



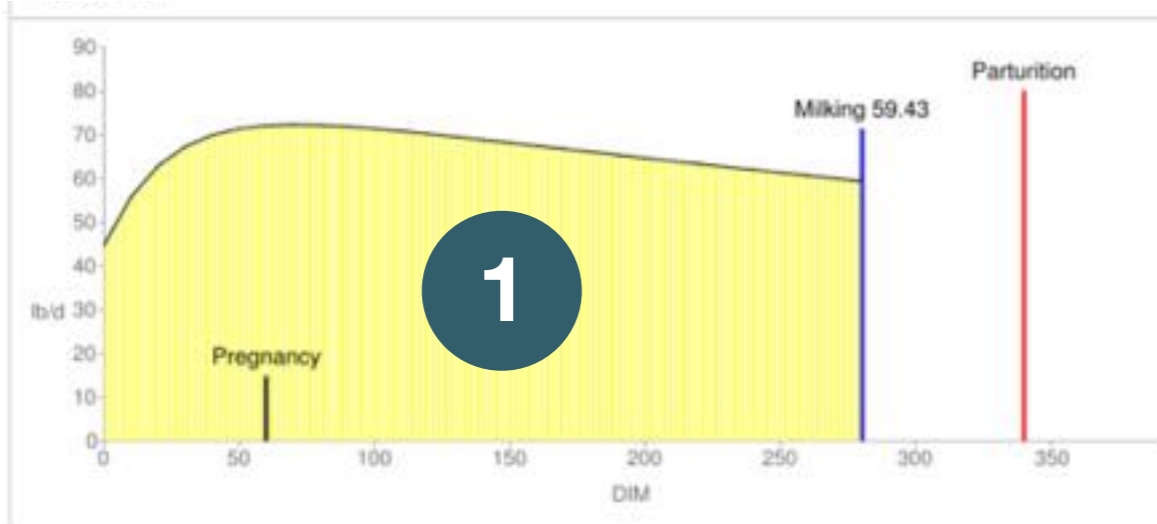
Tools for Making Economic Reproductive Decisions

Victor E. Cabrera

University of Wisconsin-Madison Dairy Science

Take home messages

- 1. Critical decision making can be assisted by DST**
- 2. DST available at DairyMGT.info → Tools → Reproduction**
- 3. *Exploring the Time of Pregnancy* → best time of pregnancy**
- 4. *Premium Beef on Dairy Program* evaluates use of beef semen**
- 5. *UW-Cornell DairyRepro\$* analyzes specific reproductive programs**
- 6. *Economic Value of a Dairy Cow* calculates both: value of a cow and cow's net return**



The Economic Value of a Dairy Cow

V.E. Cabrera, UW Dairy Science

4

English Spanish Units: US English US Metric UK [Help!](#)

Overview Single Cow Analysis Herd Analysis

INPUTS - Edit Values in This Block

Evaluated Cow Variables

Current Lactation	3
Current Months after Calving	5
Current Months in Pregnancy	1
Expected Milk Production Rest of Lactation, %	100
Expected Milk Production Next Lactations, %	100

Replacement Cow Variable

Expected genetic improvement, % additional milk	0
---	---

Herd Production and Reproduction Variables

Herd Turnover Ratio, %/year	35
Rolling Herd Average, lb/cow per year	24,000
21-d Pregnancy Rate, %	18
Reproduction Cost, \$/cow per month	20
Last Month After Calving to Breed a Cow	10
Do-not-Breed Cow Minimum Milk, lb/day	50
Pregnancy Loss after 35 Days Pregnant, %	22.6
Average Cow Body Weight, lb	1306

Herd Economic Variables

Replacement Cost, \$/cow	1300
Salvage Value, \$/lb live weight	0.38
Calf Value, \$/calf	100
Milk Price, \$/cwt	15.88
Milk Butterfat, %	3.5
Feed Cost Lactating Cows, \$/lb dry matter	0.1
Feed Cost Dry Cows, \$/lb dry matter	0.08
Interest Rate, %/year	6

OUTPUTS - Interactive Results

Value of the Cow, \$ 627

Compared Against a Replacement, \$

Milk Sales, \$	147
Feed Cost, \$	-157
Calf Value, \$	26
Non-reproductive Cull, \$	-126
Mortality Cost, \$	-24
Reproductive Cull, \$	12
Reproduction Costs, \$	45
Replacement Transaction, \$	704

Herd Structure at Steady State

Days in milk	224
Days to Conception	122
Percent of Pregnant	52
Reproductive Culling, %	8
Mortality, %	3
1st Lactation, %	43
2nd Lactation, %	27
>= 3rd Lactation, %	30

Economics of an Average Cow, \$/year

Net Return, \$	1969
Milk Sales, \$	3806
Feed Cost, \$	-1522
Calf Sales, \$	60
Non-Reprod. Culling Cost, \$	-198
Mortality Cost, \$	-38
Reproductive Culling Cost, \$	-59
Reproductive Cost, \$	-80

University of Wisconsin-Extension

EXCELLENCE IN EDUCATION AND DISCOVERY

THE UNIVERSITY of WISCONSIN MADISON

Cornell University
Department of Animal Science

Wisconsin-Cornell Dairy Repro\$ (UWCUREpro\$)
Version 1.3.5.0

Developed By:
Afshin S. Kalantari, Julio O. Giordano and Victor E. Cabrera

Copyright © Protected

Male and Female Calves by Semen Type

2

	conventional		sexed		beef		
	Male	Female	Male	Female	Male	Female	
Calf value, \$	50	150	50	150	180	180	
Calves, #	42	37	32	286	30	0	323
Return, \$	2,084	5,543	1,590	42,939	5,325	0	57,481
Semen cost, \$	2,880		15,792		1,491		20,163
Eartag cost, \$	21	18	16	143	89	0	287
NET RETURN, \$							37,031

Acknowledgments

This project was supported by Agriculture and Food Research Initiative Competitive Grant no. 2010-85122-20612 from the USDA National Institute of Food and Agriculture.

This research was also supported by Hatch project to V.E.C. WIS01577.

DST to support decision-making

**Economic simulation
research has proven to
be effective**

Cabrera, 2014

**DST can become
essential for dairy farm
strategic management**

Cabrera, 2012

**Research labs are
making available DST
for repro management**

UF, Penn State, UW-Madison, etc.

**UW-Madison Dairy
Management
(DairyMGT.info) has
been active in DST for
report management**

Cabrera, 2012

DairyMGT.info

Large collection of DST for dairy reproductive economic analysis

Additional information

- Projects
- Publications
- Presentations
- Links

Core of DairyMGT.info

Tools

to Support

Decision making

Dairy Management

WISCONSIN UNIVERSITY OF WISCONSIN-MADISON

DEPARTMENT OF DAIRY SCIENCE University of Wisconsin-Madison

UW Extension University of Wisconsin-Extension

Home - Tools Projects Publications Presentations Links

Model-based decision support tools

This 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 tools to help dairy farmers improve their economic performance along with environmental stewardship.

UW-Dairy Management Decision Support TOOLS

University of Wisconsin

University of Wisconsin - Madison
UW - Cooperative Extension
UW - Dairy Science
Dairy Cattle Reproduction
Dairy Cattle Nutrition
Milk Quality
UW Dairy Nutrient
Understanding Dairy Markets
UW Center for Dairy Profitability

Latest Projects

Improving Dairy Farm Sustainability
Genomic Selection and Herd Management
Dairy Reproduction Decision Support Tools
Strategies of Pasture Supplementation
Improving Dairy Cow Fertility

Contact

Associate Professor
Extension Specialist
in Dairy Management
279 Animal Sciences
1675 Observatory Dr.
Madison, WI 53706
(608) 265-8506
vcabrera@wisc.edu
More =

Victor E. Cabrera, Ph.D.

Helpful Link

Repro Money Program

Tweets

Victor E. Cabrera @vecabrera 18h
Seminar to focus on 'strategies to optimize performance' - Progressive Dairyman: Canada: progressivedairyman.com/news-logic/ev...

Victor E. Cabrera @vecabrera 24 Jan
Scientist Opportunity at the Dairy Science Department, University of Wisconsin-Madison
goo.gl/bLmID fb.me/ZuOBj14N

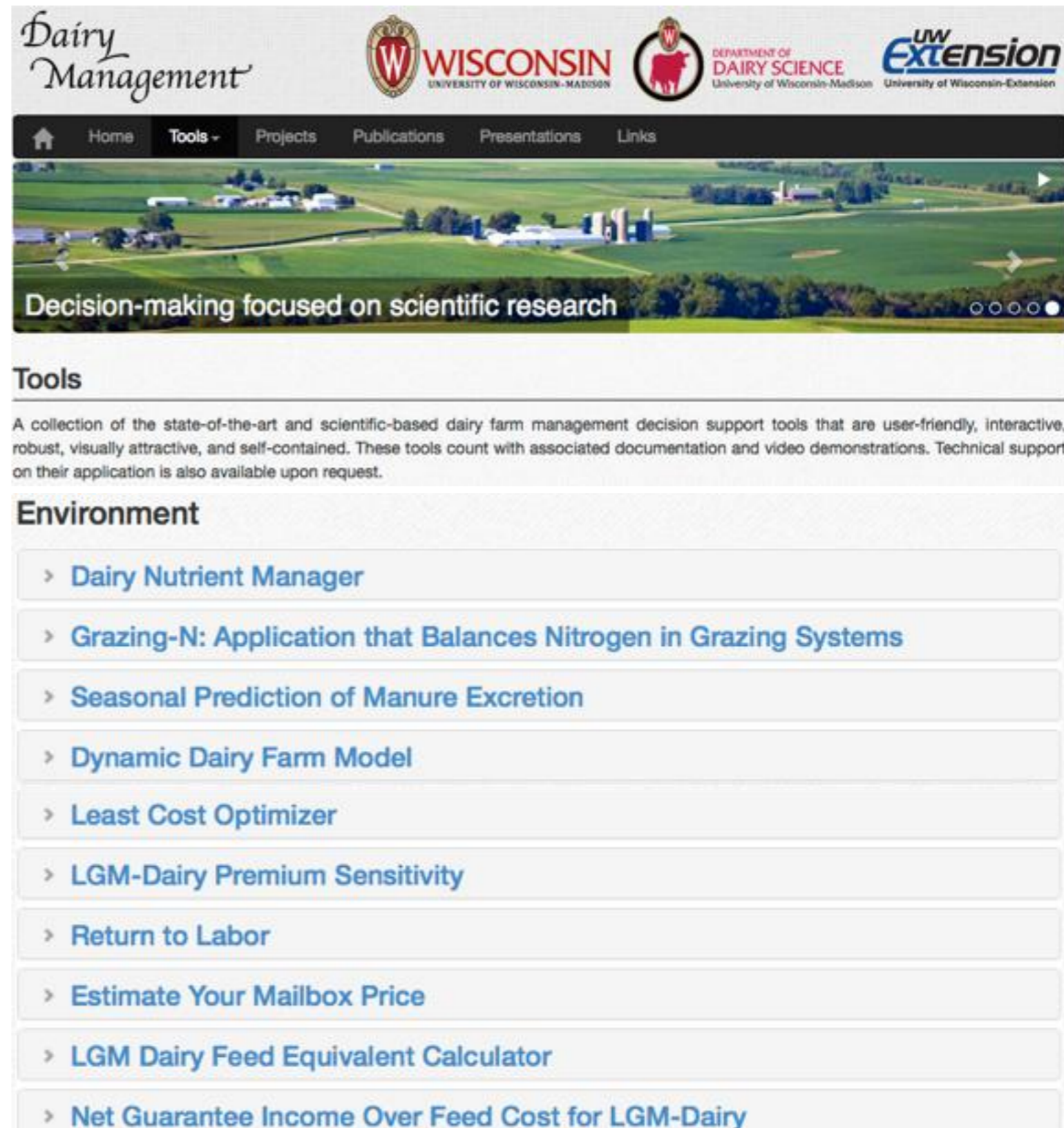
Share

DairyMGT.info: Tools

>40 DST to support dairy farm management

Many areas of dairy farm management

- Feeding
- Heifers
- **Reproduction**
- Production
- Replacement
- Environment
- Finances
- Genomics
- Health
- ...



The screenshot shows the DairyMGT.info website. At the top, there is a header with the text "Dairy Management" and logos for "WISCONSIN UNIVERSITY OF WISCONSIN-MADISON", "DEPARTMENT OF DAIRY SCIENCE University of Wisconsin-Madison", and "UW Extension University of Wisconsin-Extension". Below the header is a navigation menu with links for "Home", "Tools", "Projects", "Publications", "Presentations", and "Links". The main content area features a large image of a dairy farm with the text "Decision-making focused on scientific research". Below this is a section titled "Tools" with a description: "A collection of the state-of-the-art and scientific-based dairy farm management decision support tools that are user-friendly, interactive, robust, visually attractive, and self-contained. These tools count with associated documentation and video demonstrations. Technical support on their application is also available upon request." Underneath the description is a section titled "Environment" containing a list of tools, each with a right-pointing chevron icon:

- > Dairy Nutrient Manager
- > Grazing-N: Application that Balances Nitrogen in Grazing Systems
- > Seasonal Prediction of Manure Excretion
- > Dynamic Dairy Farm Model
- > Least Cost Optimizer
- > LGM-Dairy Premium Sensitivity
- > Return to Labor
- > Estimate Your Mailbox Price
- > LGM Dairy Feed Equivalent Calculator
- > Net Guarantee Income Over Feed Cost for LGM-Dairy

Anatomy on each DST

How to explore and use them

The screenshot shows a web interface for a Decision Support Tool (DST) titled "The Economic Value of a Dairy Cow". The interface includes a title bar, a brief description, a list of links to various resources (Online Tool, Excel Spreadsheet, Presentation, Paper, Magazine Article, Demo), a video player showing a spreadsheet interface, and a link to a Spanish version. Red arrows point from text labels to these elements: "Title" points to the title bar; "Link to the tool" points to the "Online Tool (Open)" link; "Brief description" points to the text "Calculates the projected net return of a cow or the entire herd"; "Supporting documentation" points to the list of links; "Video Demo" points to the video player; and "Other languages" points to the "Spanish Version" link. A green box with the text "Openly available" is overlaid on the video player.

Title →

Link to the tool →

Brief description ←

Supporting documentation ←

Video Demo →

Other languages ←

Openly available

> [The Economic Value of a Dairy Cow](#)

Calculates the projected net return of a cow or the entire herd

[Online Tool \(Open\)](#)

[Excel Spreadsheet \(Download\)](#)

[Presentation \(Download\)](#)

[Paper \(Download\)](#)

[Magazine Article \(Download\)](#)

[Demo \(Click to View/Hide the Video\)](#)

Economic Value of A Dairy Cow

Parameter	Value
Herd Turnover Ratio, %/year	35
Rolling Herd Average, lb/cow per year	24,000
21-d Pregnancy Rate, %	18
Reproduction Cost, \$/cow per month	20
Last Month After Calving to Breed a Cow	18
Replacement Transaction, \$	704
Days in milk	224
Days to Conception	122
Percent of Pregnant	57
Feed Cost Lactating Cows, \$/lb dry matter	0.1
Feed Cost Dry Cows, \$/lb dry matter	0.08
Interest Rate, %/year	5
Call Sales, \$	60
Non-Reprod. Culling Cost, \$	-158
Mortality Cost, \$	-38
Reproductive Culling Cost, \$	-59
Reproductive Cost, \$	-80

Spanish Version

Herramienta ([Abrir](#))

Exploring Best Pregnancy Time

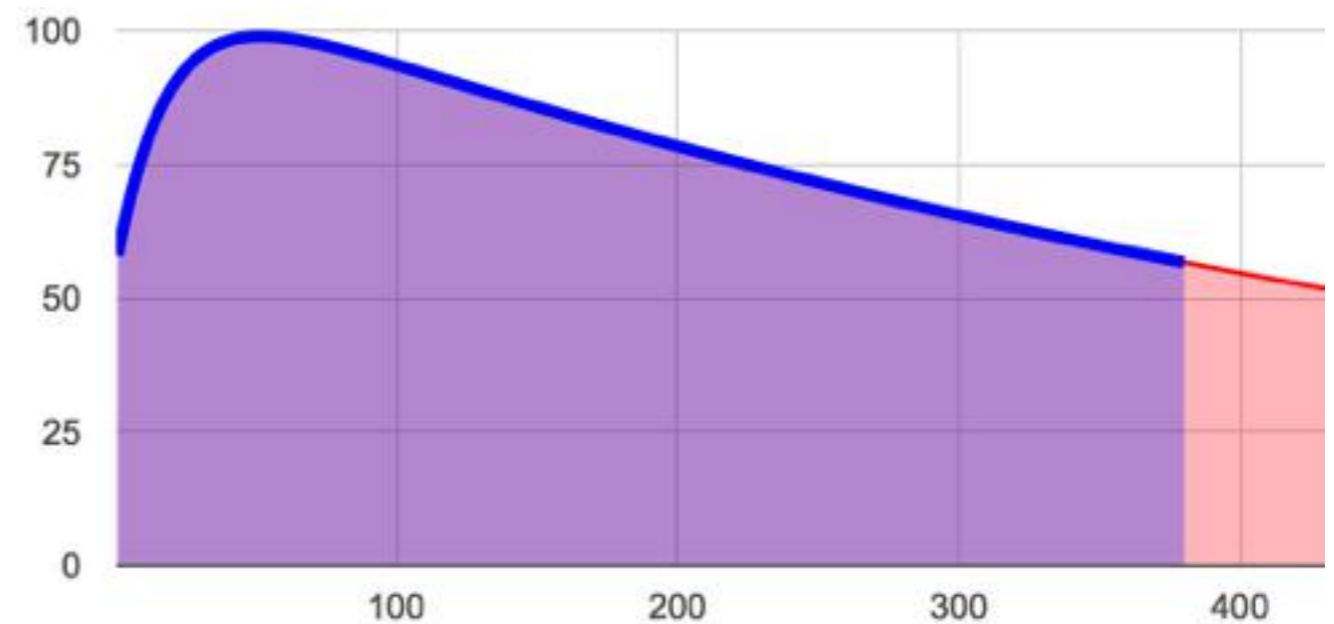
1

**Pregnancy time →
large determinant of
economic value**

**Farmers, consultants,
and researchers
understand this
economic principle**

**Calculating its real
economic value → not
straightforward**

**It depends on the
magnitude and shape
of the lactation curve**



First → Lactation curve

Milk Curve Fitter

A number of traits define cow (herd) lactation curves

Cabrera, 2014

“fit” records to pre-defined functions

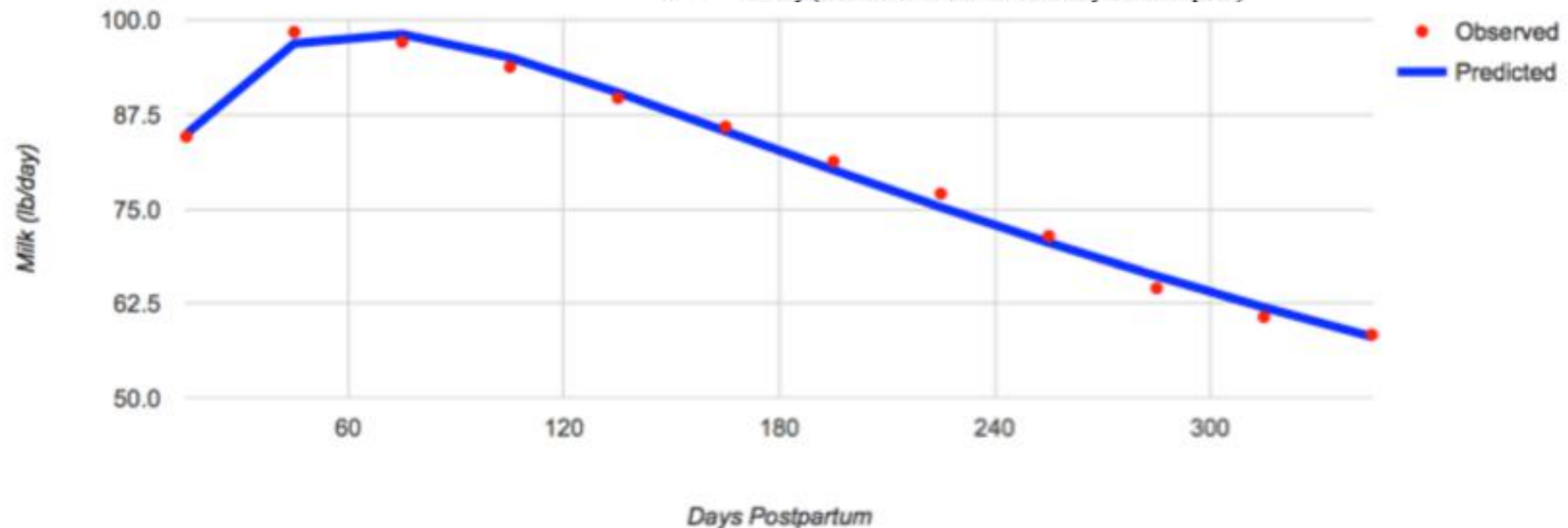
Observed vs. predicted data points for 12 milk test records

MilkBot’s model (Ehrlich, 2011)

$$M_{DIM} = a \left(1 - \frac{e^{\left(\frac{c-DIM}{b}\right)}}{2} \right) e^{-(d)(DIM)}$$

- M = Milk Yield
- DIM = Days in milk
- a = Scale (overall capacity to produce milk)
- b = Ramp (slope of milk production rising after calving)
- c = Offset (starting amount of milk yield)
- d = Decay (rate factor of decline in milk yield after peak)

Parameter	Value
a	112.3355
b	18.9885
c	0.3467
d	0.0018

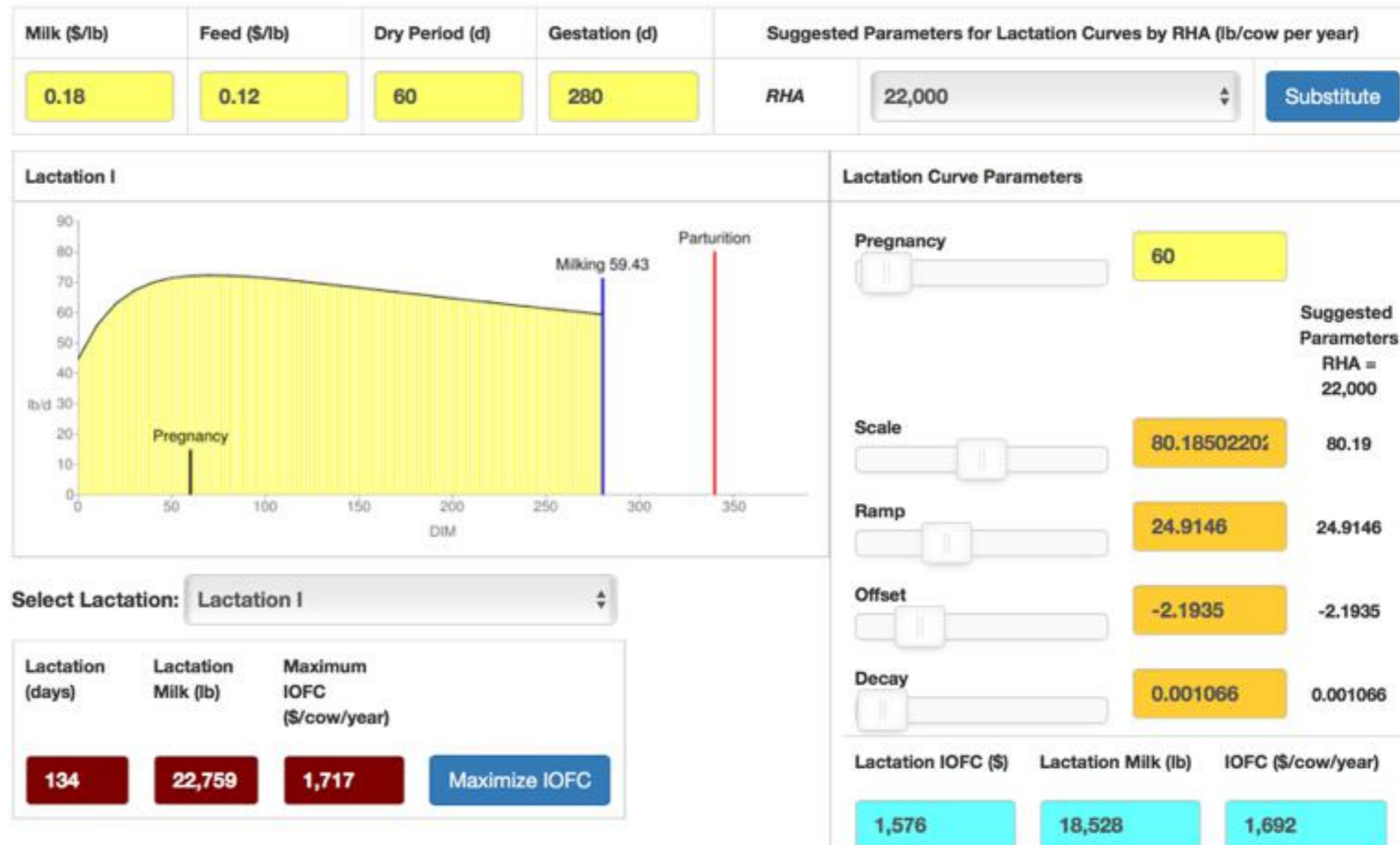


Exploring Best Pregnancy Time

Evaluate and maximize IOFC to a pregnancy time

E.g., 134 d pregnancy maximum IOFC = \$1,717/cow.yr

Pregnant at 60 d = -\$25/cow.yr



Exploring Best Pregnancy Time

Conclusions are largely dependent on the shape and magnitude of the lactation curve



Important to know cow(herd) specific lactation curves

Understand reproductive management in a herd is a much more complex and highly probabilistic process



Full assessment requires profound analysis assisted by more sophisticated DST

Premium Beef on Dairy Program

2

An additional source of revenue → producing beef crossbred?

Companies offering premium for crossbred using beef semen

DST analyzes net return of switching inseminations from conventional or sexed dairy semen to beef semen



Premium Beef on Dairy Program



V.E. Cabrera, UW-Madison Dairy Science and G. Lopes, Accelerated Genetics

Male and Female Calves by Semen Type

	conventional		sexed		beef		
	Male	Female	Male	Female	Male	Female	
Calf value, \$	50	150	50	150	180	180	
Calves, #	42	37	32	286	30	0	323
Return, \$	2,084	5,543	1,590	42,939	5,325	0	57,481
Semen cost, \$	2,880		15,792		1,491		20,163
Eartag cost, \$	21	18	16	143	89	0	287
	NET RETURN, \$						37,031

Premium Beef on Dairy Program

Calculates the required and produced female calves for herd replacement

Number of adult cows	<input type="text" value="1000"/>	Current heifer conception rate at 1st service, %	<input type="text" value="55"/>
Current herd turnover ratio, %	<input type="text" value="30"/>	Current heifer services with sexed semen	<input type="text" value="0"/>
Current adult herd 21-d pregnancy rate, %	<input type="text" value="15"/>	Stillbirth + calf mortality, %	<input type="text" value="5"/>
Female calvings required 9 months from now	<input type="text" value="316"/>		

Herd size and structure, culling rate, pregnancy risk, number of heifers inseminated with sexed semen, and calf mortality calculate the number of replacements needed to maintain herd size and to determine the number of eligible animals for the beef program

Premium Beef on Dairy Program

Considers genetic value of animals to be inseminated and the expected premium to be received for crossbred offspring

		# Animals Eligible for Service		Conception Rate by Semen Type			Selection and Semen Type		
		Service	Projected	Adjusted	con	sexed	beef	Top	Bottom
Heifers	1st	470			60	48	50	S ⇅	S ⇅
	2nd	211			45	36	45	S ⇅	S ⇅
	3rd	95			40	32	40	S ⇅	B ⇅
	>3rd	43			35	28	35	S ⇅	B ⇅
Lactation 1	1st	29			40	32	35	C ⇅	B ⇅
	2nd	23			35	28	33	C ⇅	B ⇅
	3rd	18			30	24	31	C ⇅	B ⇅
	>3rd	104			25	20	30	C ⇅	B ⇅
Lactation 2	1st	19			35	28	30	C ⇅	B ⇅
	2nd	14			33	26	28	C ⇅	B ⇅
	3rd	11			30	24	27	C ⇅	B ⇅
	>3rd	51			25	20	26	C ⇅	B ⇅
Lactation >2	1st	21			33	26	27	C ⇅	B ⇅
	2nd	16			30	24	26	C ⇅	B ⇅
	3rd	12			27	22	25	C ⇅	B ⇅
	>3rd	49			25	20	24	C ⇅	B ⇅

Premium Beef on Dairy Program

Male and Female Calves by Semen Type

	conventional		sexed		beef		
	Male	Female	Male	Female	Male	Female	
Calf value, \$	50	150	50	150	180	180	
Calves, #	57	51	32	286	0	0	337
Return, \$	2,870	7,635	1,590	42,939	0	0	55,035
Semen cost, \$	3,874		15,792		0		19,666
Eartag cost, \$	29	25	16	143	0	0	213
NET RETURN, \$							35,155

+\$1,876 when using beef semen for 3rd+ service for bottom 20% heifers and bottom 20% all cows

Male and Female Calves by Semen Type

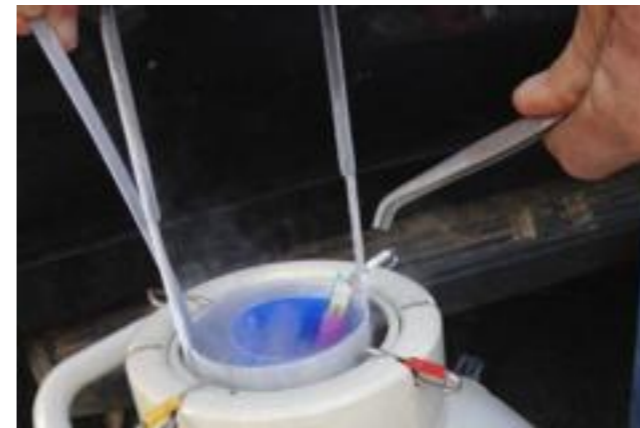
	conventional		sexed		beef		
	Male	Female	Male	Female	Male	Female	
Calf value, \$	50	150	50	150	180	180	
Calves, #	42	37	32	286	30	0	323
Return, \$	2,084	5,543	1,590	42,939	5,325	0	57,481
Semen cost, \$	2,880		15,792		1,491		20,163
Eartag cost, \$	21	18	16	143	89	0	287
NET RETURN, \$							37,031

Premium Beef on Dairy Program

Critical decision making

Do I have enough replacements available?

- How aggressively can beef semen be used?



What breedings beef semen could be used?

- Heifers or cows
- What services

What cows beef semen could be used

- Top
- Bottom

UW-Cornell Dairy Repro\$

3

**Repro performance
and associated costs
can be easily found**



**Challenging to fully
assess net value of
repro management
strategies**

**Impacts on
reproductive changes**

+

**Impacts on
productivity, newborn,
replacement, etc.**



**Net value of a
reproductive program**

UW-Cornell Dairy Repro\$

Calculates and compares the economic value of dairy reproductive programs

Includes TAI, HD, and combinations of TAI and HD and programs using activity monitors

Complex daily Markov chain model that computes the net return of reproductive programs

Giordano et al., 2012

**Inputs →
productive traits,
economic variables,
reproductive programs**

UW-Cornell Dairy Repro\$

Accommodate very complex reproductive programs mimicking what happens in actual dairy farms

What is the value of **SPECIFIC** reproductive programs?

Very sophisticated tool to assess the economics of reproductive efficiency in dairy cattle farm

UW Extension
University of Wisconsin-Extension

THE UNIVERSITY OF WISCONSIN MADISON

Cornell University
Department of Animal Science

Wisconsin-Cornell Dairy Repro\$ (UWCUREpro\$)
Version 1.3.5.0

Developed By:
Afshin S. Kalantari, Julio O. Giordano and Victor E. Cabrera

Copyright © Protected

Acknowledgments
This project was supported by Agriculture and Food Research Initiative Competitive Grant no. 2010-85122-20612 from the USDA National Institute of Food and Agriculture.

This research was also supported by Hatch project to V.E.C. WIS01577.

 J. Dairy Sci. 95:5442–5460
<http://dx.doi.org/10.3168/jds.2011-4972>
© American Dairy Science Association®, 2012.

A daily herd Markov-chain model to study the reproductive and economic impact of reproductive programs combining timed artificial insemination and estrus detection

J. O. Giordano,¹ A. S. Kalantari, P. M. Fricke, M. C. Wiltbank, and V. E. Cabrera²
Department of Dairy Science, University of Wisconsin-Madison 53706

UW-CU Repro\$

General input data

Herd Parameters

Herd Size (#)

Average Body Weight (lb)

Involuntary Culling (%/yr)

Mortality Rate (%/yr)

Stillbirth (%)

Economic Parameters

Milk Price (\$/cwt)

Cost Feed Lactating (\$/lb DM)

Dry Period Fixed Cost (\$/lb DM)

Female Calf value(\$)

Male Calf value (\$)

Heifer Replacement Value(\$)

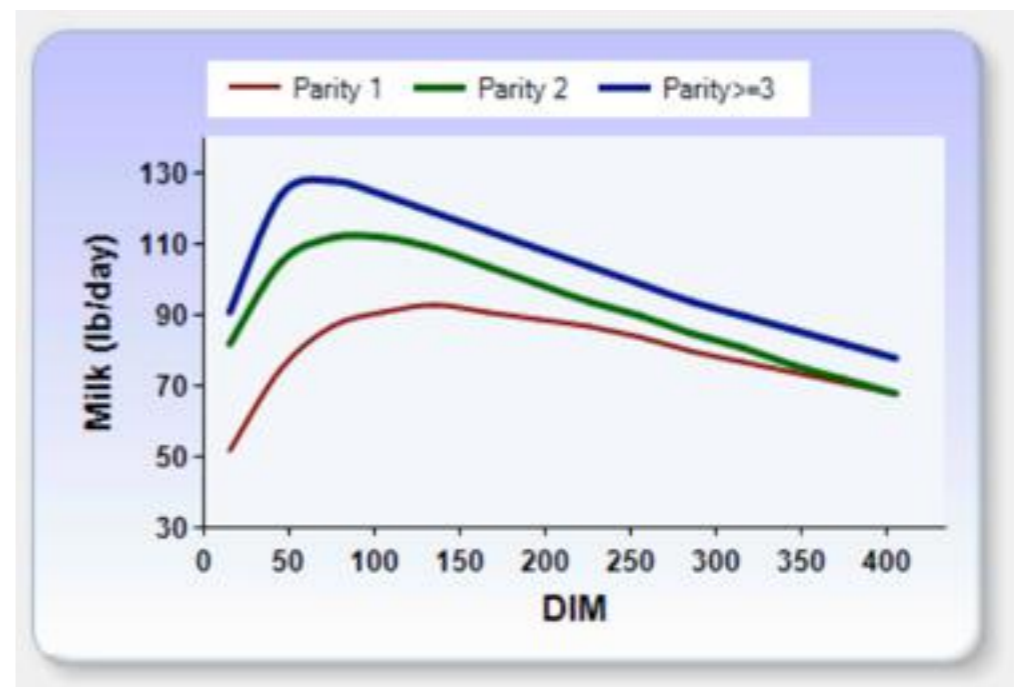
Salvage Value (\$/lb)

Very important

Lactation Curves (lb/cow/test)

Own Farm Lactations (Enter/Edit NUMBERS Below)

DIM	Parity 1	Parity 2	Parity ≥3
15	52	82	91
45	75	105	124
75	87	112	128
105	91	112	124
135	93	109	119
165	91	104	114
195	89	99	109
225	87	94	104
255	84	90	99
285	80	85	94
315	77	81	90
345	74	76	86
375	71	72	82
405	68	68	78



Critical data of Repro

Reproductive Programs

Current

Alternative

First AI postpartum

Presynch-Ovsynch-14

Double-Ovsynch

Second and sub. AI

Ovsynch

Ovsynch

Resynch before preg check

NO

YES

Programs Description

VWP (d)

50

50

Estrous Cycle Duration (d)

22

22

Maximum DIM for Breeding

300

300

Do-not-Breed Minimum Milk (lb/d)

50

50

DIM first injection for first AI sync program (d)

36

36

Weekday first injection

Tuesday

Monday

Interbreeding interval for TAI services (d)

42

35

Heat bred before first TAI service (%)

60

0

CR heat bred before first TAI service (%)

30

0

CR first TAI service (%)

30

45

Heat bred after first TAI service (%)

60

60

CR heat bred after first TAI service (%)

30

30

CR second and subsequent TAI services (%)

28

28

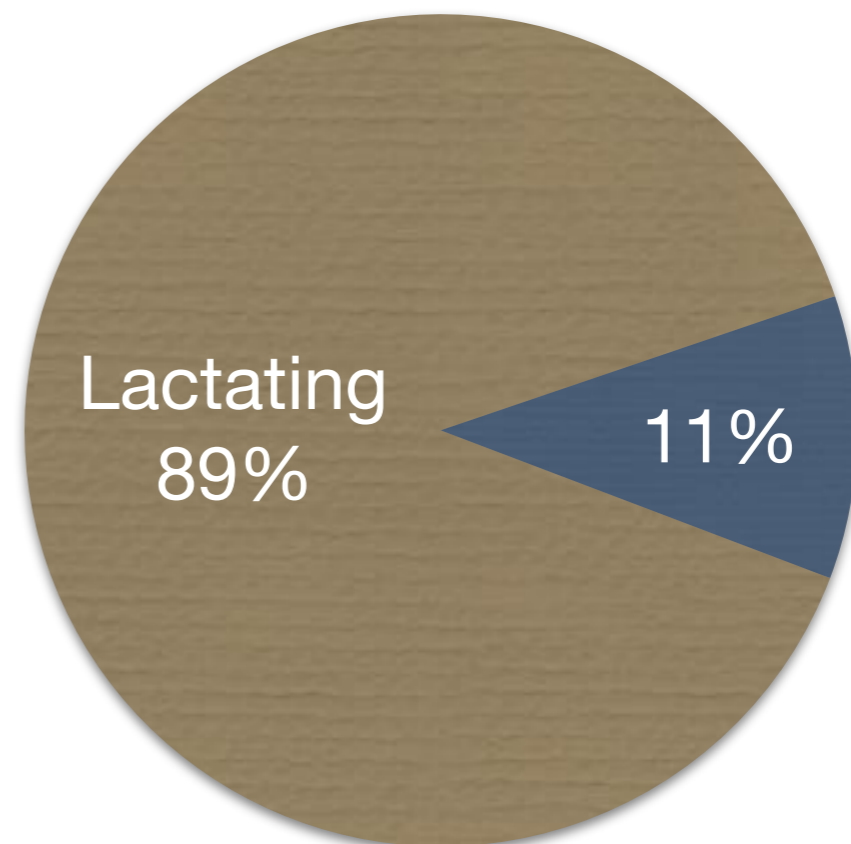
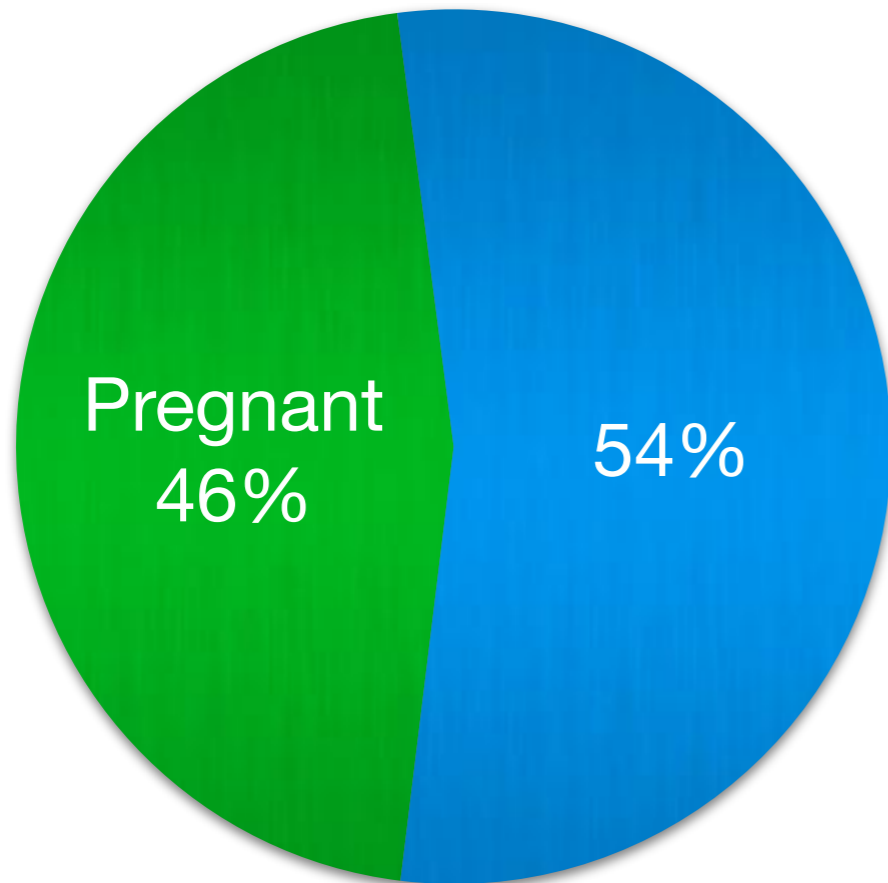


Case study
Farm in Wisconsin
Current - December 2014
Alternative - July 2015



Cows by status

Total number of cows in records: 945



21-d PR (50 d)

19%

Economic values

December 2014

Milk price

18.5

\$/cwt

0.41

\$/kg

Feed cost (lactating)

0.132

\$/lb

0.291

\$/kg

Feed cost (dry)

0.084

\$/lb

0.185

\$/kg

Female calf value

400

\$

Male calf value

300

\$

Heifer replacement

2,150

\$

Salvage value

0.85

\$/lb

1.87

\$/kg

Reproductive program

Description of program

Voluntary waiting period 1st lact, d

40

Voluntary waiting period 2nd+ lact, d

40

Estrous duration, d

22

Maximum DIM breeding 1st lact, d

338

Maximum DIM breeding 2nd lact, d

276

Maximum DIM breeding 3rd+ lact, d

236

Reproductive program

Description of program

lb

kg

Do-not-breed minimum milk/d

80

36

DIM first TAI injection, d

36

Resynch before preg check

NO

Interbreeding interval TAI, d

70

Reproductive program

Description of program

Heat bred before 1st TAI service, %
AFI detect

72

CR before 1st TAI service, %

37

CR 1st TAI service

25

Heat bred after 1st TAI service, %
AFI detect

85

CR after 1st HD services, %

29

CR 2nd+ TAI services

33

Reproductive program

Pregnancy diagnosis

Days in gestation 1st preg check, d

34

Days in gestation 2nd preg check, d

90

Days in gestation 3rd preg check, d

180

Reproductive program

Cost of semen, insemination, & pre check

Semen cost, \$/dose

15

Labor insemination, \$/AI

2.5

Ultrasound, \$/hr

30

Time used in preg check, hr/d

3

Number of cows checked, #/d

60

Reproductive program

Synchronization labor and hormones

Labor for injections, \$/hr

20

GnRH, \$/dose

2.4

PGF, \$/dose

2.08

Reproductive program

Activity monitors for heat detection

System cost, \$

40,000

Monitors, #

990

Cost per monitor, \$

65

Maintenance cost, \$/yr

5,200

Life expectancy, yr

7

Salvage value, \$

0

Reproductive program

Labor for TAI injections

	Mon	Wed	Fri
Laborers, #	1	1	1
Injections, hr/d	1	1	2
Number cows, #	90	70	130
TAI breedings	Thu		

Reproductive program

UWCU Repro\$

Reproductive Programs

Current

Resynch before preg check

Programs Description

VWP (d)

Estrous Cycle Duration (d)

Maximum DIM for Breeding

Do-not-Breed Minimum Milk (lb/d)

DIM first injection for first AI sync program (d)

Weekday first injection

Interbreeding interval for TAI services (d)

Heat bred before first TAI service (%)

CR heat bred before first TAI service (%)

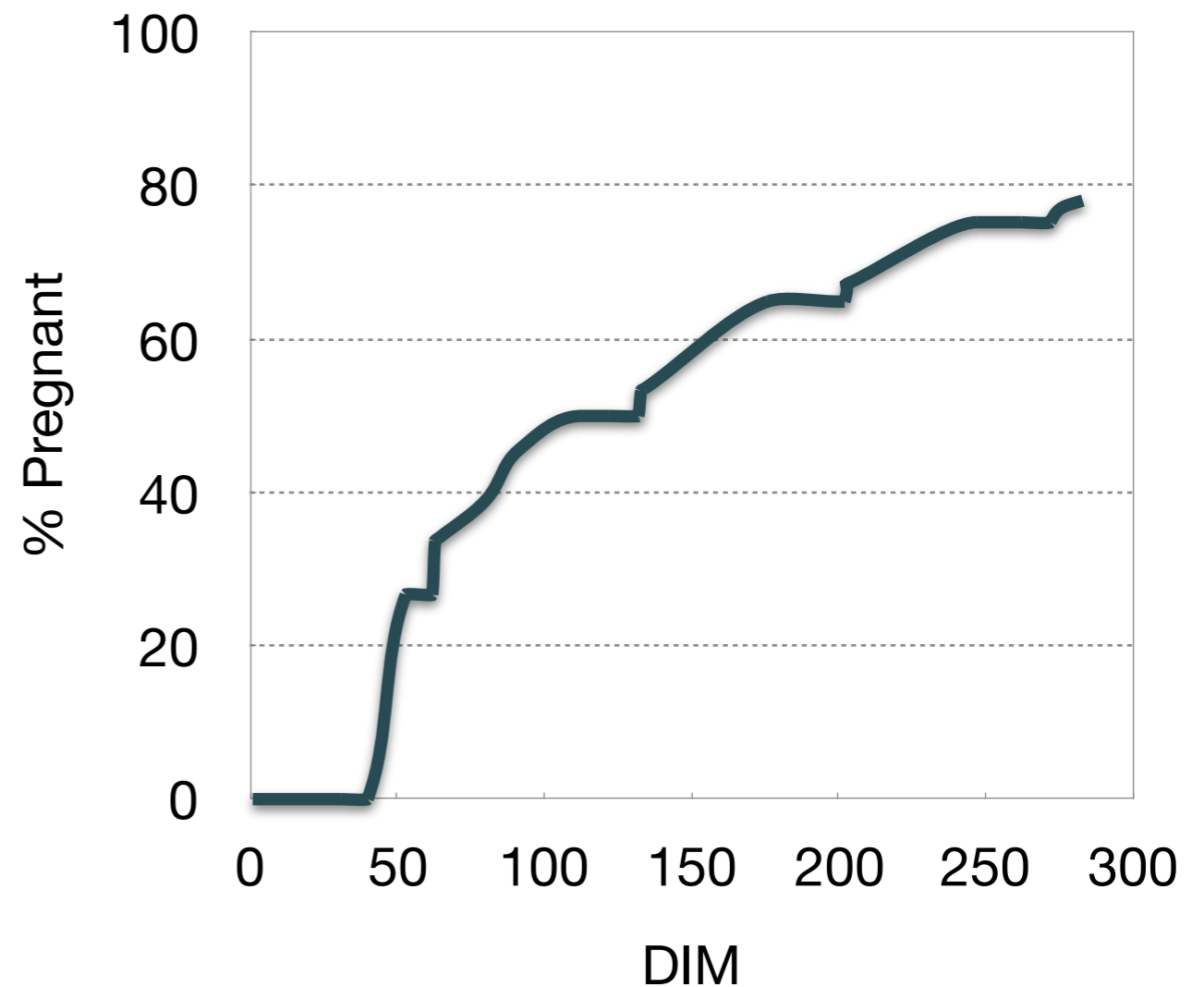
CR first TAI service (%)

Heat bred after first TAI service (%)

CR heat bred after first TAI service (%)

CR second and subsequent TAI services (%)

Pregnancy Loss (%)



21-d PR (40 d)

18%

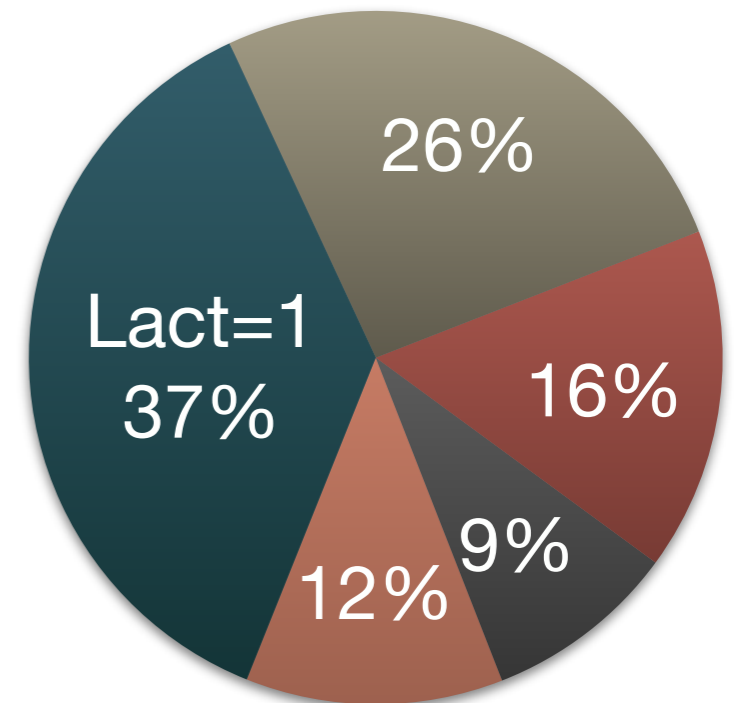
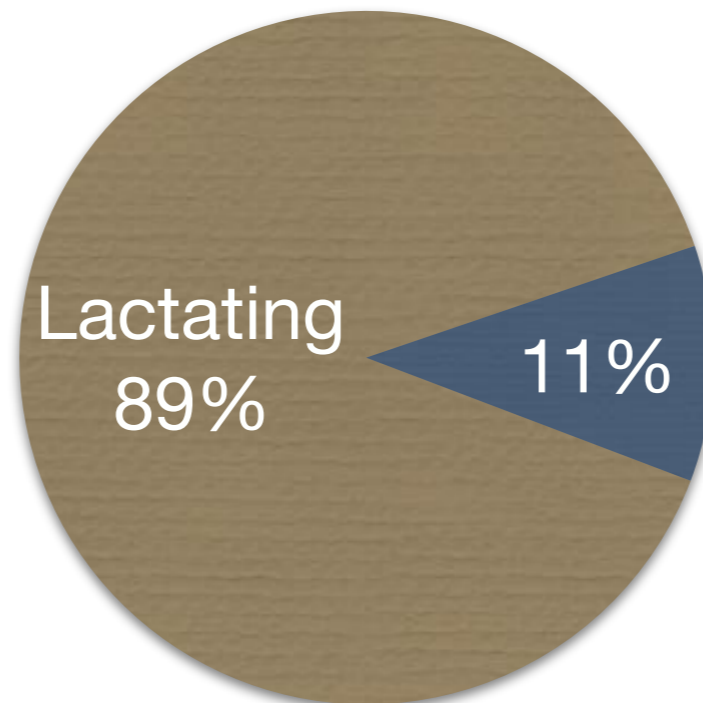
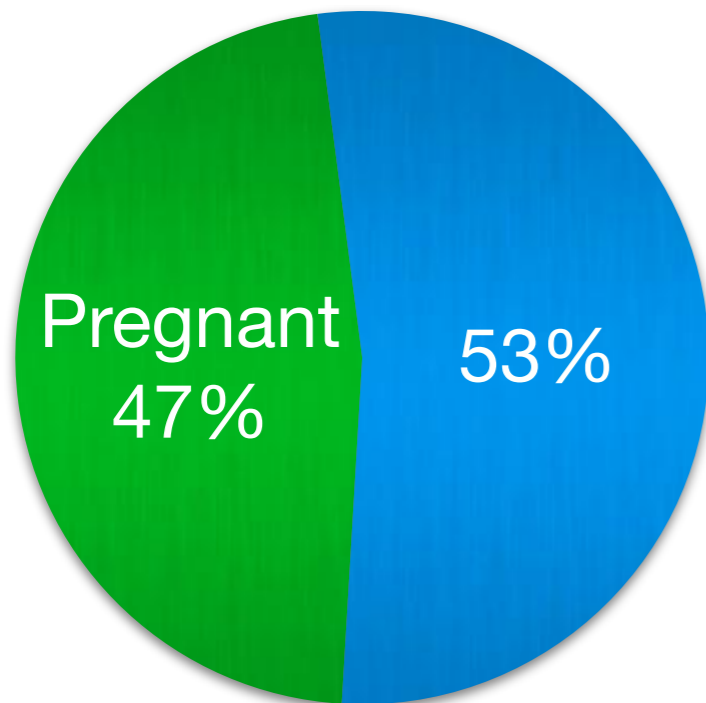
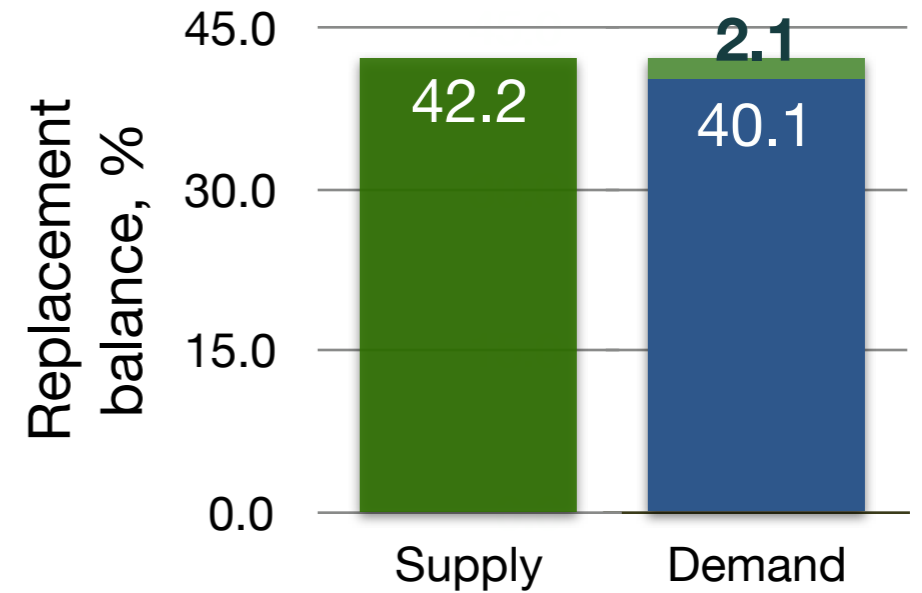
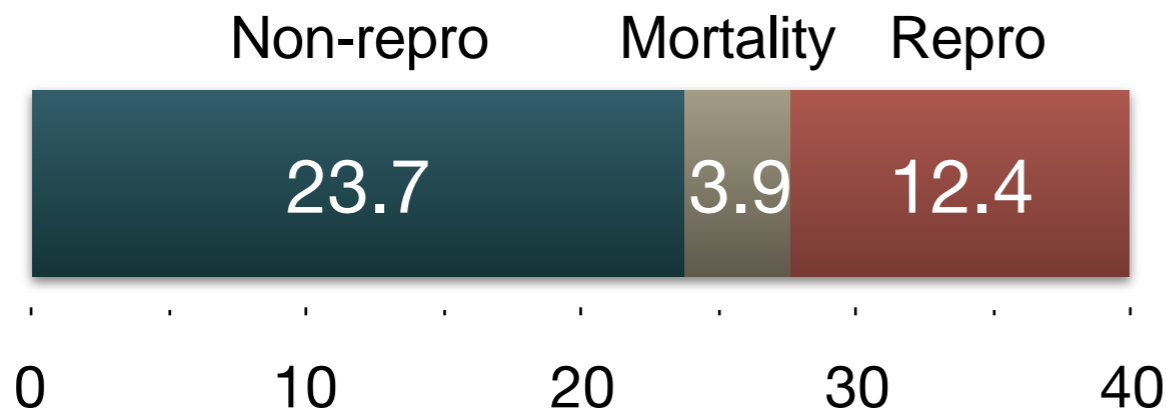
21-d PR (50 d)

19%

Reproductive program

UWCU Repro\$

Cows leaving the herd, %



Reproductive program - current

Dec14

\$/cow.yr

Income over feed costs

\$3,132.6

Replacement costs

\$243.4

Reproductive costs

\$79.6

Calf revenue

\$150.4

Cow net value

\$2,960.0

**Management strategy
(Alternative)
July 2015**

Reproductive program

Timed Artificial Insemination program

1st TAI service postpartum

Double Ovsynch¹

2nd+ TAI services

Ovsynch

Weekday first injection

Friday

¹Modified

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					¹ GnRH	
					⁷ PGF	
	¹⁰ GnRH					
	¹⁷ GnRH					
	²⁴ PGF	²⁵ PGF	²⁶ GnRH	²⁷ TAI		

Reproductive program

Description of program

lb

kg

Do-not-breed minimum milk/d

80

36

DIM first TAI injection, d

48

Resynch before preg check

YES

Interbreeding interval TAI, d

42

Reproductive program

Description of program

Heat bred before 1st TAI service, %
AFI detect

0

CR before 1st TAI service, %

0

CR 1st TAI service

47

Heat bred after 1st TAI service, %
AFI detect

23

CR after 1st HD services, %

40

CR 2nd+ TAI services

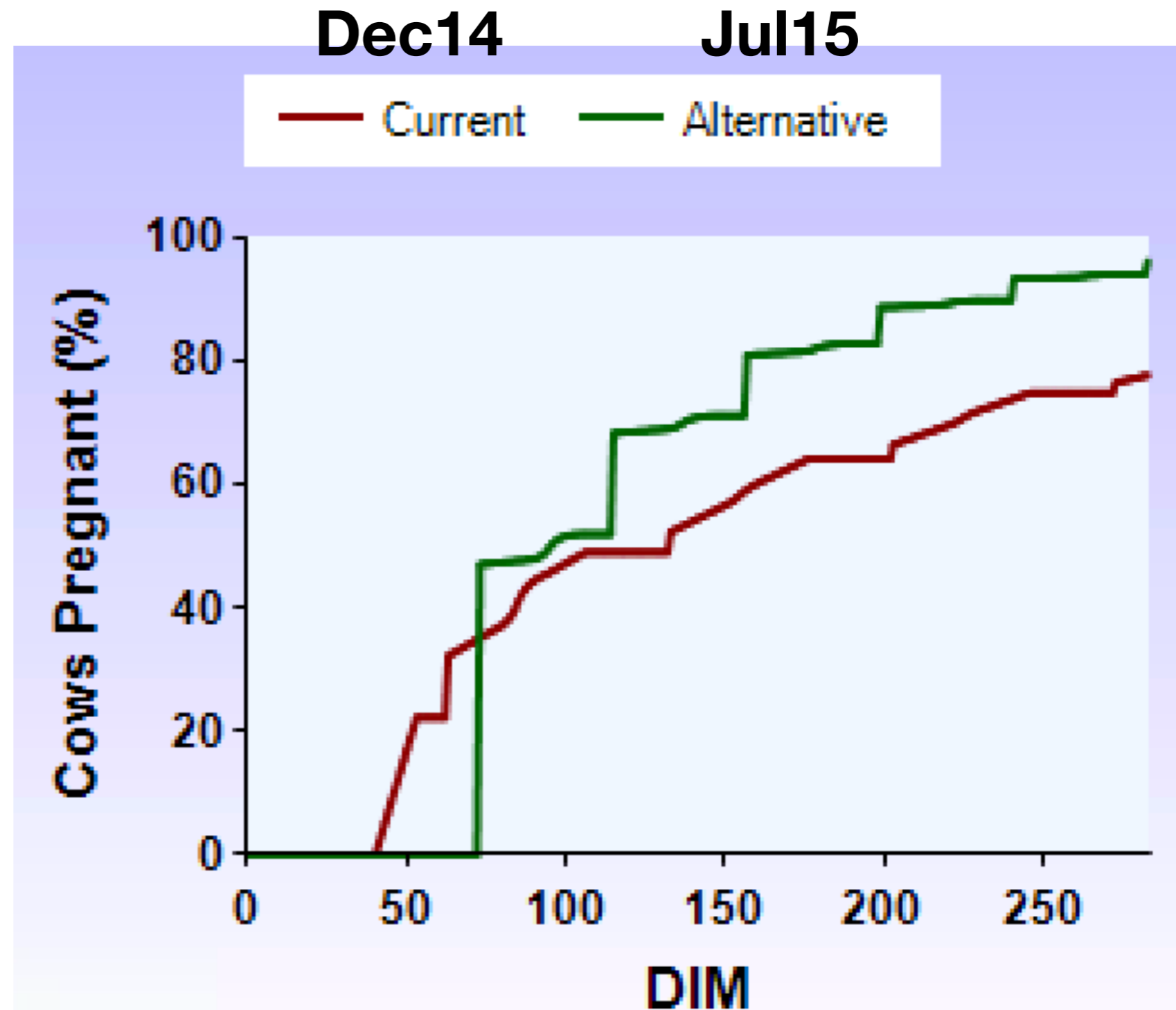
40

Alternative reproductive program

UWCU Repro\$

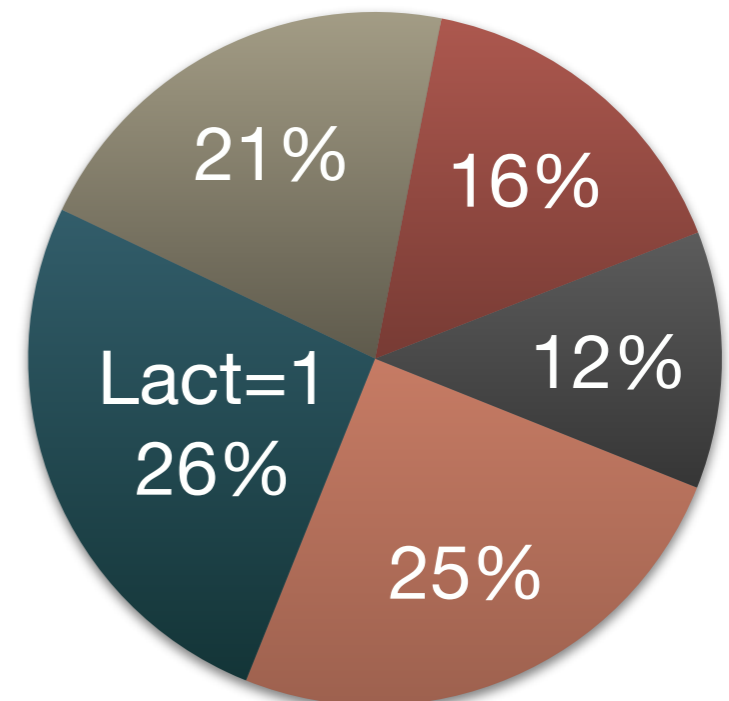
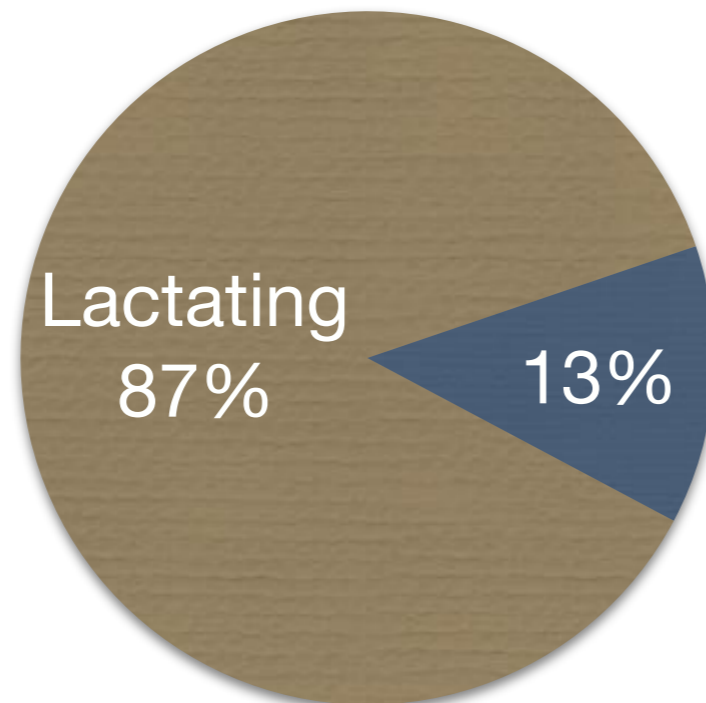
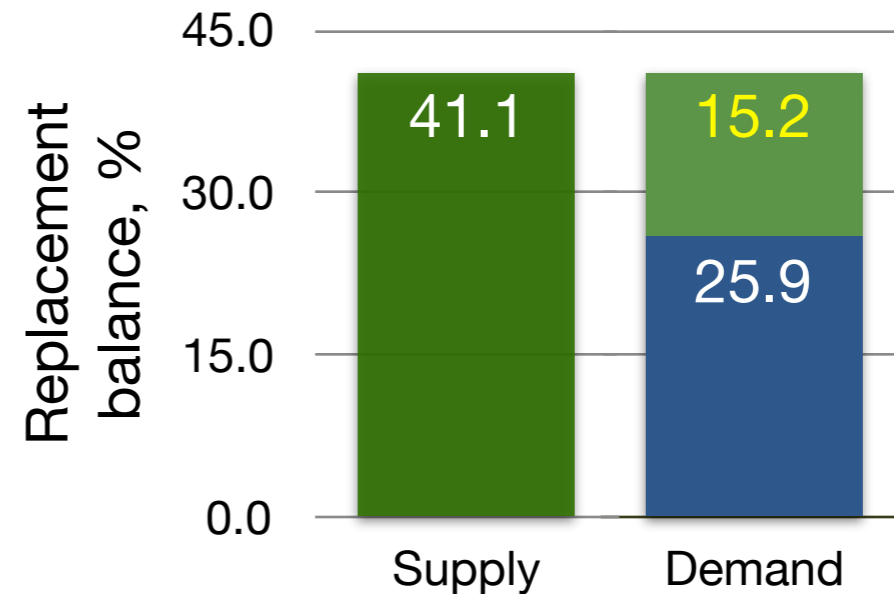
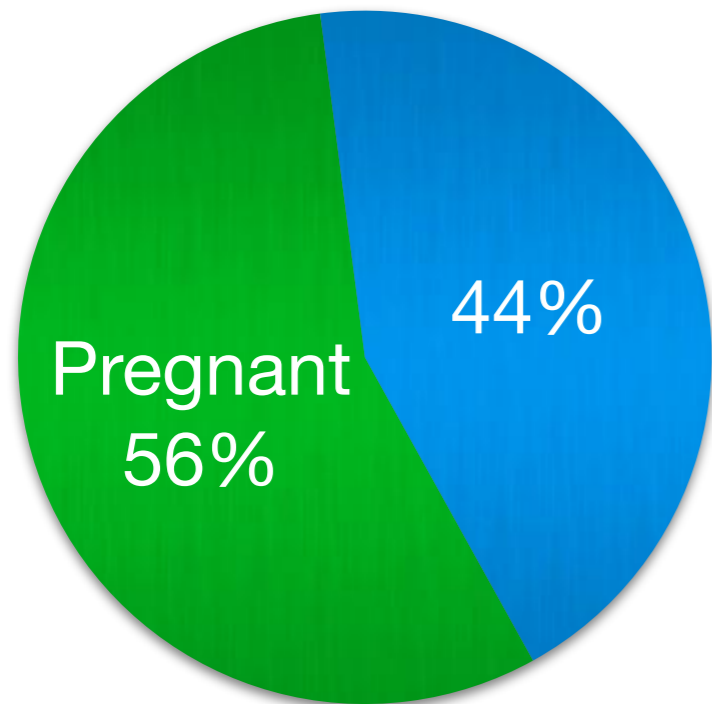
21-d PR (50 d)

29%



Alternative reproductive program

UWCU Repro\$



Reproductive program - alternative

Jul15

\$/cow.yr

Income over feed costs

\$3,202.8

Replacement costs

\$192.4

Reproductive costs

\$46.0

Calf revenue

\$195.6

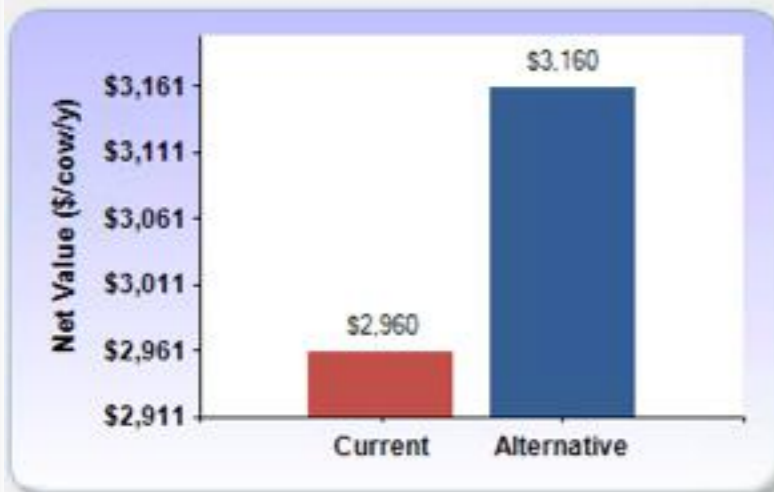
Cow net value

\$3,160.0

Alternative reproductive program

UWCU Repro\$

Economic Results



Profit made by switching to the Alternative program



Contribution to Net Value

Item	Current	Alternative	Diff
Total Net Value (\$/cow/y)	2,960.0	3,160.0	200.0
IOFC (\$/cow/y)	3,132.6	3,202.8	70.2
Replacement Cost (\$/cow/y)	-243.4	-192.4	51.0
Reproductive Cost (\$/cow/y)	-79.6	-46.0	33.6
Calf Value (\$/cow/y)	150.4	195.6	45.2

Prog.	50d PR	DO(d)	PCI
Curr...	11.65	109	13.04
Alter...	21.95	117	13.31

10% more 21-d PR



+\$200/cow per year!

UW-CU Dairy Repro\$

State-of-the-art reproduction DST

Daily simulation

- All herd's cow states

Accommodates all reproductive programs

- TAI
- HD
- TAI + HD

Calculates economic net return

- Most important parameters affected by reproductive performance



Gives additional important information

- Herd structure
- Heifer balance

The Economic Value of a Cow

4

Discounted future net return of a cow

- Compared to a replacement



Vs.

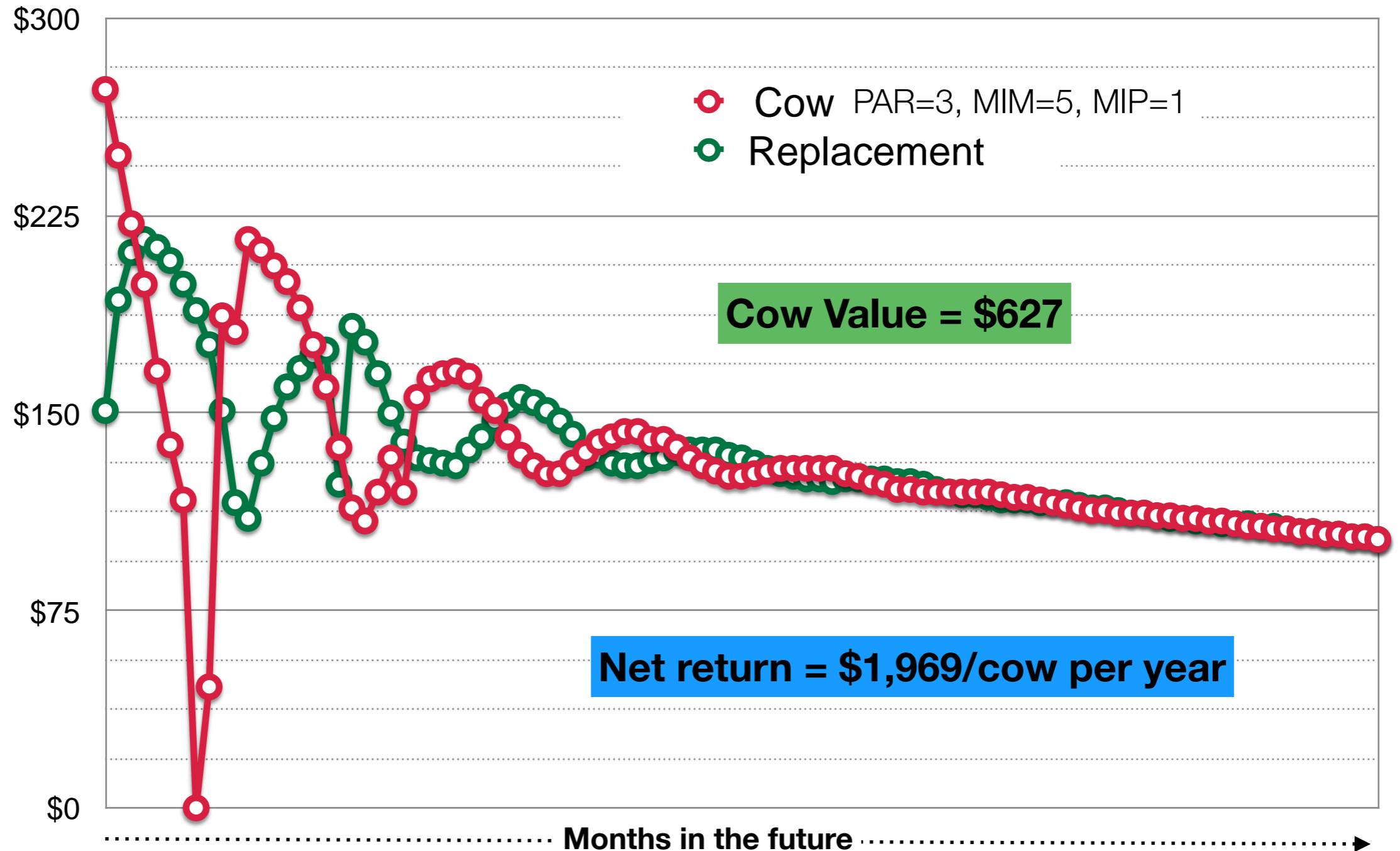
General interpretation

- Positive (+) cow value = keep
- Negative (-) cow value = replace



Expected future net returns

Economic average net return



The Economic Value of a Dairy Cow

V.E. Cabrera, UW-Madison Dairy Science

English Spanish

Units: US English US Metric UK

Help !

Overview

Single Cow Analysis

Herd Analysis

INPUTS - Edit Values in This Block

Evaluated Cow Variables

Current Lactation	3
Current Months after Calving	5
Current Months in Pregnancy	1
Expected Milk Production Rest of Lactation, %	100
Expected Milk Production Next Lactations, %	100

Replacement Cow Variable

Expected genetic improvement, % additional milk	0
---	---

Herd Production and Reproduction Variables

Herd Turnover Ratio, %/year	35
Rolling Herd Average, lb/cow per year	24,000
21-d Pregnancy Rate, %	18
Reproduction Cost, \$/cow per month	20
Last Month After Calving to Breed a Cow	10
Do-not-Breed Cow Minimum Milk, lb/day	50
Pregnancy Loss after 35 Days Pregnant, %	22.6
Average Cow Body Weight, lb	1306

Herd Economic Variables

Replacement Cost, \$/cow	1300
Salvage Value, \$/lb live weight	0.38
Calf Value, \$/calf	100
Milk Price, \$/cwt	15.88
Milk Butterfat, %	3.5
Feed Cost Lactating Cows, \$/lb dry matter	0.1
Feed Cost Dry Cows, \$/lb dry matter	0.08
Interest Rate, %/year	6

OUTPUTS - Interactive Results

Value of the Cow, \$ **627**

Compared Against a Replacement, \$

Milk Sales, \$	147
Feed Cost, \$	-157
Calf Value, \$	26
Non-reproductive Cull, \$	-126
Mortality Cost, \$	-24
Reproductive Cull, \$	12
Reproduction Costs, \$	45
Replacement Transaction, \$	704

Herd Structure at Steady State

Days in milk	224
Days to Conception	122
Percent of Pregnant	52
Reproductive Culling, %	8
Mortality, %	3
1st Lactation, %	43
2nd Lactation, %	27
>= 3rd Lactation, %	30

Economics of an Average Cow, \$/year

Net Return, \$	1969
Milk Sales, \$	3806
Feed Cost, \$	-1522
Calf Sales, \$	60
Non-Reprod. Culling Cost, \$	-198
Mortality Cost, \$	-38
Reproductive Culling Cost, \$	-59
Reproductive Cost, \$	-80

Enter Data

Value of a cow

Find Results

Net Return of a cow

Enter the input parameters.

.....

INPUTS - Edit Values in This Block

Evaluated Cow Variables

Current Lactation: 3

Current Months after Calving: 5

Current Months in Pregnancy: 1

Expected Milk Production Rest of Lactation, %: 100

Expected Milk Production Next Lactations, %: 100

Replacement Cow Variable

Expected genetic improvement, % additional milk: 0

Herd Production and Reproduction Variables

Herd Turnover Ratio, %/year: 35

Rolling Herd Average, lb/cow per year: 24,000

21-d Pregnancy Rate, %: 18

Reproduction Cost, \$/cow per month: 20

Last Month After Calving to Breed a Cow: 10

Do-not-Breed Cow Minimum Milk, lb/day: 50

Pregnancy Loss after 35 Days Pregnant, %: 22.6

Average Cow Body Weight, lb: 1306

Herd Economic Variables

Replacement Cost, \$/cow: 1300

Salvage Value, \$/lb live weight: 0.38

Calf Value, \$/calf: 100

Milk Price, \$/cwt: 15.88

Milk Butterfat, %: 3.5

Feed Cost Lactating Cows, \$/lb dry matter: 0.1

Feed Cost Dry Cows, \$/lb dry matter: 0.08

Interest Rate, %/year: 6

OUTPUTS - Interactive Results

Value of the Cow, \$ 627

Compared Against a Replacement, \$

Milk Sales, \$: 147

Feed Cost, \$: -157

Calf Value, \$: 26

Non-reproductive Cull, \$: -126

Mortality Cost, \$: -24

Reproductive Cull, \$: 12

Reproduction Costs, \$: 45

Replacement Transaction, \$: 704

Herd Structure at Steady State

Days in milk: 224

Days to Conception: 122

Percent of Pregnant: 52

Reproductive Culling, %: 8

Mortality, %: 3

1st Lactation, %: 43

2nd Lactation, %: 27

>= 3rd Lactation, %: 30

Economics of an Average Cow, \$/year

Net Return, \$: 1969

Milk Sales, \$: 3806

Feed Cost, \$: -1522

Calf Sales, \$: 60

Non-Reprod. Culling Cost, \$: -198

Mortality Cost, \$: -38

Reproductive Culling Cost, \$: -59

Reproductive Cost, \$: -80

User defines cow and herd parameters including cow state, culling risk, reproduction, and economics according to farm

Results are instantaneous

For example the value of the cow is \$627 for an average cow in third lactation, 5 months after calving and 1 month pregnant

University of Wisconsin 4

View the output as the input changes

.....

Skip ← Back Next →

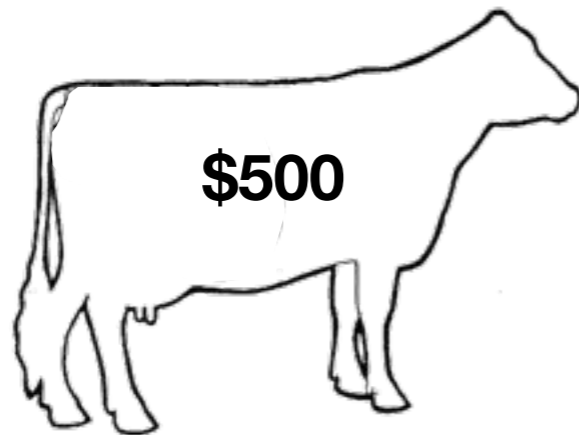
Value of the Cow, \$	627
Compared Against a Replacement, \$	
Milk Sales, \$	147
Feed Cost, \$	-157
Calf Value, \$	26
Non-reproductive Cull, \$	-126
Mortality Cost, \$	-24
Reproductive Cull, \$	12
Reproduction Costs, \$	45
Replacement Transaction, \$	704
Herd Structure at Steady State	
Days in milk	224
Days to Conception	122
Percent of Pregnant	52
Reproductive Culling, %	8
Mortality, %	3
1st Lactation, %	43
2nd Lactation, %	27
>= 3rd Lactation, %	30
Economics of an Average Cow, \$/year	
Net Return, \$	1969
Milk Sales, \$	3806
Feed Cost, \$	-1522
Calf Sales, \$	60
Non-Reprod. Culling Cost, \$	-198
Mortality Cost, \$	-38
Reproductive Culling Cost, \$	-59
Reproductive Cost, \$	-80

The value of a new pregnancy

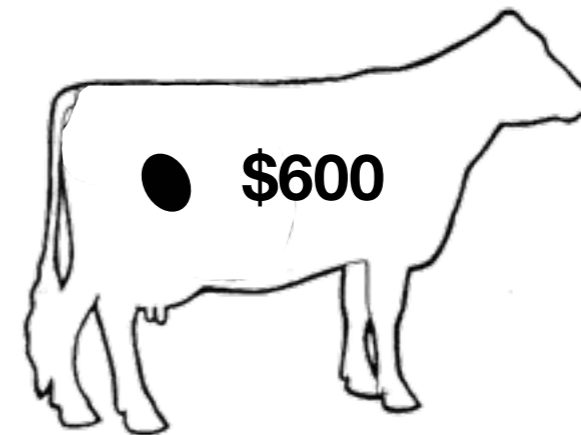
How much more \$ when a cow becomes pregnant?

Difference in cow value:

- Cow **becoming** pregnant
- Cow remaining non-pregnant



Vs.



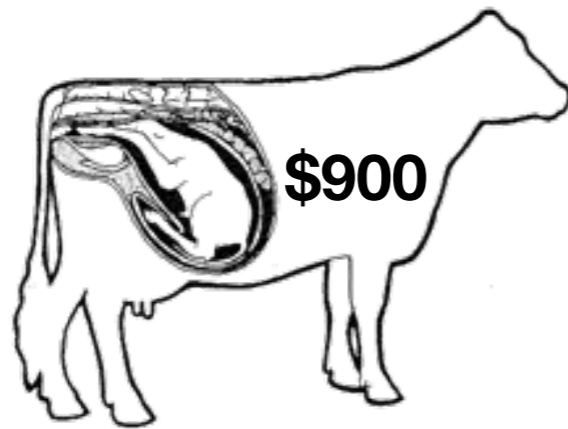
Value of a new pregnancy = **+\$100**

The cost of a pregnancy loss

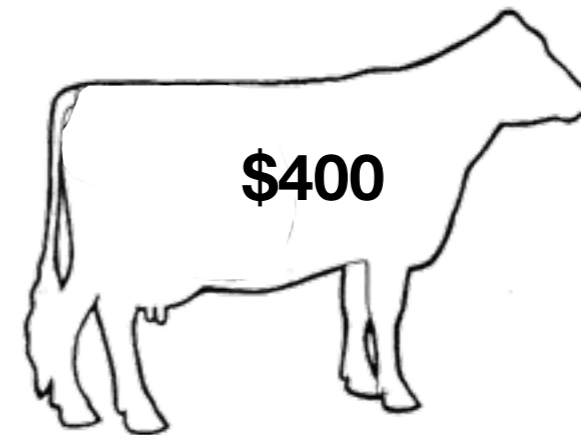
How much less \$ when a cow aborts?

Difference in cow value:

- Cow being pregnant
- Cow **losing** pregnancy



Vs.



Cost of a pregnancy loss = **-\$500**

The value of a pregnancy Cost of an abortion

Evaluated Cow Variables

Current Lactation
 Current Months after Calving
 Current Months in Pregnancy
 Expected Milk Production Rest of Lactation, %
 Expected Milk Production Next Lactations, %

3
 5
 0
 100
 100

Value of the Cow, \$

414

Compared Against a Replacement, \$

Milk Sales, \$

100

Feed Cost, \$

-136

Calf Value, \$

0

Non-reproductive Cull, \$

-174

Mortality Cost, \$

-33

Reproductive Cull, \$

-42

Reproduction Costs, \$

-3

Replacement Transaction, \$

704

Evaluated Cow Variables

Current Lactation
 Current Months after Calving
 Current Months in Pregnancy
 Expected Milk Production Rest of Lactation, %
 Expected Milk Production Next Lactations, %

3
 5
 1
 100
 100

Value of the Cow, \$

627

Compared Against a Replacement, \$

Milk Sales, \$

147

Feed Cost, \$

-157

Calf Value, \$

26

Non-reproductive Cull, \$

-126

Mortality Cost, \$

-24

Reproductive Cull, \$

12

Reproduction Costs, \$

45

Replacement Transaction, \$

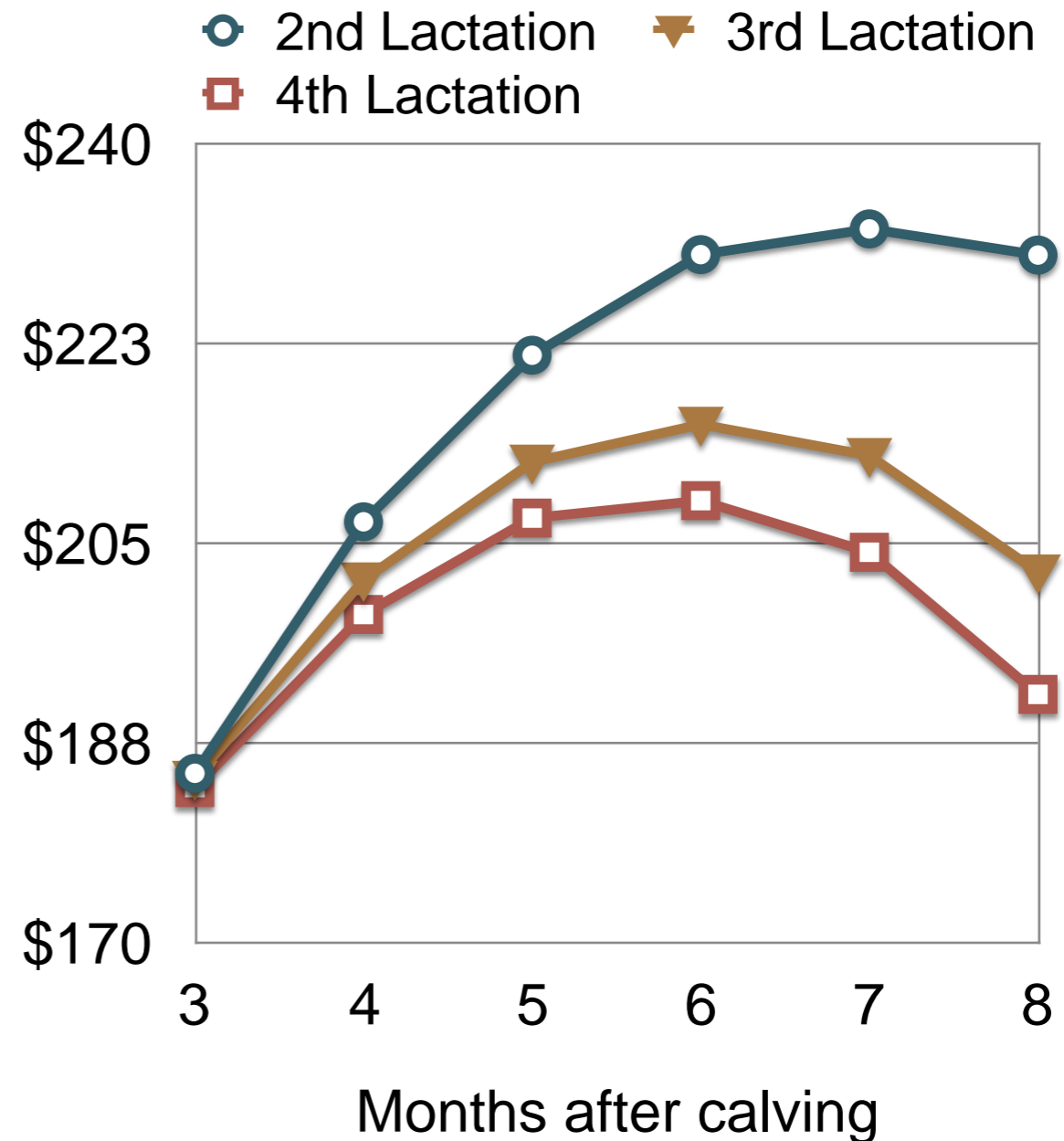
704

\$627-\$414=\$213 is the value of one month pregnancy for this specific cow. Its abortion cost would be -\$213

Dynamics of the value of a new pregnancy

Value of pregnancy

- Increases towards mid-lactation
- Decreases towards late lactation



Cost of an open day

Evaluated Cow Variables

Current Lactation	2
Current Months after Calving	6
Current Months in Pregnancy	0
Expected Milk Production Rest of Lactation, %	100
Expected Milk Production Next Lactations, %	100

2	↕
6	↕
0	↕
100	
100	

Value of the Cow, \$

282

Compared Against a Replacement, \$

Milk Sales, \$	-67
Feed Cost, \$	-114
Calf Value, \$	-1
Non-reproductive Cull, \$	-146
Mortality Cost, \$	-28
Reproductive Cull, \$	-67
Reproduction Costs, \$	1
Replacement Transaction, \$	704

Evaluated Cow Variables

Current Lactation	2
Current Months after Calving	7
Current Months in Pregnancy	0
Expected Milk Production Rest of Lactation, %	100
Expected Milk Production Next Lactations, %	100

2	↕
7	↕
0	↕
100	
100	

Value of the Cow, \$

169

Compared Against a Replacement, \$

Milk Sales, \$	-154
Feed Cost, \$	-90
Calf Value, \$	-4
Non-reproductive Cull, \$	-163
Mortality Cost, \$	-31
Reproductive Cull, \$	-97
Reproduction Costs, \$	3
Replacement Transaction, \$	704

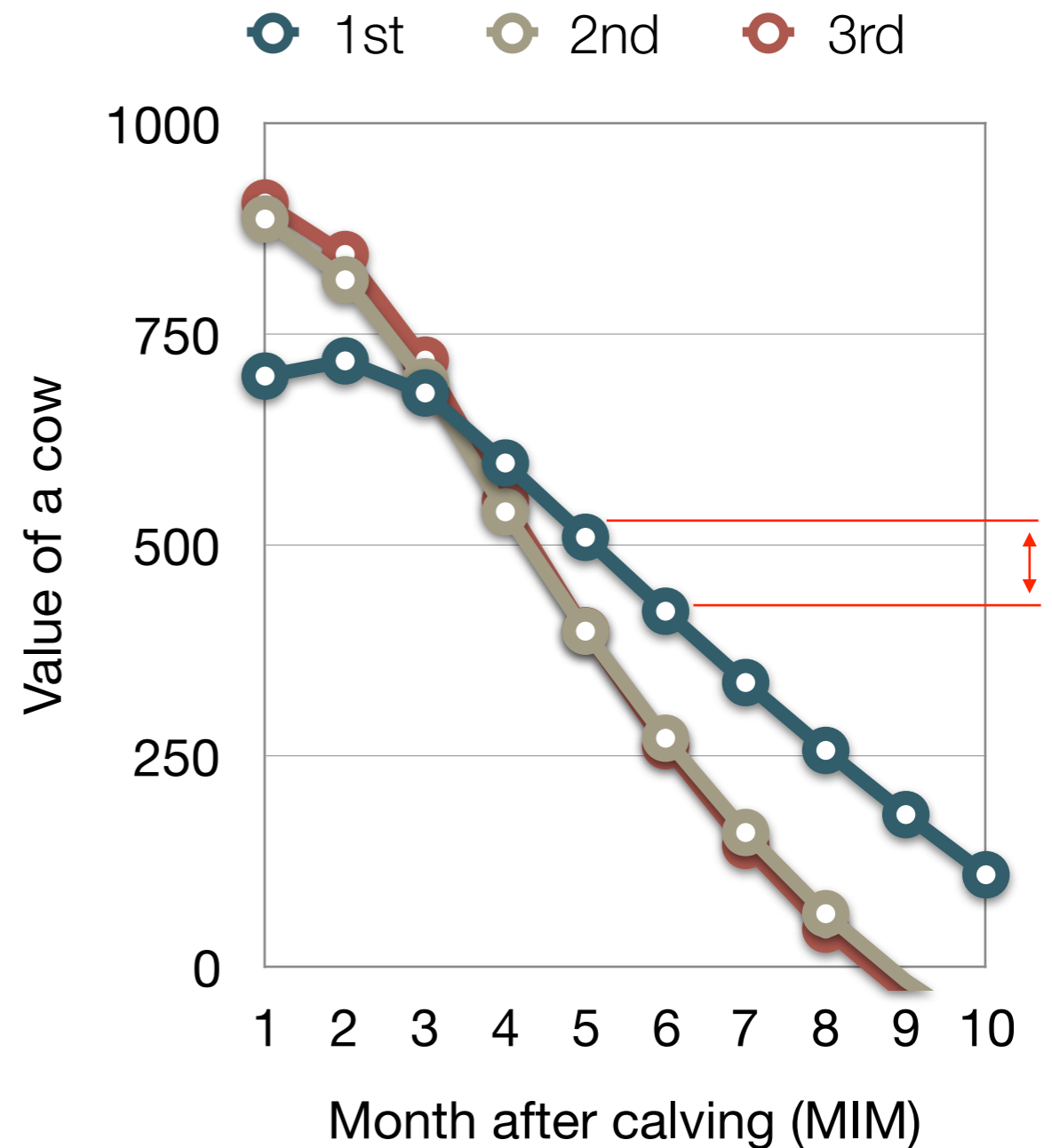
\$113

(\$282-\$169)/30=\$3.76/day is the cost of an open day for this cow of 2nd lactation between 6 and 7 MIM

Cost of a day open

3rd lactation cow

MIM	Value		
	\$/d	\$/mo	\$/total
3	5.5	165	165
4	5.1	153	318
5	4.5	135	453
6	3.9	117	570
7	3.3	99	669
8	2.6	78	747



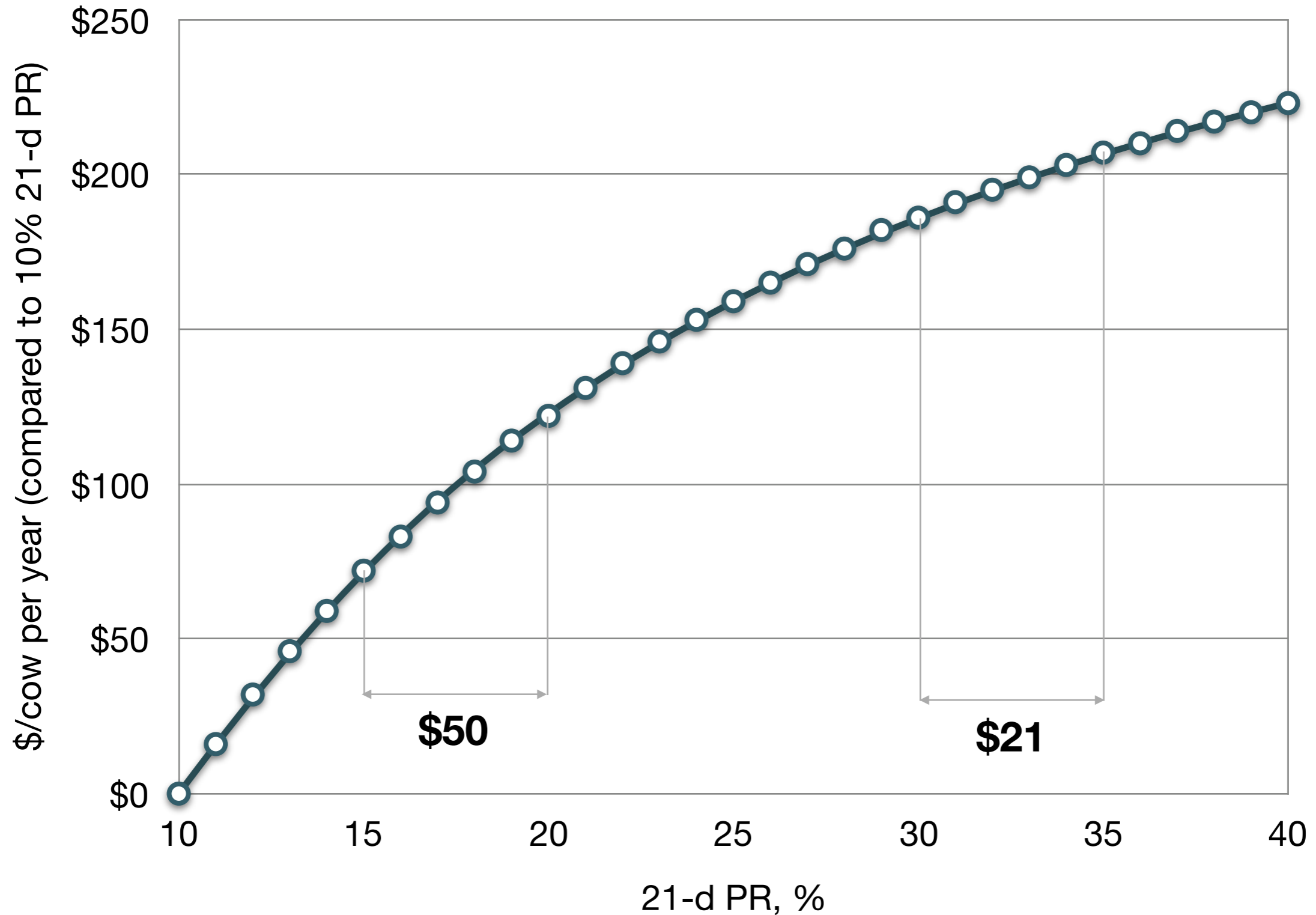
The Economic Value of a Cow

What is the economic value of changing 21-d PR?

Herd Production and Reproduction Variables		Herd Structure at Steady State	
Herd Turnover Ratio, %/year	35	Days in milk	224
Rolling Herd Average, lb/cow per year	24,000	Days to Conception	122
21-d Pregnancy Rate, %	18	Percent of Pregnant	52
Reproduction Cost, \$/cow per month	20	Reproductive Culling, %	8
Last Month After Calving to Breed a Cow	10	Mortality, %	3
Do-not-Breed Cow Minimum Milk, lb/day	50	1st Lactation, %	43
Pregnancy Loss after 35 Days Pregnant, %	22.6	2nd Lactation, %	27
Average Cow Body Weight, lb	1306	>= 3rd Lactation, %	30
Herd Economic Variables		Economics of an Average Cow, \$/year	
Replacement Cost, \$/cow	1300	Net Return, \$	1969
Salvage Value, \$/lb live weight	0.38	Milk Sales, \$	3806
Calf Value, \$/calf	100	Feed Cost, \$	-1522
Milk Price, \$/cwt	15.88	Calf Sales, \$	60
Milk Butterfat, %	3.5	Non-Reprod. Culling Cost, \$	-198
Feed Cost Lactating Cows, \$/lb dry matter	0.1	Mortality Cost, \$	-38
Feed Cost Dry Cows, \$/lb dry matter	0.08	Reproductive Culling Cost, \$	-59
Interest Rate, %/year	6	Reproductive Cost, \$	-80

Value of improving 21-d PR

Herd 21-d PR



Herd structure according to repro

18% 21-d PR

Herd Structure at Steady State

Days in milk	224
Days to Conception	122
Percent of Pregnant	52
Reproductive Culling, %	8
Mortality, %	3
1st Lactation, %	43
2nd Lactation, %	27
>= 3rd Lactation, %	30

Importance of the cow value

Critical economic implications

Optimal management

- Keep or replace

Important information

- Value of pregnancy
- Cost of pregnancy loss
- Cost of a day open

Crucial decisions

- Breed or not breed
- Breed with special semen
- Other **reproductive** decisions...



Critical economic values

- Net return according to reproductive performance



Thanks