



# Dairy Cattle Breeding for Efficiency and Profitability

Victor E. Cabrera

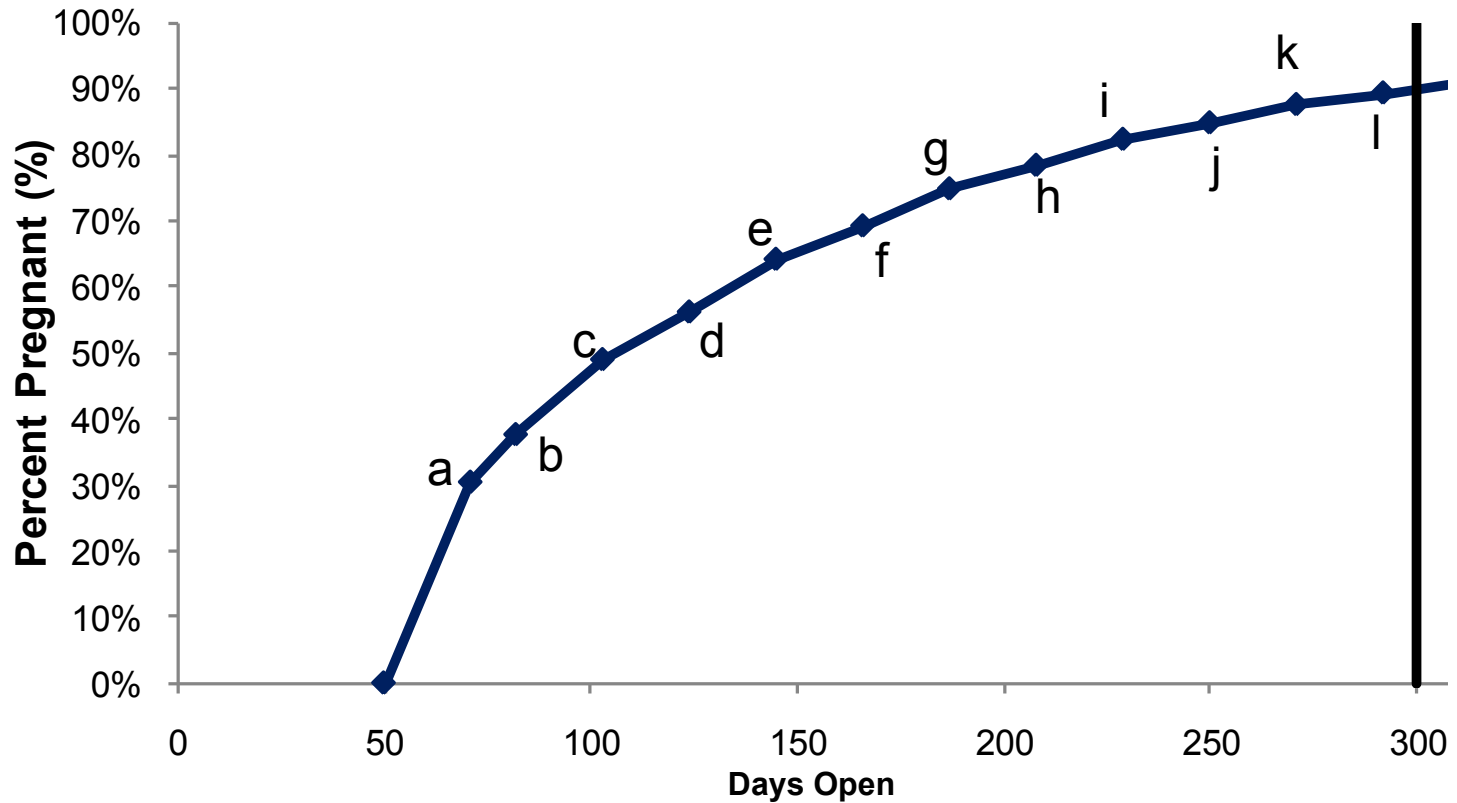


# Objectives

- Assess the value of reproductive programs
- Develop a user-friendly decision support tool
- Demonstrate the UW-DairyRepro\$ tool



# The Value of a Repro Program



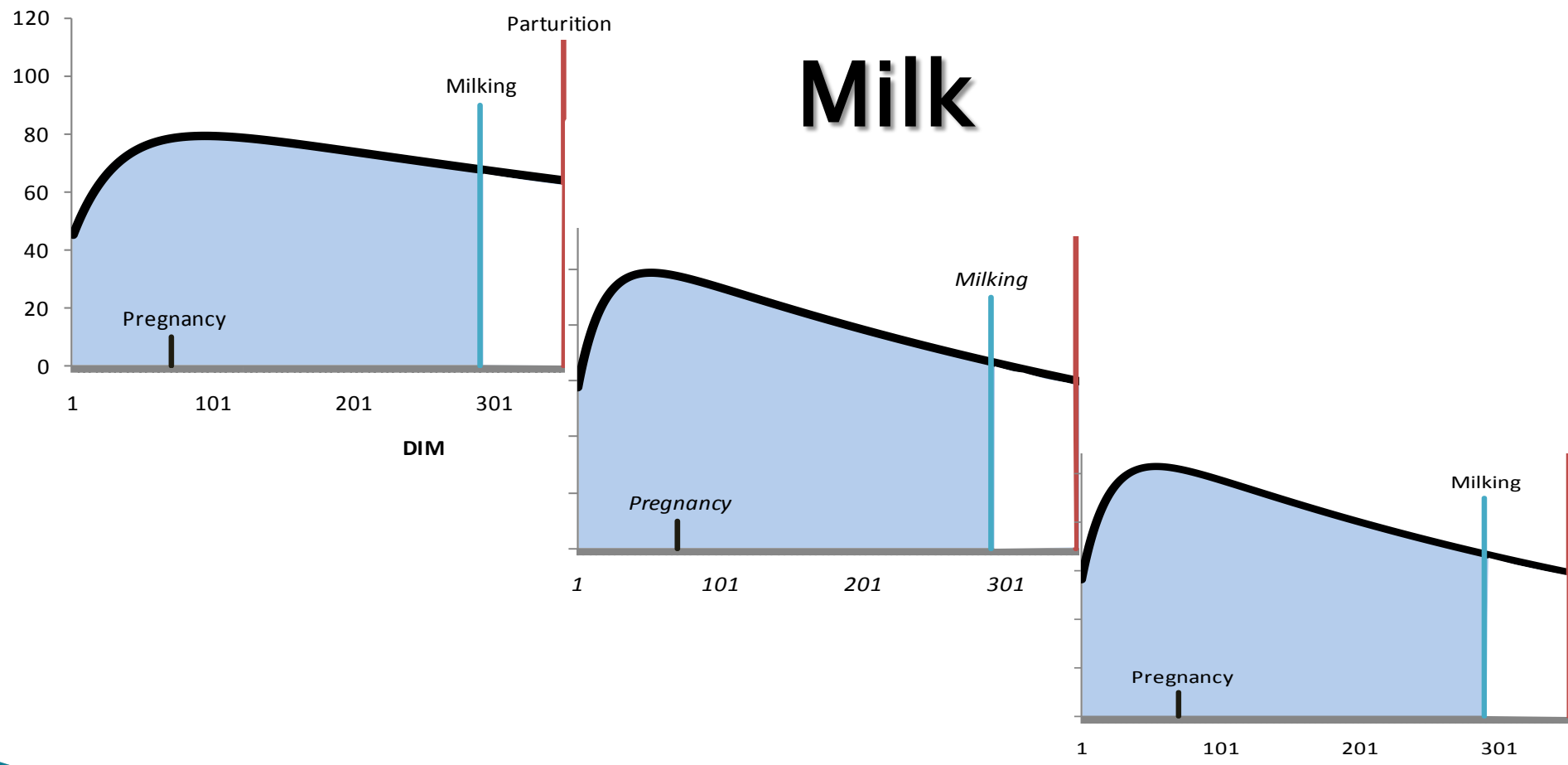
Expected Monetary Value (a, b, c, ...)  
(PREGNANT)

+

Expected Monetary Value  
(NON-PREGNANT)



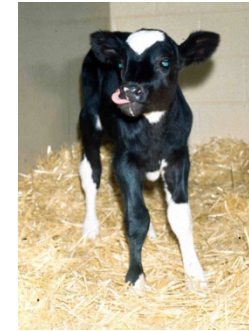
# Revenues of Pregnant



# Milk

# Revenues of Pregnant

➤ Value of a new born



➤ Value of salvage (involuntary culling)



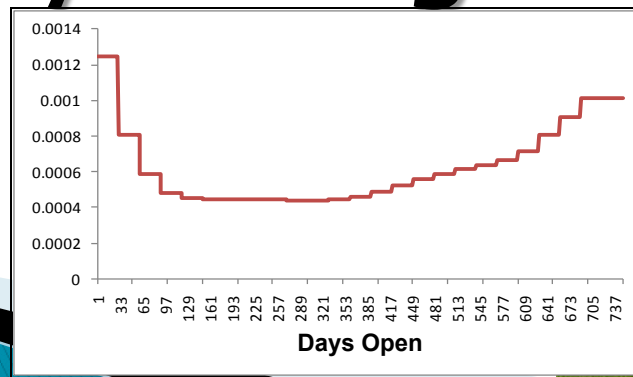
# Expenses of Pregnant

- **Repro Costs**
  - **Labor**
  - **Pregnancy diagnosis**
  - **Semen dose**
  - **Hormones**



# Expenses of Pregnant

- Feed for milking period
  - Follows lactation curve
- Feed for dry period
- Involuntary culling and death





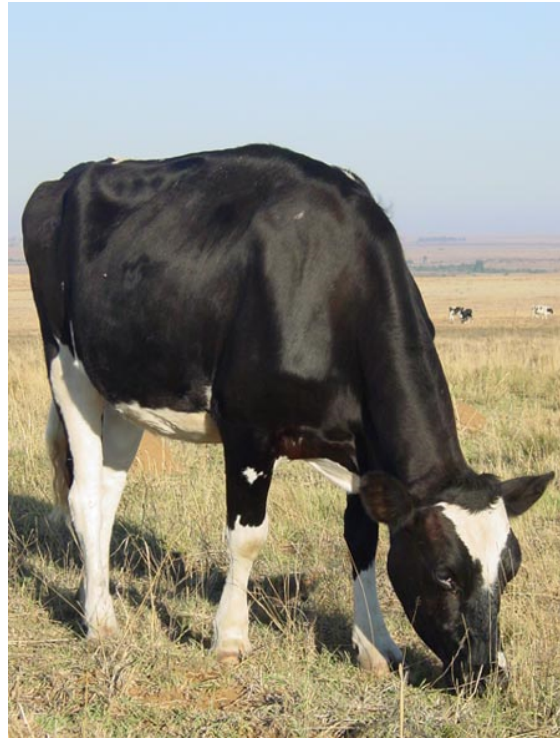
# Revenues of Non-Pregnant

- All revenues of pregnant except:
  - Value of a new born



# Expenses of Non-Pregnant

- **All expenses of pregnant plus:**
  - **Cost of replacement**



# Net Present Value (NPV)

- Discounted Economic Monetary Value (DEM<sub>EV</sub>) of a reproductive program survival curve

$$NPV_{r,DO} = DEMV(P)_{DO} + DEMV(NP)_{DO}$$

r = Reproductive Program

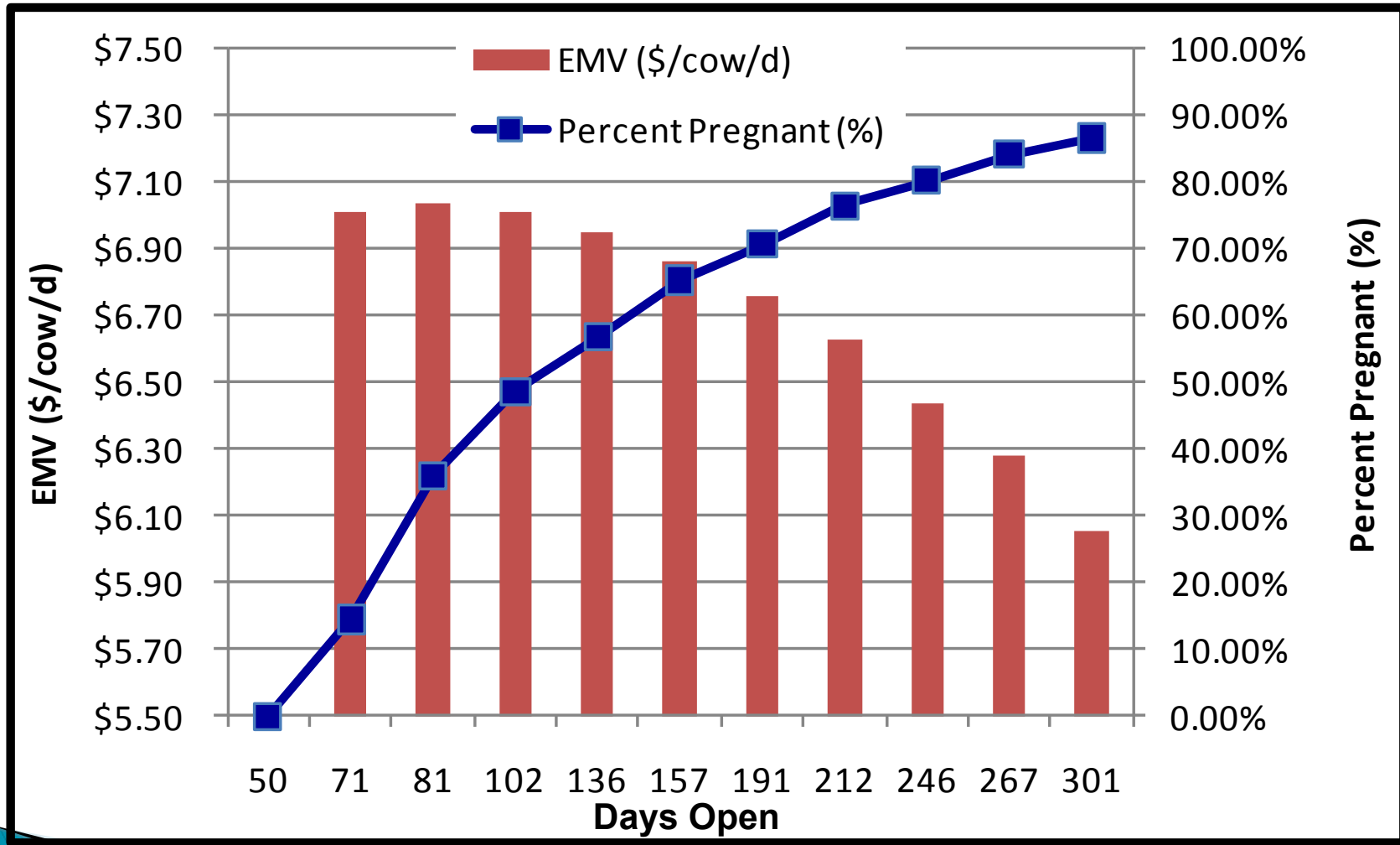
DO = days open

P = pregnant

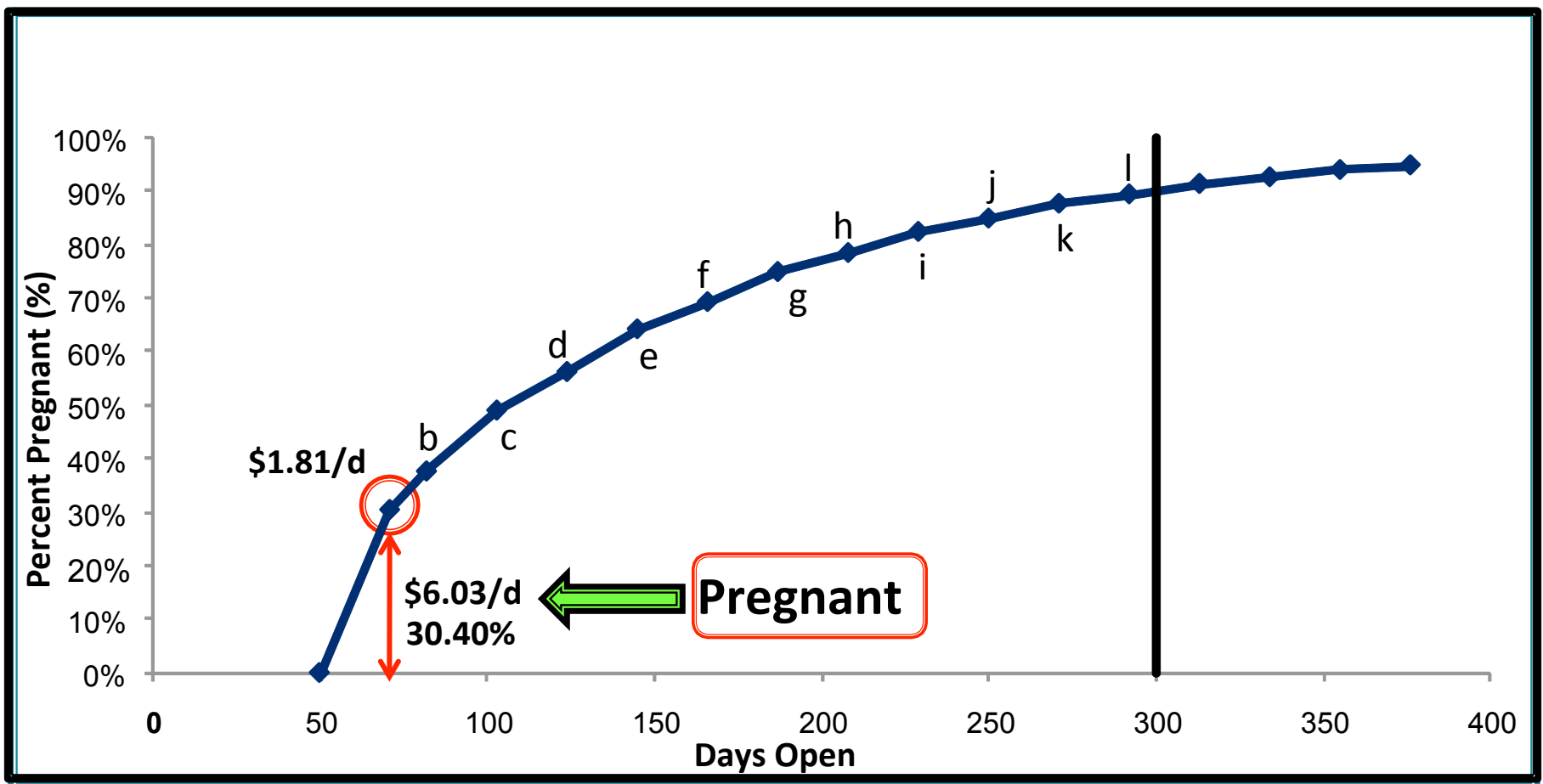
NP = non-pregnant



# Expected Monetary Value



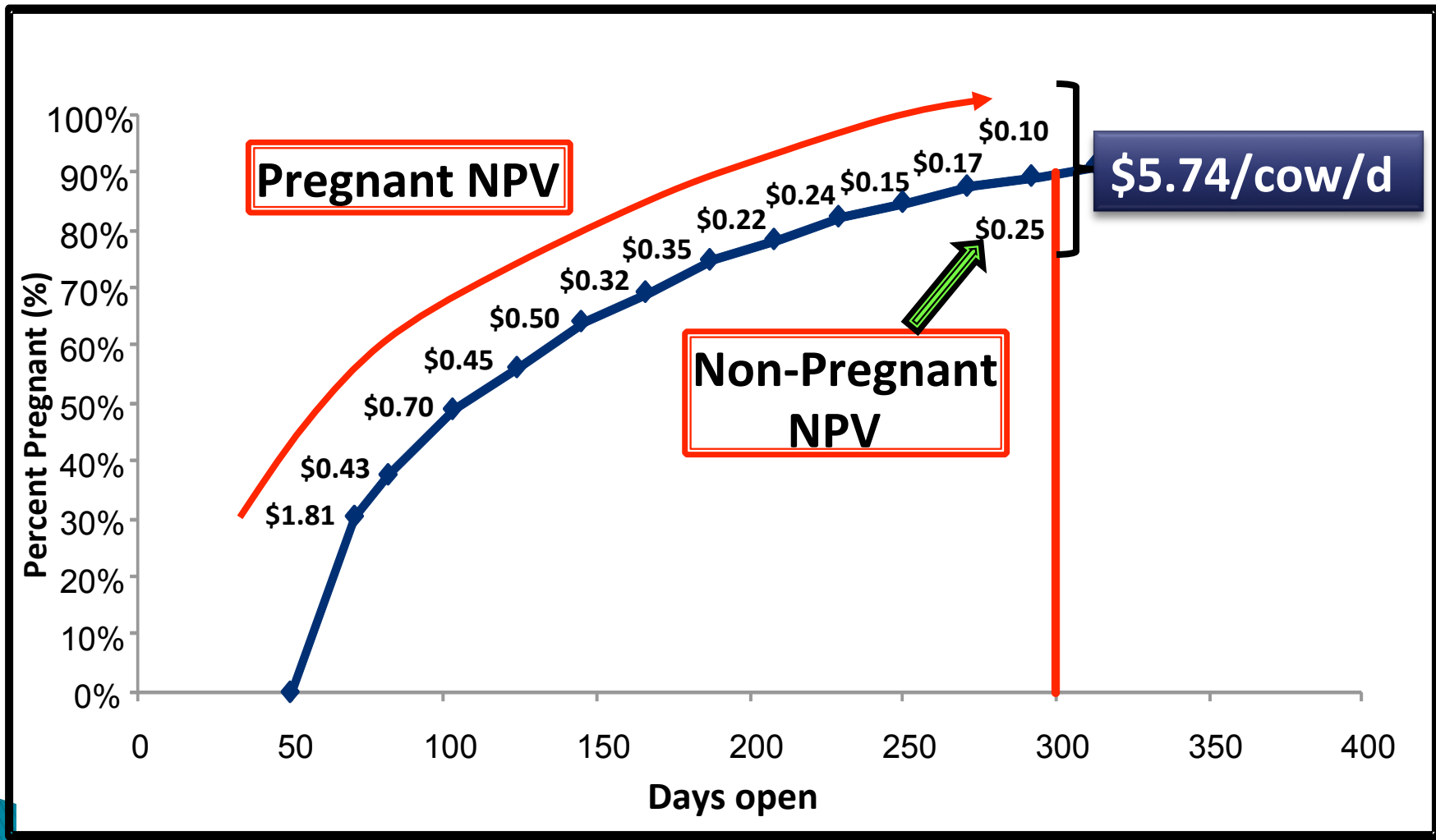
# Net Present Value



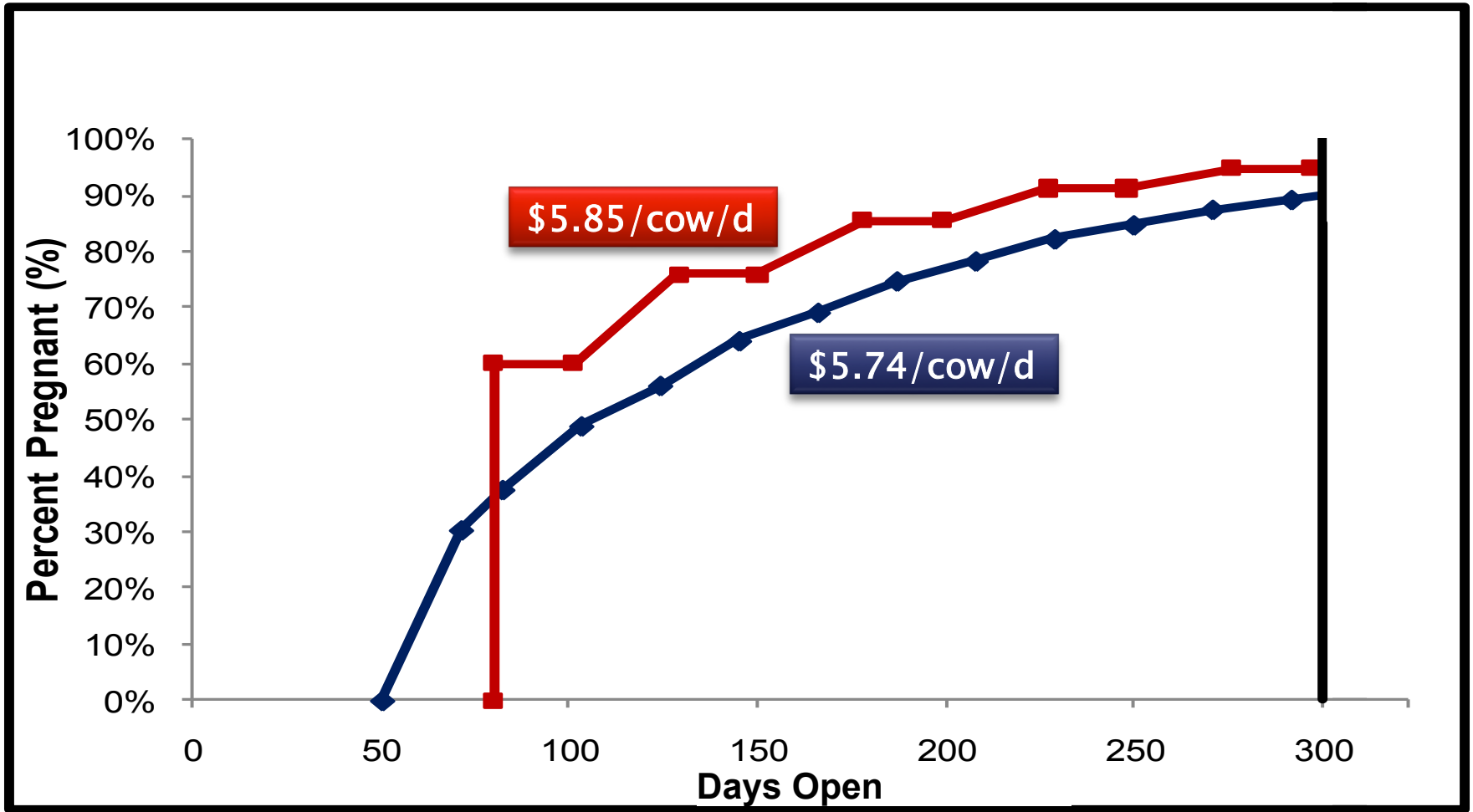
Expected Monetary Value (a, b, c, ...) (PREGNANT)

+ Expected Monetary Value (NON-PREGNANT)

# Net Present Value



# The Value of a Repro Program



# Reproductive Economic Analysis



**UW-Dairy Repro\$**  
 Victor E. Cabrera & Julio O. Giordano  
 Department of Dairy Science

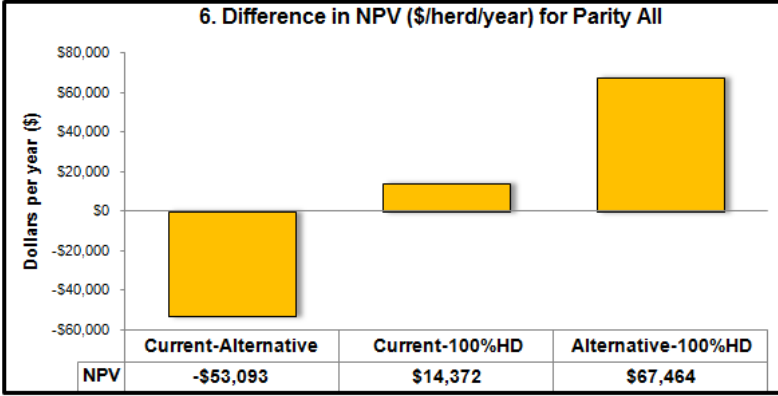
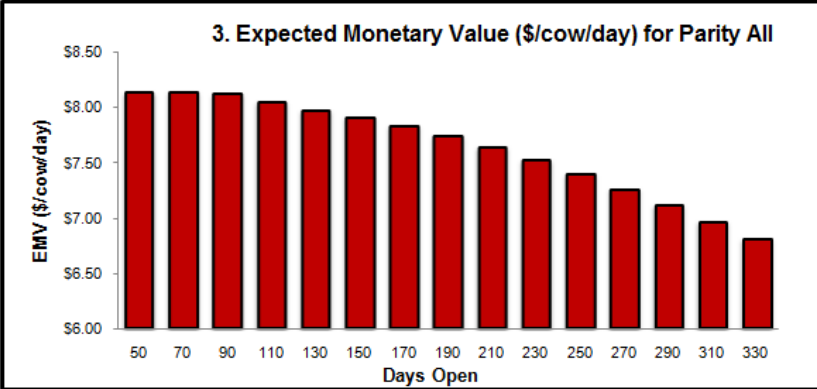
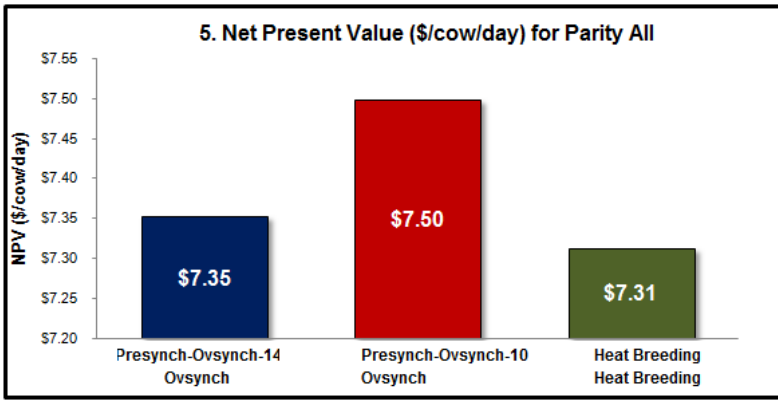
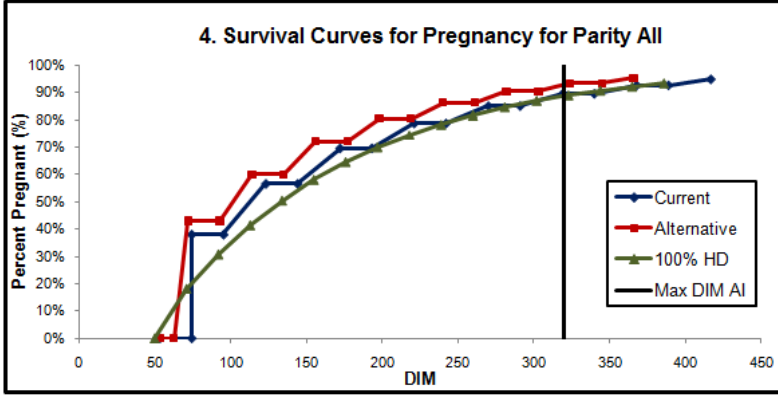


## 1. Productive and Economic Parameters Summary

Lactating Cows in Parity All	(#)	1000
Rolling Herd Average (RHA)	(lb/cow/yr)	28000
Milk Price	(\$/cwt)	14.50
Average Value New Born	(\$)	90
Heifer Replacement Value	(\$)	1,000
Salvage Value	(\$)	700

## 2. Reproductive Programs Summary

	Current	Alternative	Baseline
1 <sup>st</sup> Service Postpartum	Presynch-Ovsynch-14	Presynch-Ovsynch-10	Heat Breeding
2 <sup>nd</sup> and Following Services	Ovsynch	Ovsynch	Heat Breeding
Voluntary Waiting Period	53d	53d	50d
Maximum DIM for Breeding		320d	
DIM 1st TAI	74d	72d	
Interbreeding Interval	49d	42d	21d
Heat Bred Before 1 <sup>st</sup> TAI	0%	0%	55%
CR Heat Bred Before 1 <sup>st</sup> TAI	0%	0%	33%
Heat Bred After 1 <sup>st</sup> TAI	0%	0%	55%
CR Heat Bred After 1 <sup>st</sup> TAI	0%	0%	28%
CR 1 <sup>st</sup> Service TAI	38%	43%	
CR 2 <sup>nd</sup> + Services TAI	30%	30%	
Cost 1st Service Breeding	\$34.00	\$33.89	
Cost Resynch Breedings	\$27.33	\$29.33	
Cost Heat Breedings	\$16.61	\$18.16	\$17.00
Pregnancy Diagnosis Method	Palpation	Ultrasound	Palpation
Pregnancy Diagnosis Cost	\$6.56	\$8.16	\$7.00





# Data Inputs



# Productive Parameters

## 1. Productive Parameters

Lactating Cows	(#)	960
Rolling Herd Average (RHA)	(lb/cow/y)	29000 <input type="text"/>
Involuntary Culling Rate	(%/y)	14.3%
Mortality Rate	(%/y)	8.00%
Stillbirth Rate	(%)	9.4%

2. Lactation Curves		Lact. 1	Lact. 2	Lact. > 2
Cow Number		363	244	353
Body Weight (lb/cow)		1,350	1,400	1,450
Test	DIM <input checked="" type="checkbox"/>	Define Lactation Curves Below		
1	15	77	105	107
2	45	91	120	126
3	75	94	120	128
4	105	94	116	125
5	135	93	112	120
6	165	91	107	112
7	195	89	98	104
8	225	87	91	94
9	255	83	82	86
10	285	79	75	81
11	315	76	68	71
12	345	72	61	61
13	375	70	57	60
14	405	60	53	55
17	495	56	45	40
18	525	57	45	55
19	555	54	29	27



# Economic Parameters

**3. Economic Parameters**  Check if total breeding costs are known

Milk Price	(\$/cwt)	16.00
Cost Feed Lactating (DM)	(\$/lb)	0.10
Dry Period Fixed Cost	(\$/d)	2.20
Female Calf Value	(\$/calf)	300
Male Calf value	(\$/calf)	75
Heifer Replacement Value	(\$/heifer)	1,600
Salvage Value	(\$/cow)	780
Labor Cost for Injection	(\$/hr)	15.00
Heat Detection Cost	(\$/hr)	15.00
Artificial Insemination Cost	(\$/cow)	17.00
Interest Rate	(%/y)	6.5%

**4. Pregnancy Diagnosis Cost**

		Current	Alternative	100% HD
Palpation	(\$/hr)	90		90
Ultrasound	(\$/hr)		90	
Blood Test	(\$/cow)			

# Reproductive Program

Resynch-39

Resynch-32

5.a. Reproductive Program

	Current	Start day	Alternative	Start day
1 <sup>st</sup> Service Postpartum	Double-Ovsynch	Sat	Double-Ovsynch	Sat
2 <sup>nd</sup> and Subsequent Services	Ovsynch	Tue	Ovsynch	Tue
Resynch before preg check	NO		YES	

5.b. Reproductive Program Parameters

	Current	Alternative	100% HD
Voluntary Waiting Period (d)	85	85	50
Estrus Cycle Duration (d)		22	
Maximum DIM for Breeding		330	
DIM to 1 <sup>st</sup> TAI (d)	85	85	
Interbreeding Interval (d)	49	42	
Heat Bred Before 1 <sup>st</sup> TAI (%)	55%	55%	55%
CR Heat Bred Before 1 <sup>st</sup> TAI (%)	33%	33%	33%
Heat Bred After 1 <sup>st</sup> TAI (%)	55%	55%	55%
CR Heat Bred After 1 <sup>st</sup> TAI (%)	30%	30%	30%
CR 1 <sup>st</sup> Service TAI (%)	47%	47%	
CR 2 <sup>nd</sup> + Services TAI (%)	32%	30%	
Calving Interval (mo)		14.1	
Dry Period (d)		62	



# Hormone and Labor Costs

**5.c. Hormones Cost**      Doses

Hormone	Brand	Vial Cost	Vial
GnRH	Fertagyl	19	10
PGF	Lutalyse	40	20
CIDR			
hCG	Chorulon	17.4	5

**5.d. Injections and Pregnancy Diagnosis Labor Cost: Current Program**

		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Inject.	Laborers		3		1		2	
	hr/d		3.5		1.5		1	
	Cows Treated		165		45		20	
Preg. Diag.	# Cows		45		0		0	
	hr/d		2.75		0		0	

**5.e. Injections and Pregnancy Diagnosis Labor Cost: Alternative Program**

		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Inject.	Laborers		3		1		2	
	hr/d		3.75		1.5		1	
	Cows Treated		195		40		20	
Preg. Diag.	# Cows		40		0		0	
	hr/d		2.75		0		0	

**5.f. Heat Detection Labor Cost**

		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Heat Detect.	Laborers	1	1	1	1	1	1	1
	hr/d	3	3	3	3	3	3	3
Preg. Diag.	# Cows	30	0	0	0	0	0	0
	hr/d	2	0	0	0	0	0	0



# Results



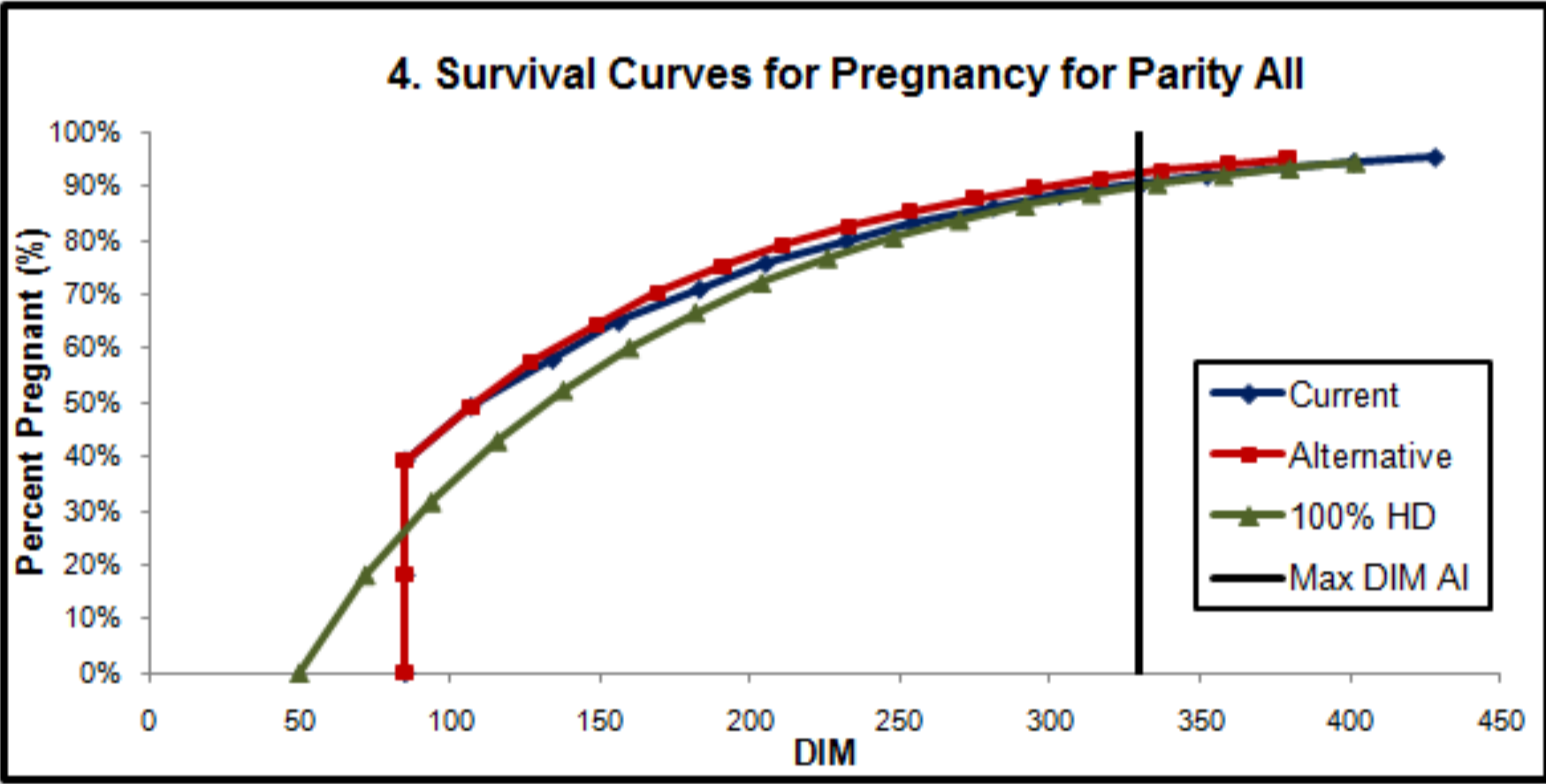
# Breeding Costs

## 2. Reproductive Programs Summary

	Current	Alternative	Baseline
1 <sup>st</sup> Service Postpartum	Double-Ovsynch	Double-Ovsynch	Heat Breeding
2 <sup>nd</sup> and Following Services	Ovsynch	Ovsynch	Heat Breeding
Cost 1st Service Breeding	\$40.46	\$40.95	
Cost Resynch Breedings	\$30.71	\$31.28	
Cost Heat Breedings	\$22.56	\$23.19	\$23.00
Pregnancy Diagnosis Method	Palpation	Ultrasound	Palpation
Pregnancy Diagnosis Cost	\$5.50	\$6.19	\$6.00



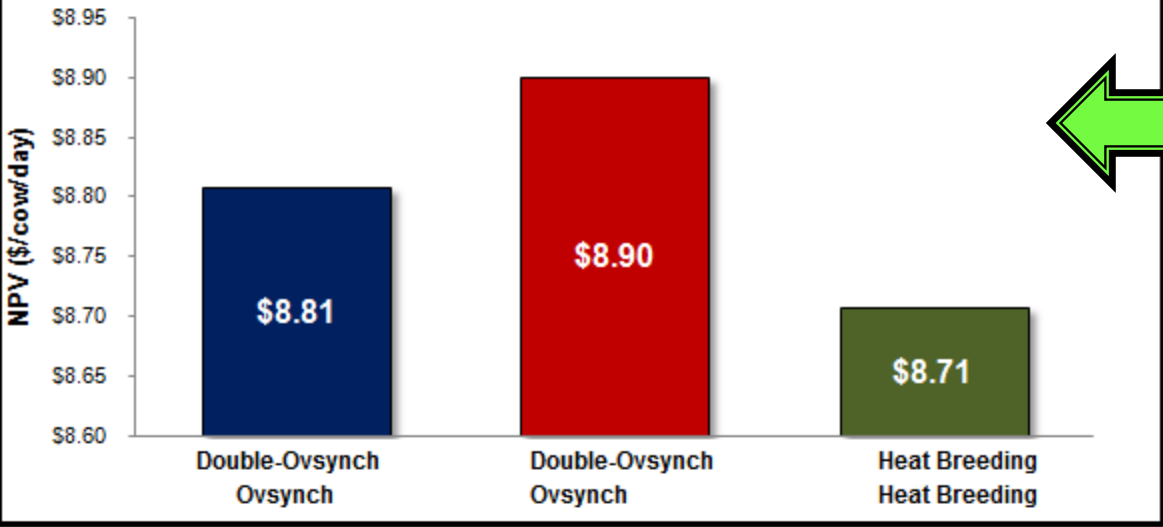
# Reproductive Performance





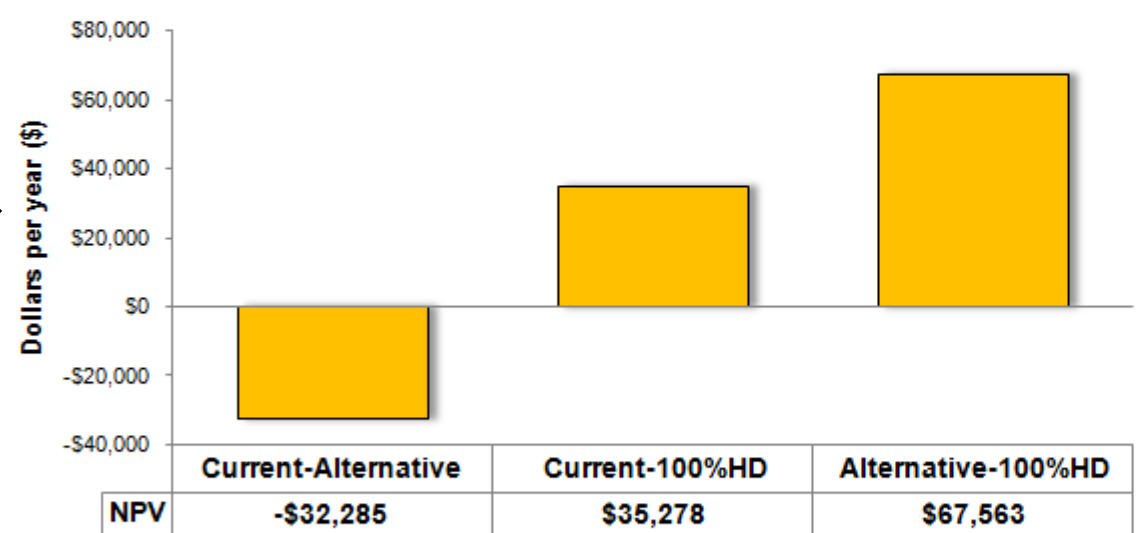
# Economic Performance

5. Net Present Value (\$/cow/day) for Parity All



Per Cow per Day

6. Difference in NPV (\$/herd/year) for Parity All



Per Herd per Year

# What if ?

## ➤ Heat Breeding is removed:

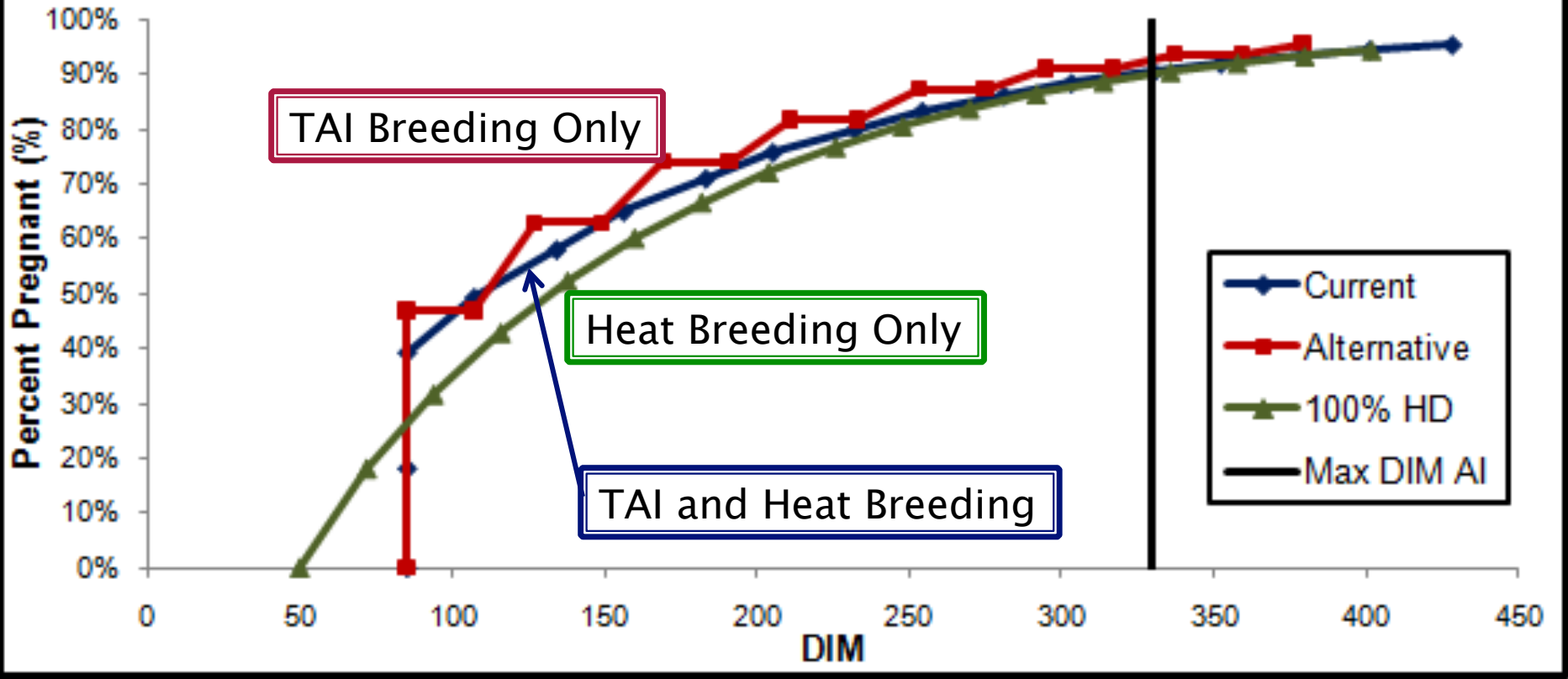
### 5.b. Reproductive Program Parameters

		Current	Alternative	100% HD
Voluntary Waiting Period	(d)	85	85	50
Estrus Cycle Duration	(d)	22		
Maximum DIM for Breeding		330		
DIM to 1 <sup>st</sup> TAI	(d)	85	85	
Interbreeding Interval	(d)	49	42	
Heat Bred Before 1 <sup>st</sup> TAI	(%)	55%		55%
CR Heat Bred Before 1 <sup>st</sup> TAI	(%)	33%		33%
Heat Bred After 1 <sup>st</sup> TAI	(%)	55%		55%
CR Heat Bred After 1 <sup>st</sup> TAI	(%)	30%		30%
CR 1 <sup>st</sup> Service TAI	(%)	47%	47%	
CR 2 <sup>nd</sup> + Services TAI	(%)	32%	30%	
Calving Interval	(mo)	14.1		
Dry Period	(d)	62		



# Heat Breeding Removed

### 4. Survival Curves for Pregnancy for Parity All



➤ Net Gain = \$4,397 / herd per yr

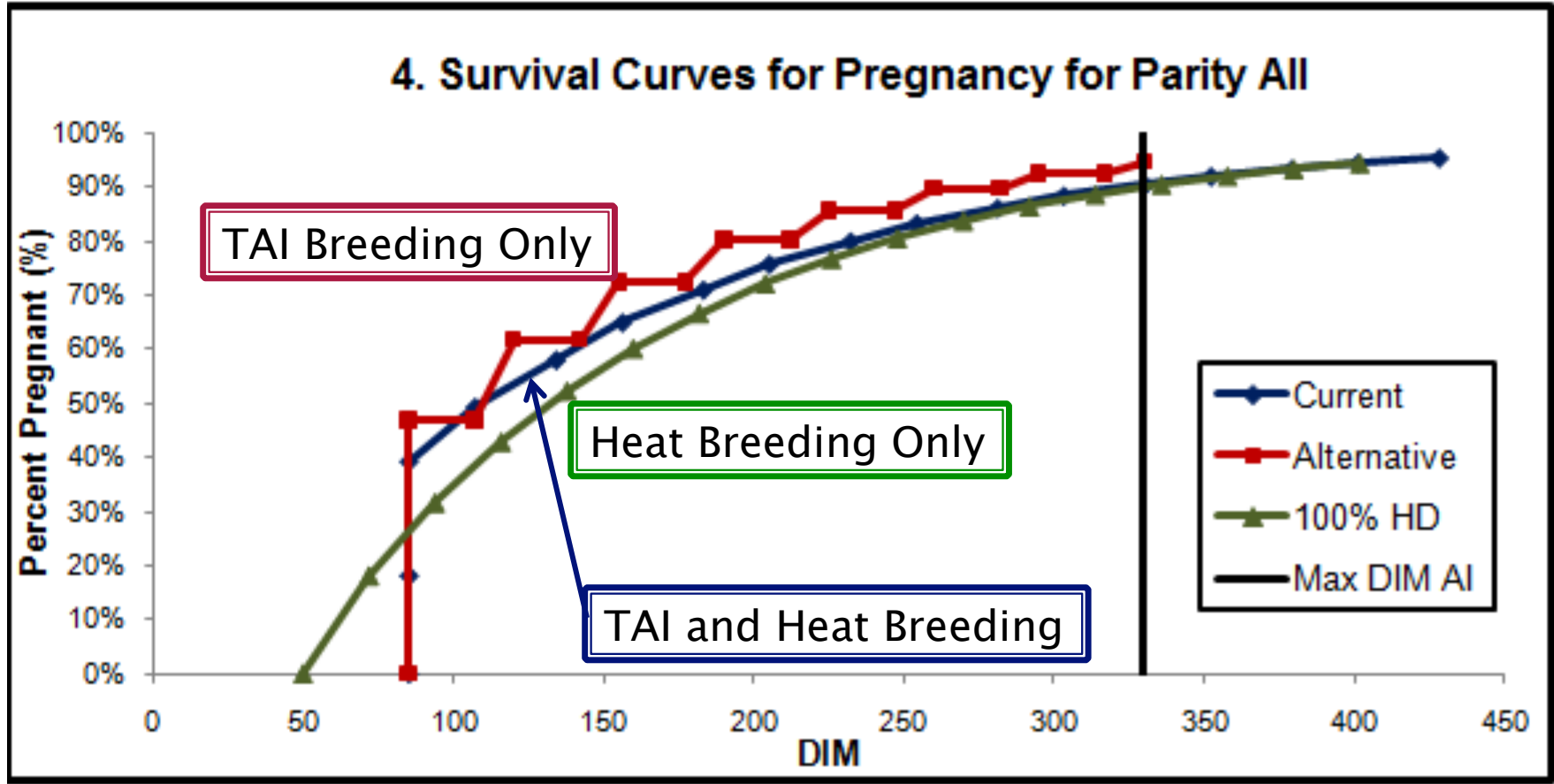
# What if ?

## ➤ Reduce Interbreeding 7 d more:

### 5.b. Reproductive Program Parameters

		Current	Alternative	100% HD
Voluntary Waiting Period	(d)	85	85	50
Estrus Cycle Duration	(d)	22		
Maximum DIM for Breeding		330		
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CR 2 <sup>nd</sup> + Services TAI	(%)	32%	28%	
Calving Interval	(mo)	14.1		
Dry Period	(d)	62		

# Reduced Interbreeding Time



➔ **Net Gain = \$33,594 / herd per yr**

# Summing Up

- Data from Wisconsin Commercial Dairy Farm
- Potential Gains (herd/year)
  - Remove Heat Breeding: \$4,397
  - Reduce Interbreeding 14 d: \$65,879
  - Total: **\$70,276**



# Conclusions

- **Breeding costs become trivial with respect to revenues of pregnancy**
- **Most important factor: difference NPV between repro programs**
- **Great flexibility of analysis**



# Limitations

- **Calculations based on single lactation**
- **Pregnancy losses not included**
- **Breeding to estrus occurring at the same interval**





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Feeding Heifers Reproduction Production Replacement Financial Environment Price Risk

## Management Tools

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.

Click on the Tool title to learn more.

### Feeding

- Optigen® Evaluator
- Income Over Feed Supplement Cost
- The 4-State Dairy Extension Feed Cost Evaluator
- Corn Feeding Strategies
- Dairy Ration Feed Additive Break-Even Analysis

### Heifers

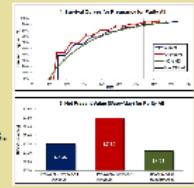
- Cost-Benefit of Accelerated Liquid Feeding Program for Dairy Calves
- Economic Value of Sexed Semen Programs for Dairy Heifers
- Heifer Replacement
- Heifer Break-Even

### Reproduction

- Economic Value of Sexed Semen Programs for Dairy Heifers
- UW-DairyRepro\$: A Reproductive Economic Analysis Tool

Calculates and compares the economic value of dairy reproductive programs including timed artificial insemination (TAI), heat detection (HD), and combinations of TAI and HD programs. It applies probabilistic reproduction survival curves with expected monetary values to assess the net present value (NPV) of defined reproductive programs. The overall NPV of a specific reproduction program is the aggregation of the expected monetary values (EMV) of reproductive events according to defined economic parameters.

- Excel Spreadsheet ([Download](#))
- Instructions and Documentation ([Download](#))
- Slides of Power Point Presentation ([Download](#))
- Instrument for Data Collection ([Download](#))
- Survey Responses ([Download](#))



# UW-DairyRepro\$

## 🔗 UW-DairyRepro\$: A Reproductive Economic Analysis Tool

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Thanks

