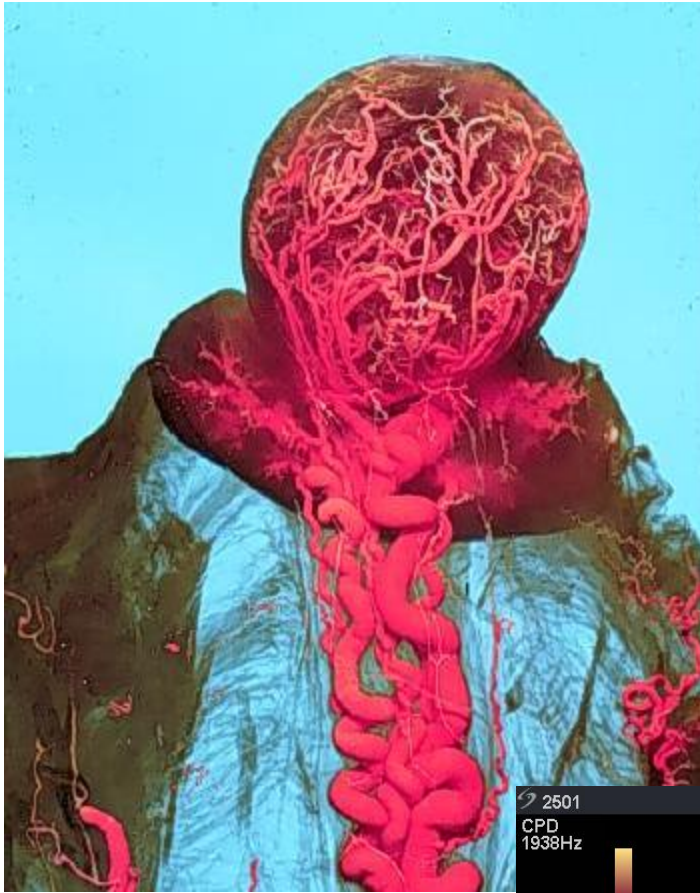
EFFECT OF PROTEIN SUPPLEMENTATION DURING POSTPARTUM

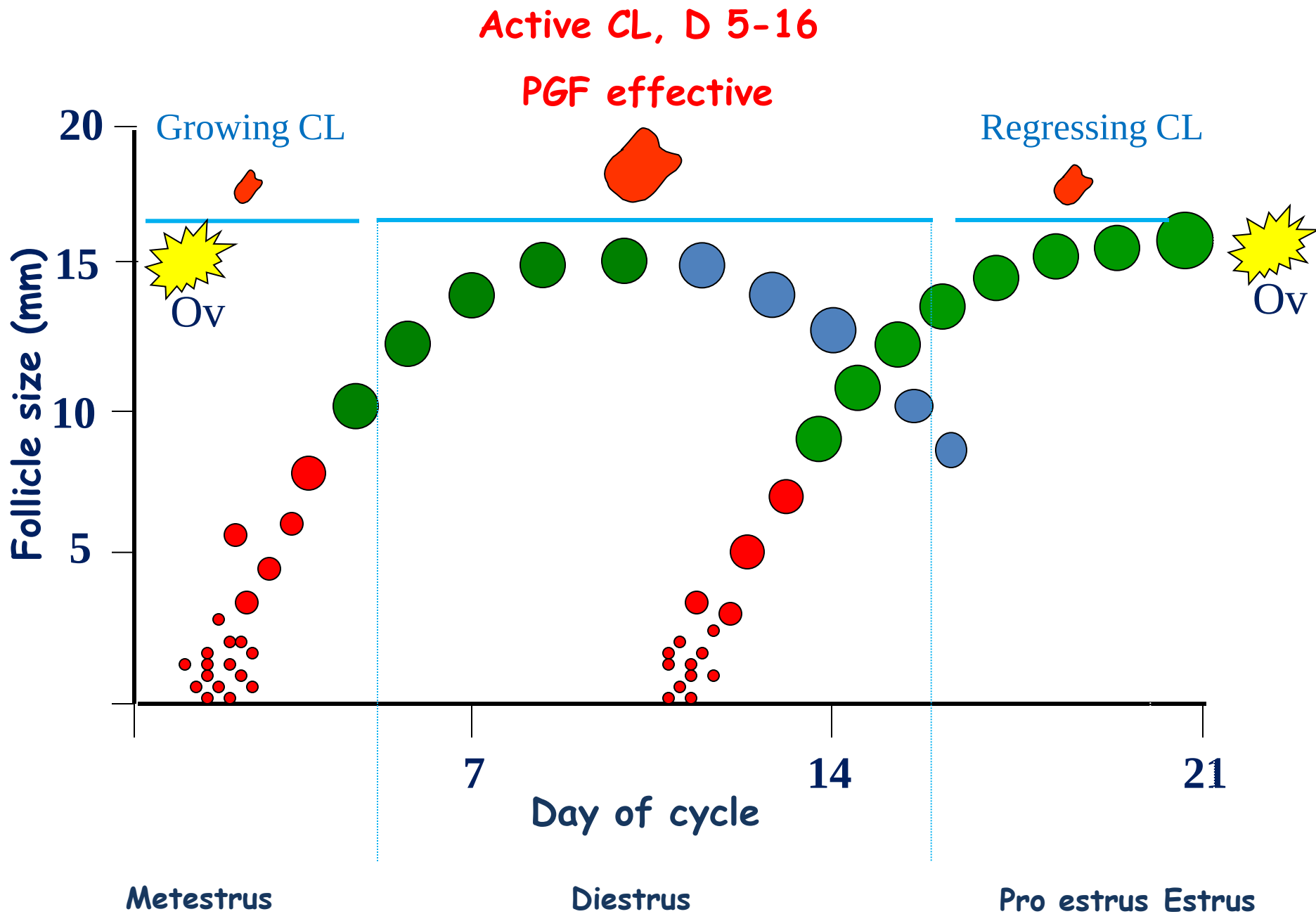


ESTRUS SYNCHRONIZATION PROTOCOLS

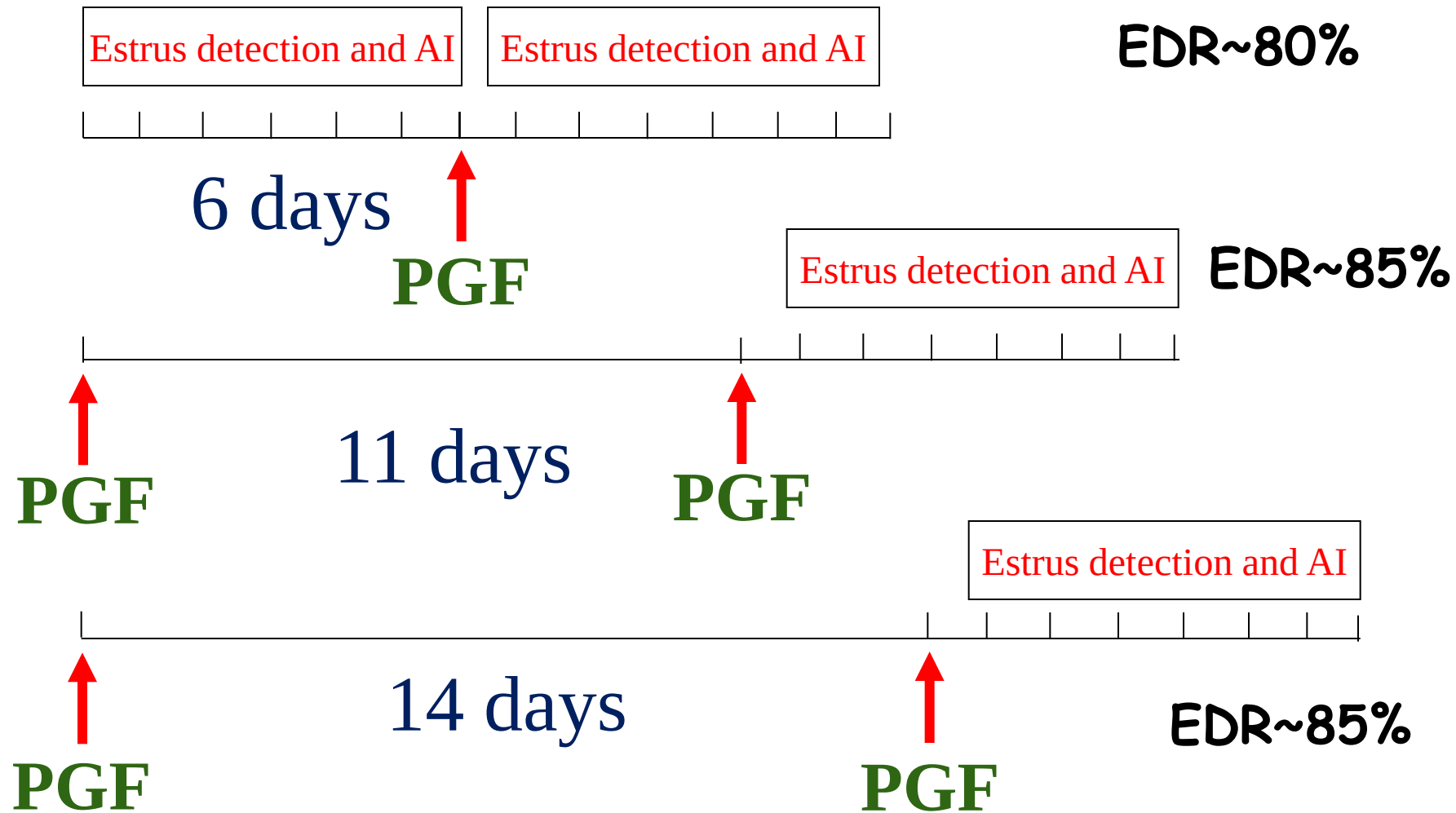
Commercially available PGF products



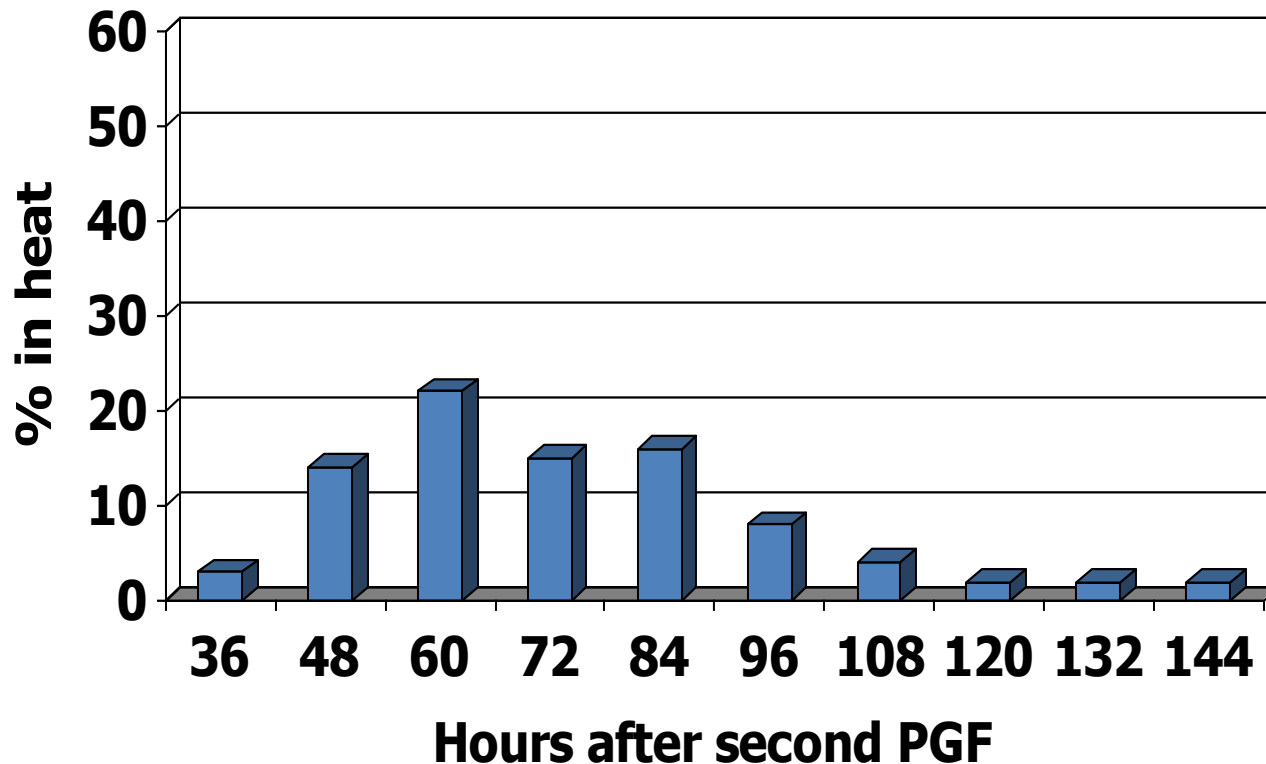




Common Protocols using PGF



Distribution of heat in Holstein heifers given PGF 14 d apart

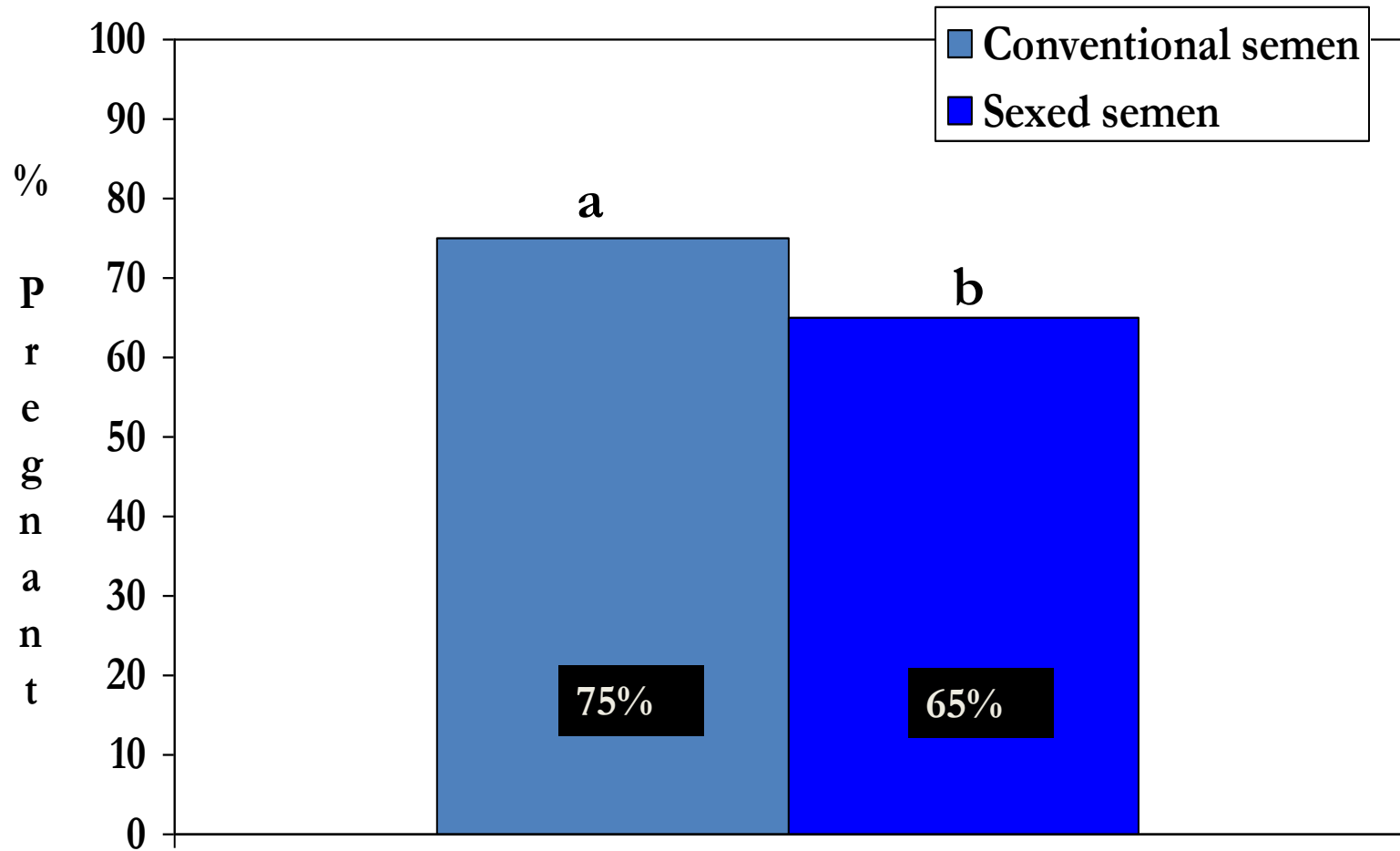


■ Total in heat: 86%

45% ovulated
30% don't ovulate
25% don't respond

n = 132

Conception Rate



a, b Effect of TRT $P < 0.05$

Oral Progestins:

Melengestrol Acetate (MGA)

Ear implants : **Crestar**



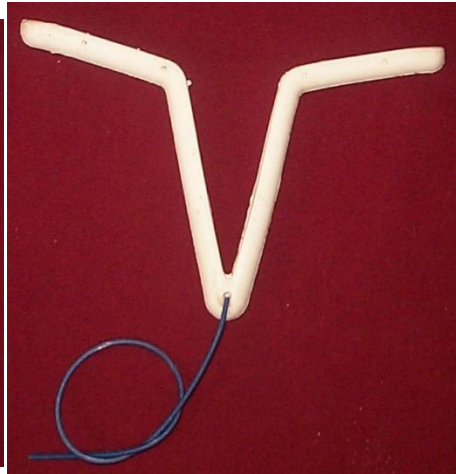
Intravaginal Devices



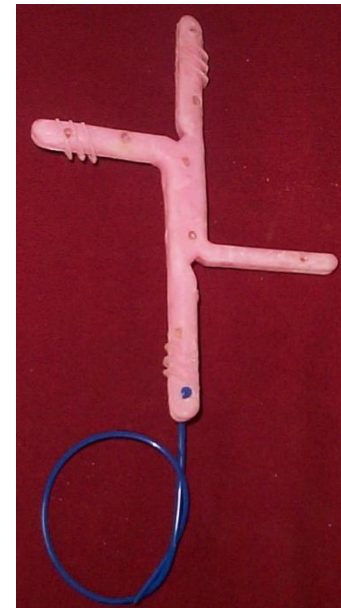
PRID



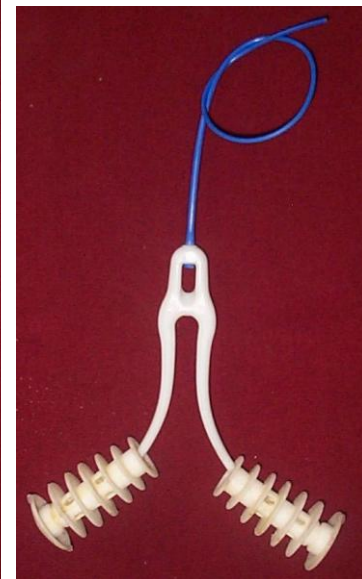
CIDR-B



DIB



TRIU-B



CUE-MATE

Oral Progestins:

Melengestrol Acetate (MGA)

Ear implants : **Crestar**



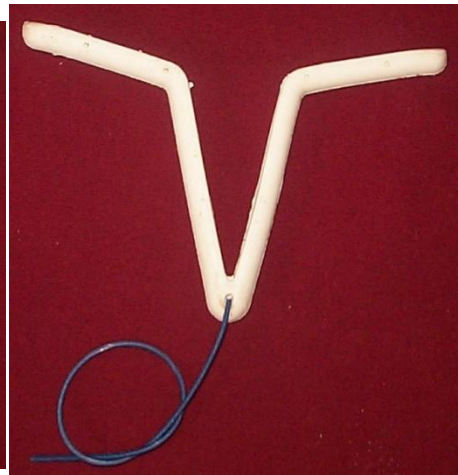
Intravaginal Devices



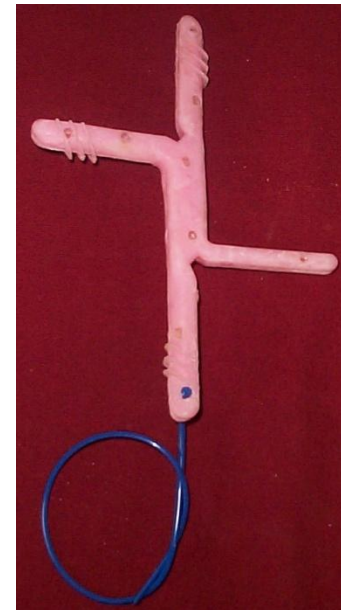
PRID



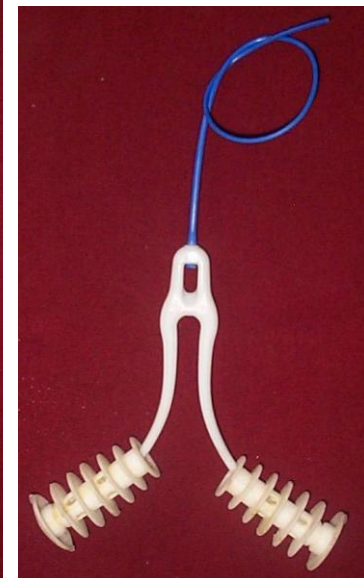
CIDR-B



DIB

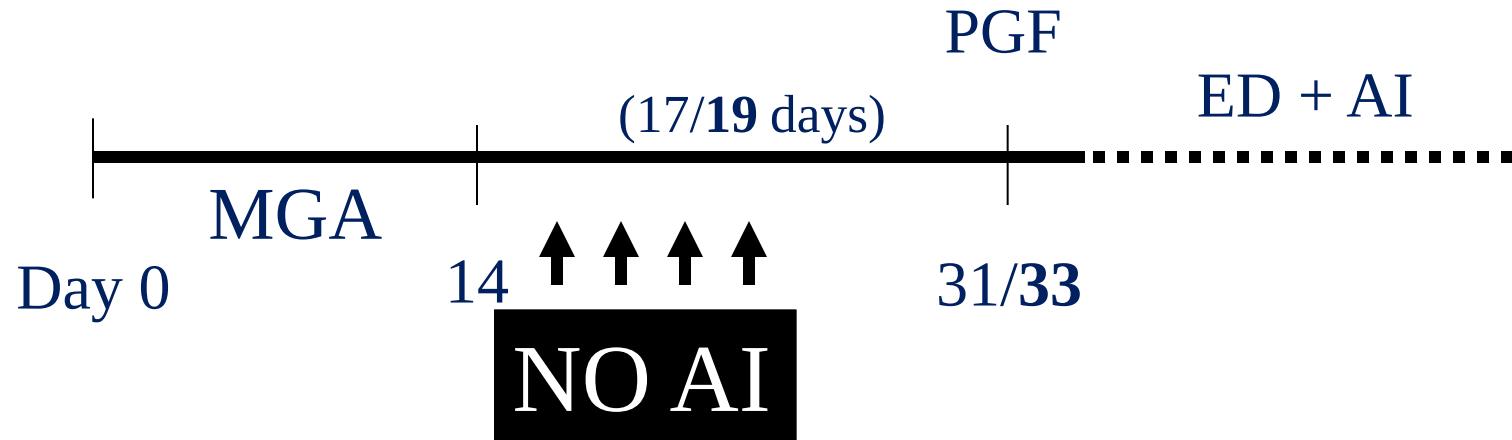


TRIU-B



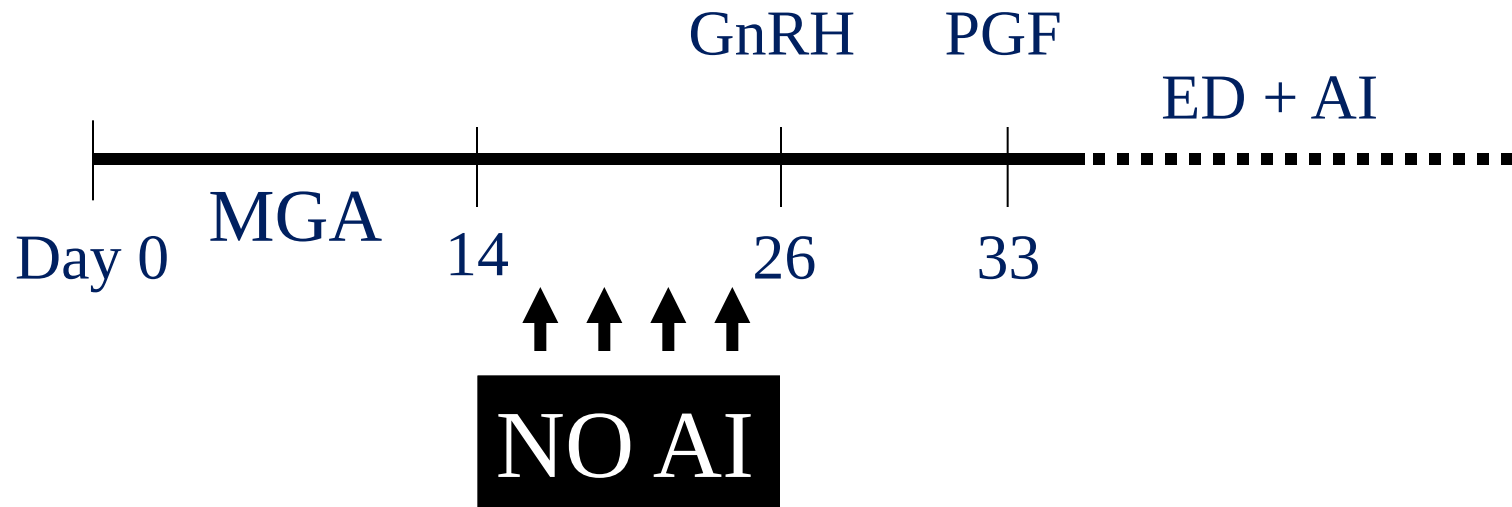
CUE-MATE

Program with MGA for estrus synchronization



MGA = melengestrol acetate @ 0.5 mg/heifer/day

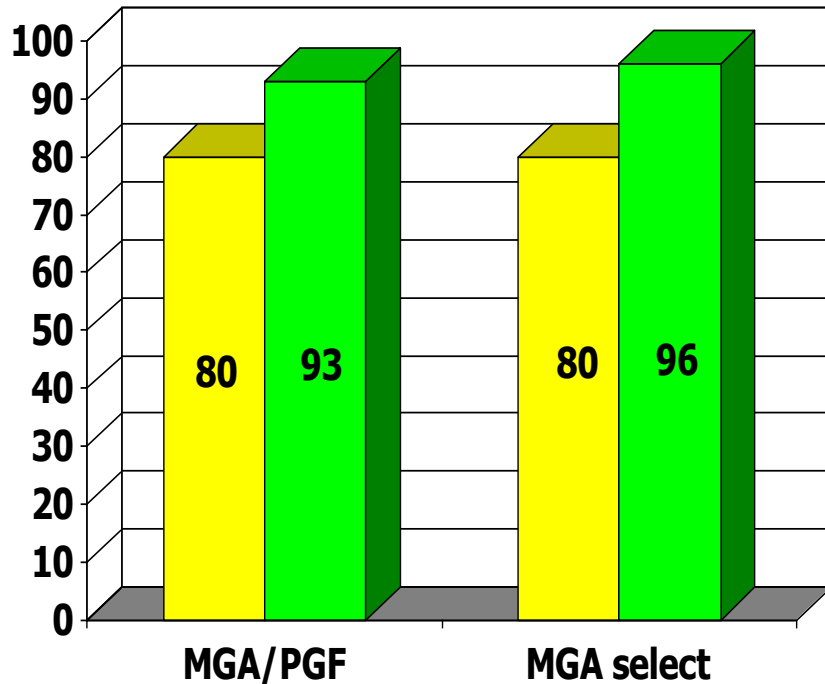
Modified MGA program (MGA select)



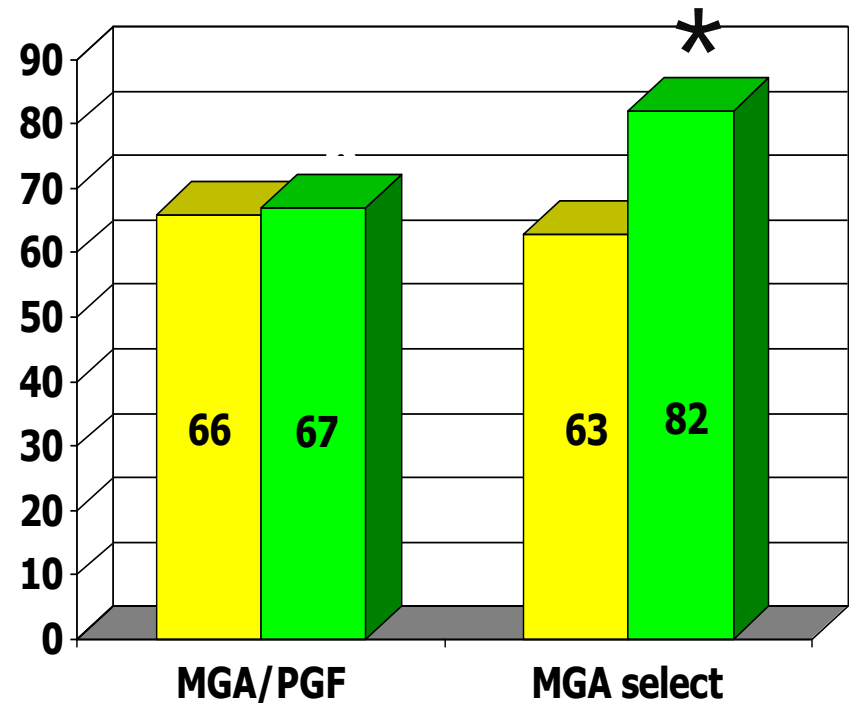
MGA/PGF vs. MGA Select (ED + AI for 6 days)

■ Anestrus

■ Cycling



Estrus rate



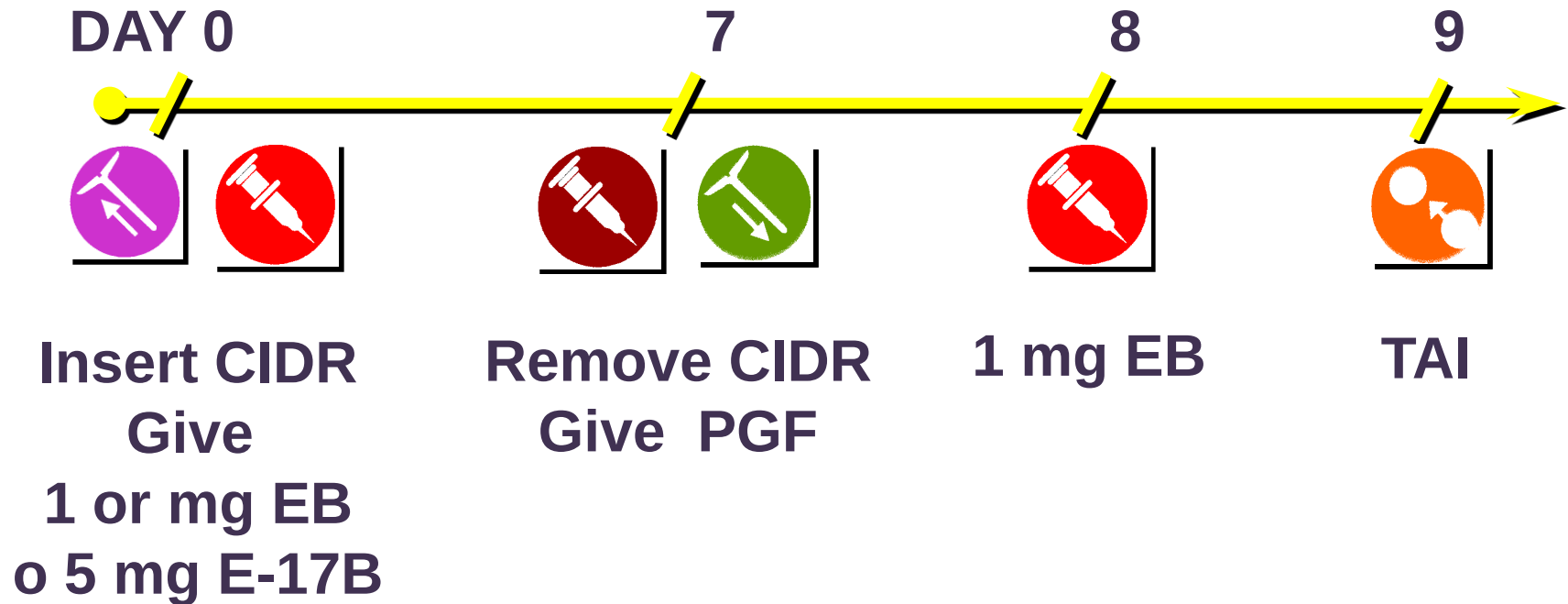
Pregnancy rate

N = 124

Wood-Follis et al., 2004

PROTOCOLS FOR TIMED-AI

TAI protocol (Progesterone & Estrogen)



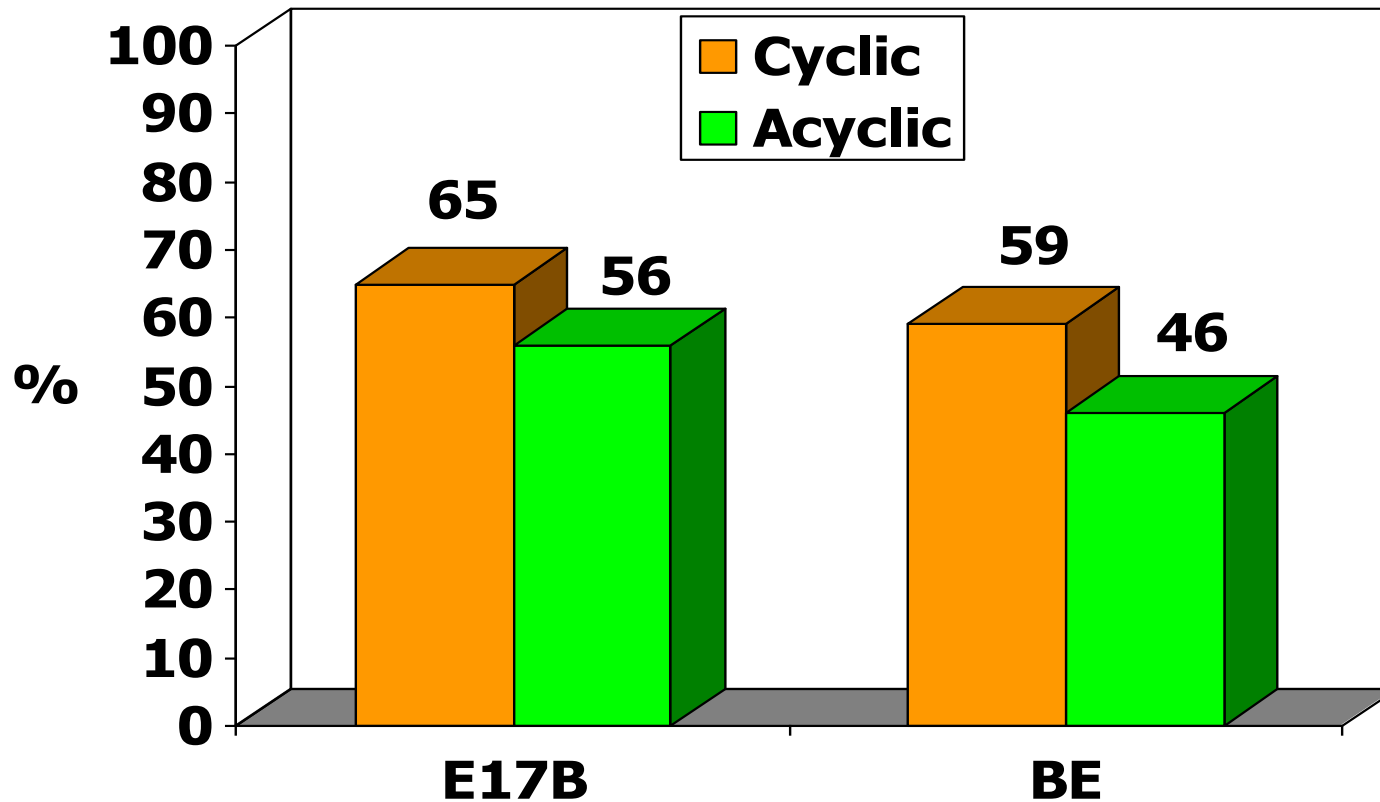
TAI protocol-Schedule (Progesterone & Estrogen)

MON am	TUE am	WED pm	THU	FRI	SAT	SUN
EB or 17B CIDRi						
CIDRr PGF	EB	TAI				



28-34 hours

Pregnancy rate in heifers treated with E17B or EB



n = 1428 heifers

Colazo et al., 2001; 2002; 2004; 2005

Some commercially available GnRH products



Fertiline (Vetoquinol)



Cystorelin (Merial)

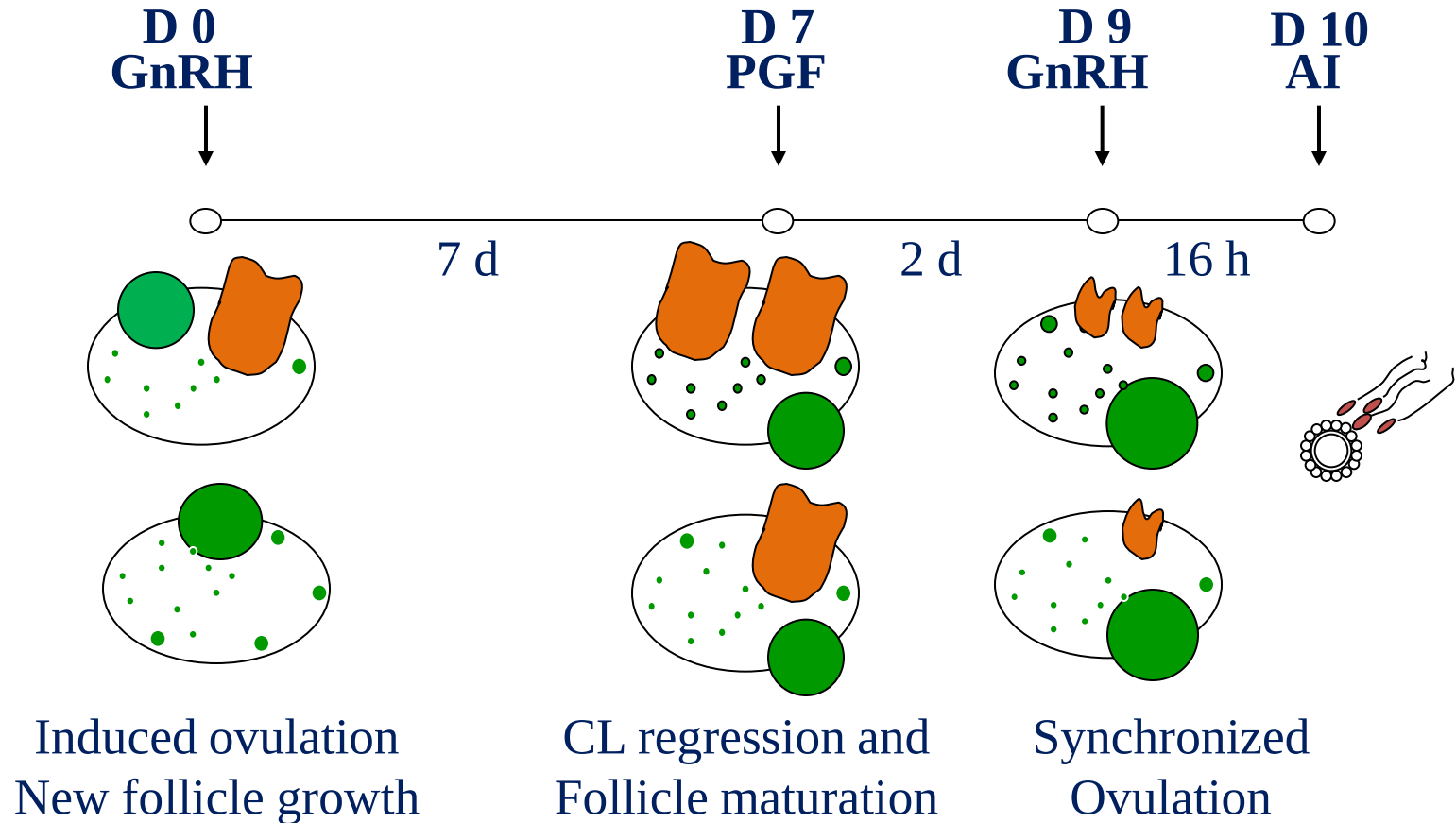


Factrel (Pfizer Animal Health)



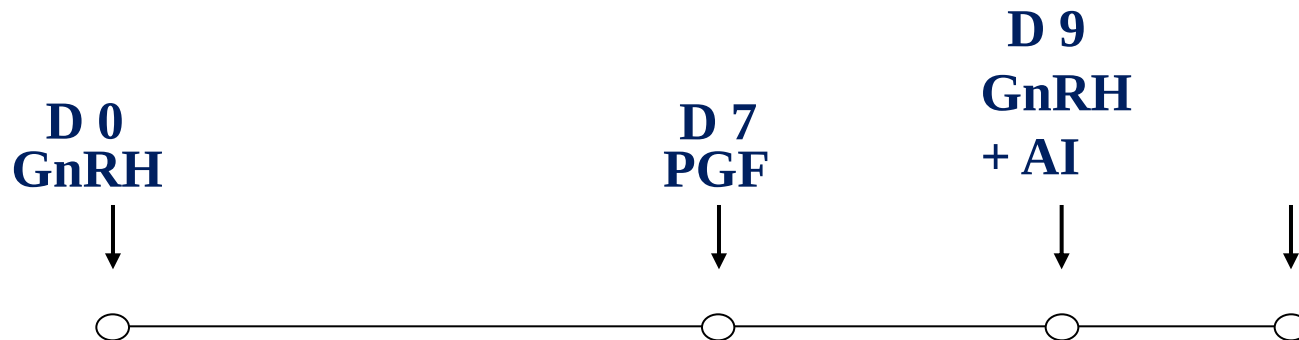
Fertagyl (Merck Animal Health)

How Ovsynch works?



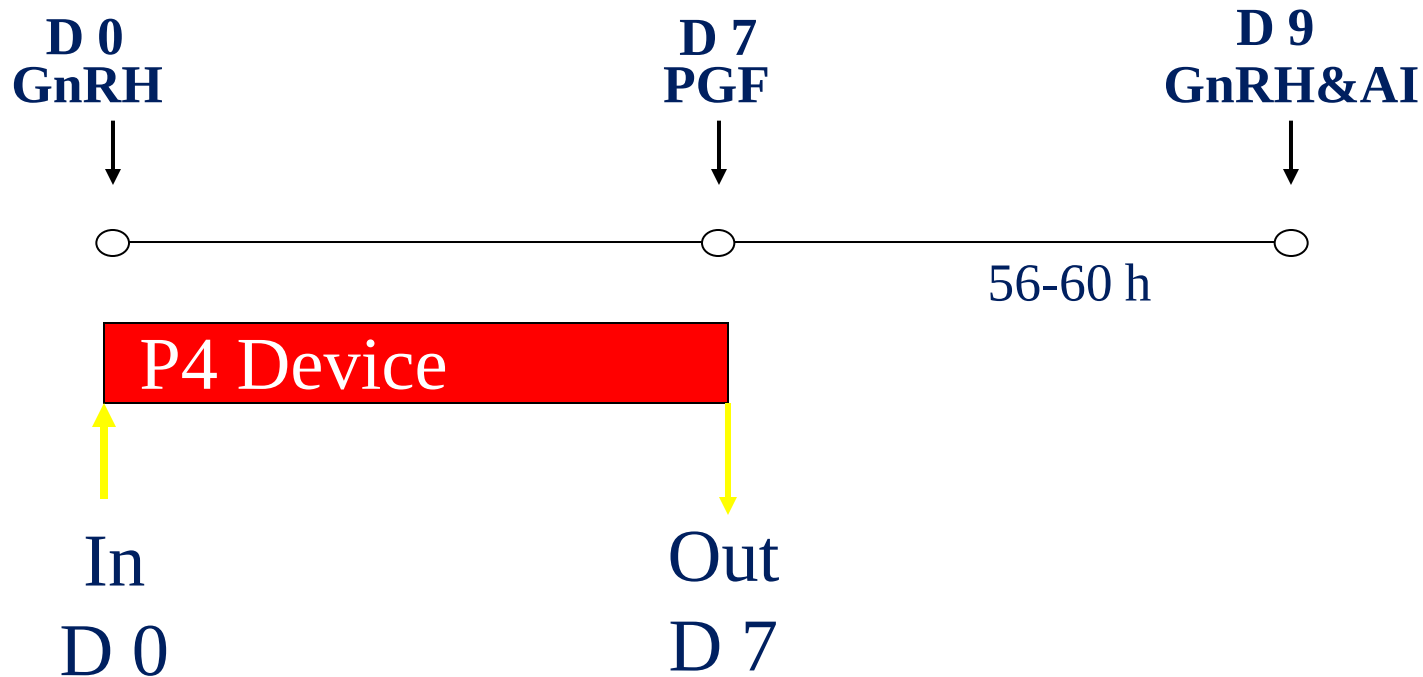
Cosynch

- Second GnRH given at time of AI



- Advantage: Reduced handling
- Possible disadvantage: Delayed ovulation

Cosynch plus a P4 device



TAI protocol-Schedule (7d Cosynch & CIDR)

MON am	TUE am	WED pm	THU	FRI	SAT	SUN
GnRH CIDRi						
CIDRr PGF		GnRH & TAI				

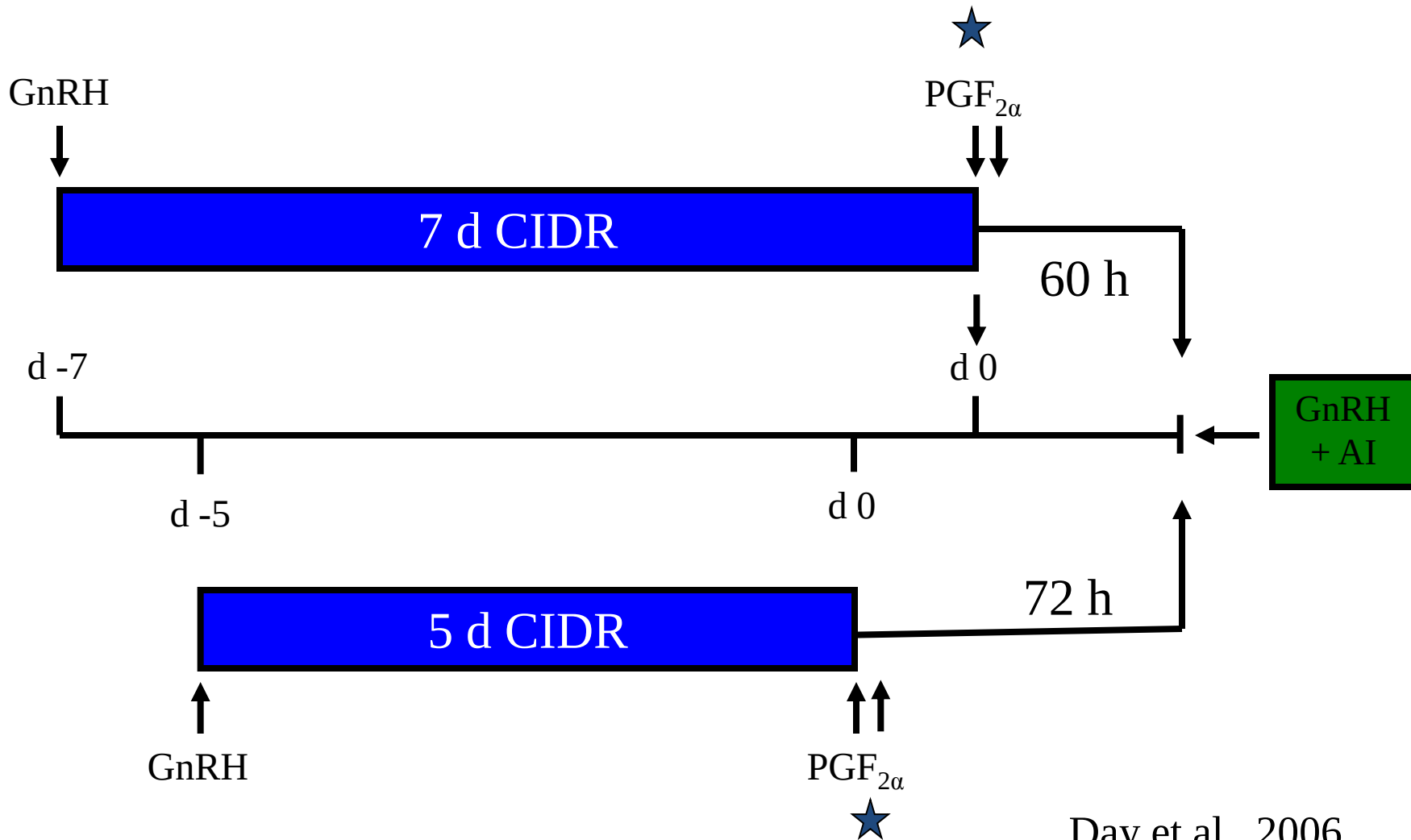


400 IU eCG

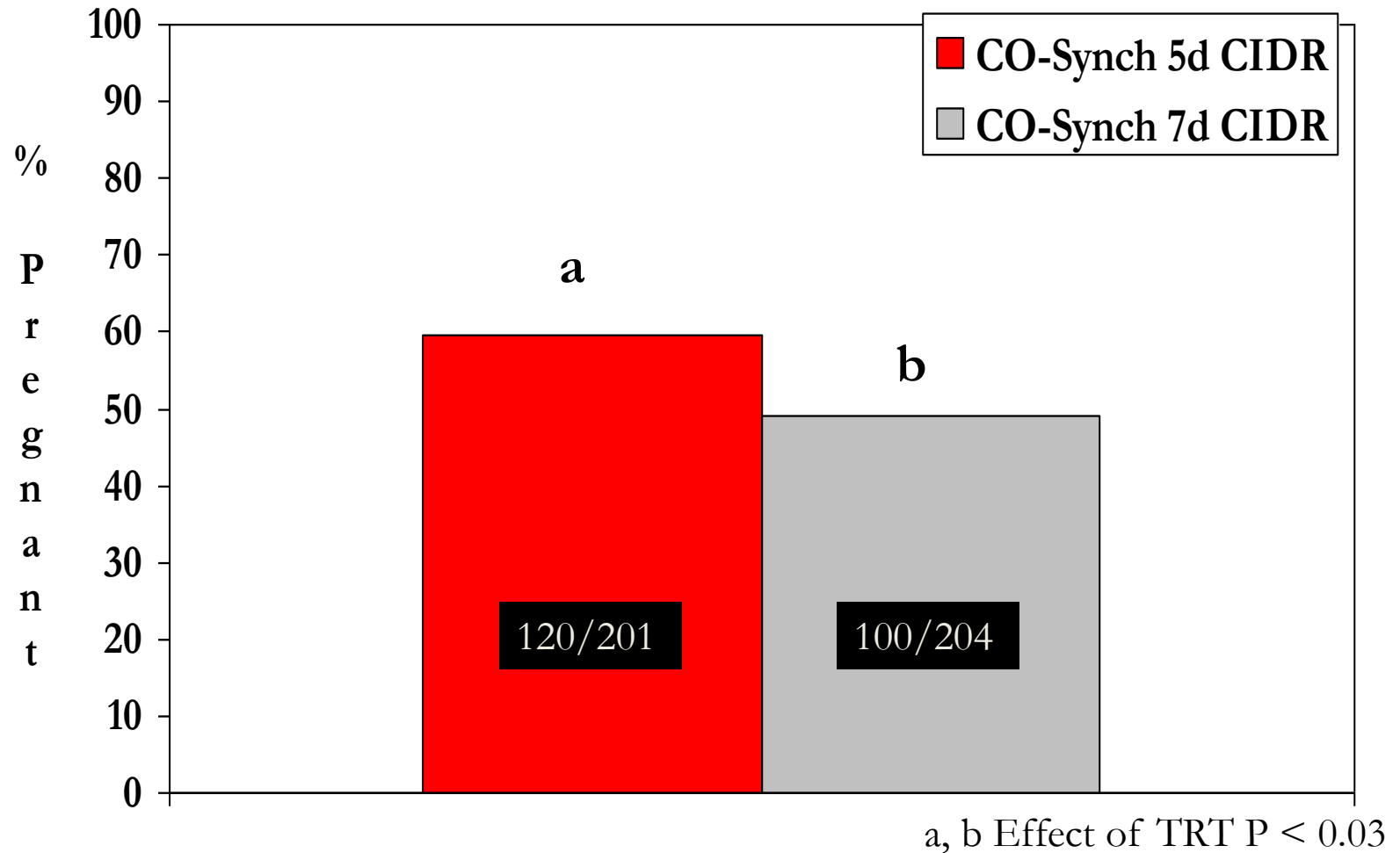


56-60 hours

Experimental Design - 5 d vs 7 d Cosynch



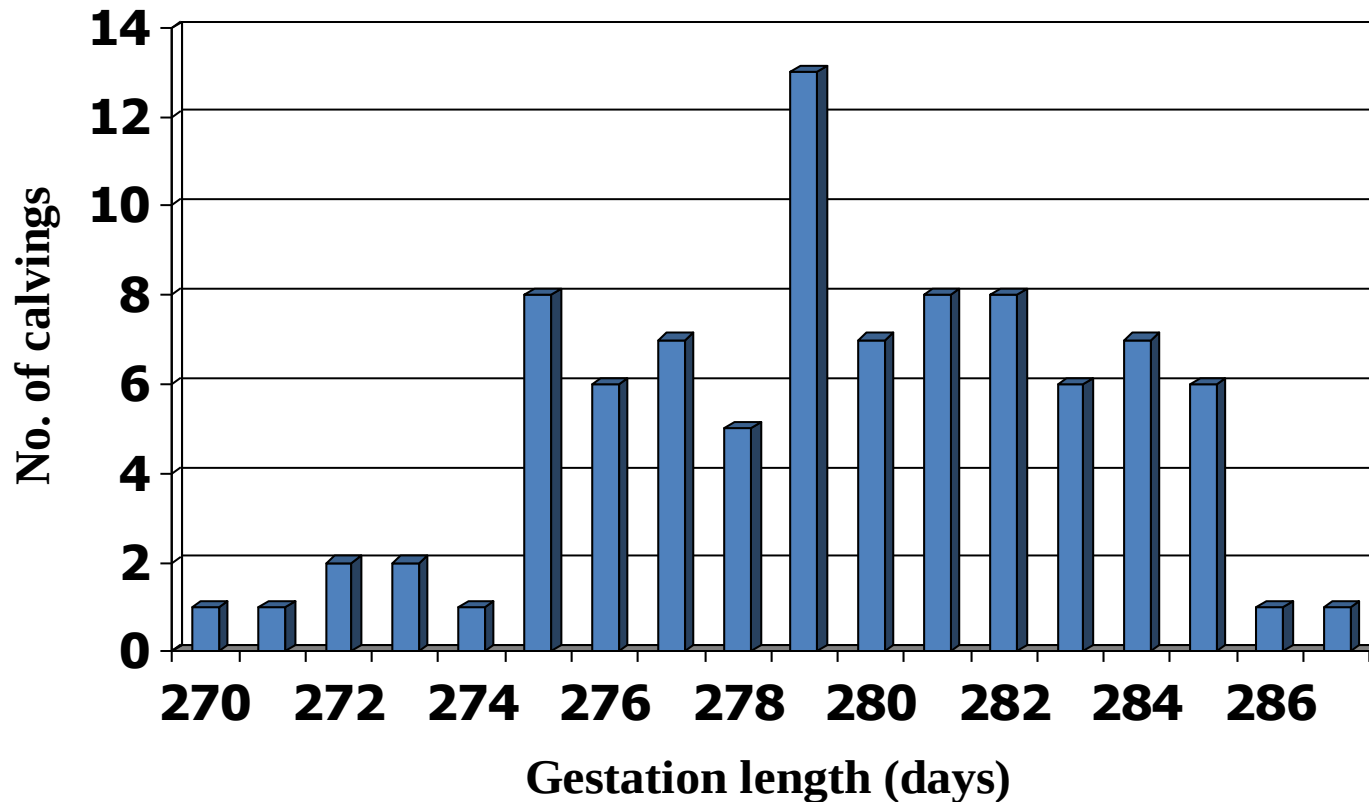
TAI Pregnancy Rate



TAI protocol-Schedule (5d Cosynch & PRID)

MON am	TUE am	WED am	THU am	FRI	SAT	SUN
		GnRH PRIDi				
PRIDr PGF	PGF		GnRH & TAI			

Calving distribution of 90 beef heifers all bred on a single day



N = 90

Reuter and Rinette, 2009

**First FTAI
50-60 %**

**Half of the cows
are still open!!**

What are the possibilities?



**Bulls for
45 to 60 days**

- Estrus detection & AI of the returns
- ReSynchronization & AI
- ReSynchronization & TAI

Resynchronization

Estrus detection

Days

0 (TAI)

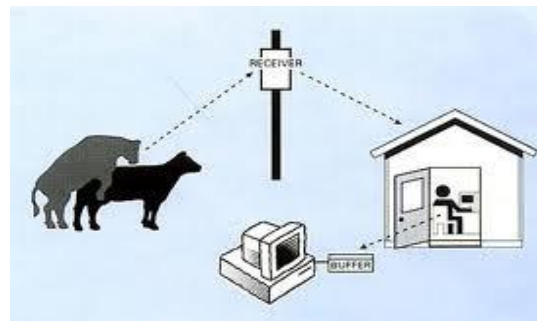
13

20

26

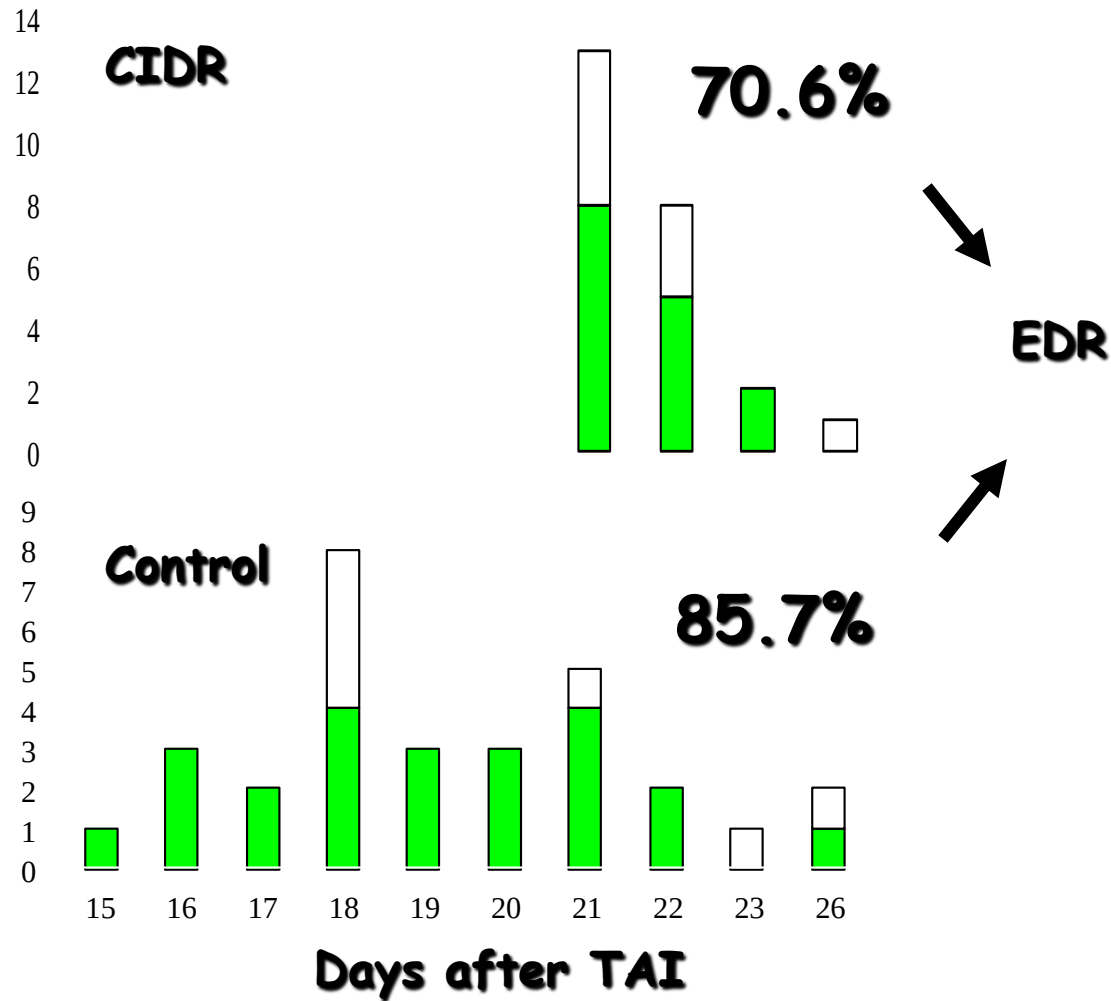
CIDR

Control



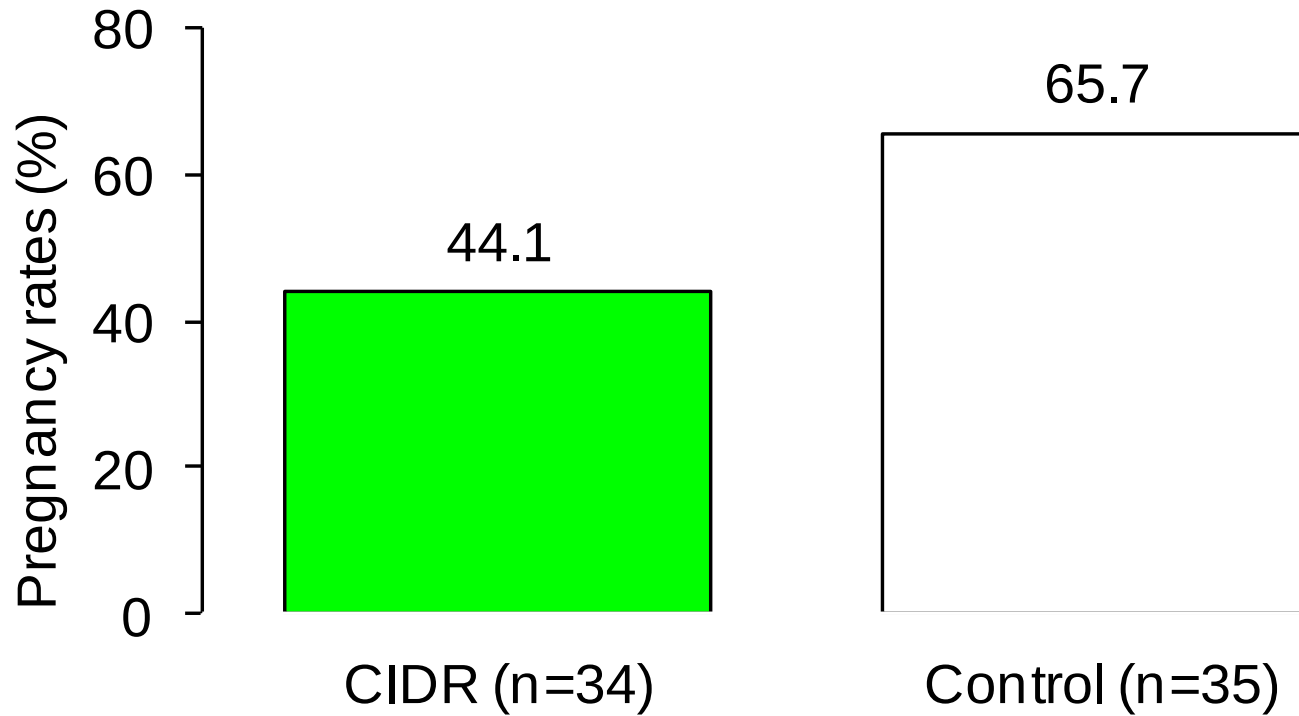
Total n=159
Vacías n=69

Number of heifers bred and pregnant by treatment



Varianza $P=0.07$

Conception rate



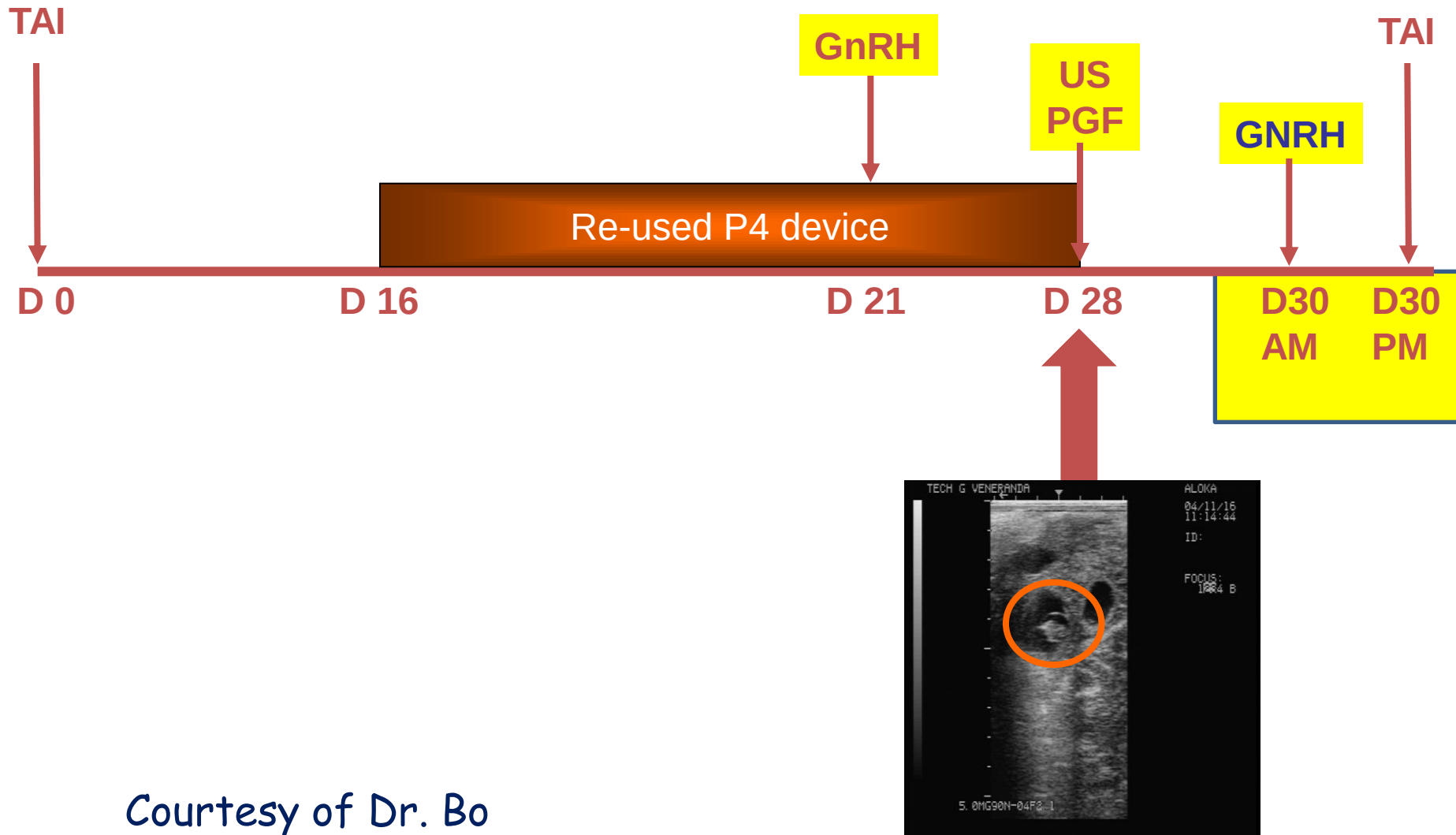
P=0.07

Resyncronization with an used CIDR or MGA

Groups	Control	CIDR-B	MGA
Preg. to 1 st AI (%)	45.2	43.4	49.5
	42	121	138
Estrus rate (%)	48.5 ^{ab}	53.4 ^a	41.2 ^b
n	45/51	149/158	115/141
Conception rate (%)	62.2 ^{ab}	65.1 ^a	49.6 ^b
n	28/45	97/149	57/115
Pregnancy rate (%)	54.9 ^{ab}	61.4 ^a	40.4 ^b
n	28/51	97/158	57/141
Accumulated PR	60/93	218/279	195/279
(%)	64.5 ^x	78.1 ^y	69.9 ^x

^{abc}Percentages are different (P<0.05); ^{xy}P<0.003

Re-TAI Program for Beef Cattle



Courtesy of Dr. Bo

Commercial TAI Programs using Re-TAI (2007/2011)

	N	1° TAI %	2° TAI %	Total %
<i>Heifers</i>	4267	56%	51%	77%
Cows	415	65%	47%	84%
<i>Suckled Cows</i>	1749	58%	51%	80%
TOTAL	6431	57%	51%	78%

Courtesy of Dr. Bo

CONCLUSIONS

1. AI in commercial beef herds:

- **Improve genetics of the herd**
- **Improve progeny performance**
- **Allow for the incorporation of new breeds**

2. The use of TAI:

- **Reduce the breeding and calving season**
- **Increase the proportion of cows calving in the first 21 days**
- **Increase the average weaning weight of calves**
- **Induce cyclicity in anestrous and prepubertal cattle**

Thank You!

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