



Economic Evaluation of Reproductive Programs for Cows

V.E. Cabrera

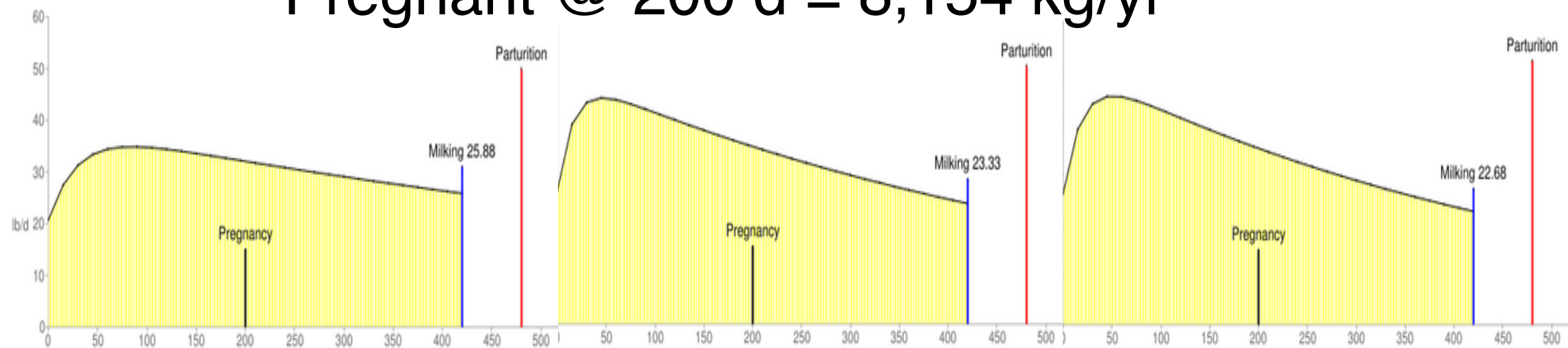
University of Wisconsin-Madison Dairy Science

Rationale

Economics of reproduction

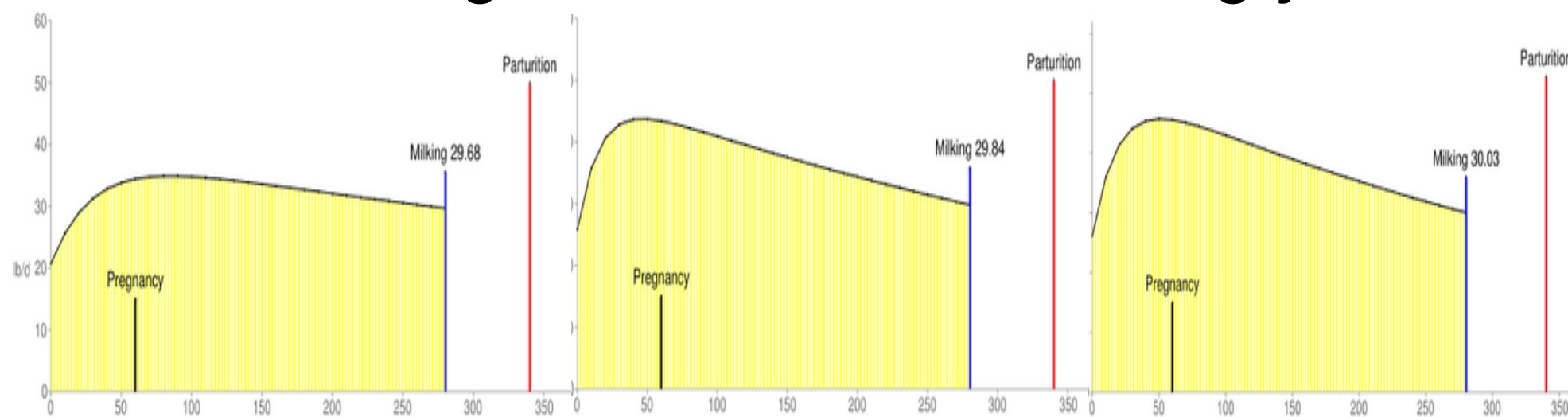
Milk productivity

Pregnant @ 200 d = 8,154 kg/yr



Pregnant @ 60 d = 8,370 kg/yr

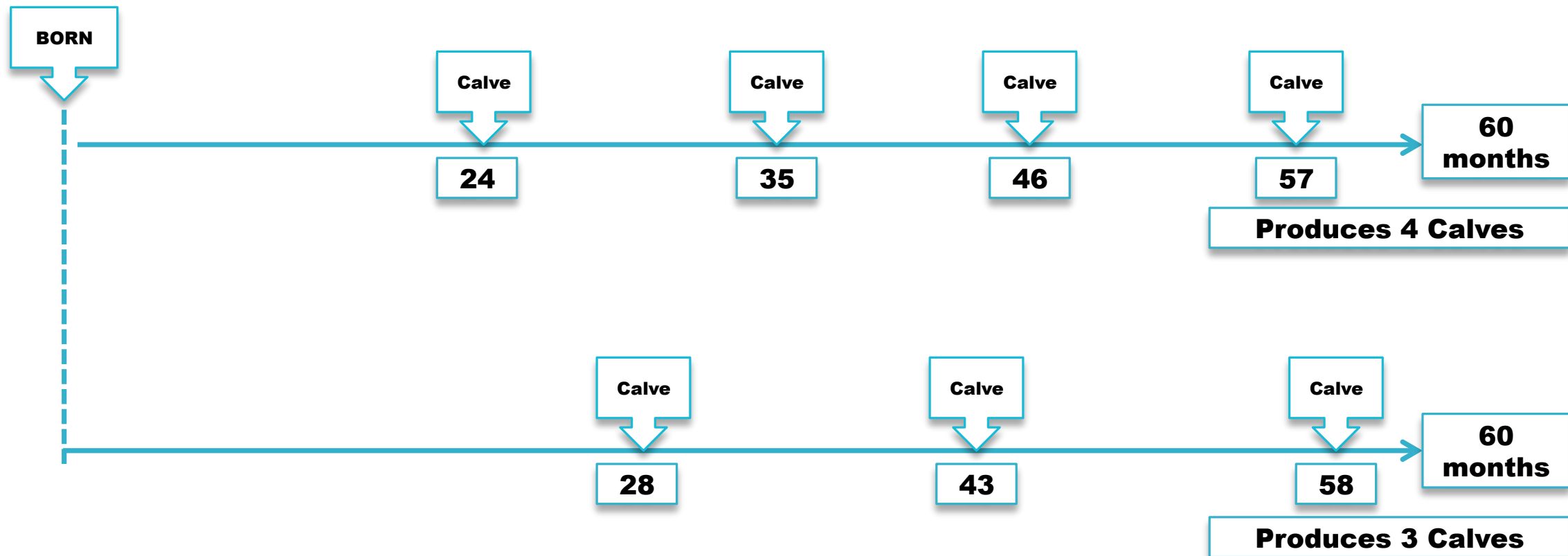
+216 kg/yr



Rationale

Economics of reproduction

Newborn value

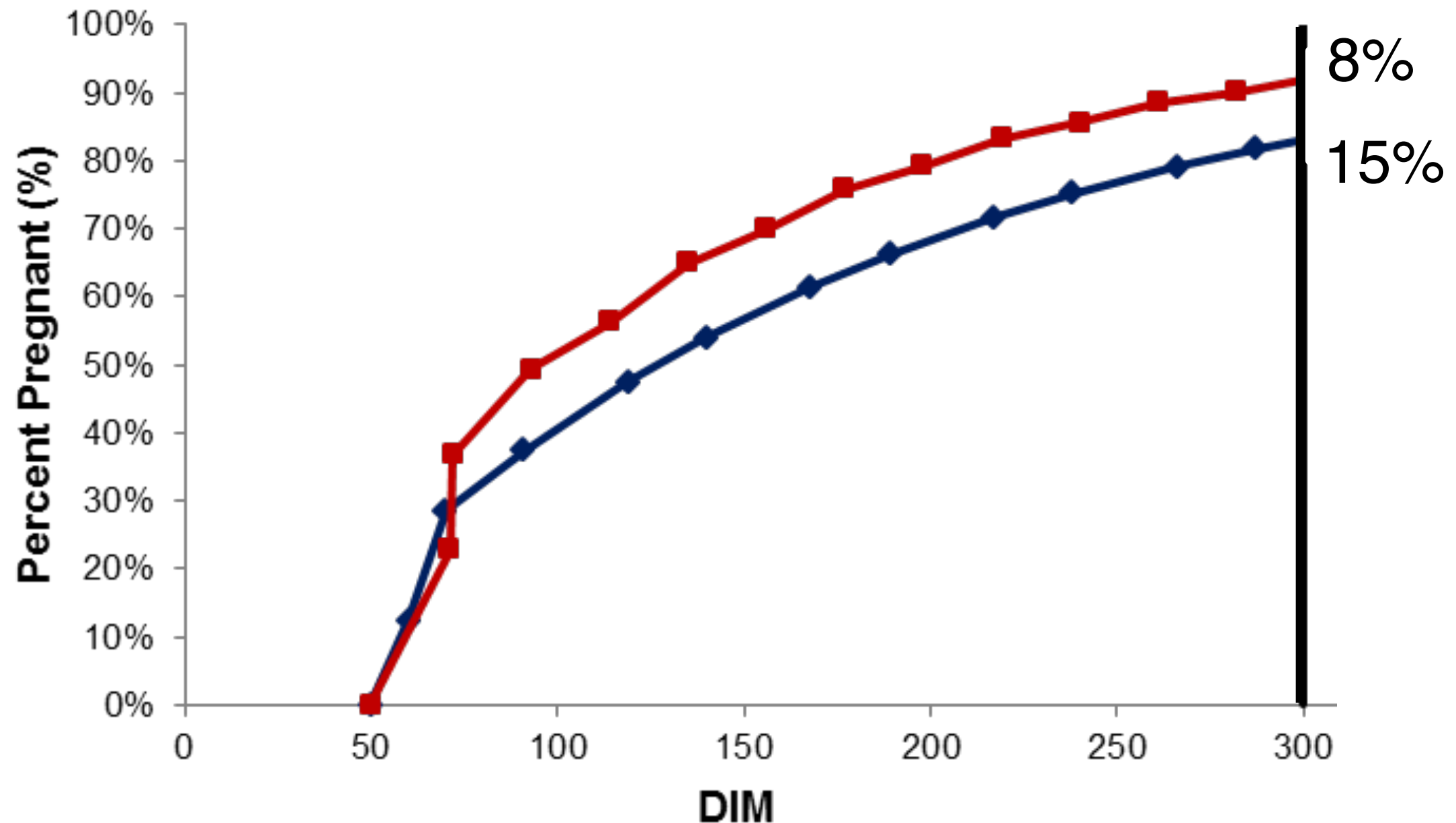


One more calf in 60 months life expectancy

Rationale

Economics of reproduction

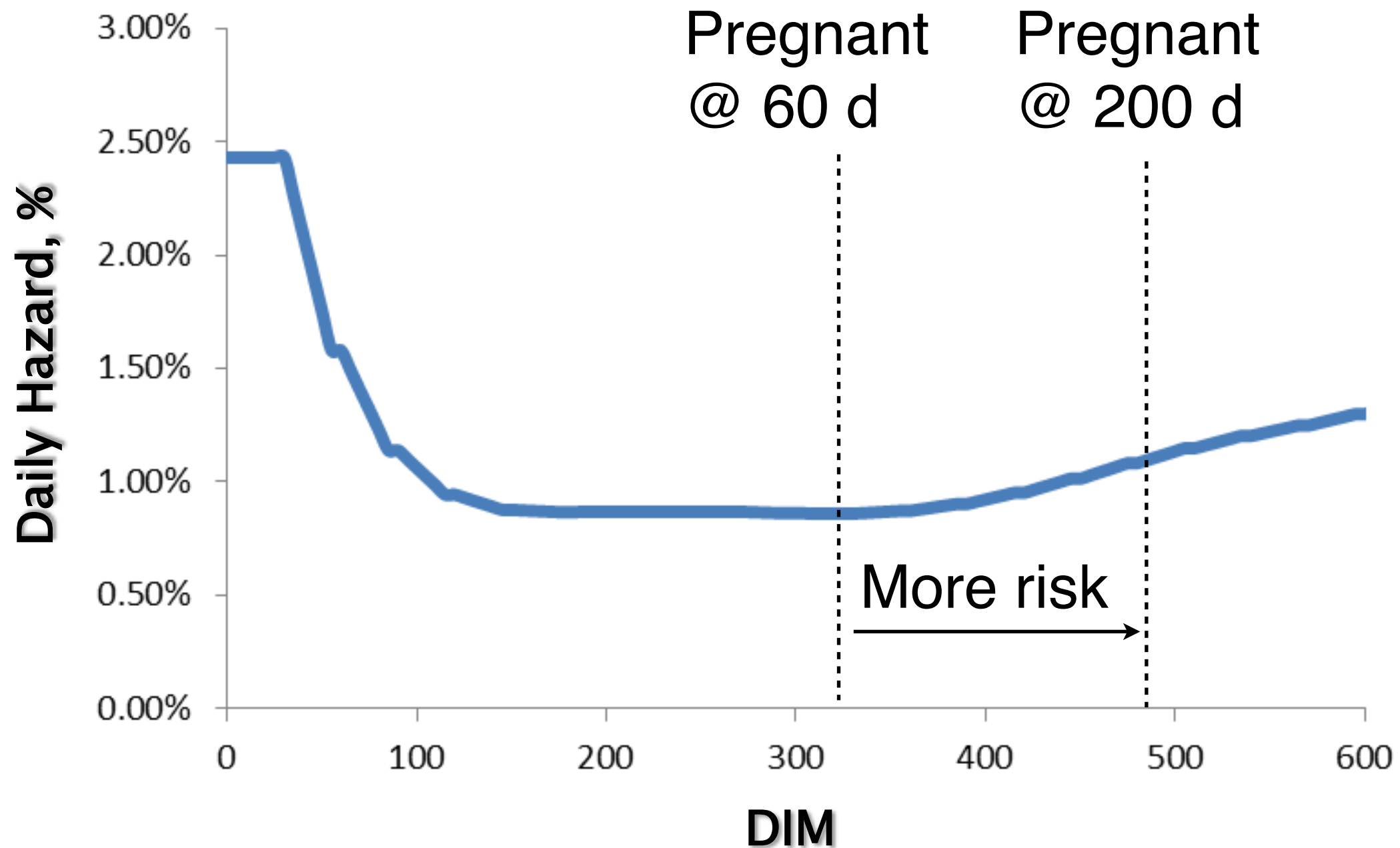
Reproductive culling



Rationale

Economics of reproduction

Involuntary culling

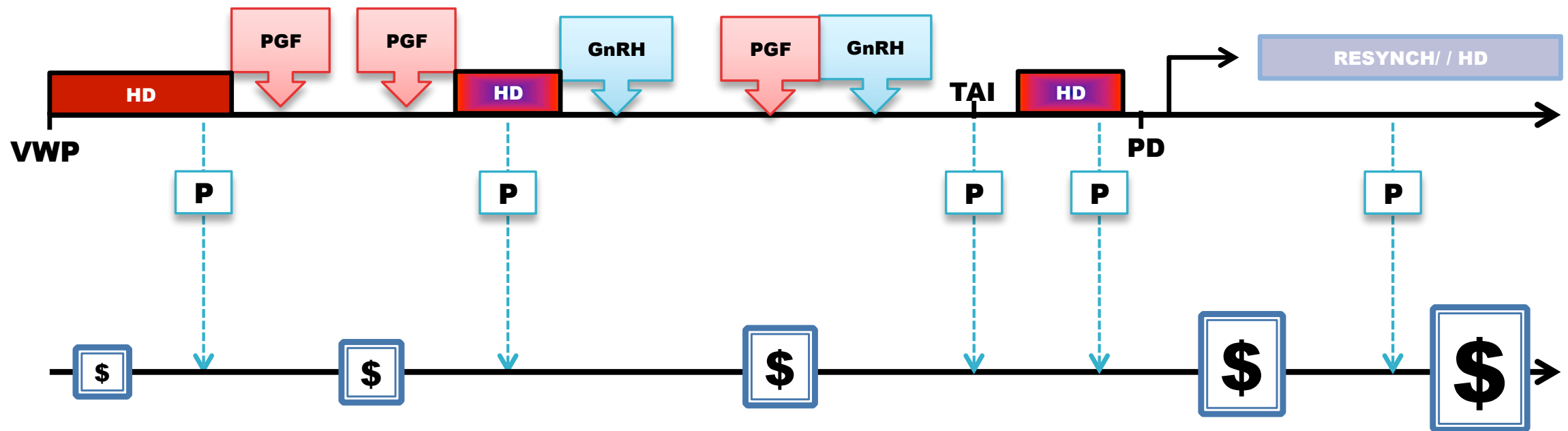


Rationale

Economics of reproduction

Reproductive costs

Reproductive events

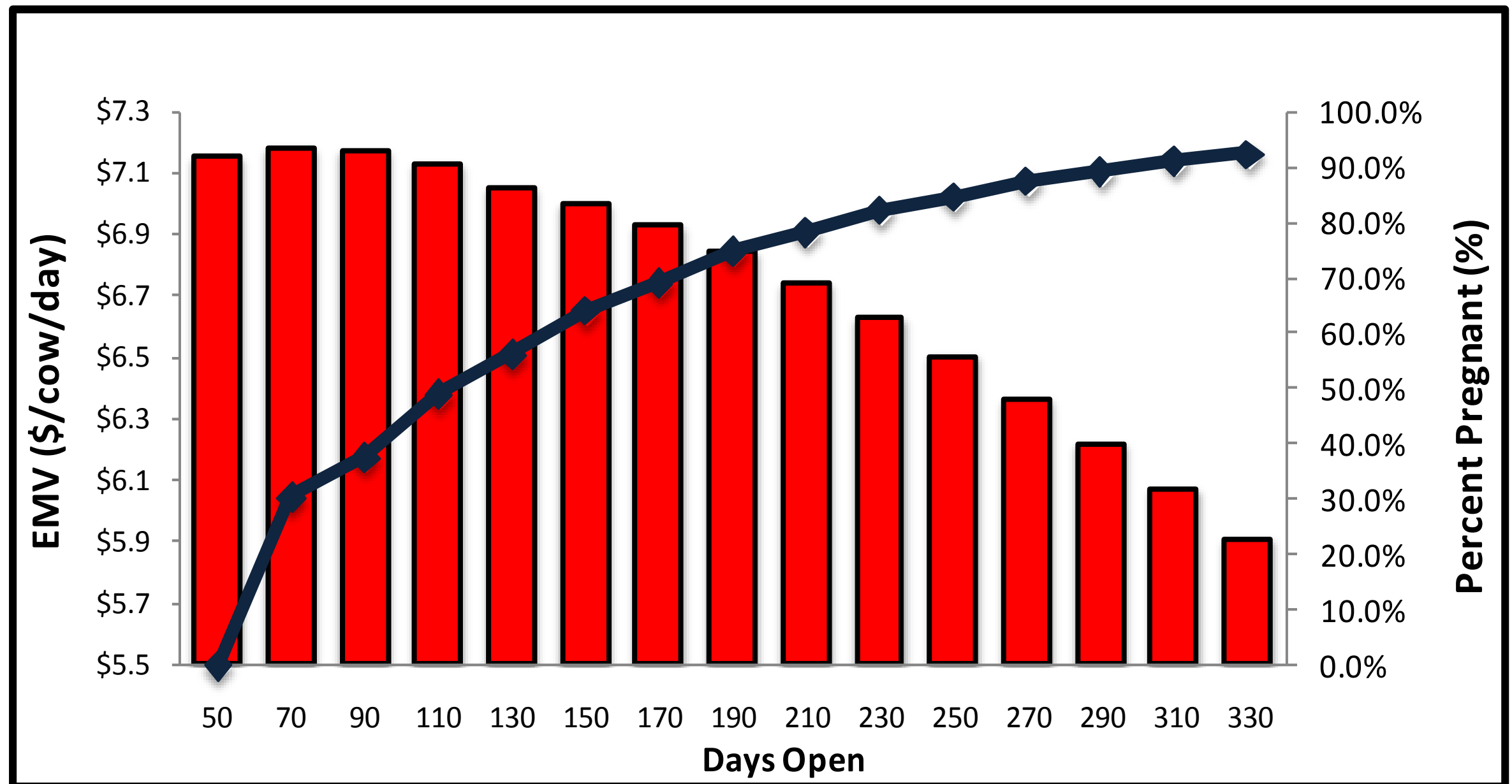


Reproductive costs

Expected monetary value

Economics of reproductive programs

Expected monetary value vs. Reproductive program



UW-DairyRepro\$Plus

Spreadsheet decision support tool

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

1. Herd Parameters

Lactating Cows, #	500
Parity 1	175
Parity 2	125
Parity ≥ 3	200
Body Weight, lb/cow	
Parity 1	1,350
Parity 2	1,400
Parity ≥ 3	1,450
Involuntary Culling, %/yr	20.0%
Mortality, %/yr	6.0%
Stillbirth, %/yr	6.0%

2. Economic Parameters

Milk Price, \$/cwt	15.00
Cost Feed Lactating, \$/lb DM	0.10
Dry Period Fixed Cost, \$/d	2.20
Female Calf Value, \$	125
Male Calf value, \$	50
Heifer Replacement Value, \$	1,250
Cow Salvage Value, \$	650
Labor Cost for Injection, \$/hr	15.00
Heat Detection Cost, \$/hr	15.00
AI Cost, \$/cow	15.00
Interest Rate, %/yr	5.5%

3. Lactation Curves (lb/cow/yr)

Year	Parity 1	Parity 2	Parity ≥ 3
1	77	105	107
2	91	120	128
3	94	120	128
4	94	116	125
5	93	112	120
6	91	107	112
7	89	98	104
8	87	91	94
9	83	82	86
10	79	75	81
11	76	68	71
12	72	61	61
13	70	57	60
14	60	53	55

4. Reproductive Program

	Current	Alternative
1 st Service postpartum	Ovsynch	Presynch-Ovsynch-12
2 nd and subsequent services	Ovsynch	Ovsynch
Resynch before preg check	NO	YES

5. Do you know total breeding costs (semen, hormones, and pregnancy diagnosis)?
If "Yes" check box

6. Reproductive Program Parameters

	Current	Alternative
Voluntary Waiting Period, d	60	72
Estrus Cycle Duration, d	22	22
Maximum DIM for Breeding, d	330	330
DIM to 1 st TAI, d	60	72
Interbreeding Interval, d	49	35
Heat Bred Before 1 st TAI, %	0%	0%
CR Heat Bred Before 1 st TAI, %	0%	0%
Heat Bred After 1 st TAI, %	0%	0%
CR Heat Bred After 1 st TAI, %	0%	0%
CR 1 st Service TAI, %	33%	42%
CR 2 nd + Services TAI, %	30%	30%
Cost of 1 st Service TAI, \$		
Cost of 2 nd + Services TAI, \$		
Cost of Heat Breeding, \$		
Cost resynch before preg check, \$		
Calving Interval, d	13.7	13.7
Dry Period, d	60	60

7. Heat Detection Labor Cost

	Current	Alternative
Laborers	1	1
hr/d	2.5	2.5

8. Activity Monitors for Heat Detection

	Current	Alternative
System Cost, \$	7,000	0
Number of monitors	250	0
Cost per monitor, \$	100	0
Maintenance, \$/yr	250	0
Life expectancy, yr	10	0
Salvage value, %	25%	0%

9. Pregnancy Diagnosis Cost

	Current	Alternative
Palpation, \$/hr	105	105
Ultrasound, \$/hr		135
Blood Test, \$/cow		

10. Labor Required for Injections and Labor Required for Pregnancy Diagnosis

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Current	Injections	1	1				
	Pregnancy Diagnosis	30					
Alternative	Injections	2	2	1			
	Pregnancy Diagnosis	30					

11. Hormones Cost

	Factl, \$	# Doses
GnRH1	20	10
PGF	25	10
P4 Inset		
hCG		

UW-DairyRepro\$ Plus
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Department of Dairy Science

Reproductive Programs Summary

	Current	Alternative
1 st Service Postpartum	Ovsynch	Presynch-Ovsynch-12
2 nd and Following Services	Ovsynch	Ovsynch
Voluntary Waiting Period, d	60	72
Maximum DIM for Breeding, d	330	330
DIM 1st TAI, d	60	72
Interbreeding Interval, d	49	35
Heat Bred Before 1 st TAI, %	0%	0%
CR Heat Bred Before 1 st TAI, %	0%	0%
Heat Bred After 1 st TAI, %	0%	0%
CR Heat Bred After 1 st TAI, %	0%	0%
CR 1 st Service TAI, %	33%	42%
CR 2 nd + Services TAI, %	30%	30%
Cost 1st Service Breeding, \$	26.7	34.5
Cost Resynch Breedings, \$	26.7	28.5
Cost Heat Breedings, \$	18.5	19.5
Pregnancy Diagnosis Method	Palpation	Ultrasound
Pregnancy Diagnosis Cost, \$	3.5	4.5
Activity Monitors for Heat Detection		
System + monitors cost, \$	32000	0
Salvage value, \$	8000	0
Value after depreciation, \$	24000	0
Total cost per d of period, \$/d	6.58	0.00
Maintenance, \$/d	0.68	0.00
Cost Per Cow/d, \$	0.017	0.000

Expected change by switching to the ALTERNATIVE program

21d-PR, %	8
21d-SR, %	18
Avg. CR, %	5
DO, d	-7
PCI, mo	-0.7

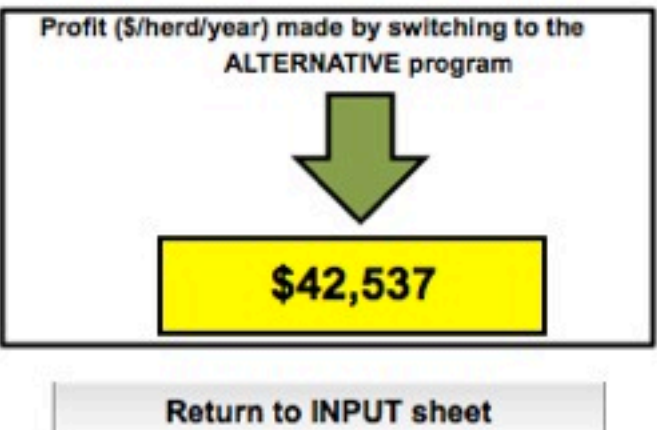
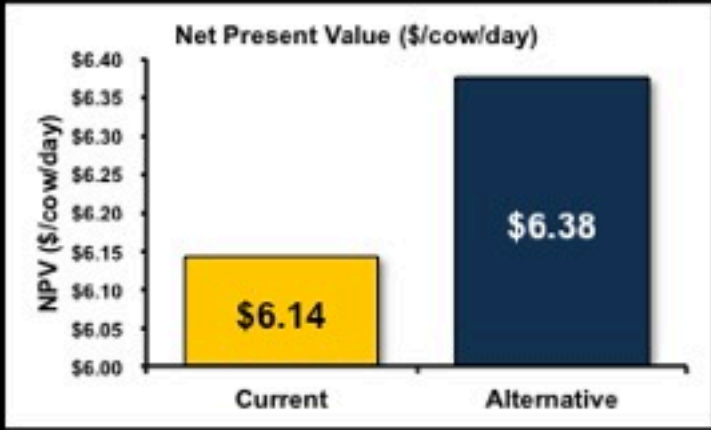
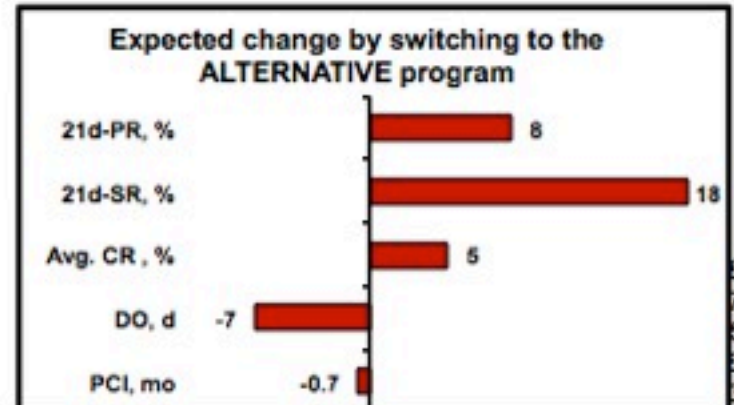
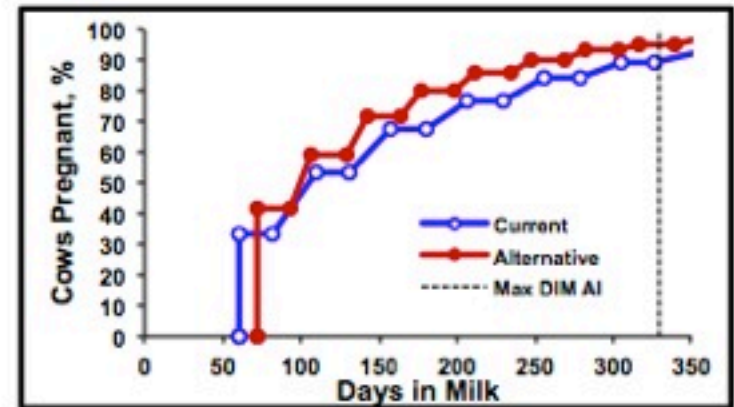
Net Present Value (\$/cow/day)

Current	\$6.14
Alternative	\$6.38

Profit (\$/herd/year) made by switching to the ALTERNATIVE program

\$42,537

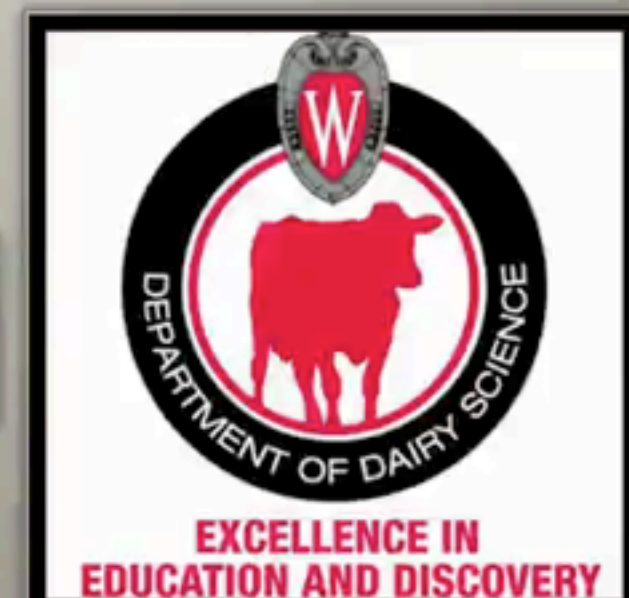
[Return to INPUT sheet](#)



Video demonstration

Available at DairyMGT.info

UW-DairyRepro\$: A Reproductive Economic Analysis Tool



UW-DairyRepro\$Plus

Spreadsheet decision support tool

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

1. Herd Parameters

Lactating Cows, #	500
Parity 1	175
Parity 2	125
Parity ≥ 3	200
Body Weight, lb/cow	
Parity 1	1,350
Parity 2	1,400
Parity ≥ 3	1,450
Involuntary Culling, %/yr	20.0%
Mortality, %/yr	6.0%
Stillbirth, %/yr	6.0%

2. Economic Parameters

Milk Price, \$/cwt	15.00
Cost Feed Lactating, \$/lb DM	0.10
Dry Period Fixed Cost, \$/d	2.20
Female Calf Value, \$	125
Male Calf value, \$	50
Heifer Replacement Value, \$	1,250
Cow Salvage Value, \$	650
Labor Cost for Injection, \$/hr	15.00
Heat Detection Cost, \$/hr	15.00
AI Cost, \$/cow	15.00
Interest Rate, %/yr	5.5%

3. Lactation Curves (lb/cow/yr)

Year	Parity 1	Parity 2	Parity ≥ 3
1	77	105	107
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6	91	107	112
7	89	98	104
8	87	91	94
9	83	82	86
10	79	75	81
11	76	68	71
12	72	61	61
13	70	57	60
14	60	53	55

4. Reproductive Program

	Current	Start day	Alternative	Start day
1 st Service postpartum	Ovsynch	1	Presynch-Ovsynch-12	1
2 nd and subsequent services	Ovsynch	1	Ovsynch	1
Resynch before preg check	NO		YES	

5. Do you know total breeding costs (semen, hormones, and pregnancy diagnosis)?
If "Yes" check box

6. Reproductive Program Parameters

	Current	Alternative
Voluntary Waiting Period, d	60	72
Estrus Cycle Duration, d	22	
Maximum DIM for Breeding, d		330
DIM to 1 st TAI, d	60	72
Interbreeding Interval, d	49	35
Heat Bred Before 1 st TAI, %	0%	0%
CR Heat Bred Before 1 st TAI, %	0%	0%
Heat Bred After 1 st TAI, %	0%	0%
CR Heat Bred After 1 st TAI, %	0%	0%
CR 1 st Service TAI, %	33%	42%
CR 2 nd + Services TAI, %	30%	30%
Cost of 1 st Service TAI, \$		
Cost of 2 nd + Services TAI, \$		
Cost of Heat Breeding, \$		
Cost resynch before preg check, \$		
Calving Interval, d		13.7
Dry Period, d		60

7. Heat Detection Labor Cost

	Current	Alternative
Laborers	1	1
hr/d	2.5	2.5

8. Activity Monitors for Heat Detection

	Current	Alternative
System Cost, \$	7,000	0
Number of monitors	250	0
Cost per monitor, \$	100	0
Maintenance, \$/yr	250	0
Life expectancy, yr	10	0
Salvage value, %	25%	0%

9. Pregnancy Diagnosis Cost

	Current	Alternative
Palpation, \$/hr	105	
Ultrasound, \$/hr		135
Blood Test, \$/cow		

10. Labor Required for Injections and Labor Required for Pregnancy Diagnosis

		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Current	Injections	1		1				
	# Cows	2		1				
Alternative	Injections		2		1			
	# Cows		2.5		2			
Current	Pregnancy Diagnosis	30		30				
	# Cows	1		1				
Alternative	Pregnancy Diagnosis		1		60			
	# Cows		30					

11. Hormones Cost

	Factel	Estimate	CIDR	Chonolan
GnRH1	20	10		
PGF	25	10		
P4 Insert				
hCG				

Parity Group to ANALYZE: Run ANALYSIS

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

Reproductive Programs Summary

	Current	Alternative
1 st Service Postpartum	Ovsynch	Presynch-Ovsynch-12
2 nd and Following Services	Ovsynch	Ovsynch
Voluntary Waiting Period, d	60	72
Maximum DIM for Breeding, d		330
DIM 1st TAI, d	60	72
Interbreeding Interval, d	49	35
Heat Bred Before 1 st TAI, %	0%	0%
CR Heat Bred Before 1 st TAI, %	0%	0%
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Pregnancy Diagnosis Cost, \$	3.5	4.5
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System + monitors cost, \$	32000	0
Salvage value, \$	8000	0
Value after depreciation, \$	24000	0
Total cost per d of period, \$/d	6.58	0.00
Maintenance, \$/d	0.68	0.00
Cost Per Cow/d, \$	0.017	0.000

Net Present Value (\$/cow/day)

Current	\$6.14
Alternative	\$6.38

Profit (\$/herd/year) made by switching to the ALTERNATIVE program

↓

\$42,537

Return to INPUT sheet

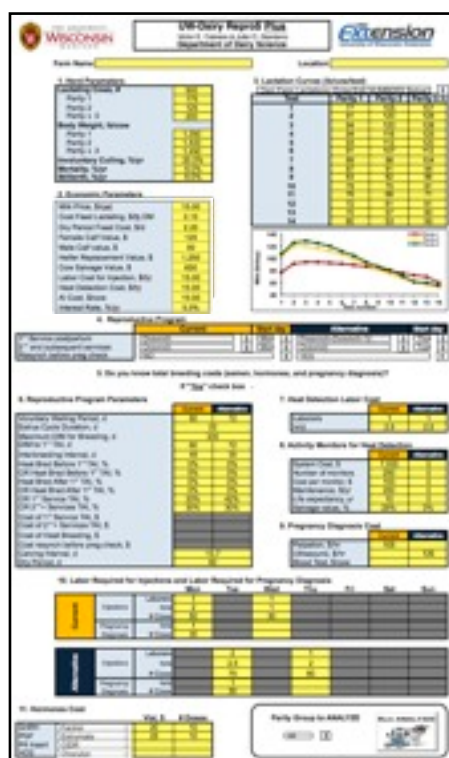
Cows Pregnant, % vs Days in Milk

Expected change by switching to the ALTERNATIVE program

21d-PR, %	8
21d-SR, %	18
Avg. CR, %	5
DO, d	-7
PCI, mo	-0.7

UW-DairyRepro\$Plus

Input data

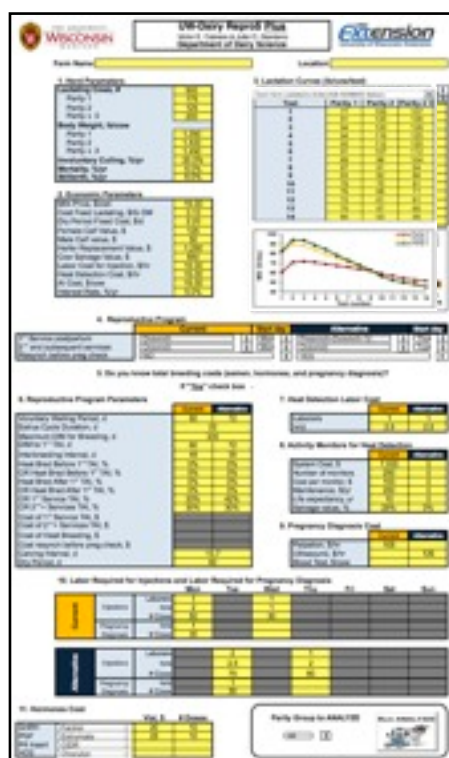


Herd

Lactating Cows, #	500
Parity 1	175
Parity 2	125
Parity ≥ 3	200
Body Weight, <u>lb/cow</u>	
Parity 1	1,350
Parity 2	1,400
Parity ≥ 3	1,450
Involuntary Culling, <u>%/yr</u>	20.0%
Mortality, <u>%/yr</u>	6.0%
Stillbirth, <u>%/yr</u>	6.0%

UW-DairyRepro\$Plus

Input data



Economics

Milk Price, \$/cwt	15.00
Cost Feed Lactating, \$/lb DM	0.10
Dry Period Fixed Cost, \$/d	2.20
Female Calf Value, \$	125
Male Calf value, \$	50
Heifer Replacement Value, \$	1,250
Cow Salvage Value, \$	650
Labor Cost for Injection, \$/hr	15.00
Heat Detection Cost, \$/hr	15.00
AI Cost, \$/cow	15.00
Interest Rate, %/yr	5.0%

UW-DairyRepro\$Plus

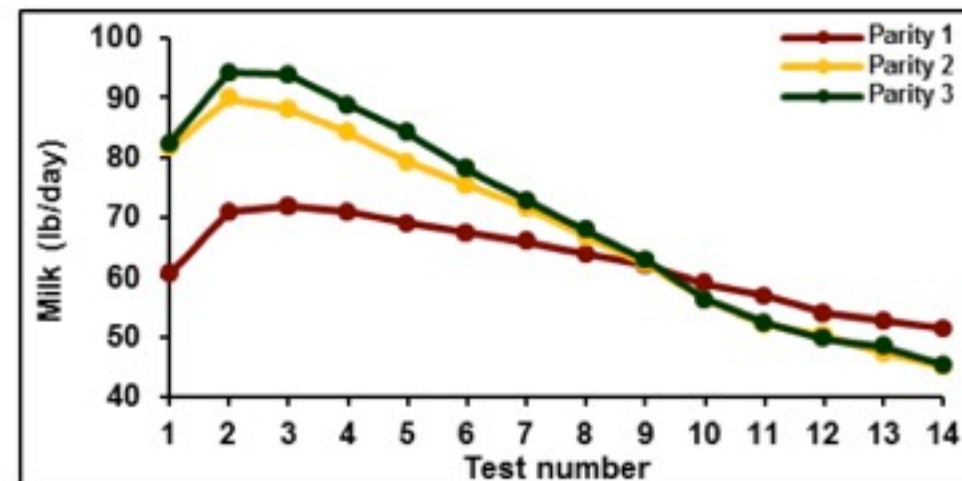
Input data

The screenshot shows the 'UW-DairyRepro\$Plus' software interface. It includes sections for 'Farm Name', 'Location', 'Parity 1-4' data entry, 'Lactation Curve (Graphical)', 'Reproductive Program Parameters', and 'Labor Required for Operations and Labor Required for Pregnancy Diagnosis'. A small graph is visible in the top right section.

Lactation curves

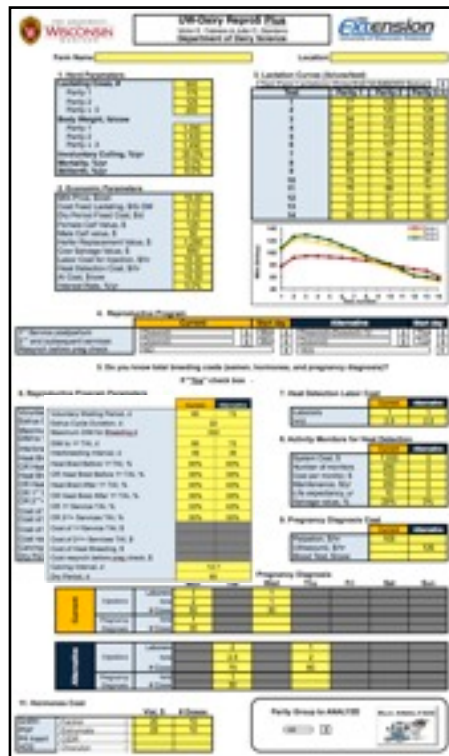
Own Farm Lactations (Enter/Edit NUMBERS Below)

Test	Parity 1	Parity 2	Parity ≥ 3
1	77	105	107
2	91	120	126
3	94	120	128
4	94	116	125
5	93	112	120
6	91	107	112
7	89	98	104
8	87	91	94
9	83	82	86
10	79	75	81
11	76	68	71
12	72	61	61
13	70	57	60
14	60	53	55



UW-DairyRepro\$Plus

Detailed definition of reproduction



Reproductive programs

1st Service postpartum
2nd and subsequent services
Resynch before preg check

Current		Start day
Ovsynch	◆	Tue ◆
Ovsynch	◆	Tue ◆
YES		◆

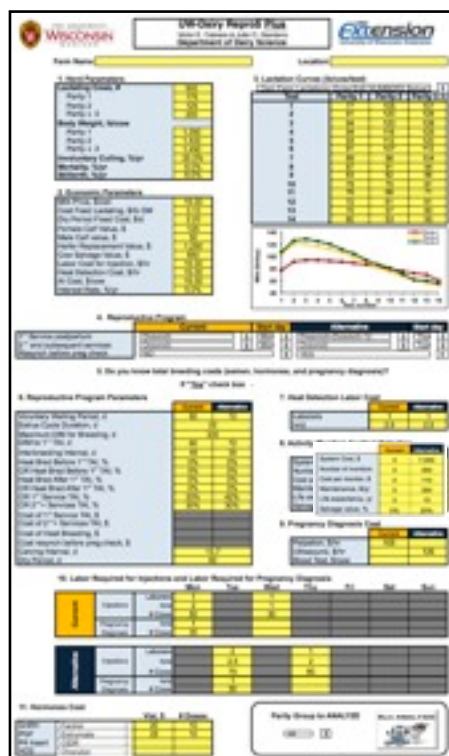
1st Service postpartum
2nd and subsequent services
Resynch before preg check

Alternative		Start day
Presynch-Ovsynch-12	◆	Thu ◆
Ovsynch	◆	Tue ◆
YES		◆

UW-DairyRepro\$Plus

Define reproduction performance

Reproductive programs



	Current	Alternative
Voluntary Waiting Period, d	60	72
Estrus Cycle Duration, d	22	
Maximum DIM for <u>Breeding</u> , d	330	
DIM to 1 st TAI, d	60	72
Interbreeding Interval, d	49	35
Heat Bred Before 1 st TAI, %	50%	50%
CR Heat Bred Before 1 st TAI, %	35%	35%
Heat Bred After 1 st TAI, %	40%	40%
CR Heat Bred After 1 st TAI, %	35%	35%
CR 1 st Service TAI, %	33%	42%
CR 2 nd + Services TAI, %	30%	30%
Cost of 1 st Service TAI, \$		
Cost of 2 nd + Services TAI, \$		
Cost of Heat Breeding, \$		
Cost resynch before <u>preg</u> check, \$		
Calving Interval, d	13.7	
Dry Period, d	60	

UW-DairyRepro\$Plus

Expected performance 1st service

Synchronization Program	VWP (d)	Conception Rate (%)	
		Mean	Range
Presynch-Ovsynch-14	70-85	37	(32-42)
Presynch-Ovsynch-12	70-85	42	(37-47)
Presynch-Ovsynch-11	70-85	43	(37-47)
Presynch-Ovsynch-10	70-85	44	(37-47)
Double-Ovsynch	70-85	47	(40-50)
G-6-G	70-85	45	(37-47)
Ovsynch	60-75	33	(30-37)
Cosynch-72	60-75	26	(25-33)
Presynch-Ovsynch-12 w/CIDR	70-85	45	(40-50)
Double-Ovsynch w/ CIDR	70-85	50	(43-53)
Ovsynch w/ CIDR	60-75	36	(40-50)
Cosynch-72 w/ CIDR	60-75	32	(33-40)

UW-DairyRepro\$Plus

Expected performance 2nd+ services

Synchronization Program	Interbreeding Interval	Conception Rate (%)	
	(d)	Mean	Range
Ovsynch-Day 25	35	27	(24-30)
Ovsynch-Day 32	42	30	(25-35)
Ovsynch-Day 39	49	28	(25-32)
Double-Ovsynch	49	38	(33-42)
Short-Double-Ovsynch	42	34	(30-38)
HGPG (hCG-7d-Ovsynch)	35	37	(33-41)
GGPG (GnRH-7d-Ovsynch)	35	34	(27-37)
G-6-G	49	35	(32-38)
Cosynch-72-Day 25	35	23	(20-25)
Cosynch-72-Day 32	42	28	(24-32)
Cosynch-72-Day 39	49	25	(23-28)
Ovsynch-Day 32 w/ CIDR	42	33	(28-38)
Double-Ovsynch w/ CIDR	49	41	(36-45)
Short-Double-Ovsynch w/CIDR	42	37	(33-41)
HGPG (hCG-7d-Ovsynch) w/CIDR	35	40	(36-41)
GGPG (GnRH-7d-Ovsynch) w/ CIDR	35	35	(30-40)
G-6-G w/CIDR	49	38	(33-41)
Cosynch-72-Day 32 w/CIDR	42	31	(27-35)

UW-DairyRepro\$Plus

Use of heat detection devices



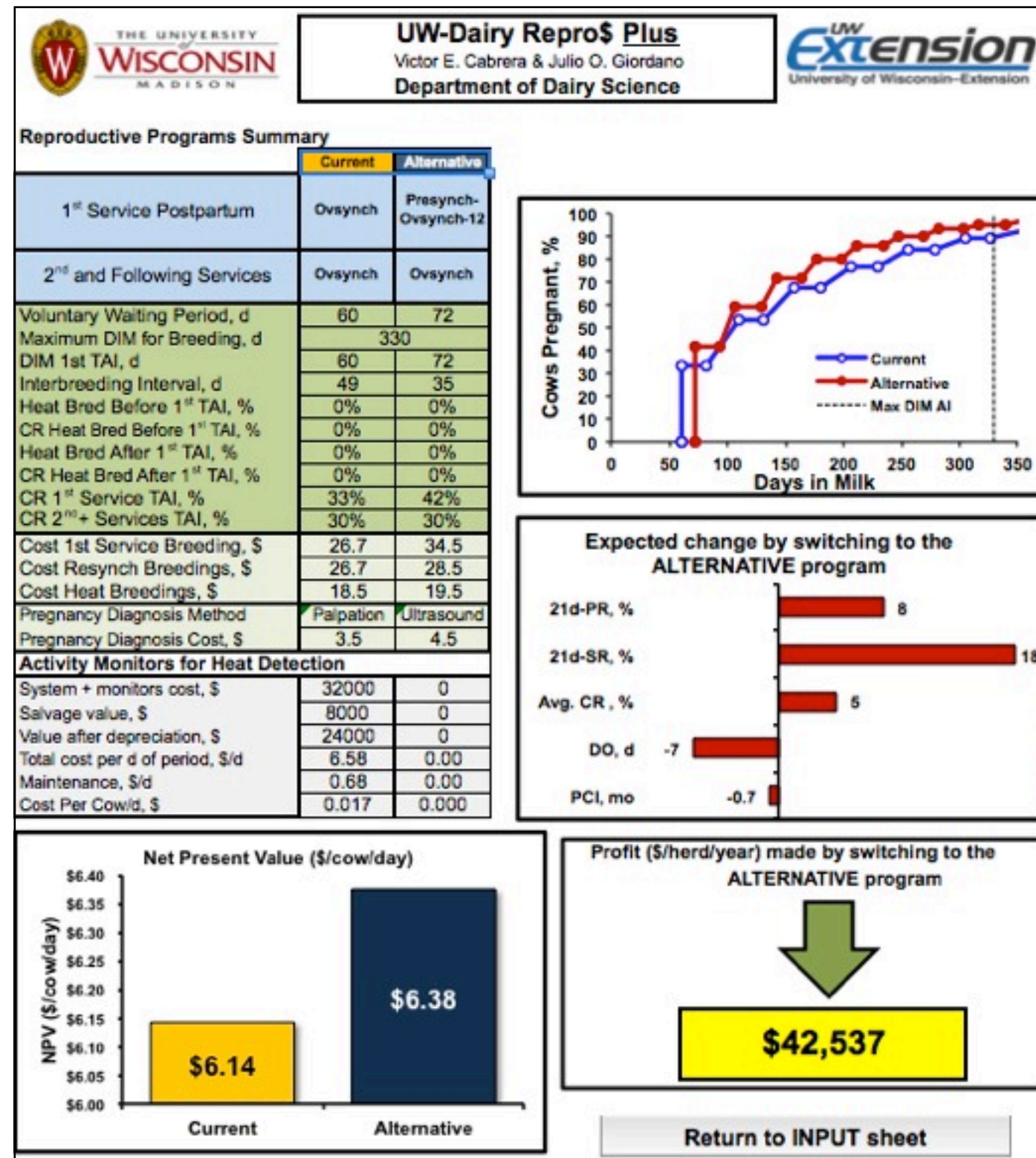
Activity monitors for heat detection

New!

	Current	Alternative
System Cost, \$	0	7,000
Number of monitors	0	350
Cost per monitor, \$	0	110
Maintenance, \$/yr	0	350
Life expectancy, yr	0	10
Salvage value, %	0%	25%

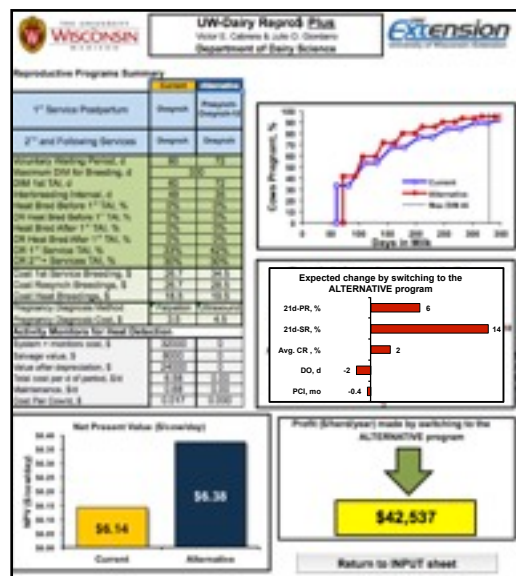
UW-DairyRepro\$Plus

Examine results

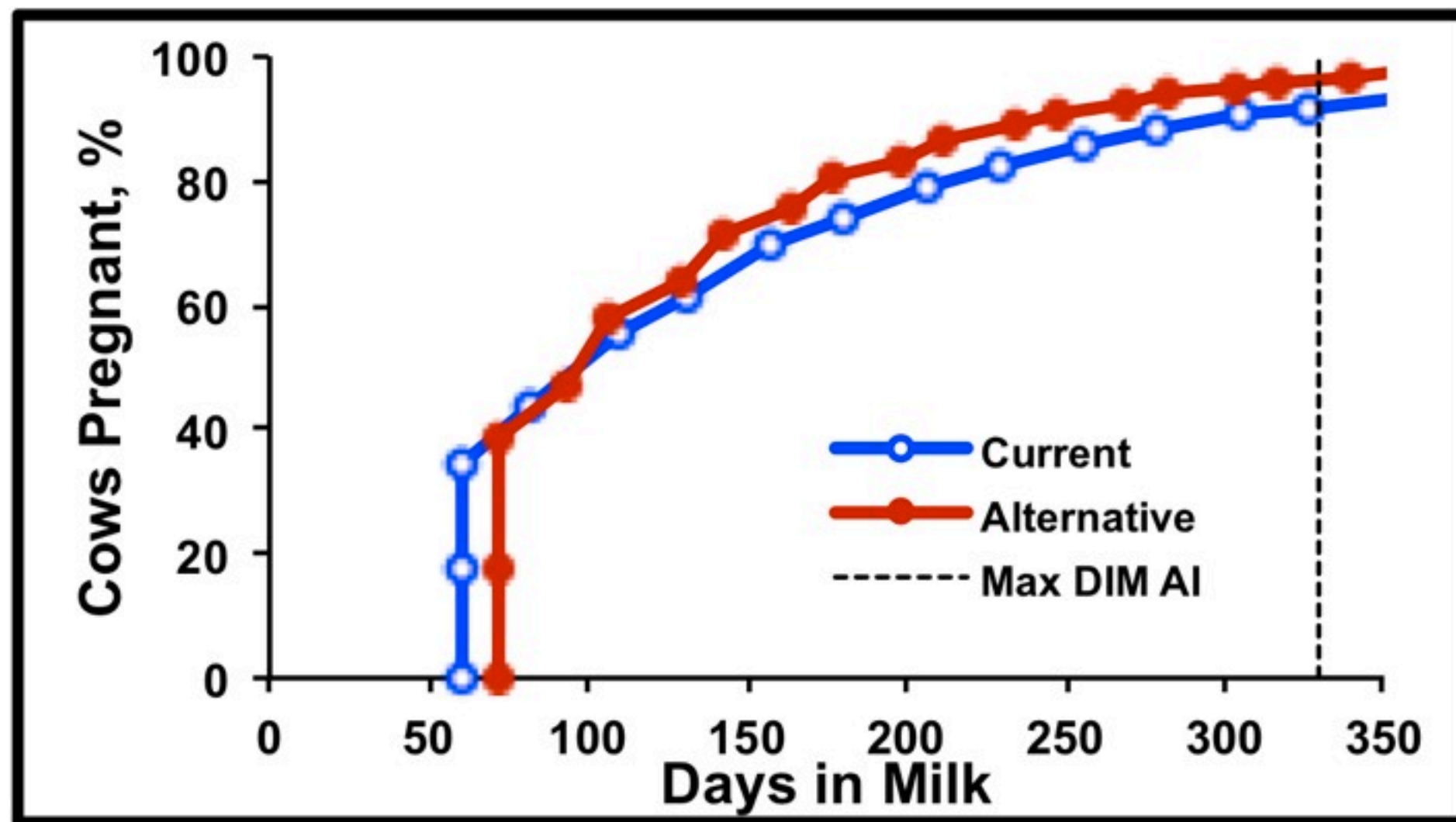


UW-DairyRepro\$Plus

Examine results

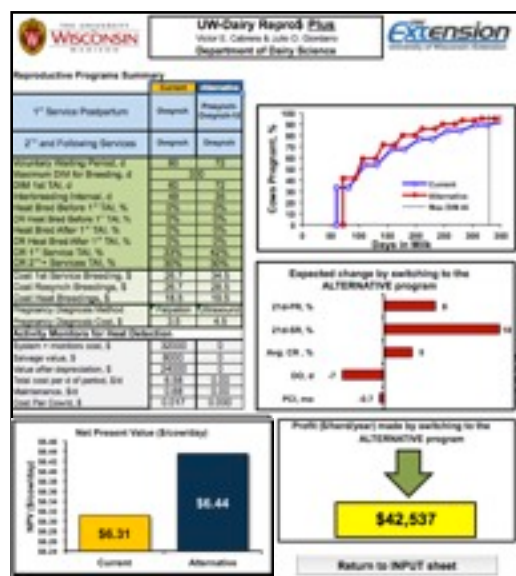


Reproductive performance



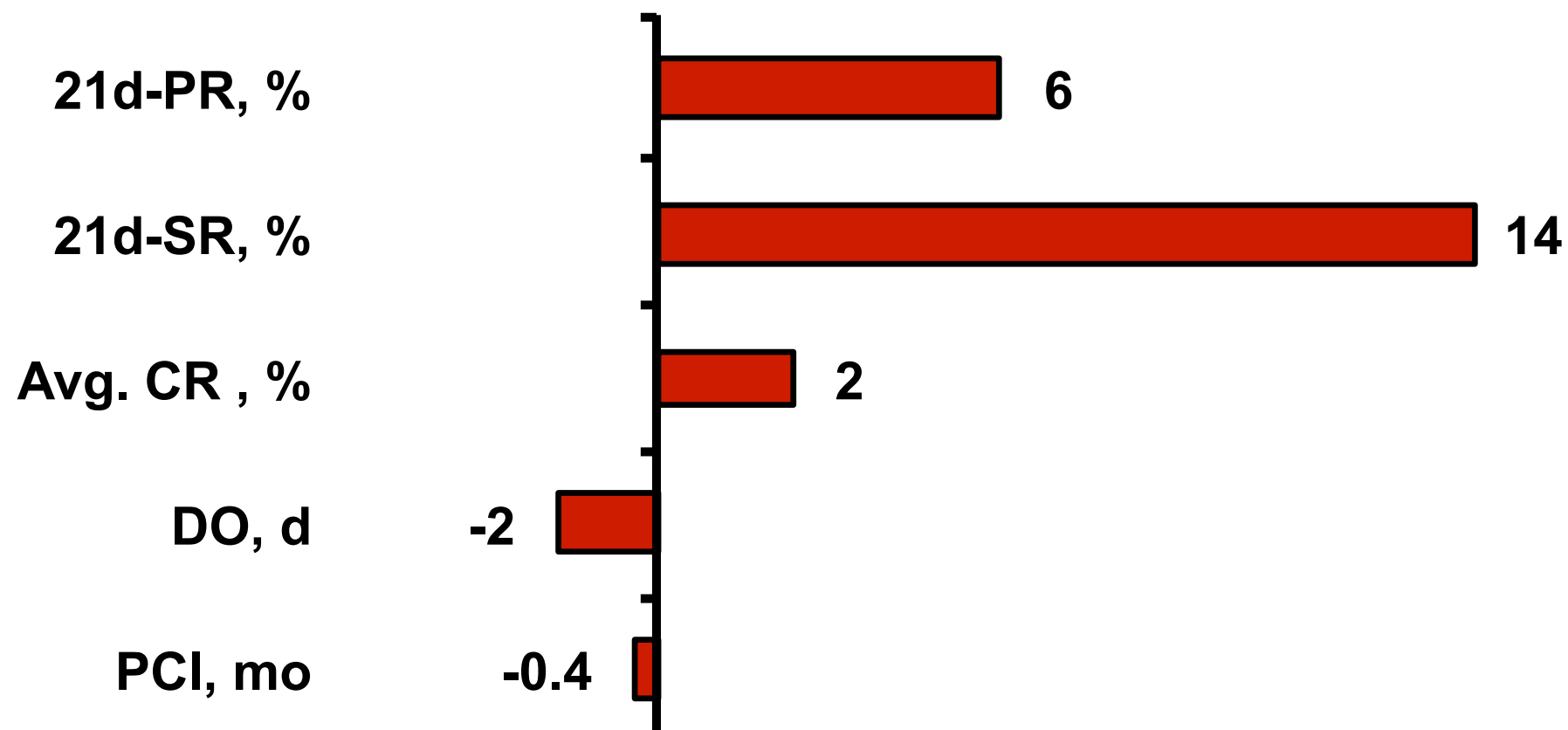
UW-DairyRepro\$Plus

Examine results



Reproductive performance

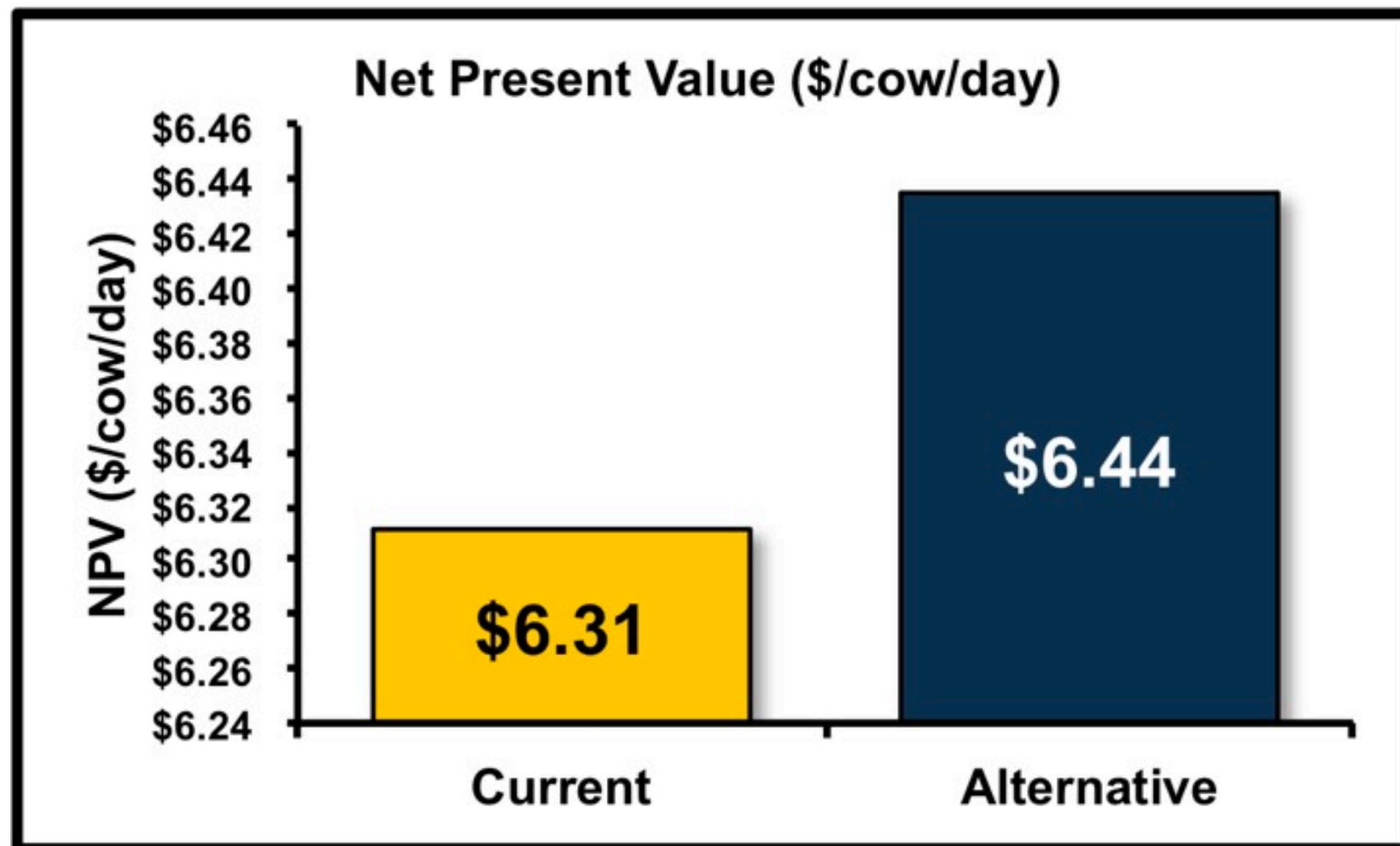
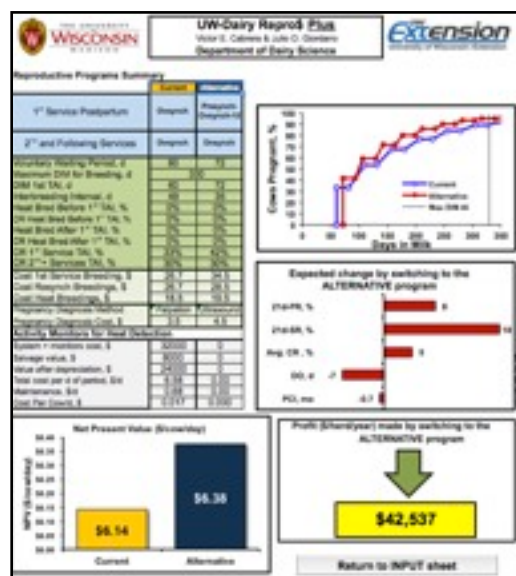
Expected change by switching to the ALTERNATIVE program



UW-DairyRepro\$Plus

Examine results

Economic difference of programs



\$0.13 = \$47/cow per year net gain

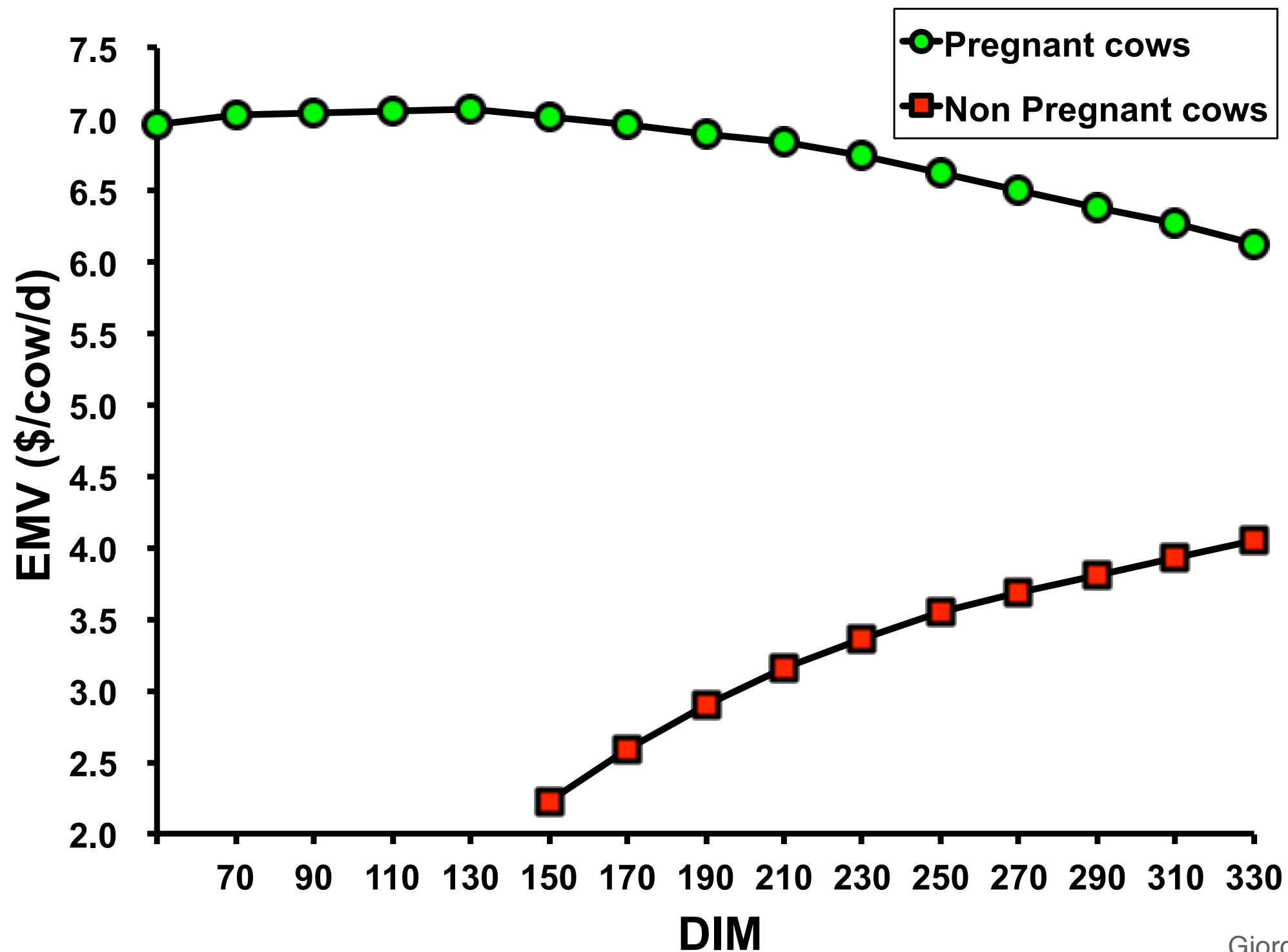
Repro\$ Plus application 1

TAI and heat detection interaction

	A	B	C
1 st Service	Double-OvSynch		Heat detection
2 nd + Services	ReSynch-D32	Double-OvSynch	Heat detection
Voluntary waiting period, d	82	82	50
Interbreeding interval, d	42	49	21
CR at 1 st service, %	45	45	33
CR at 2 nd + services, %	30	39	30

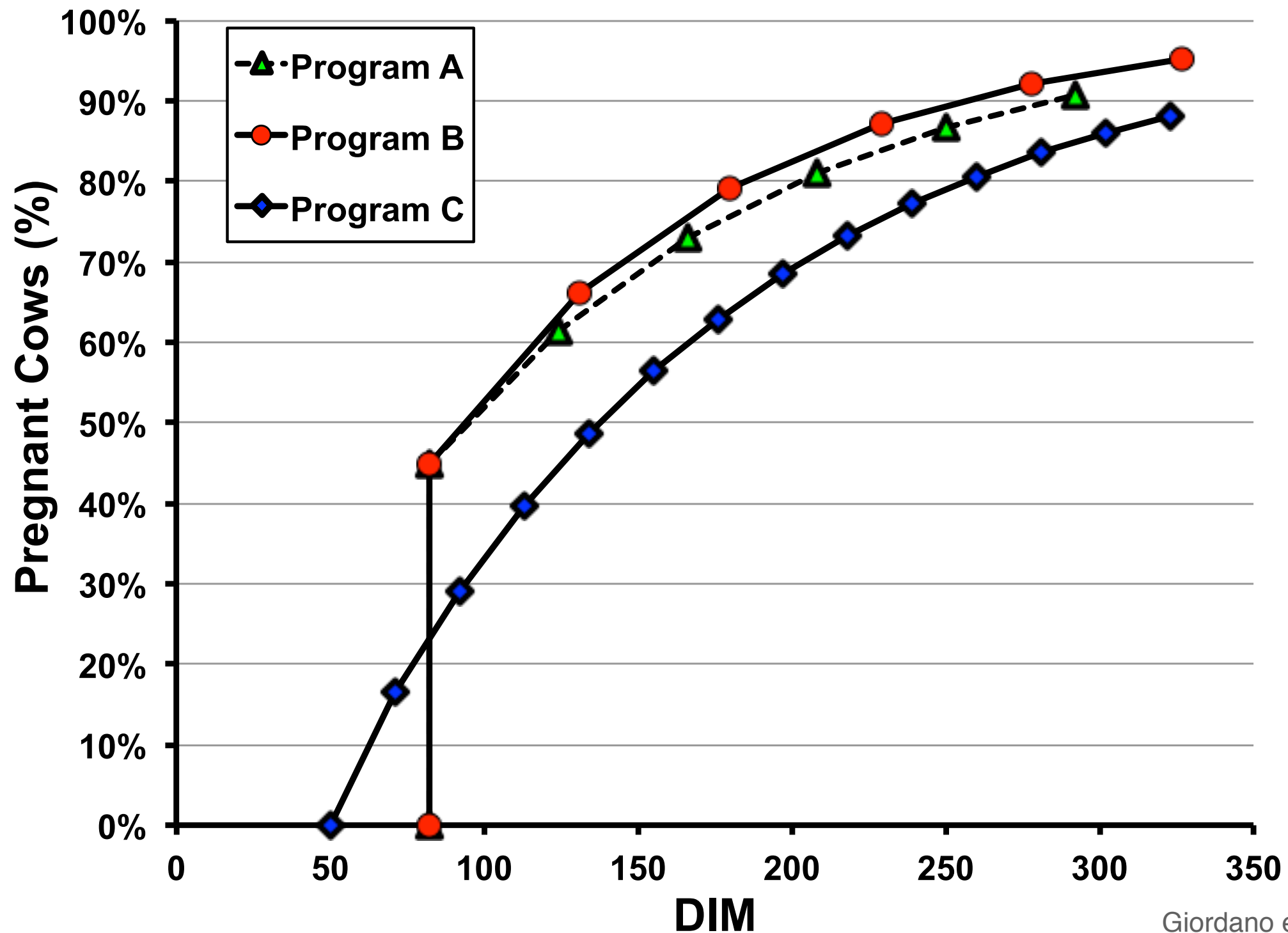
Repro\$ Plus application 1

Expected monetary value (EMV)



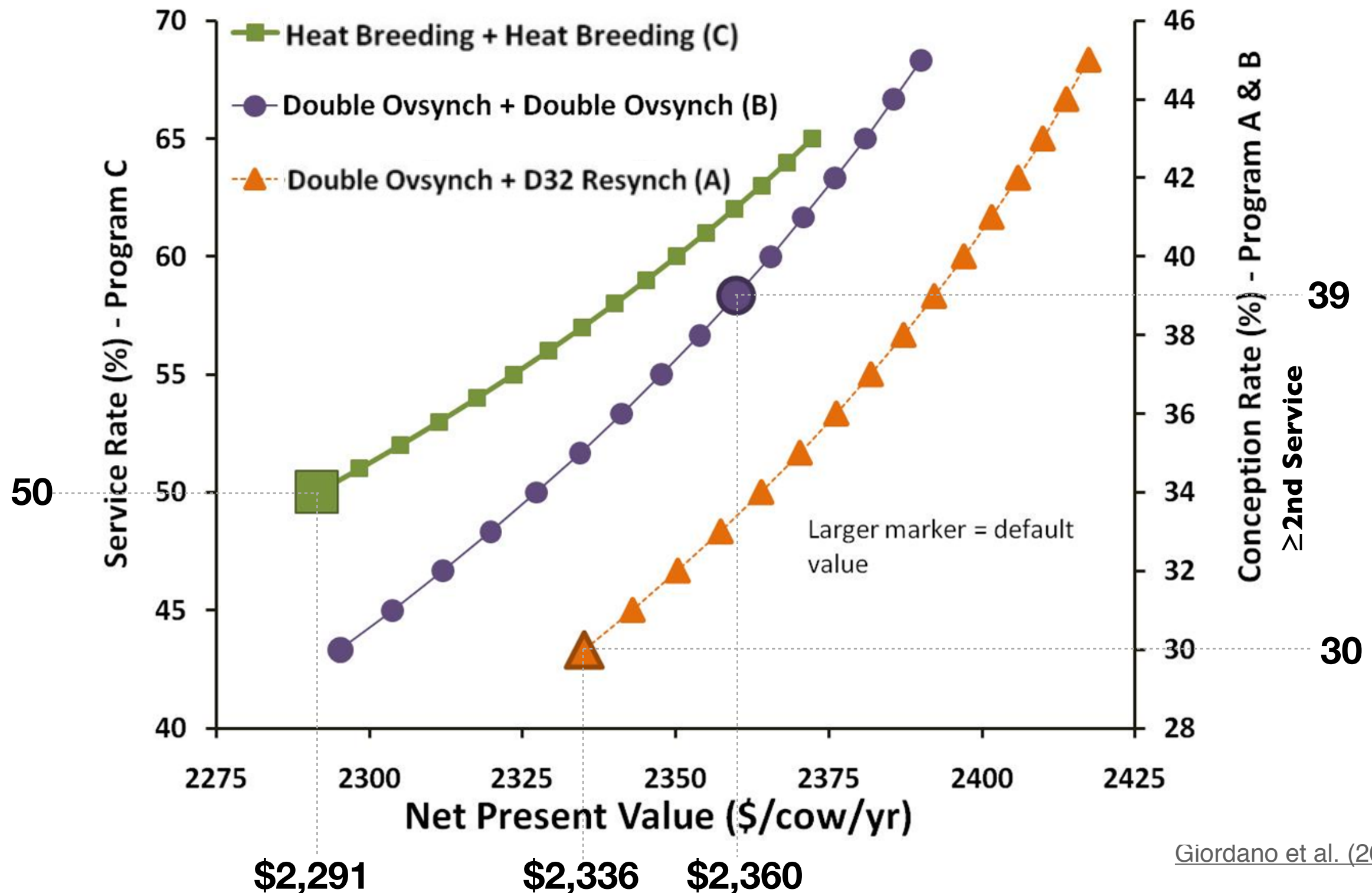
Repro\$ Plus application 1

Reproductive performance



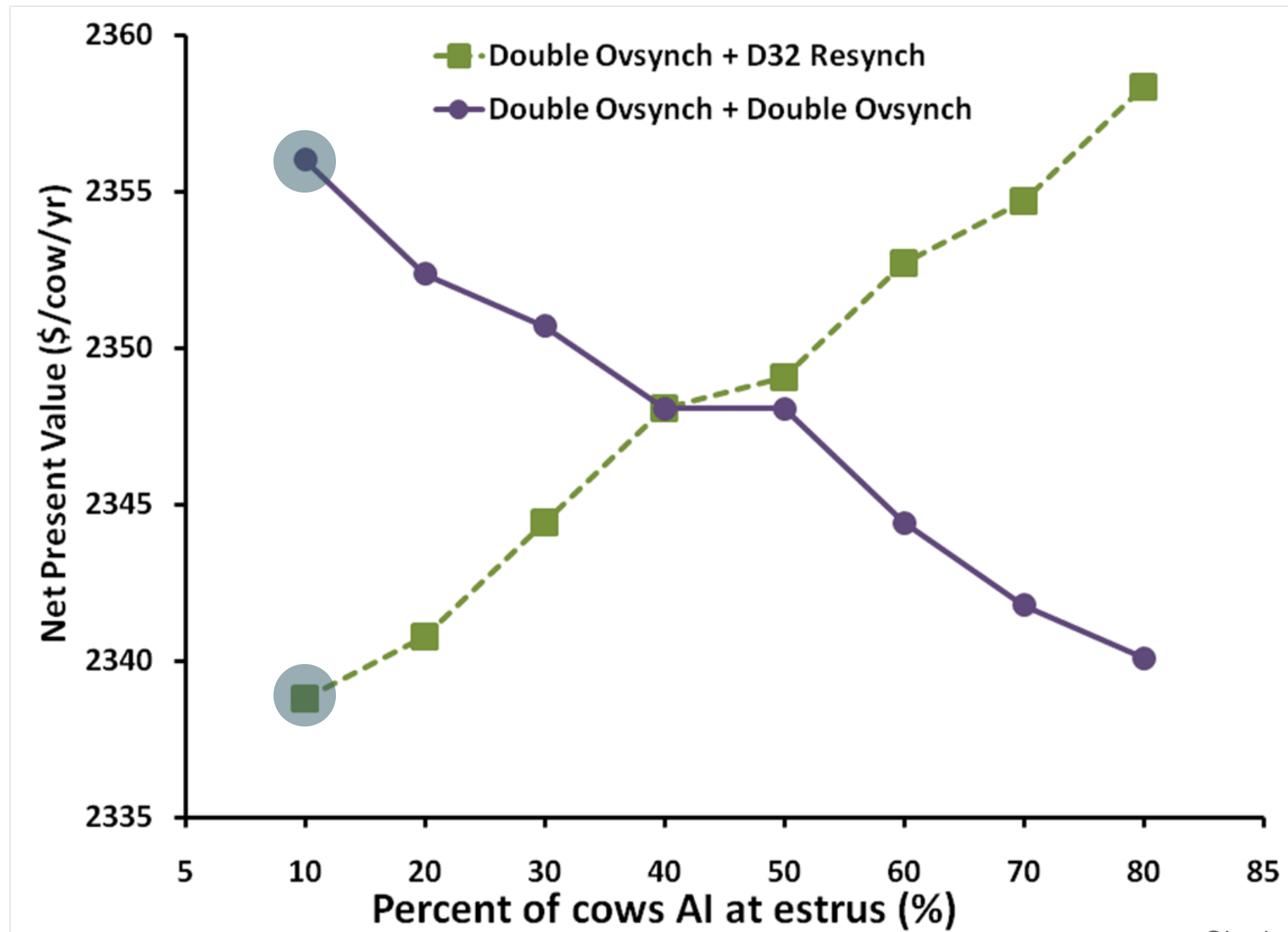
Repro\$ Plus application 1

Sensitivity to service and conception rates



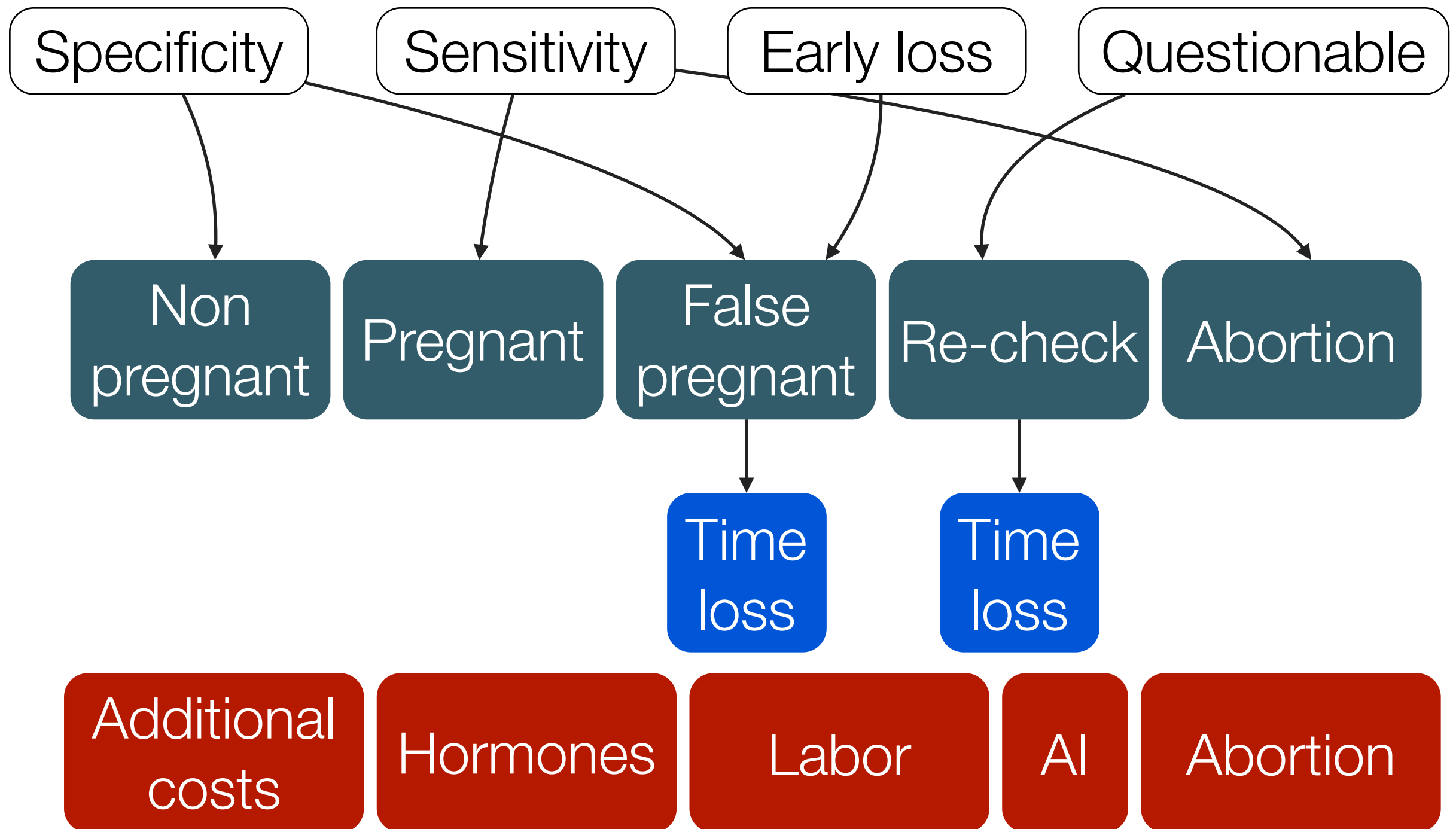
Repro\$ Plus application 1

Impact of heat AI services for ≥ 2 services



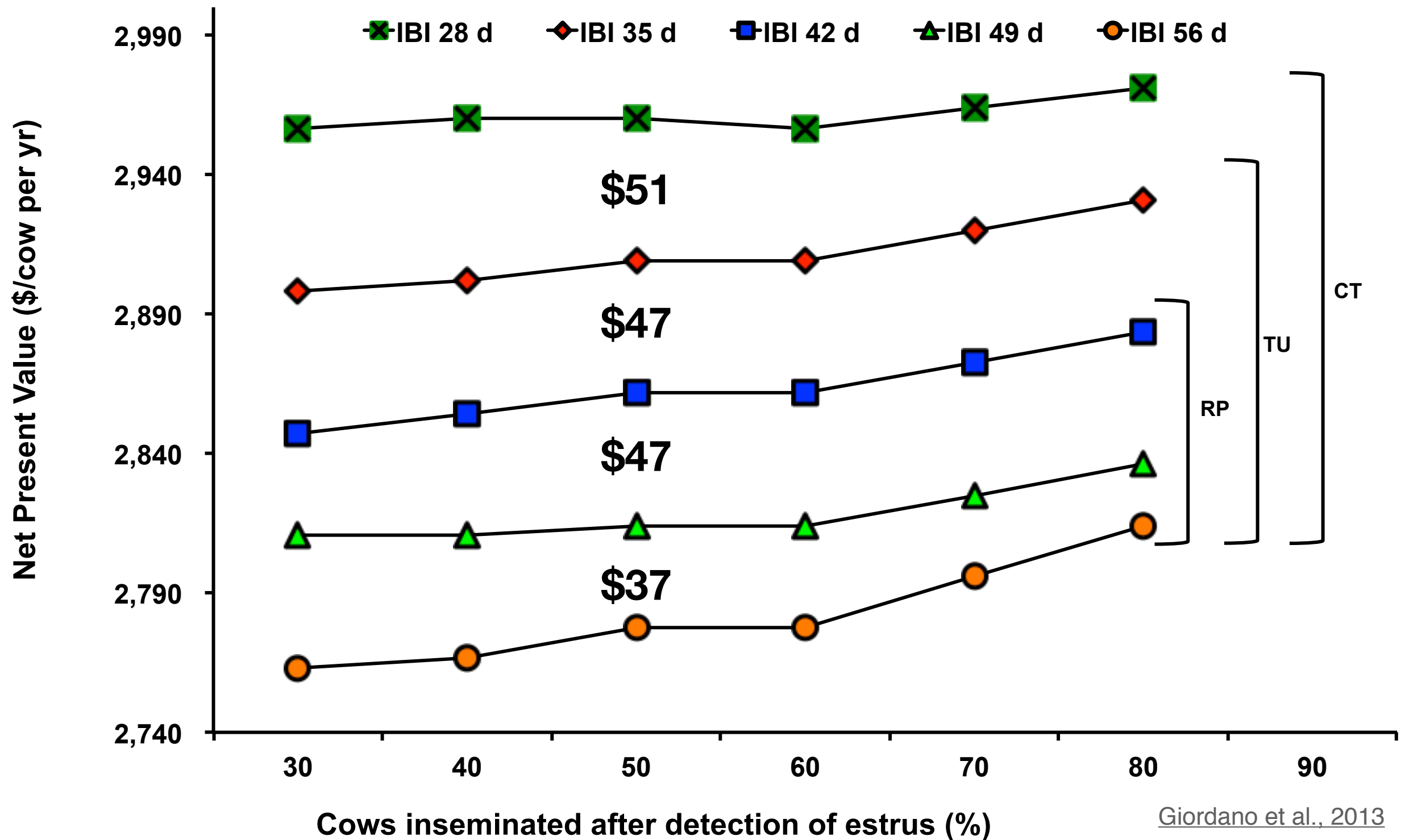
Repro\$ Plus application 2

Chemical test for early pregnancy detection



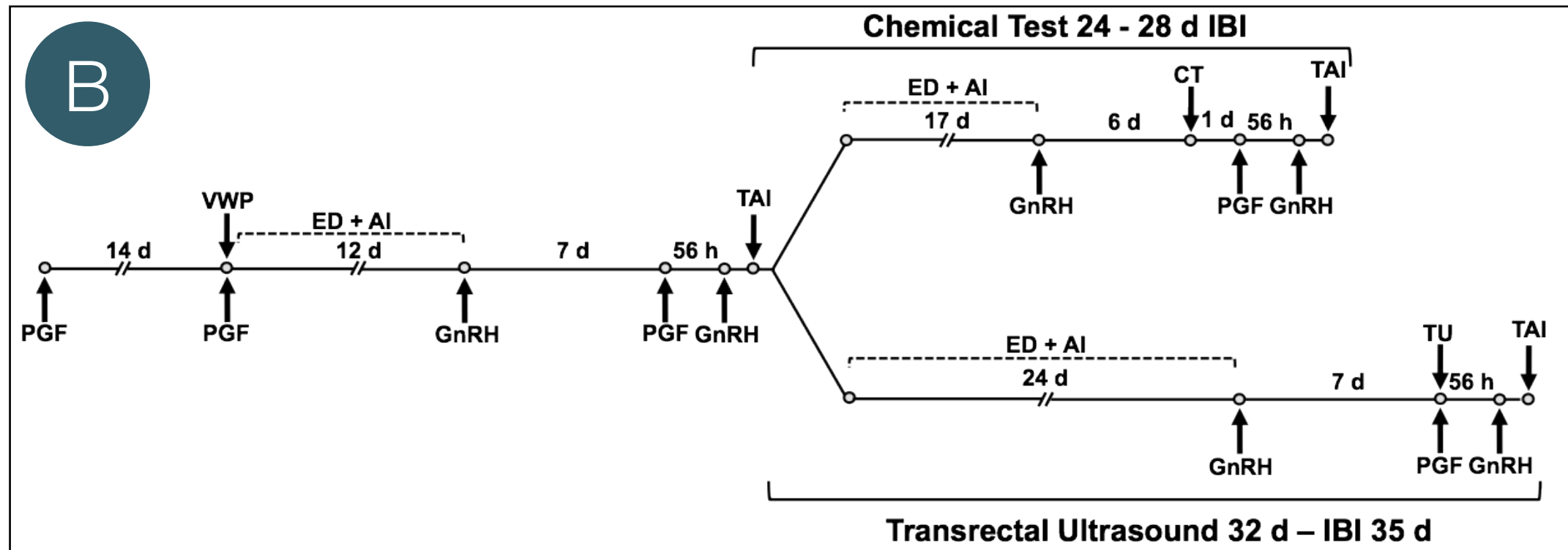
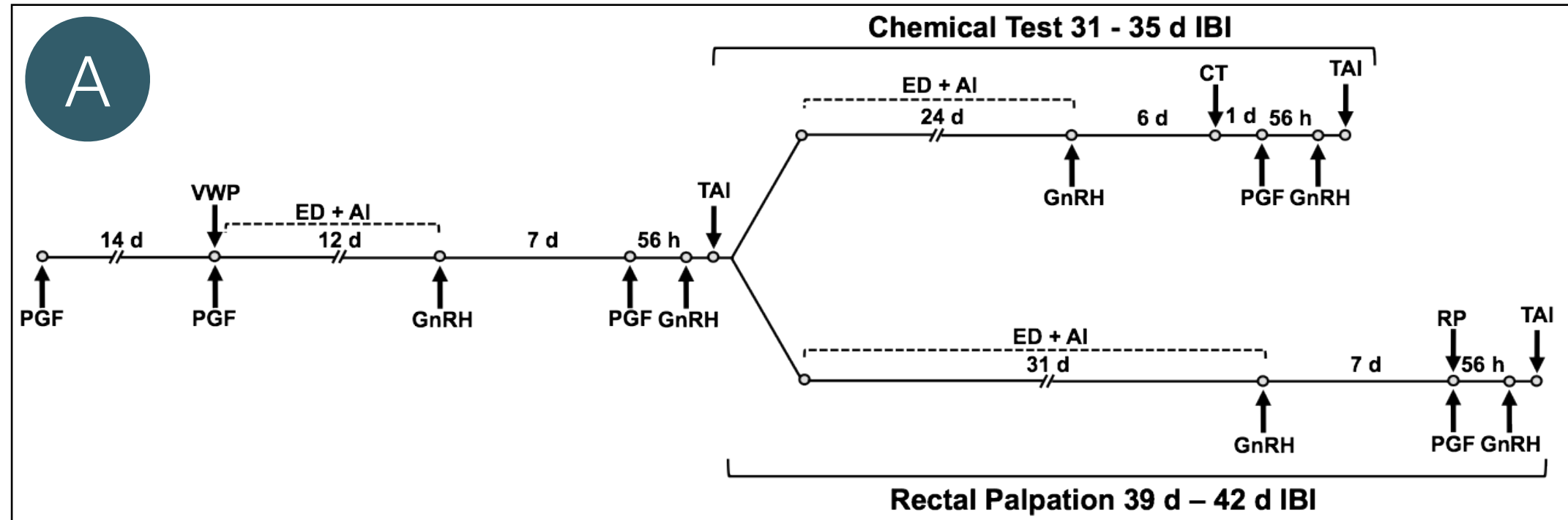
Repro\$ Plus application 2

The value of shorter interbreeding (IBI)



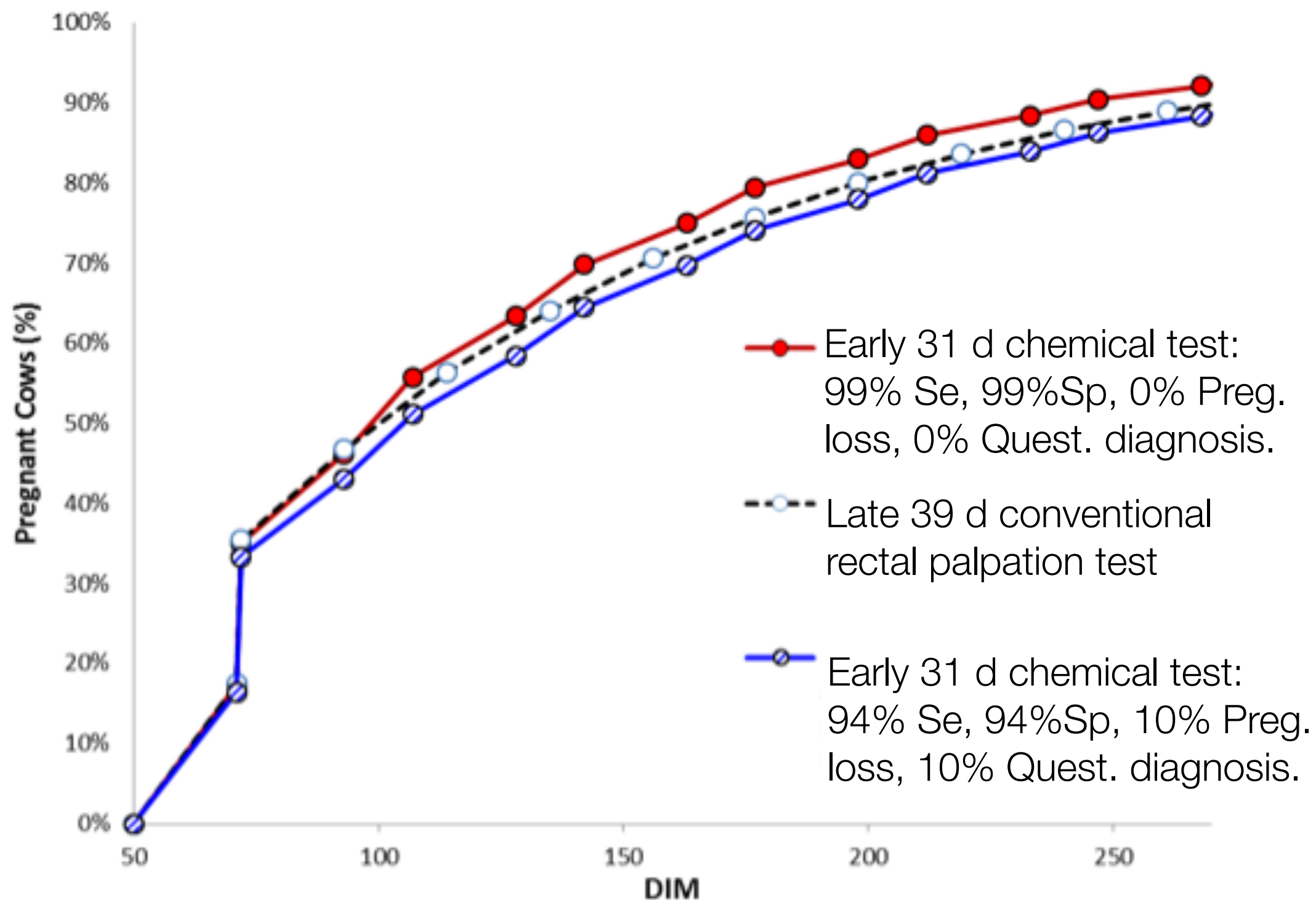
Repro\$ Plus application 2

Test of shorter IBI programs



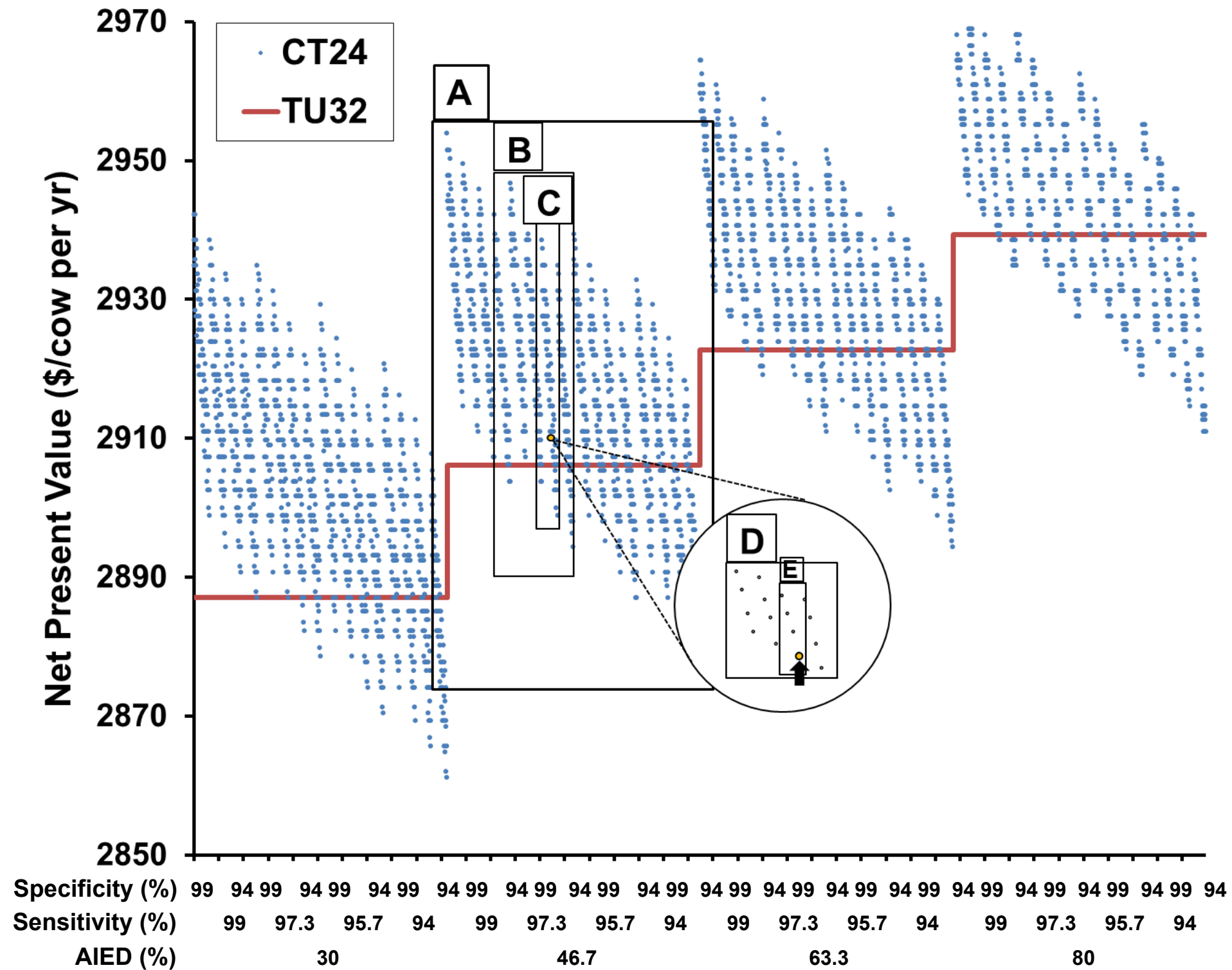
Repro\$ Plus application 2

Reproductive performance



Repro\$ Plus application 2

Economic performance



Repro\$ Plus application 2

Economic performance

			\$ per 1% or \$0.1	
	Base	Range	CT31 vs RP39	CT24 vs TU32
% Sensitivity	98/97	94-99	+5.3	+4.5
% Specificity	98/97	94-99	+3.1	+2.5
% Pregnancy loss	6/6.6	0-10	-3.1	-2.5
% Questionable	3.3/8.5	0-10	-0.4	-0.3
% Estrous detection	50	30-80	0.097	-0.220
\$ CT cost	2.4	0.5-5	-0.0175	-0.0192

Repro\$ Plus application 2

Economic performance

	Break even	
	CT31 vs RP39	CT24 vs TU32
% Sensitivity	96.4	94.9
% Specificity	95.1	93.2
% Pregnancy loss	8.9	10.5

Early chemical pregnancy test

Profitable when Sensitivity >95%,
Specificity >93%, Early pregnancy
loss <11%



Thanks