



Economics of Dairy Heifers Breeding Programs

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Heifer Pregnancy Cost (HPC)

A simple protocol

$$\text{HPC} = \text{BCR} \bullet + \text{BCR} \circ \times (\% \circ \div \% \bullet)$$

BCR = breeding costs
+ rearing costs
+ TAI costs

○ = non-pregnant; ● = pregnant

BCR and Pregnancy (○; ●)

Calculated within a researched breeding period: e.g., 32 d

Breeding costs

Labor for handling
Labor for ED
Hormones

BCR ○

Full breeding period

BCR ●

Till heifer became pregnant

Heifer Pregnancy Cost (HPC)

A simple protocol

Hormones cost (US\$/dose)

GnRH = **1.65**

PGF_{2α} = **2.50**

CIDR = **8.00**

Rearing costs

Reported breeding period:
e.g., 32 d.

Normalized to **30 d**

Labor costs US\$/hr

Handling = **10**

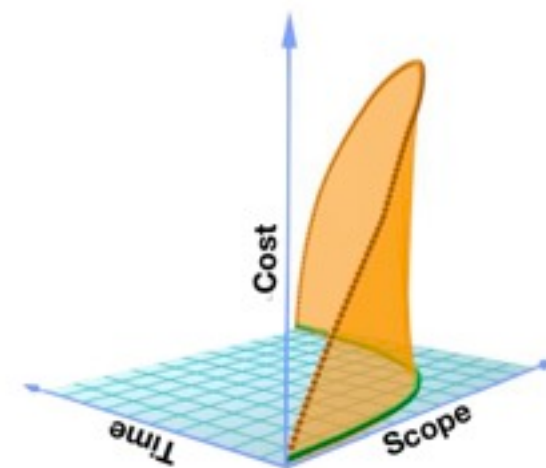
ED = **10**

Labor time required, min

GnRH = **1**

ED = **1**

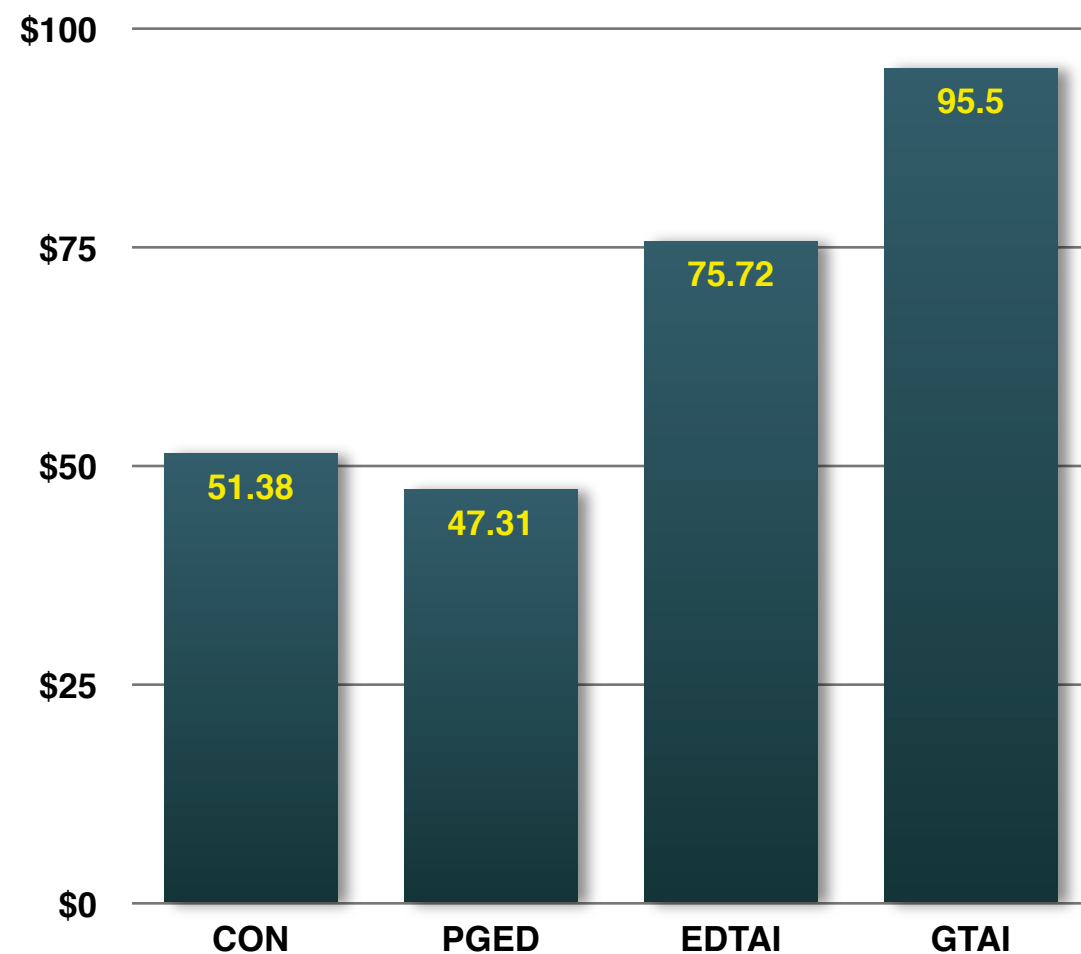
CIDR = **3**



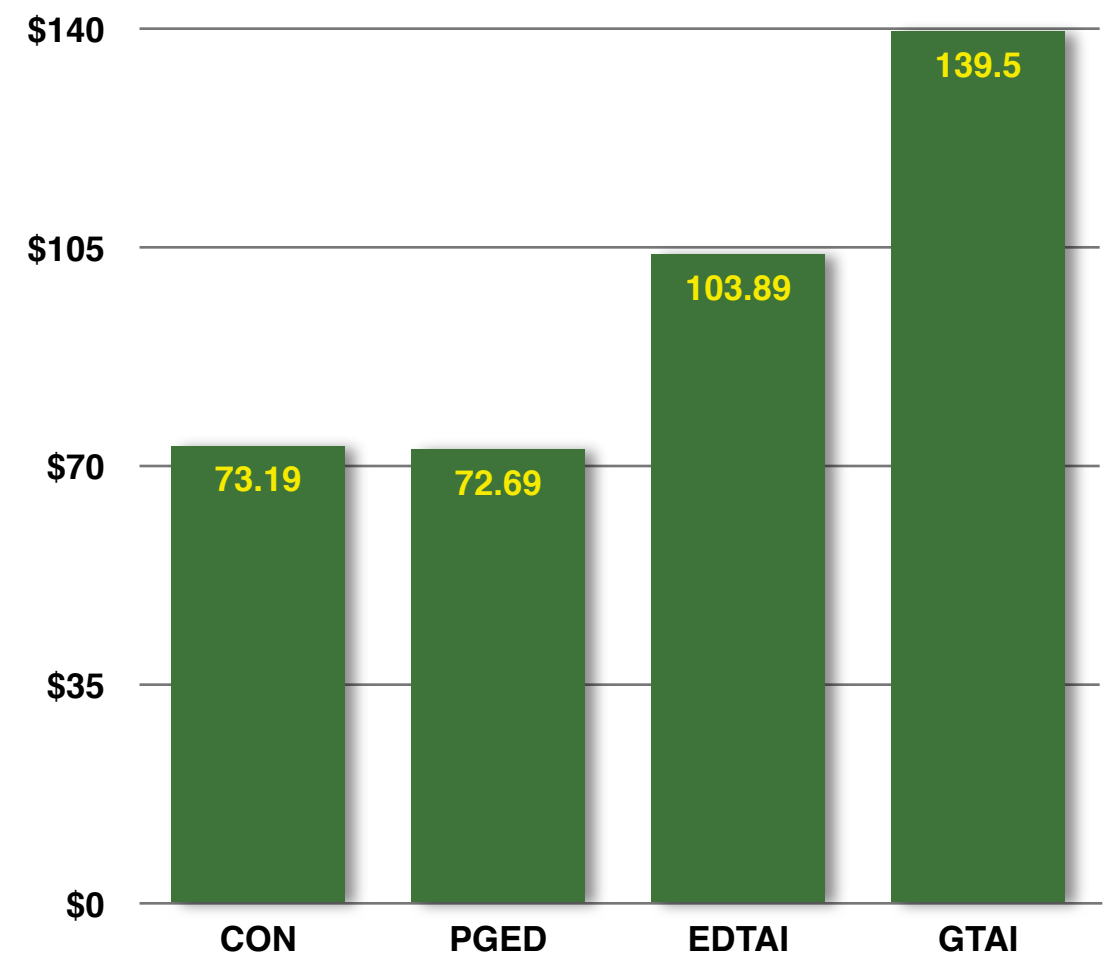
ED vs. PGED vs. EDTAI vs. GTAI

Stevenson et al. (2008): J. Dairy Sci. 91:3424

Heifer Pregnancy Cost (HPC 28 d breeding)



Original paper report



Modified assessment

Tail chalk vs. GPG + tail chalk

Rivera et al. (2004): J. Dairy Sci. 87:2051

Tail chalk (n=175)



GPG + tail chalk (n=172)



Tail chalk vs. GPG + tail chalk

Rivera et al. (2004): J. Dairy Sci. 87:2051

Treatment	CR (%)	CR (n/n)
Tail chalk	46.5	80/172
GPG + tail chalk	38.3	67/175
Overall	40	138/347

Tail chalk vs. GPG + tail chalk

Rivera et al. (2004): J. Dairy Sci. 87:2051

	Tail Chalk			GPG + TC	
	○	◎		○	◎
Service, %	100	94		100	100
Pregnancy, %	46.5	53.5		38.3	61.7
GnRH, \$	0	0		3.3	3.3
PGF _{2α} , \$	0	0		2.5	2.5
CIDR, \$	0	0		0	0
TAI, \$	10	9.4		10	10
Handling labor, \$	0	0		0.5	0.5
ED labor, \$	1.32	2.64		1.04	2.08
Rearing, \$	34.65	69.3		13.2	69.3
BCR, \$	45.97	81.34		30.54	87.68
HPC, \$ (30 d breeding)	99.68			122.71	

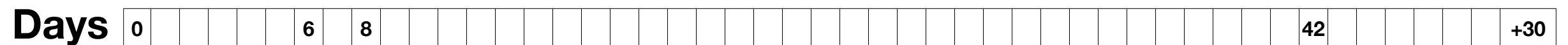
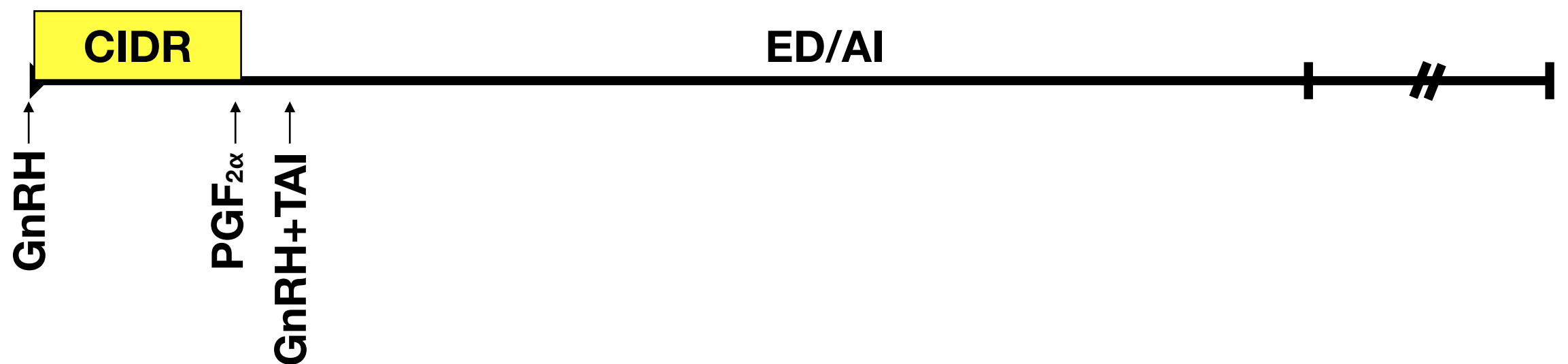
GPG vs. GPG + CIDR

Rivera et al. (2005): J. Dairy Sci. 87:2051

GPG (n=96)



GPG + CIDR (n=94)



GPG vs. GPG + CIDR

Rivera et al. (2005): J. Dairy Sci. 87:2051

Treatment	CR (%)	CR (n/n)
GPG (30 d)	29.1	28/96
GPG + CIDR	31.9	30/94
Overall	31	58/189

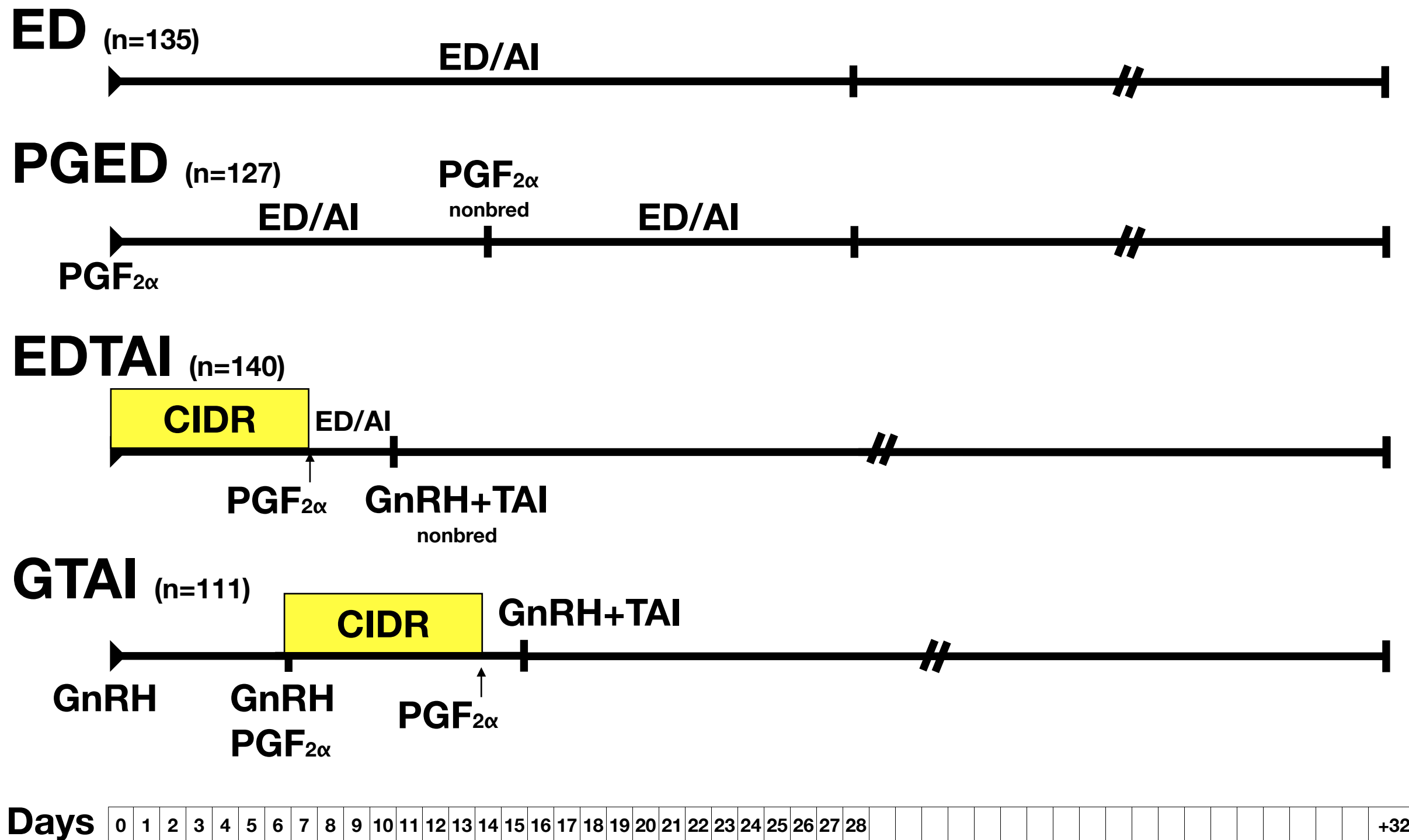
GPG vs. GPG + CIDR

Rivera et al. (2005): J. Dairy Sci. 87:2051

	GPG			GPG + CIDR	
	○	◎		○	◎
Service, %	100	100		100	100
Pregnancy, %	29.1	70.9		31.9	68.1
GnRH, \$	0	3.3		3.3	3.3
PGF _{2α} , \$	0	2.5		2.5	2.5
CIDR, \$	0	0		8	8
TAI, \$	10	10		10	10
Handling labor, \$	0.5	0.5		1	1
ED labor, \$	0	0		0	0
Rearing, \$	13.2	69.3		13.2	69.3
BCR, \$	23.7	85.6		38	94.1
HPC, \$ (30 d breeding)	165.90			170.63	

ED vs. PGED vs. EDTAI vs. GTAI

Stevenson et al. (2008): J. Dairy Sci. 91:3424



ED vs. PGED vs. EDTAI vs. GTAI

Stevenson et al. (2008): J. Dairy Sci. 91:3424

Treatment	Pregnant (%)	Pregnant (n/n)
ED	58.9 _a	86/135
PGED	62.8 _a	86/127
EDTAI	54.3 _b	76/140
GTAI	46.9 _b	52/111

ED vs. PGED vs. EDTAI vs. GTAI

Stevenson et al. (2008): J. Dairy Sci. 91:3424

	ED			PGED	
	○	⊙		○	⊙
Service, %	100	92.5		100	92.7
Pregnancy, %	58.9	41.1		62.8	37.2
GnRH, \$	0	0		0	0
PGF _{2α} , \$	0	0		2.5	5
CIDR, \$	0	0		0	0
TAI, \$	10	9.25		10	9.27
Handling labor, \$	0	0		0	0
ED labor, \$	0.58	1.17		0.58	1.17
Rearing, \$	23.1	46.2		23.1	46.2
BCR, \$	33.68	56.62		36.18	61.64
HPC, \$ (30 d breeding)	78.42			77.89	

ED vs. PGED vs. EDTAI vs. GTAI

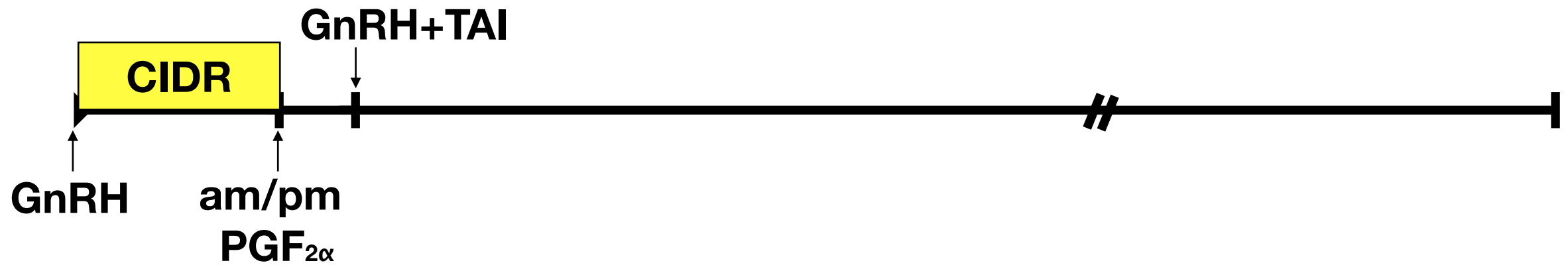
Stevenson et al. (2008): J. Dairy Sci. 91:3424

	EDTAI			GTAI	
	○	◎		○	◎
Service, %	100	100		100	100
Pregnancy, %	54.3	45.7		46.90	53.1
GnRH, \$	1.32	1.65		4.95	4.95
PGF _{2α} , \$	2.5	2.5		5	5
CIDR, \$	8	8		8	8
TAI, \$	10	10		10	10
Handling labor, \$	0.5	0.67		1.33	1.33
ED labor, \$	0.21	0.21		0	0
Rearing, \$	23.1	46.2		24.75	46.2
BCR, \$	45.63	69.23		54.03	75.48
HPC, \$ (30 d breeding)	111.32			149.45	

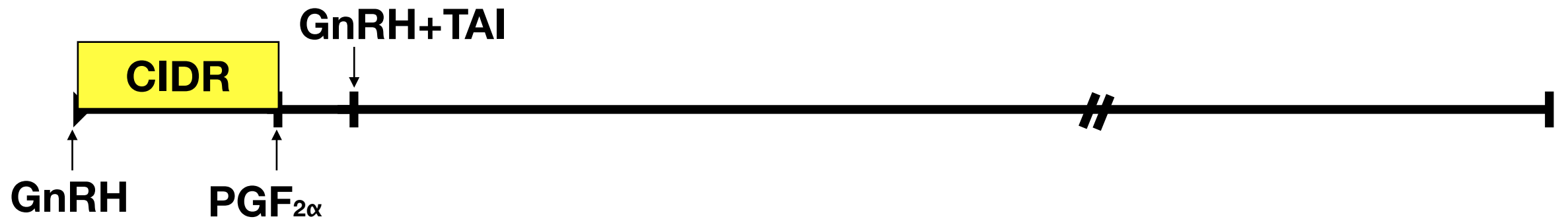
5-Day CIDR TAI - PGF

Rabaglino et al. (2010)

2PGF_{2α} (n=158+165)



1PGF_{2α} (n=416)



Days 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 +30

5-Day CIDR TAI - PGF

Rabaglino et al. (2010)

Treatment	Pregnancy	
	%	(n/n)
2PGF_{2α}	50.1	188/375
1PGF_{2α}	44.6	83/186

5-Day CIDR TAI - PGF

Rabaglino et al. (2010)

	2PGF _{2α}			1PGF _{2α}	
	○	⊙		○	⊙
Service, %	100	100		100	100
Pregnancy, %	50.1	49.9		44.6	55.4
GnRH, \$	3.3	3.3		3.3	3.3
PGF _{2α} , \$	5	5		2.5	2.5
CIDR, \$	8	8		8	8
TAI, \$	10	10		10	10
Handling labor, \$	1.17	1.17		1	1
ED labor, \$	0	0		0	0
Rearing, \$	13.2	52.8		13.2	52.8
BCR, \$	40.67	80.27		38	77.6
HPC, \$ (30 d breeding)	113.08			125.99	

5-Day CIDR TAI - GnRH

Lima et al. (2011)

Treatment	Pregnancy	
	%	(n/n)
+GnRH1	52.5	155/295
-GnRH1	54.1	165/305

5-Day CIDR TAI - PGF

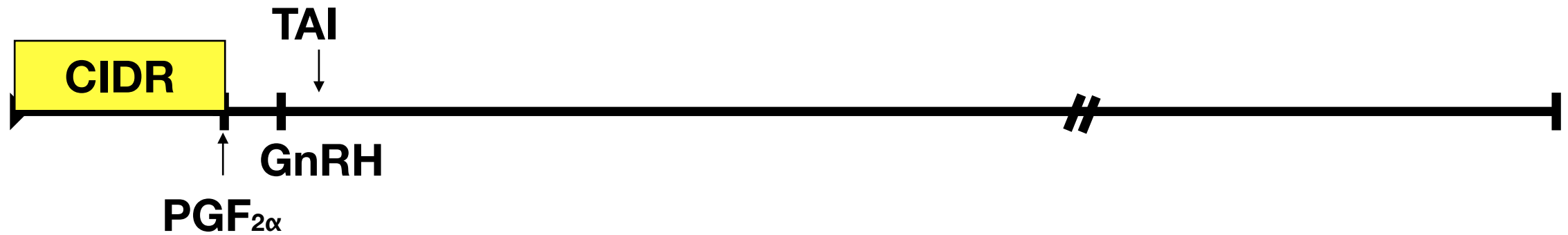
Lima et al. (2011)

	+GnRH			-GnRH	
	○	◎		○	◎
Service, %	100	100		100	100
Pregnancy, %	52.5	47.5		54.1	45.9
GnRH, \$	3.3	3.3		1.65	1.65
PGF _{2α} , \$	2.5	2.5		2.5	2.5
CIDR, \$	8	8		8	8
TAI, \$	10	10		10	10
Handling labor, \$	1	1		0.83	0.83
ED labor, \$	0	0		0	0
Rearing, \$	13.2	52.8		13.2	52.8
BCR, \$	38	77.6		36.18	75.78
HPC, \$ (30 d breeding)	101.45			94.19	

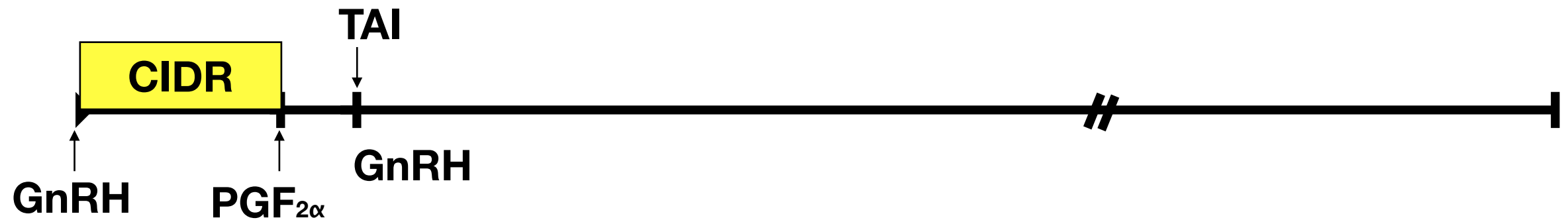
5-Day CIDR TAI - 56/72 hr

Lima et al. (2011)

56 hr (n=644)



72 hr (n=651)



Days 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 | | | | +30

5-Day CIDR TAI - 56/72 hr

Lima et al. (2011)

Treatment	Pregnancy	
	%	(n/n)
56 hr	55.4	357/644
72 hr	58.4	380/651

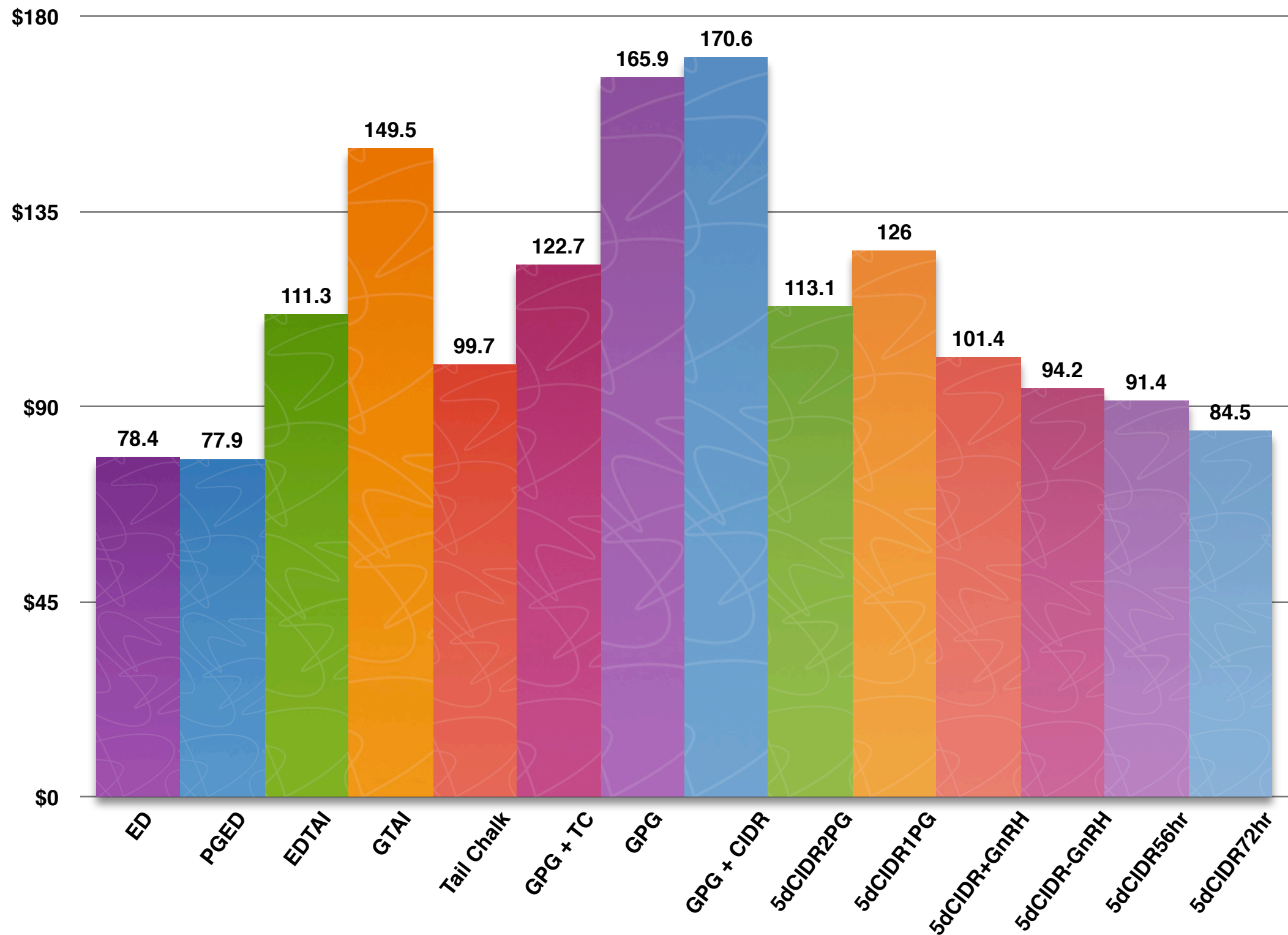
5-Day CIDR TAI - PGF

Lima et al. (2011)

	56 hr			72 hr	
	○	⊙		○	⊙
Service, %	100	100		100	100
Pregnancy, %	55.4	44.6		58.4	41.6
GnRH, \$	1.65	1.65		1.65	1.65
PGF _{2α} , \$	2.5	2.5		2.5	2.5
CIDR, \$	8	8		8	8
TAI, \$	10	10		10	10
Handling labor, \$	1	1		0.83	0.83
ED labor, \$	0	0		0	0
Rearing, \$	13.2	52.8		13.2	52.8
BCR, \$	36.35	75.95		36.18	75.78
HPC, \$ (30 d breeding)	91.40			84.53	

A summary

HPC, \$ (30 d breeding)



Important factors

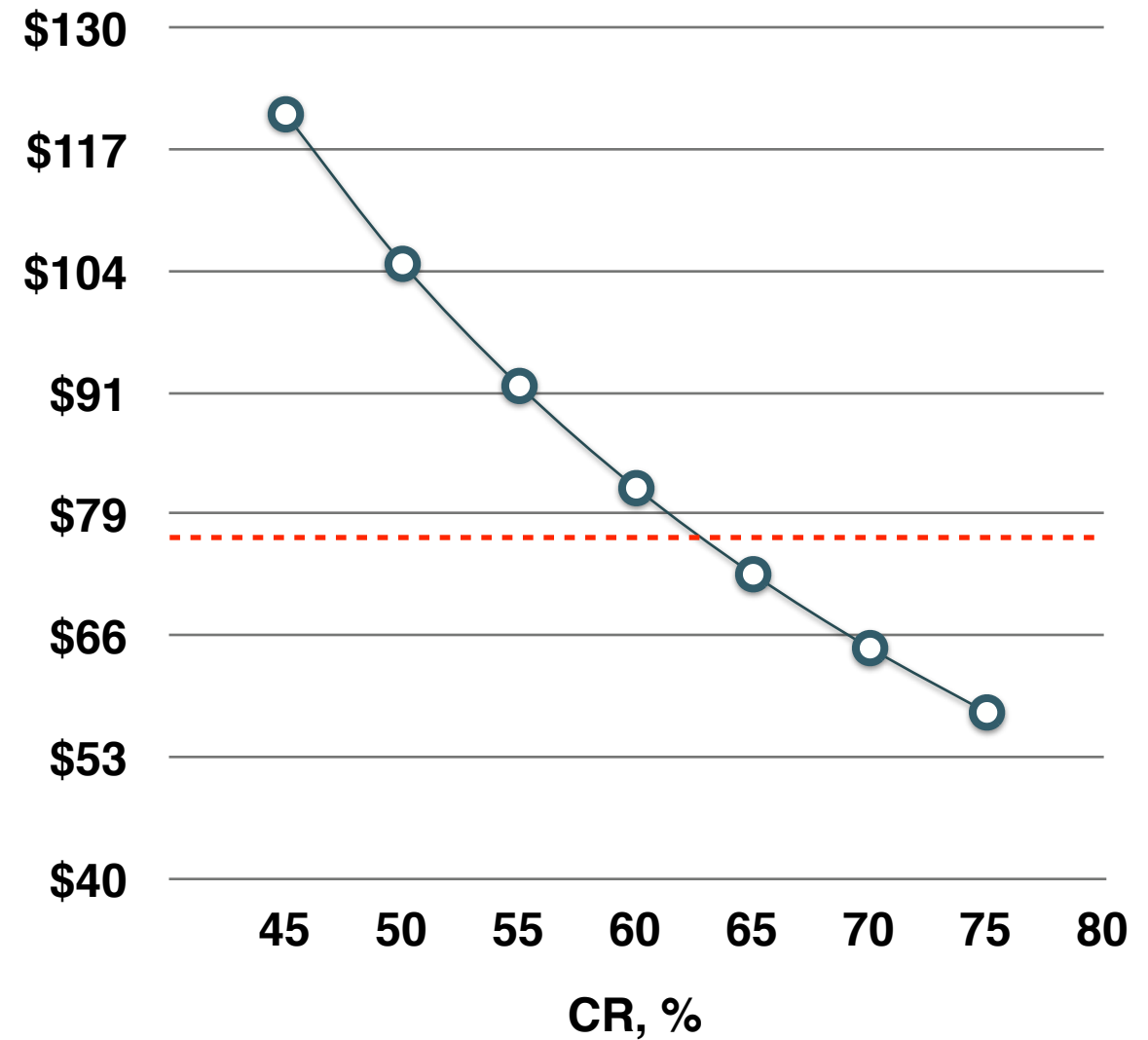
Pregnancy



Pregnancy

SR x **CR**

Between **\$1.4 to \$3.2** less
HPC for each **1%** increase
in CR



HPC, \$ (30 d breeding)
For 5dCIDR72hrGnRH
(Lima et al., 2011).

Important factors

Rearing cost

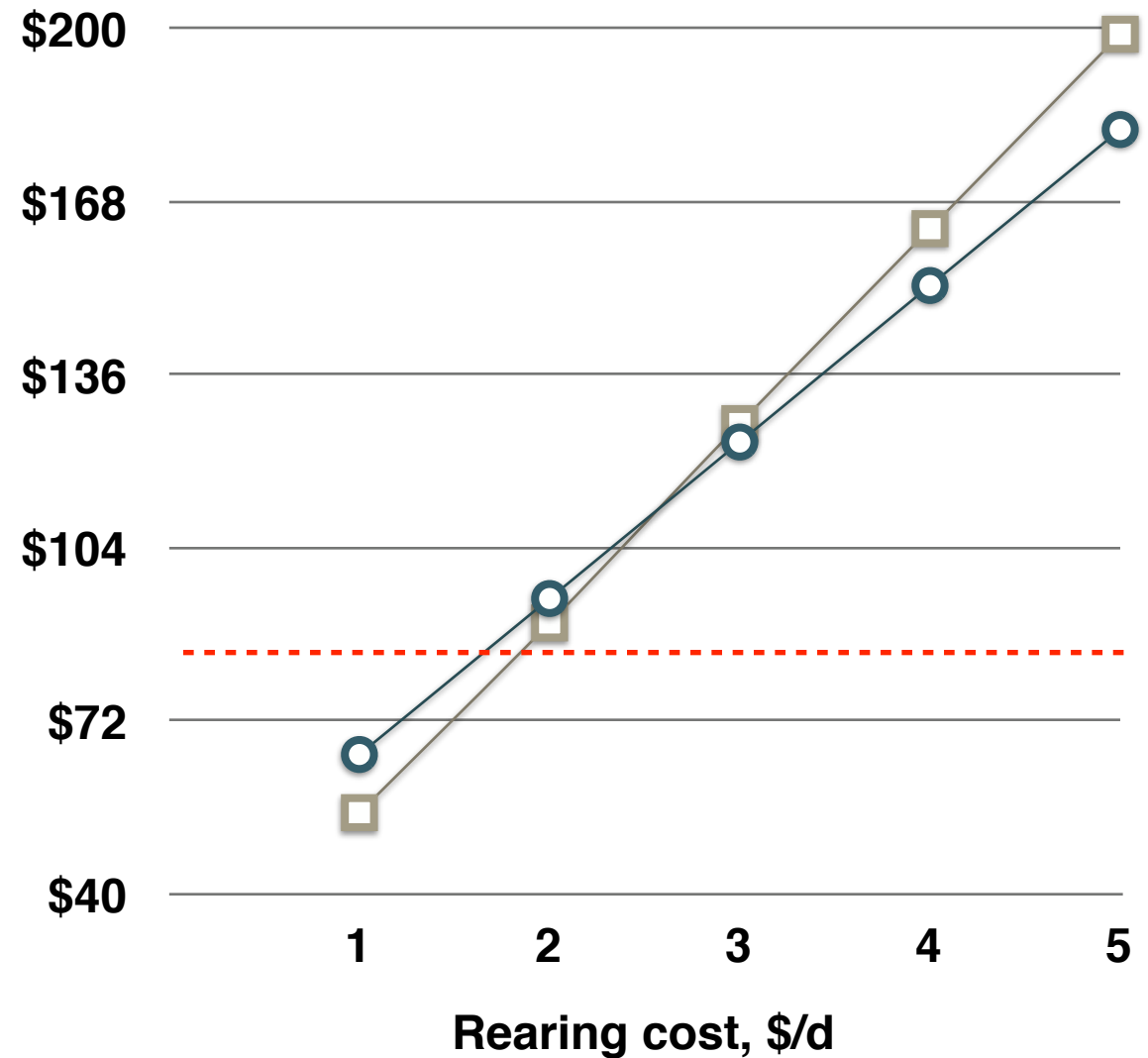


Rearing cost

\$/d

Between **\$28 to \$36** less
HPC for each **\$1/d** decrease
in rearing cost

Strong relationship with
TIGHT synchrony



HPC, \$ (30 d breeding)

For 5dCIDR72hrGnRH (Lima et al.,
2011)  and

ED (Stenvenson et al., 2008) 

Important factors

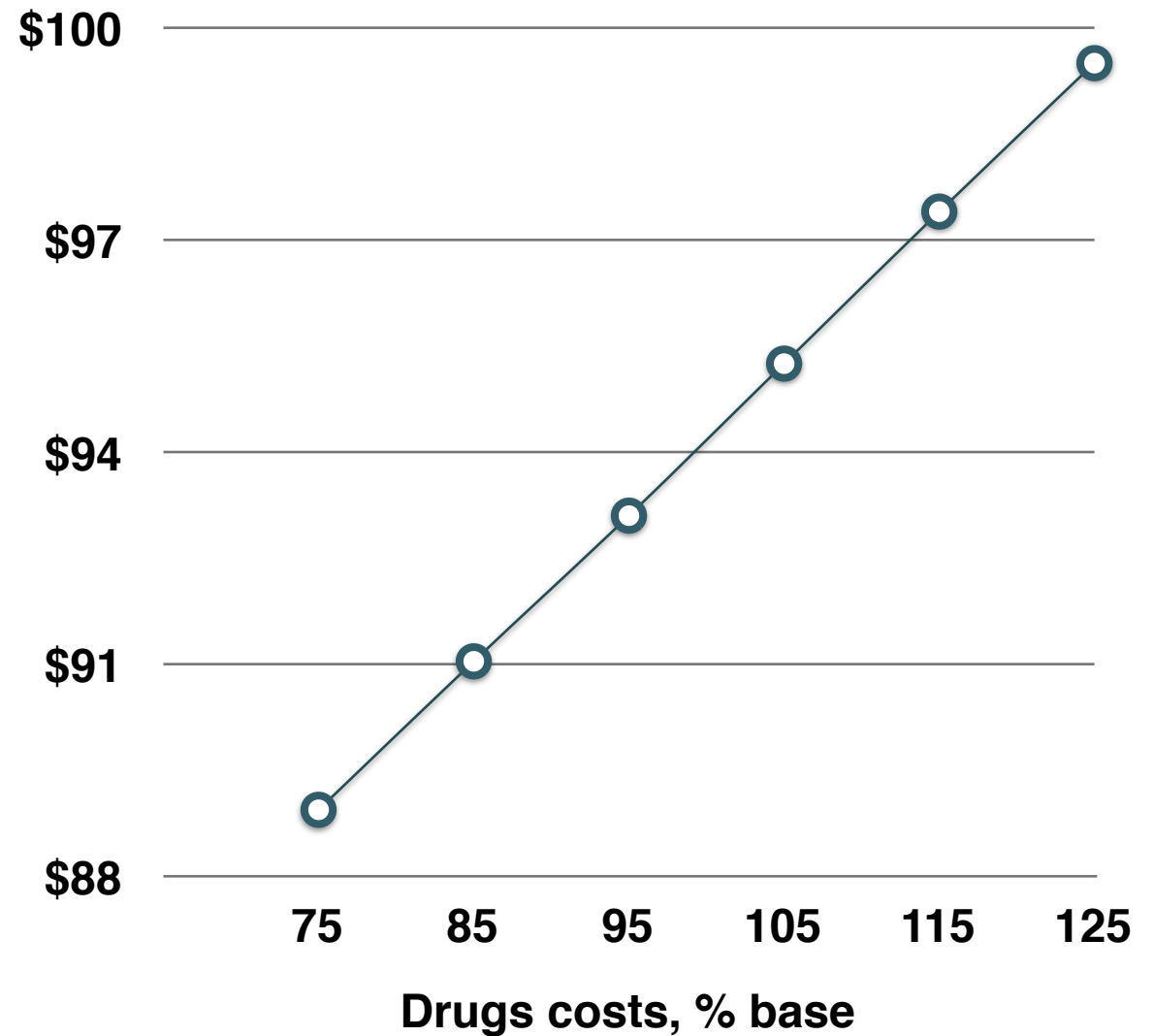
Drugs costs



Drugs costs

\$/d

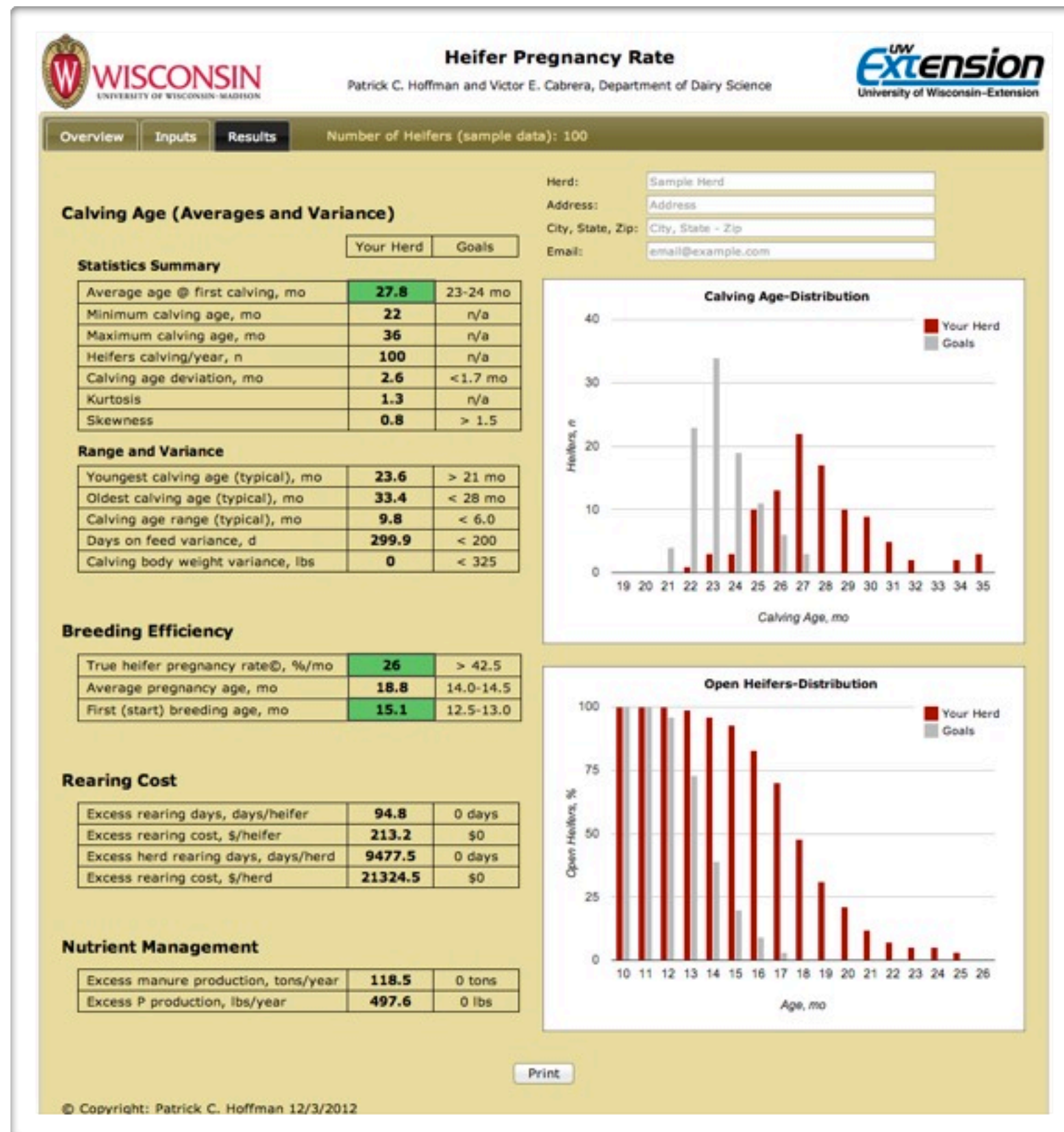
About **\$2.1** less HPC for each **10%** decrease in drug costs



HPC, \$ (30 d breeding)
For 5dCIDR-GnRH
(Lima et al., 2011)

Overall heifer reproductive performance

Calving age analysis

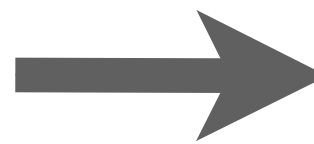


Heifer pregnancy rate

Where to find it

DairyMGT.info

The screenshot shows the homepage of DairyMGT.info. At the top, there is a banner image of cows in a field with the text "Dairy Management UW-Extension University of Wisconsin-Madison" and the "WISCONSIN Extension" logo. Below the banner is a navigation menu with links for Home, Tools, Projects, Publications, Presentations, Links, and Find. A secondary menu includes About, Contact, Comments, News, People, Opportunities, Gallery, and a search box. The main heading is "Dairy Management". Below this is a paragraph describing the site's purpose: "Dairy Management site is designed to support dairy farming decision-making focusing on model-based scientific research. The ultimate goal is to provide user-friendly computerized decision support systems to help dairy farms improve their economic performance." There are three sidebars: "Latest Projects" with links like "Genomic Selection and Herd Management"; "Helpful Link" with "Beers Money Program" and "Contact"; and a "TOOLS" section featuring a "Dairy Management Tools" box with a "HERE" button. A profile for "Victor E. Cabrera, Ph.D." is also visible, listing his title as "Assistant Professor Extension Specialist Dairy Management" and contact information.



Tools

The screenshot shows the "Tools" page on DairyMGT.info. The navigation menu at the top includes Home, Tools (selected), Projects, Publications, Presentations, Links, and Find. A secondary menu lists various tool categories: Feeding, Heifers, Reproduction, Production, Replacement, Financial, Price Risk, and Environment. The main heading is "Management Tools". Below this is a descriptive paragraph: "A collection of state-of-the-art dairy management tool that are: user-friendly, interactive, robust, visually attractive, and self contained. All these tools have clear or self-explanatory instructions and technical support available." A note says "Click on the Tool title to learn more." The page is organized into three main sections: "Feeding" with tools like "Grouping Strategies for Feeding Lactating Dairy Cattle" and "Optigen® Evaluator"; "Heifers" with tools like "Cost-Benefit of Accelerated Liquid Feeding Program for Dairy Calves" and "Heifer Replacement"; and "Reproduction" with tools like "Economic Value of Sexed Semen Programs for Dairy Heifers" and "UW DairyRepro®: A Reproductive Economic Analysis Tool".

- [Grouping Strategies for Feeding Lactating Dairy Cattle](#)
- [Optigen® Evaluator](#)
- [Income Over Feed Supplement Cost](#)
- [Dairy Extension Feed Cost Evaluator](#)
- [Corn Feeding Strategies](#)
- [Income Over Feed Cost](#)
- [Dairy Ration Feed Additive Break-Even Analysis](#)

Reproduction

- [Economic Value of Sexed Semen Programs for Dairy Heifers](#)
- [UW DairyRepro®: A Reproductive Economic Analysis Tool](#)
- [Exploring Timing of Pregnancy Impact on Income Over Feed Cost](#)
- [Dairy Reproductive Economic Analysis](#)

Heifer pregnancy rate

What it does

True pregnancy rate

- Herd level
- Retroactive
- Does not include reproductive failure

Goal comparison

Against ideal conditions



Encompass

Detection of estrus

Conception rate



Additional indices

Economic

Environmental

Heifer pregnancy rate

How to use it?

Use the “data entry spreadsheet” template

	A	B
1	ID	AFC, mo
2	1296	30
3	1313	25
4	1312	27
5	1314	30
6	1361	31
7	1358	35
8	1360	26
9	1357	34
10	1359	29
11	1362	27
12	1369	28
13	1370	31
14	1373	29
15	1376	28

[Download data entry spreadsheet](#)

Select Breed:

Holstein

Select Spreadsheet:

Choose File

No file chosen

Submit

What do you need?

Heifer ID

AFC=Age at first calving

Heifer pregnancy rate

Analyze results

Average AFC

Important, but not the only one

Goals

Based on long experience, mostly in Wisconsin

Your Herd	Goals
-----------	-------

Statistics Summary

Average age @ first calving, mo	27.8	23-24 mo
Minimum calving age, mo	22	n/a
Maximum calving age, mo	36	n/a
Heifers calving/year, n	100	n/a
Calving age deviation, mo	2.6	<1.7 mo
Kurtosis	1.3	n/a
Skewness	0.8	> 1.5

Heifer pregnancy rate

Analyze results

Spread of calving

Better less sparse

Your Herd	Goals
-----------	-------

Range and Variance

Youngest calving age (typical), mo	23.6	> 21 mo
Oldest calving age (typical), mo	33.4	< 28 mo
Calving age range (typical), mo	9.8	< 6.0
Days on feed variance, d	299.9	< 200
Calving body weight variance, lbs	0	< 325

Heifer pregnancy rate

Analyze results

True pregnancy

Indicates the speed at which heifers become pregnant in a monthly basis

First breeding age

Calculated retrospectively

Your Herd	Goals
-----------	-------

Breeding Efficiency

True heifer pregnancy rate©, %/mo	26	> 42.5
Average pregnancy age, mo	18.8	14.0-14.5
First (start) breeding age, mo	15.1	12.5-13.0

Heifer pregnancy rate

Analyze results

Excess rearing days

Deviation from goal

Excess rearing costs

Standard rearing costs

Potential savings

Your Herd	Goals
-----------	-------

Rearing Cost

Excess rearing days, days/heifer	94.8	0 days
Excess rearing cost, \$/heifer	213.2	\$0
Excess herd rearing days, days/herd	9477.5	0 days
Excess rearing cost, \$/herd	21324.5	\$0

Heifer pregnancy rate

Analyze results

Excess manure and P

Can contribute substantially to decrease environmental impacts

Your Herd	Goals
-----------	-------

Nutrient Management

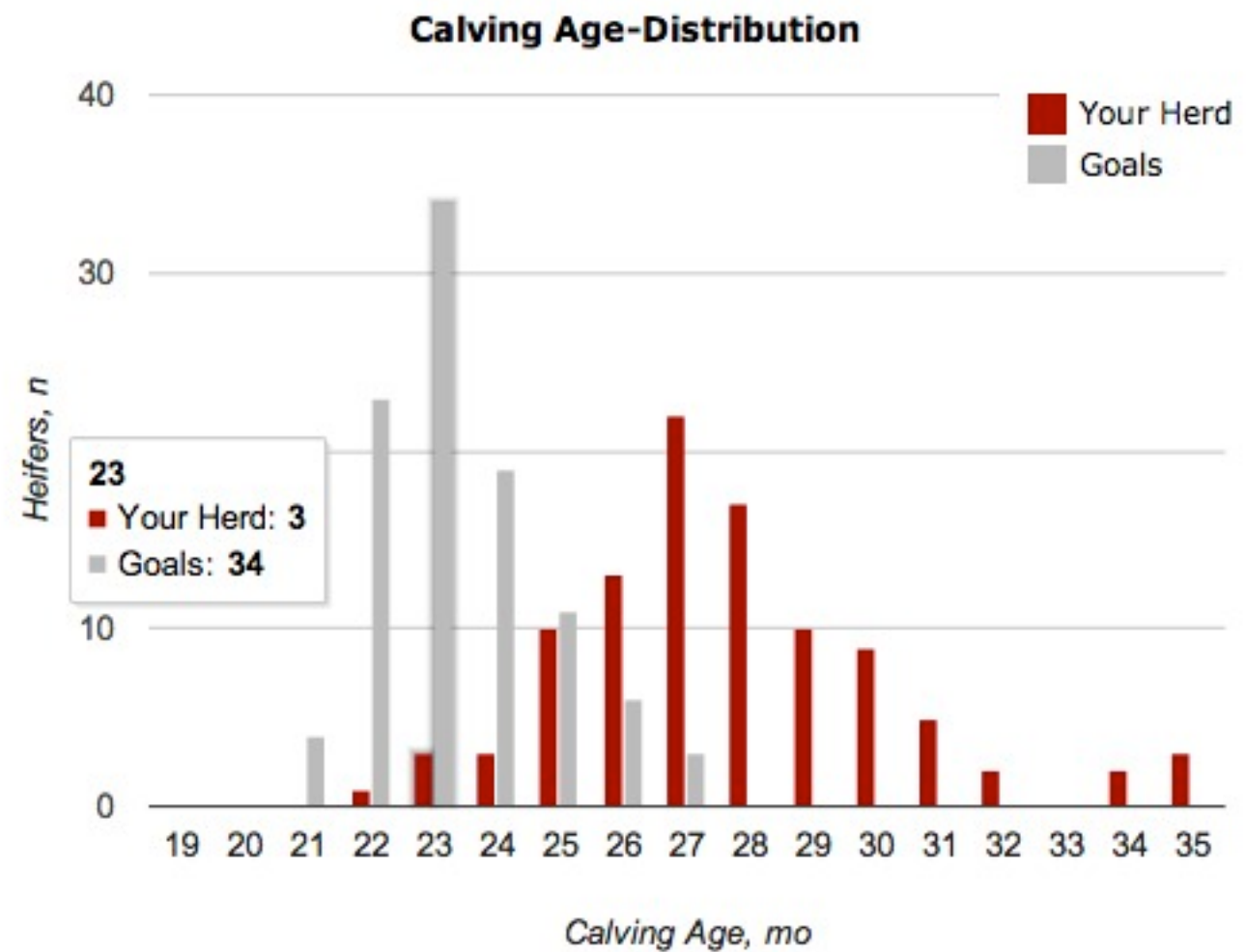
Excess manure production, tons/year	118.5	0 tons
Excess P production, lbs/year	497.6	0 lbs

Heifer pregnancy rate

Analyze results

Calving distribution

- Tight
- Right skewed

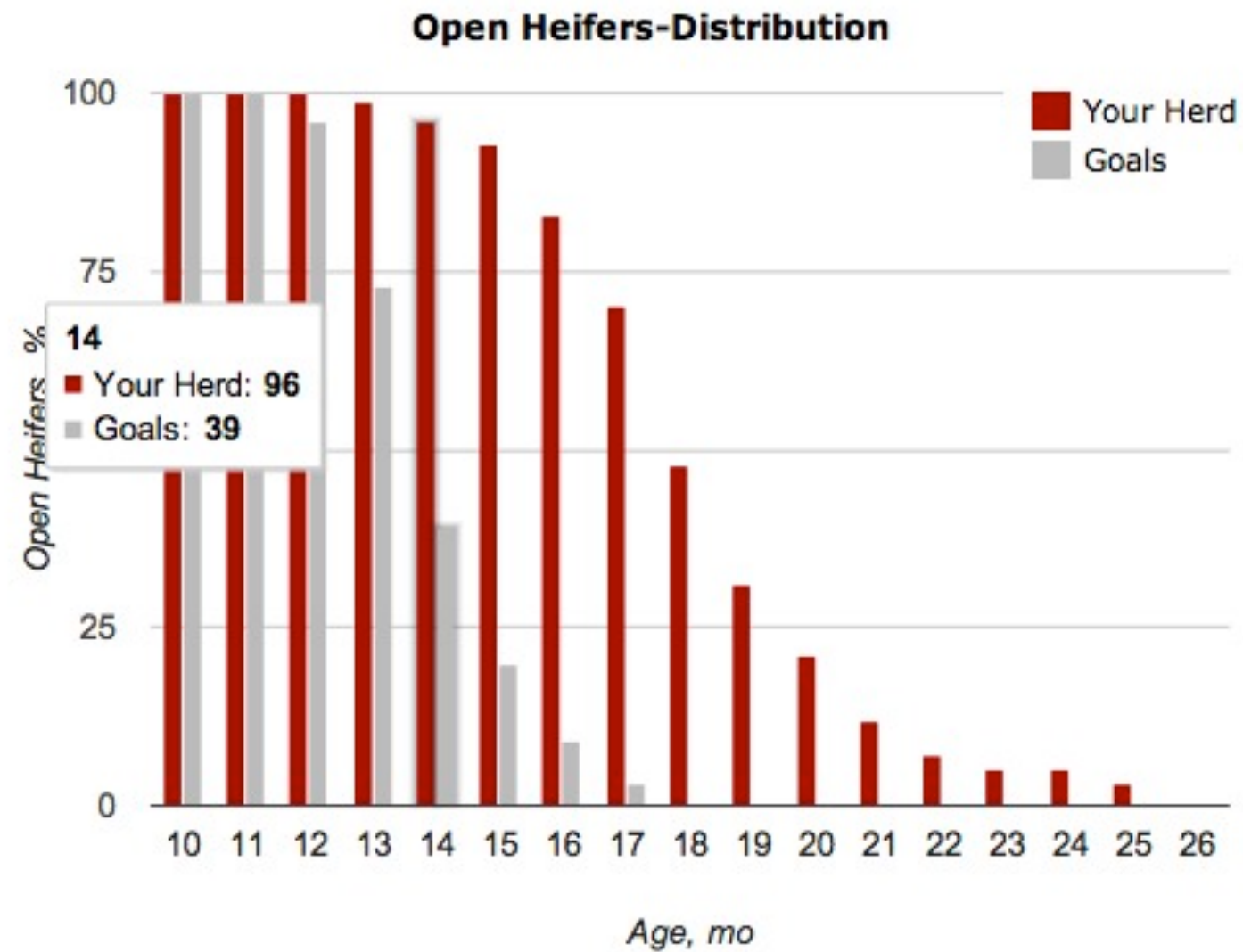


Heifer pregnancy rate

Analyze results

Survival curve

- Tight
- Early start

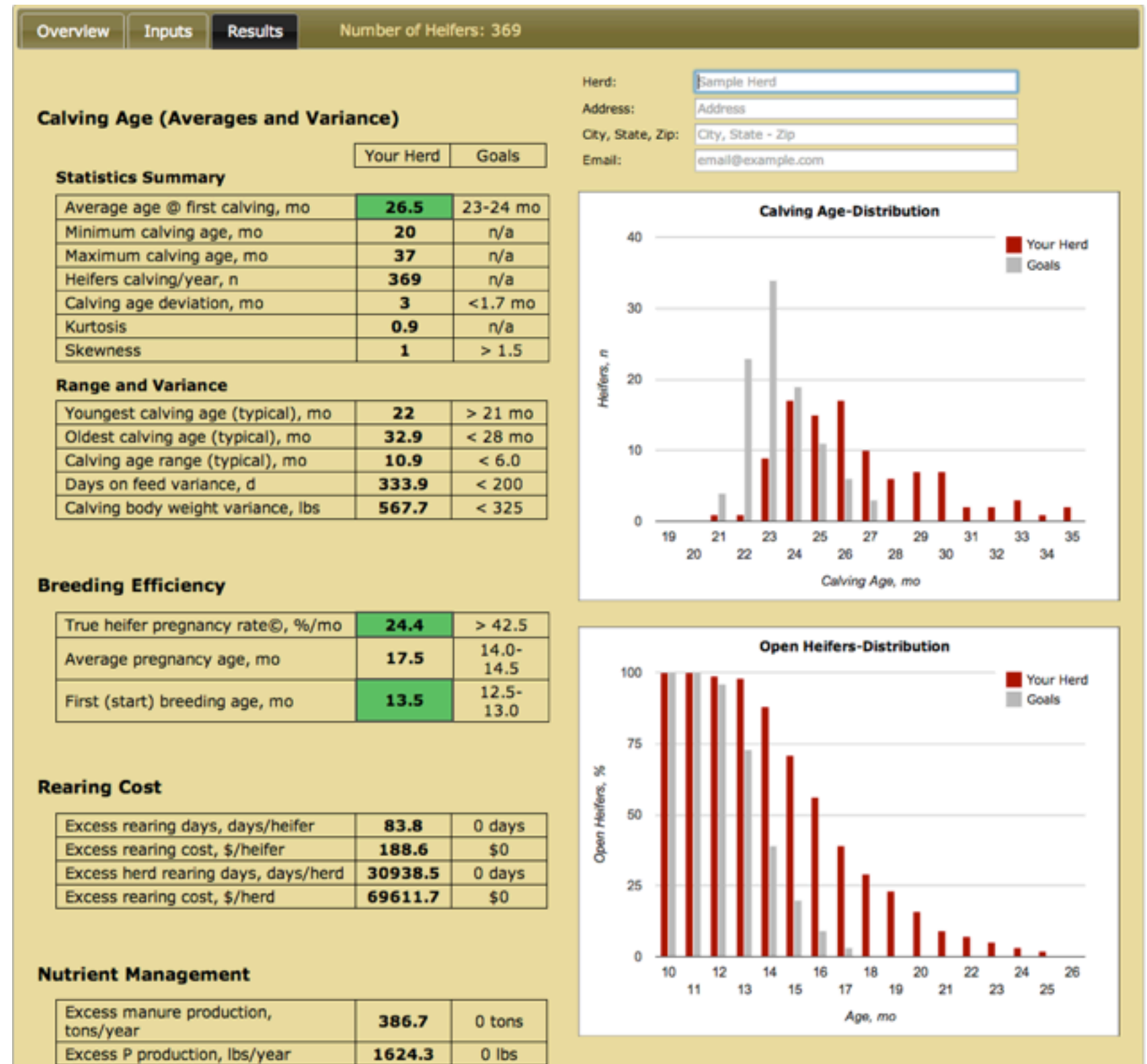


Herds in Wisconsin (& around)

Analyze results

Average AFC
Very sparse

True pregnancy
Late start
Not effective

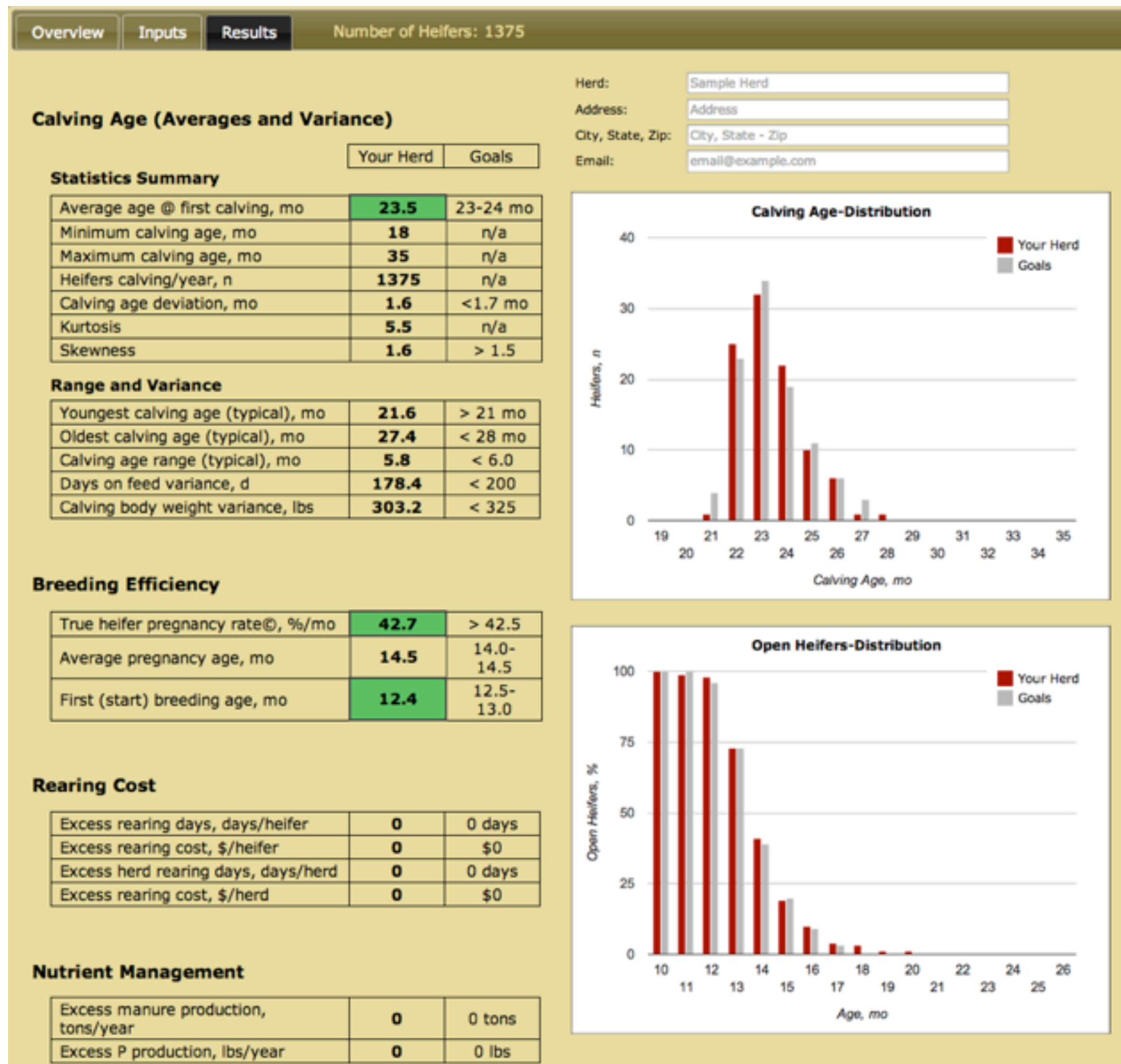


Herds in Wisconsin (& around)

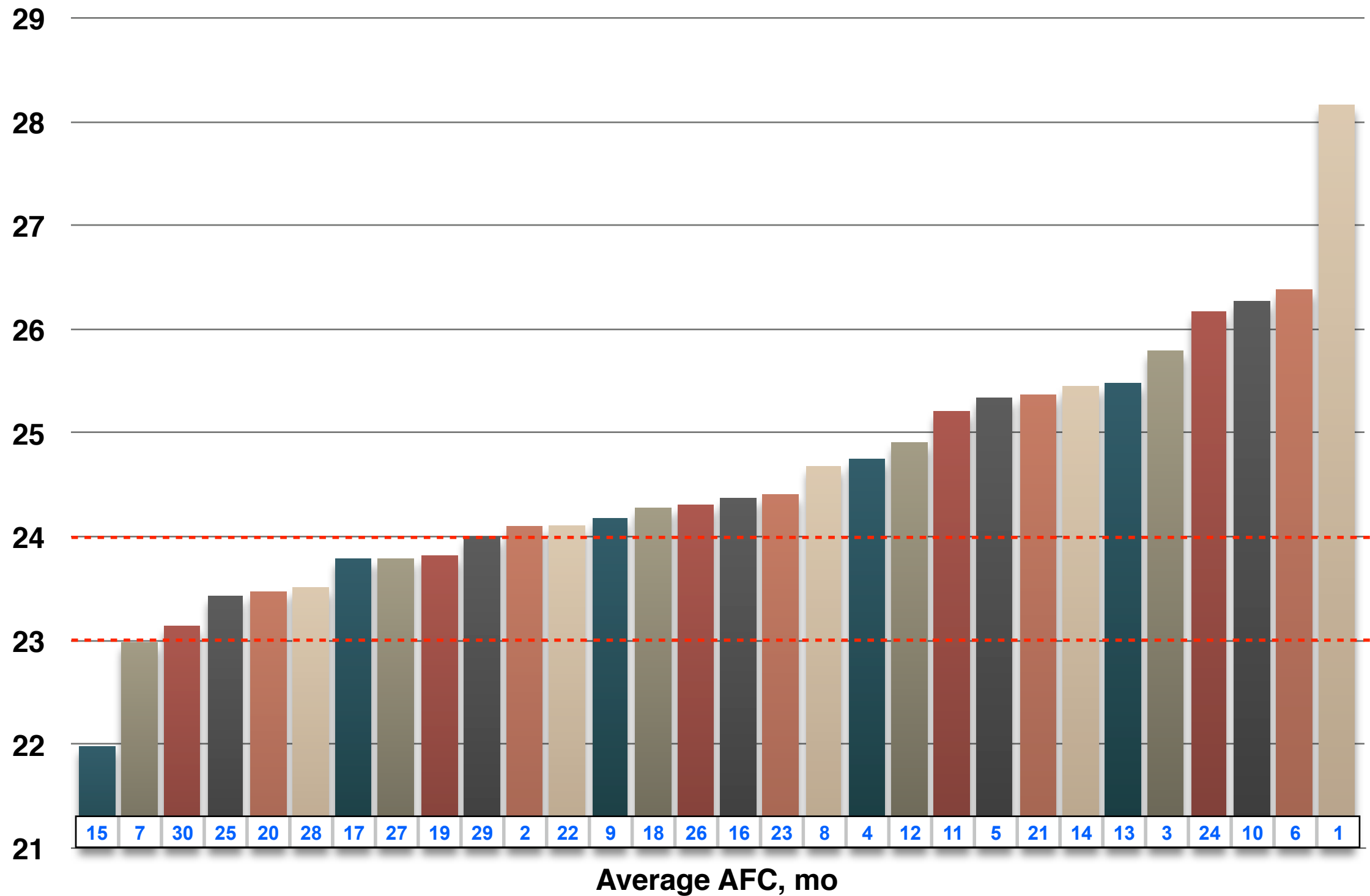
Analyze results

Average AFC
Nicely
distributed

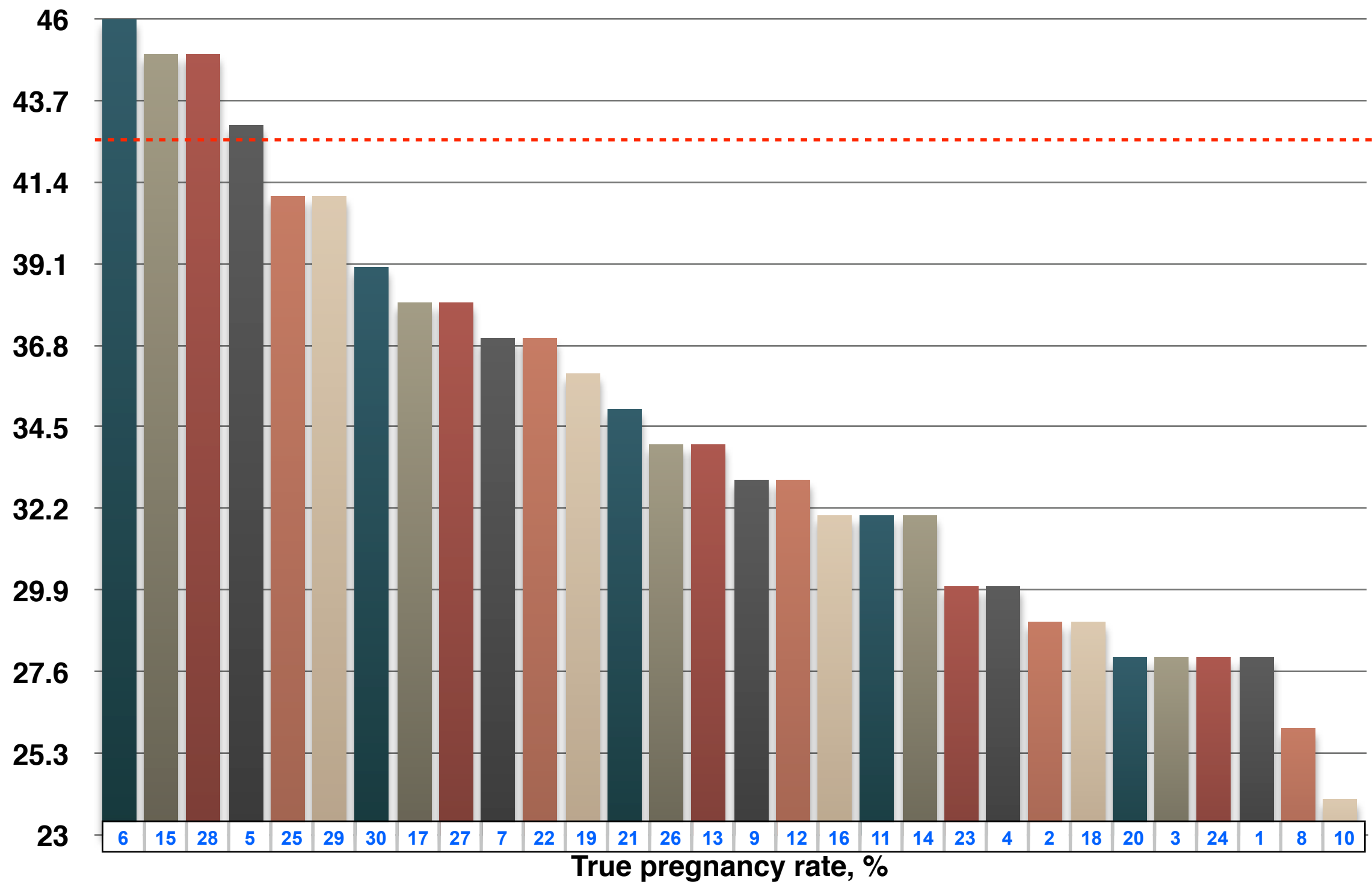
True pregnancy
Early start
Very effective



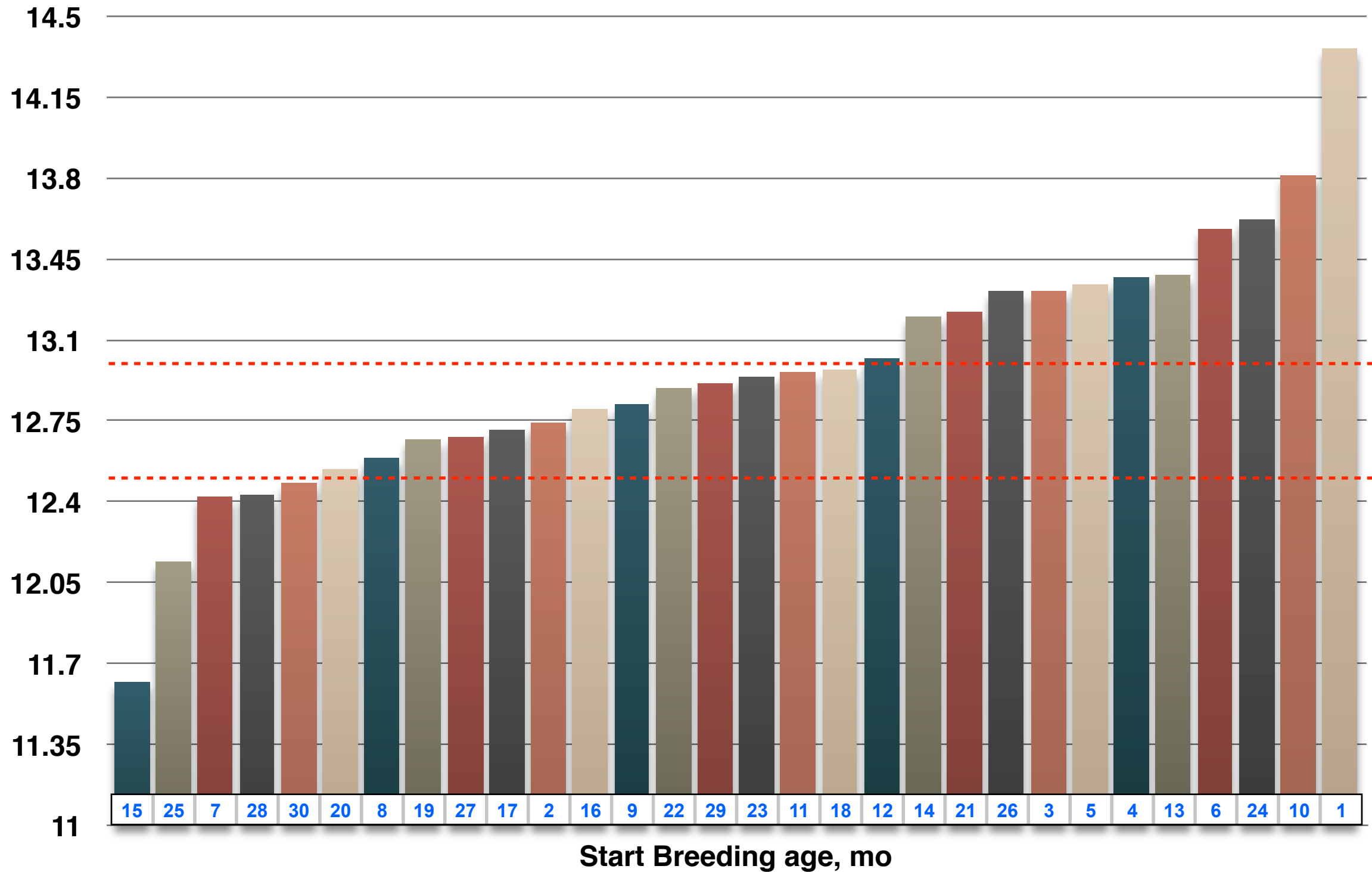
30 herds in Wisconsin (& around)



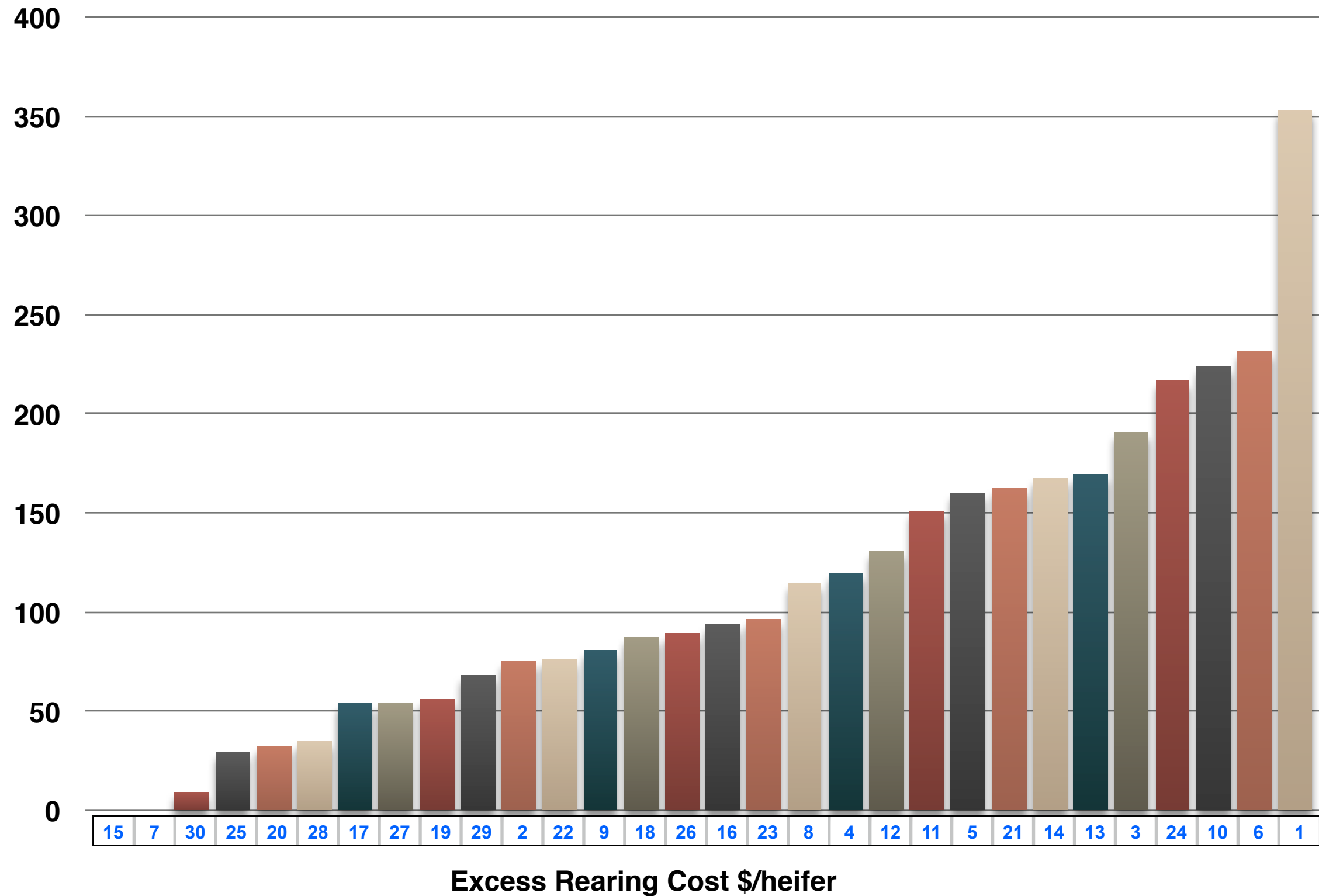
30 herds in Wisconsin (& around)



30 herds in Wisconsin (& around)



30 herds in Wisconsin (& around)





Thanks