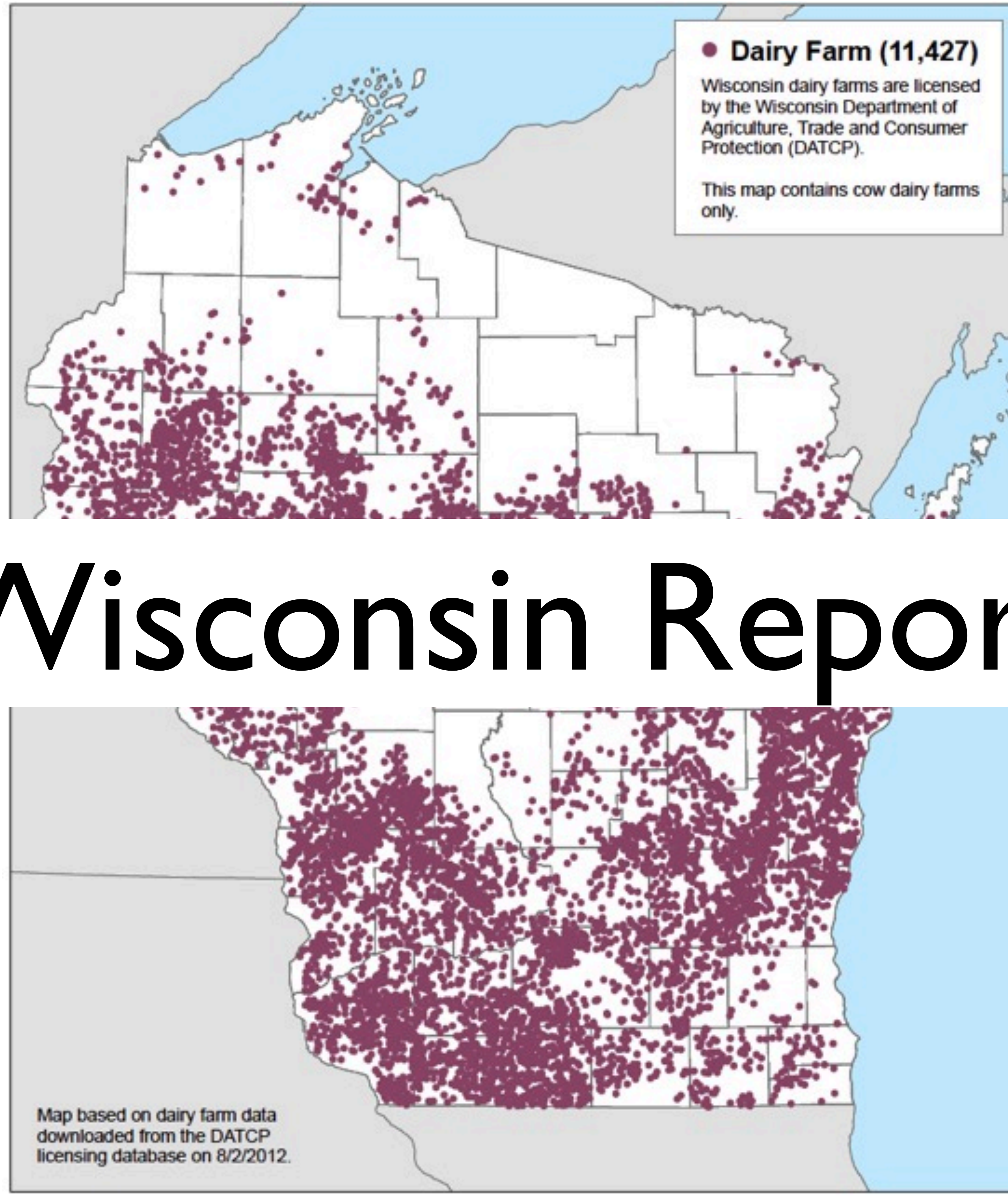
Wisconsin Report



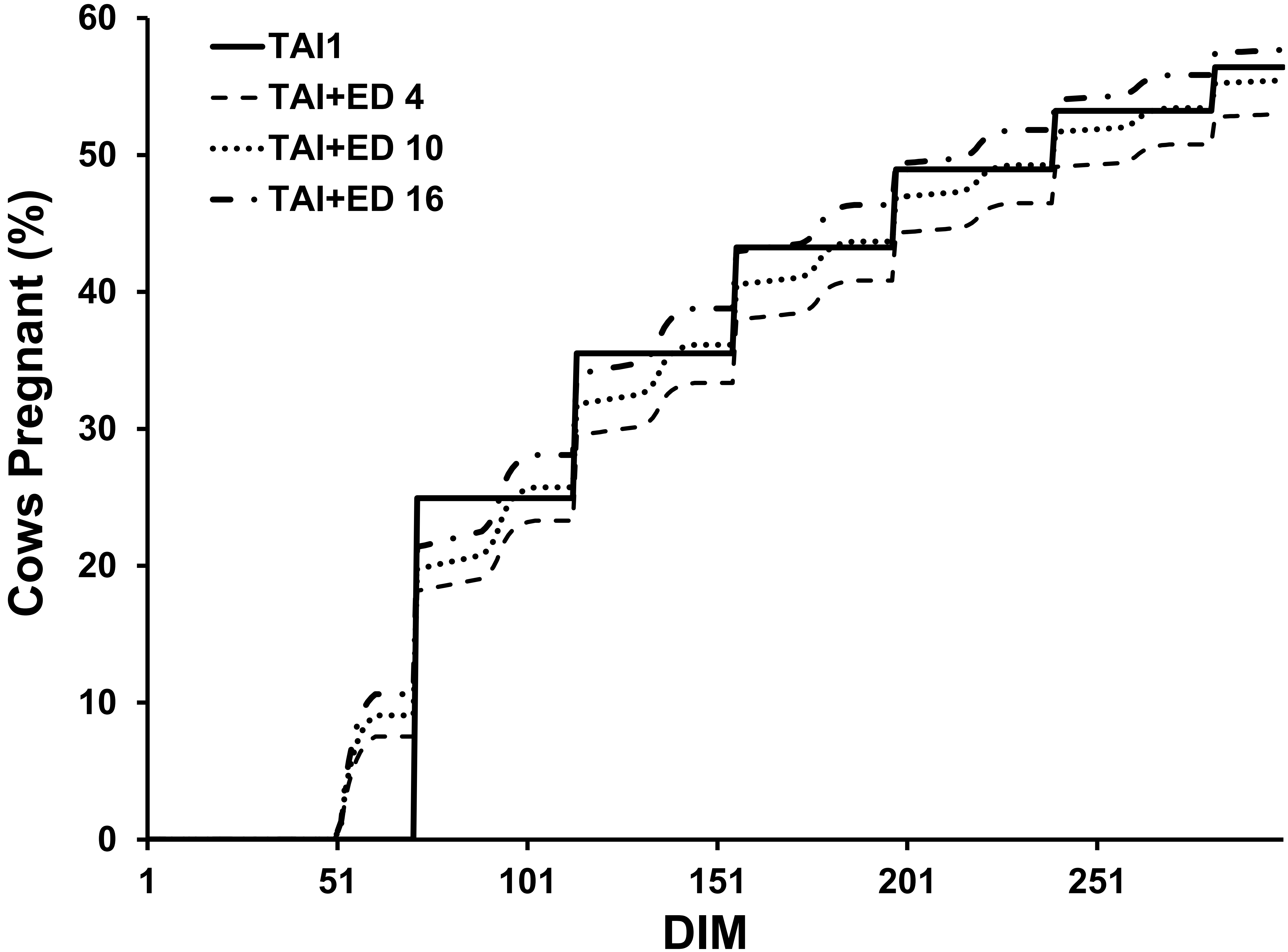
Victor E. Cabrera

Daily Markov Chain for Repro Evaluation

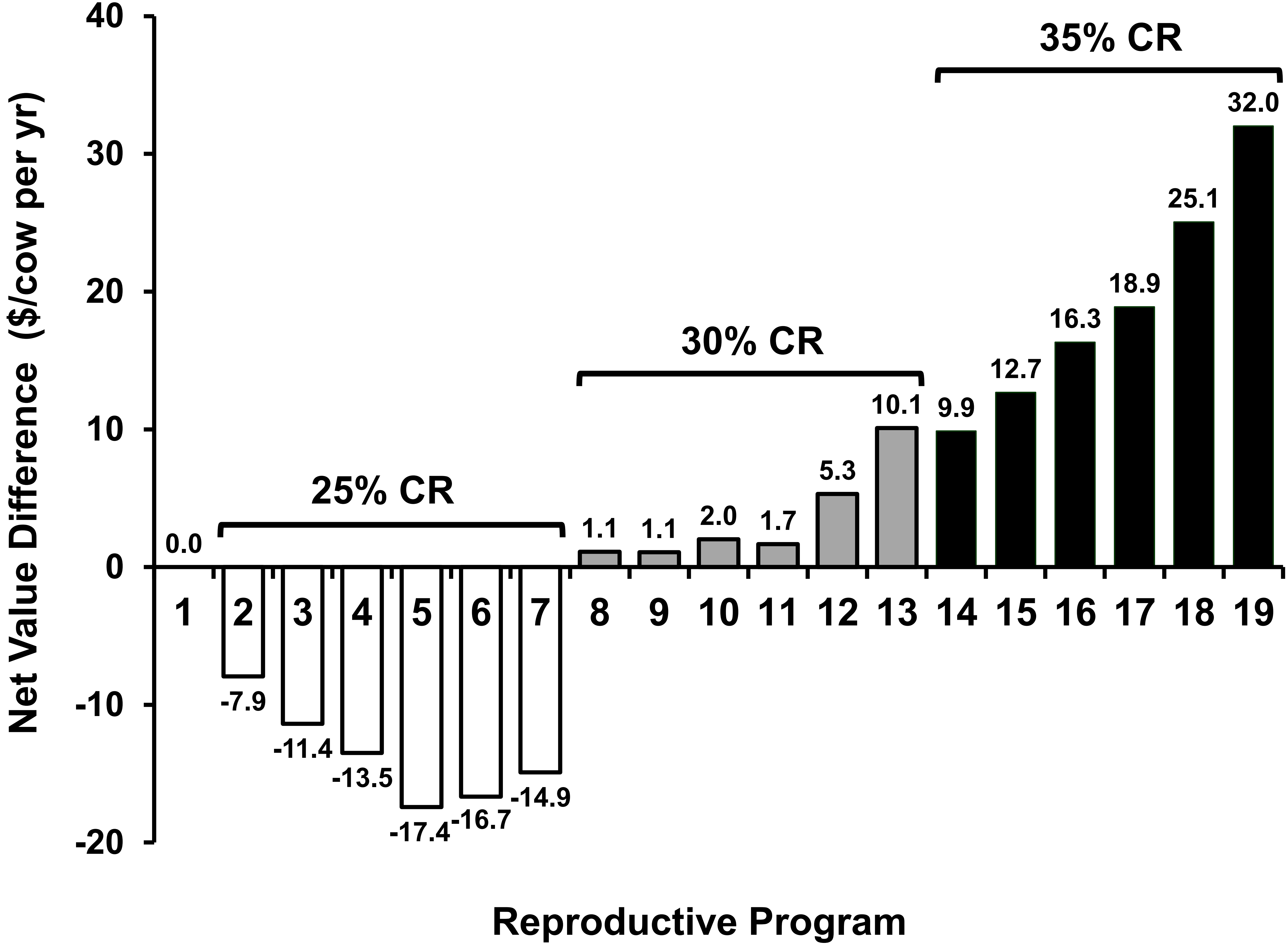
Compare economic and reproductive performance of programs combining timed artificial insemination and different levels of AI estrus detection.

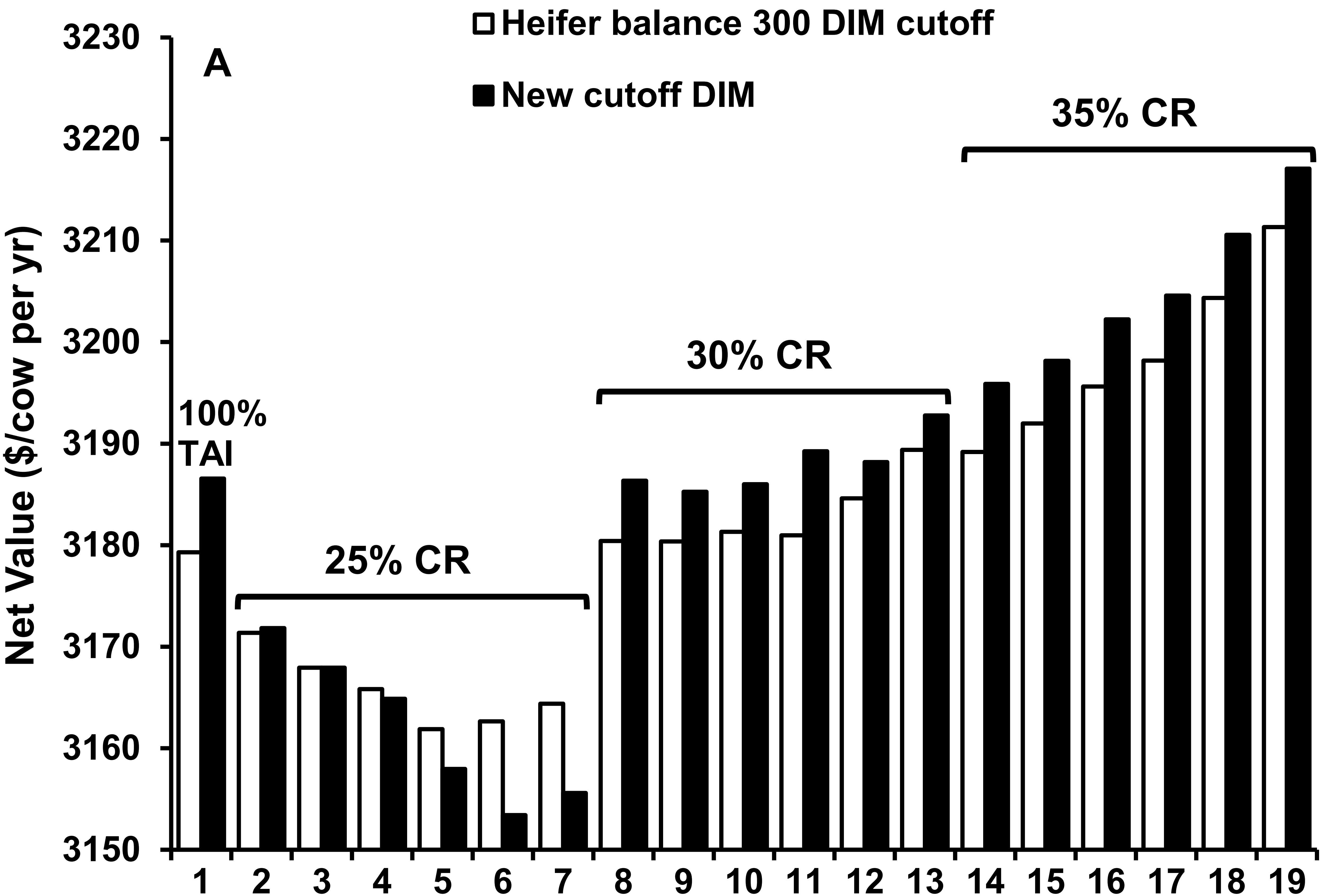
Giordano, J. O., A. Kalantari, P. M. Fricke, M. C. Wiltbank, and V. E. Cabrera. 2012. A daily herd Markov-chain model to study the reproductive and economic impact of reproductive programs combining timed artificial insemination and estrous detection. Journal of Dairy Science 95:5442–5460.

Program Number	Program	First AI			Second and subsequent AI		
		ED[1] before 1st TAI[2]	CR ED[3] before 1st TAI	CR TAI	ED before TAI	CR ED before TAI	CR TAI
1	TAI 1[4]	-	-	42	-	-	30
2	TAI+ED 2[5]	30	25	40	30	25	30
3	TAI+ED 3	40	25	38	40	25	30
4	TAI+ED 4	50	25	36	50	25	30
5	TAI+ED 5	60	25	34	60	25	28
6	TAI+ED 6	70	25	32	70	25	28
7	TAI+ED 7	80	25	30	80	25	28
8	TAI+ED 8	30	30	40	30	30	30
9	TAI+ED 9	40	30	38	40	30	30
10	TAI+ED 10	50	30	36	50	30	30
11	TAI+ED 11	60	30	34	60	30	28
12	TAI+ED 12	70	30	32	70	30	28
13	TAI+ED 13	80	30	30	80	30	28
14	TAI+ED 14	30	35	40	30	35	30
15	TAI+ED 15	40	35	38	40	35	30
16	TAI+ED 16	50	35	36	50	35	30
17	TAI+ED 17	60	35	34	60	35	28
18	TAI+ED 18	70	35	32	70	35	28
19	TAI+ED 19	80	35	30	80	35	28



TAI1
TAI+ED 4
TAI+ED 10
TAI+ED 16
Cows Pregnant (%)
0
10
20
30
40
50
60
1
51
101
151
201
251
DIM


Net Value Difference ($/cow per yr)
40
30
20
10
0
-10
-20
35% CR
30% CR
25% CR
0.0
-7.9
-11.4
-13.5
-17.4
-16.7
-14.9
1.1
1.1
2.0
1.7
5.3
10.1
9.9
12.7
16.3
18.9
25.1
32.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
Reproductive Program



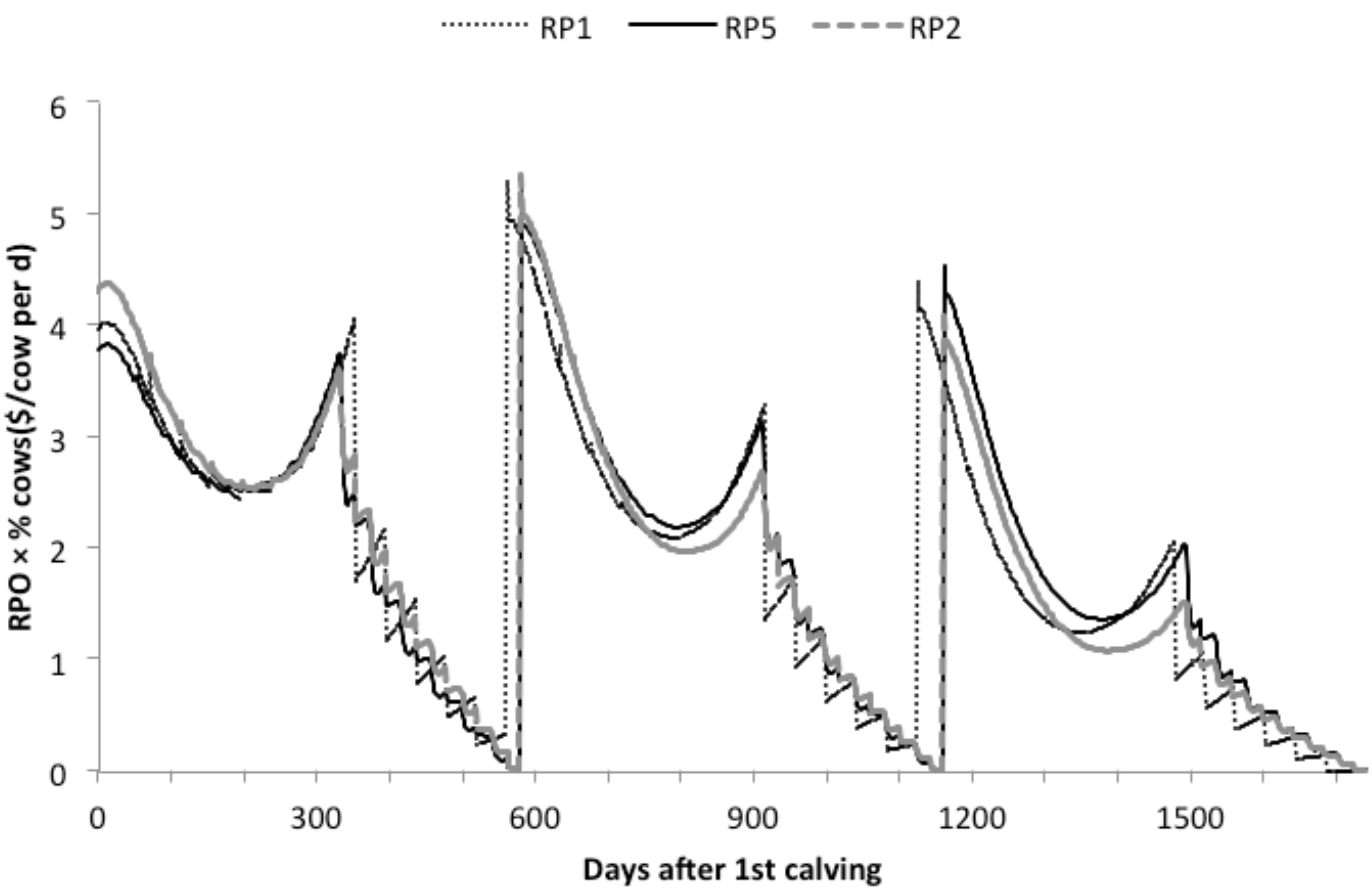
Heifer balance 300 DIM cutoff
New cutoff DIM
A
35% CR
30% CR
25% CR
100% TAI
Net Value ($/cow per yr)
3230
3220
3210
3200
3190
3180
3170
3160
3150
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19

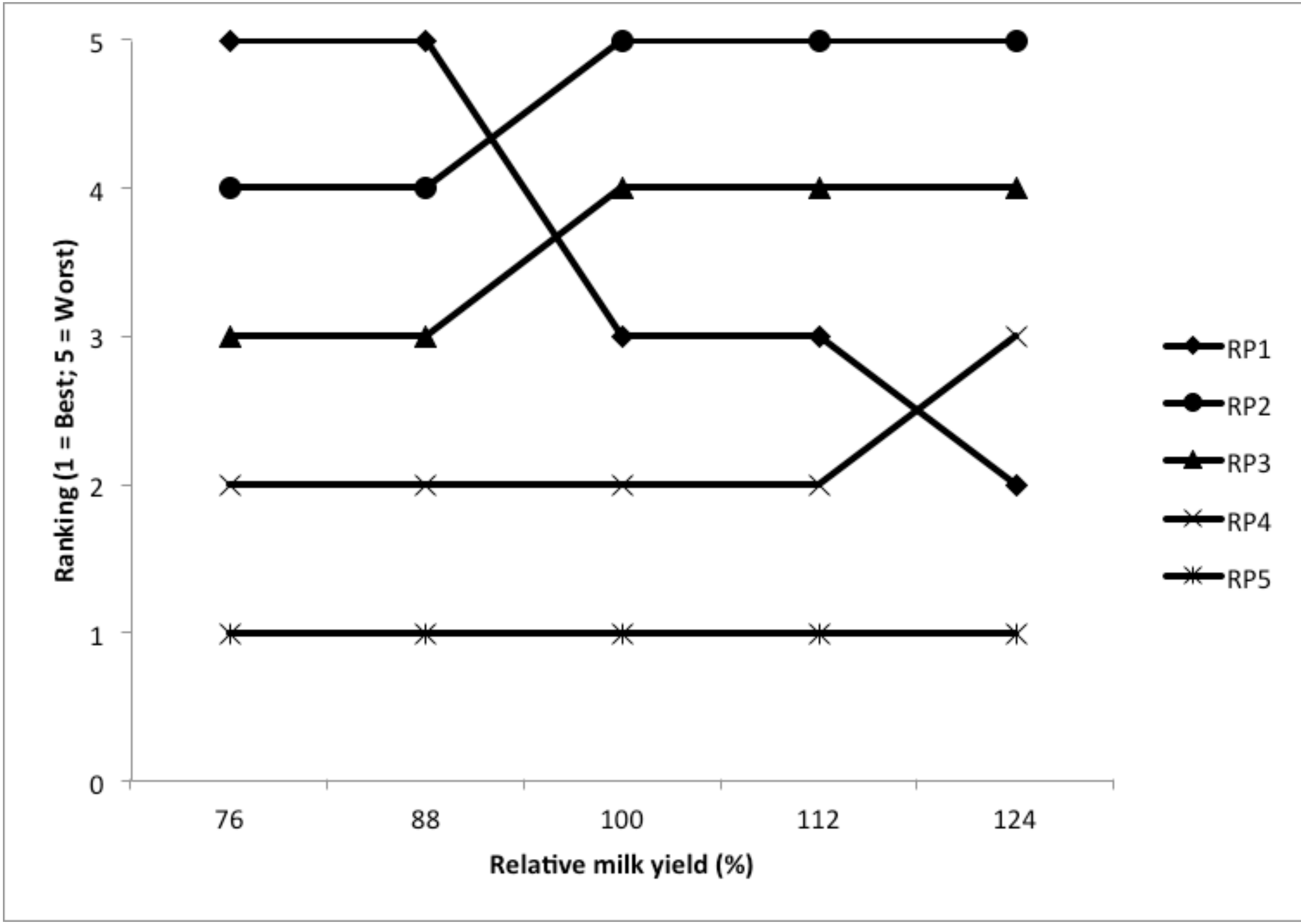
Daily DP and Daily MC

Determine the effect of reproductive performance under optimal replacement policies. Herd Value = herd's average retention pay-off (RPO).

Kalantari, A. S., and V. E. Cabrera. 2012. The effect of reproductive performance on the dairy cattle herd value assessed by integrating a daily dynamic programming with a daily Markov chain model. Journal of Dairy Science 00:00-00. *In Press*.

Reproductive Program	First AI			Second and subsequent AI			
	ED[2] before 1st TAI	CR[3]ED before 1st TAI	CR TAI[4]	ED before TAI	CR ED before TAI	CR TAI	21d pregnancy rate (%)
RP1[5]	-	-	42	-	-	30	17
RP2[6]	70	25	32	70	25	28	14
RP3[6]	50	30	36	50	30	30	16
RP4[6]	30	35	40	30	35	30	18
RP5[6]	80	35	30	80	35	28	20





Ranking (1 = Best; 5 = Worst)
0
1
2
3
4
5
76
88
100
112
124
Relative milk yield (%)
RP1
RP2
RP3
RP4
RP5

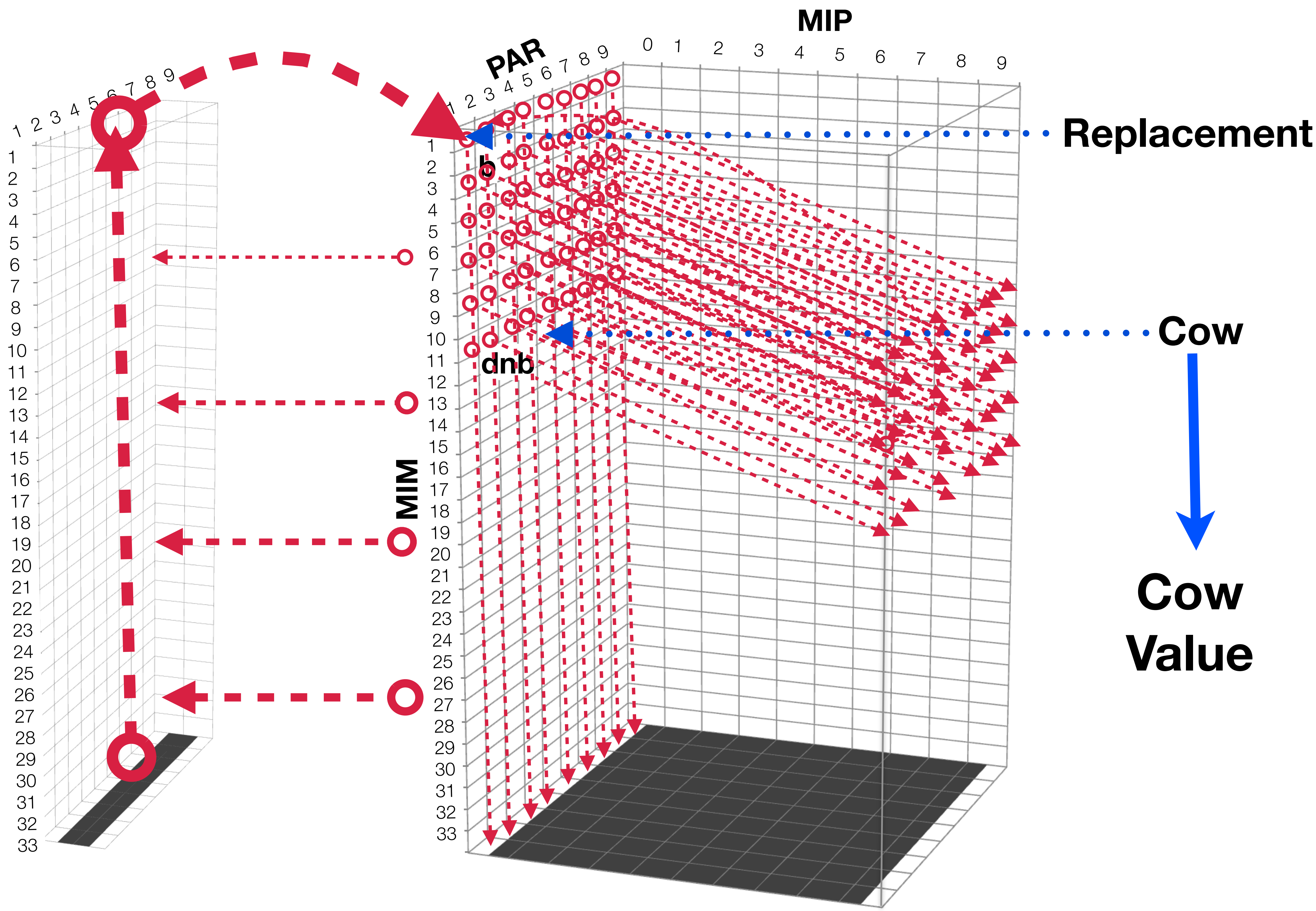
Simple Formulation of Cow Value

Find a simple algorithm to calculate the cow value and apply it to a decision support system.

Cabrera, V. E. 2012. A simple formulation and solution to the replacement problem: A practical tool to assess the economic cow value, the value of a new pregnancy, and the cost of a pregnancy loss. Journal of Dairy Science 95:4683-4698.

How to calculate the cow value?

Markov chains to simulate herd dynamics



Cabrera, 2012

The Economic Value of a Dairy Cow

Victor E. Cabrera, Department of Dairy Science

WISCONSIN UNIVERSITY OF WISCONSIN–MADISON

UW Extension University of Wisconsin–Extension

Overview | **Single Cow Analysis** | Herd Analysis

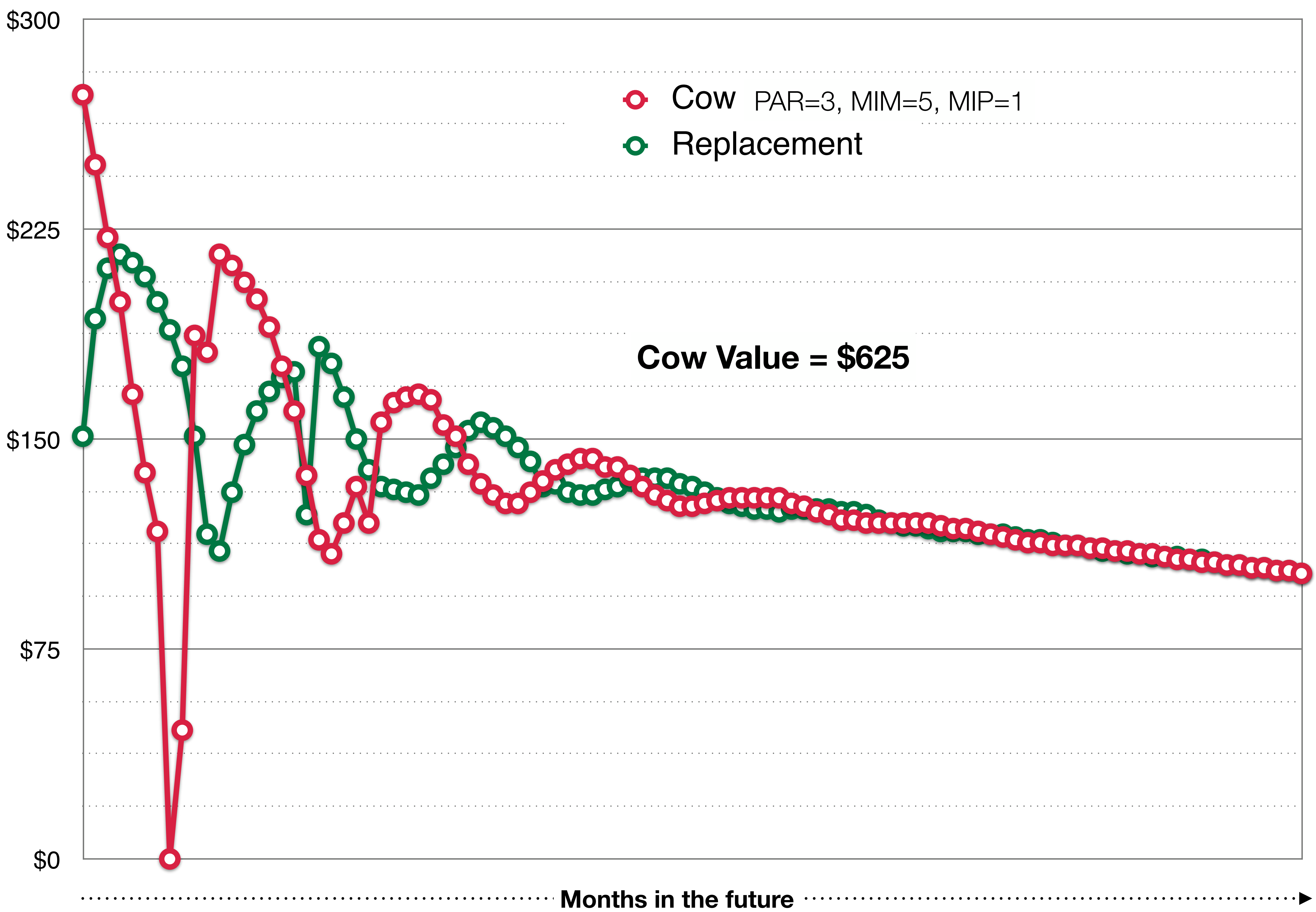
INPUTS - Edit Values in This Block

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	24,00(
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	16
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

Analyze

OUTPUTS - Interactive Results

Value of the Cow, $	**628**
Compared Against a Replacement, $	
Milk Sales, $	148
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
2^{nd} Lactation, %	27
> 3^{rd} Lactation, %	30
Economics of an Average Cow, $/year	
Net Return, $	1998
Milk Sales, $	3834
Feed Cost, $	-1522
Calf Sales, $	60
Non-Reprod. Culling Cost, $	-198
Mortality Cost, $	-38
Reproductive Culling Cost, $	-59
Reproductive Cost, $	-80

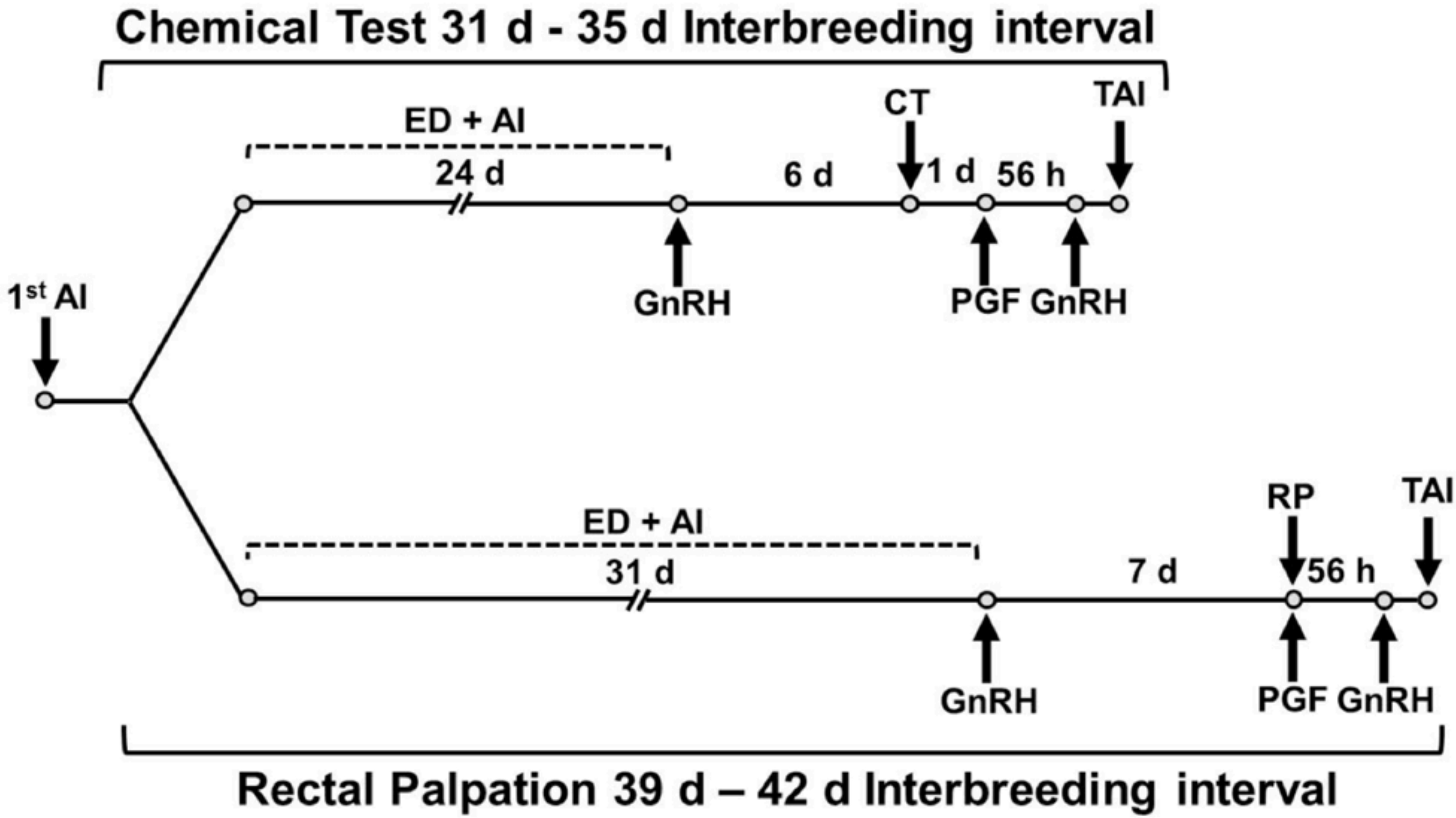


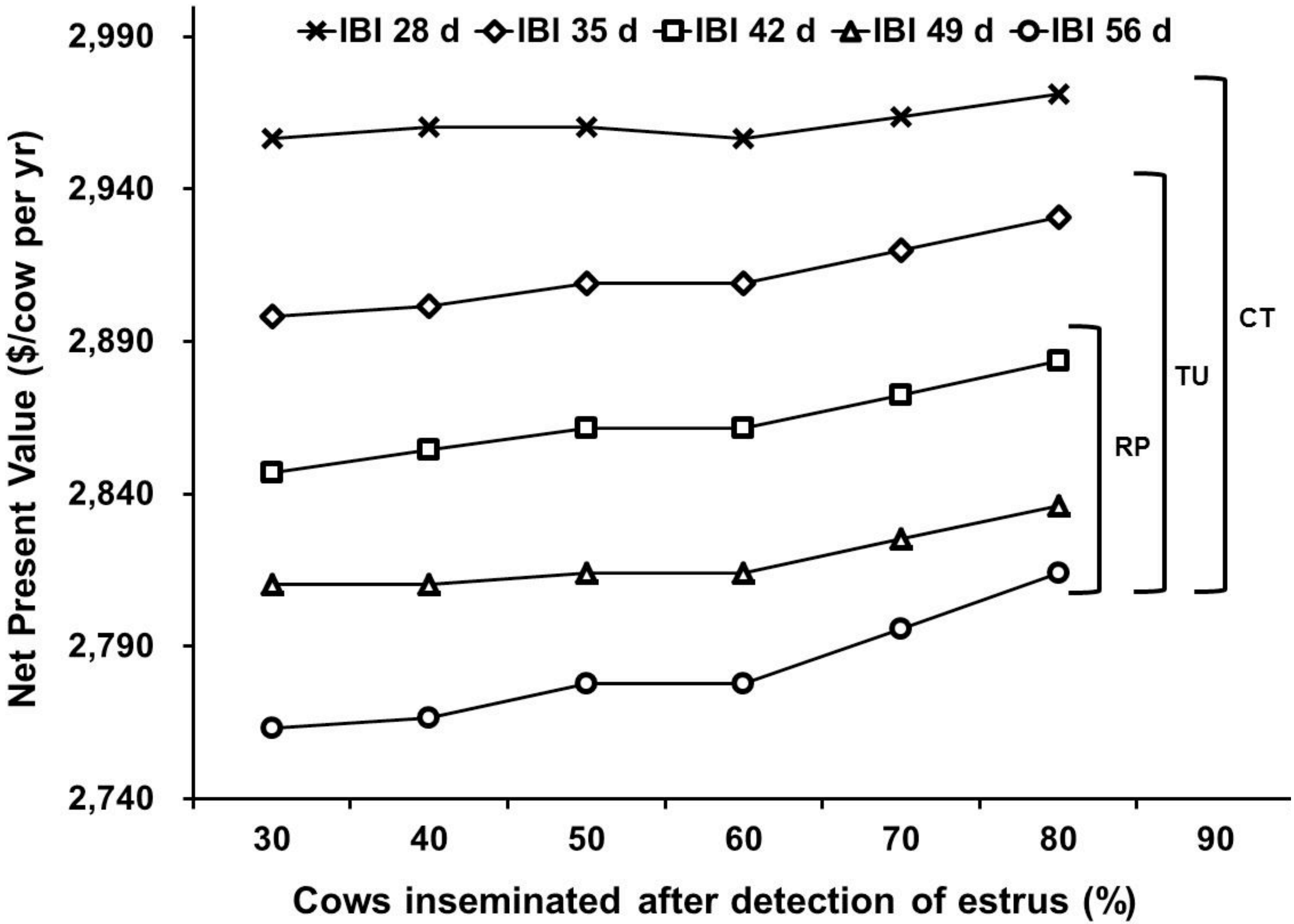
$300
$225
$150
$75
$0
Cow PAR=3, MIM=5, MIP=1
Replacement
Cow Value = $625
Months in the future

Earlier Chemical Pregnancy Test

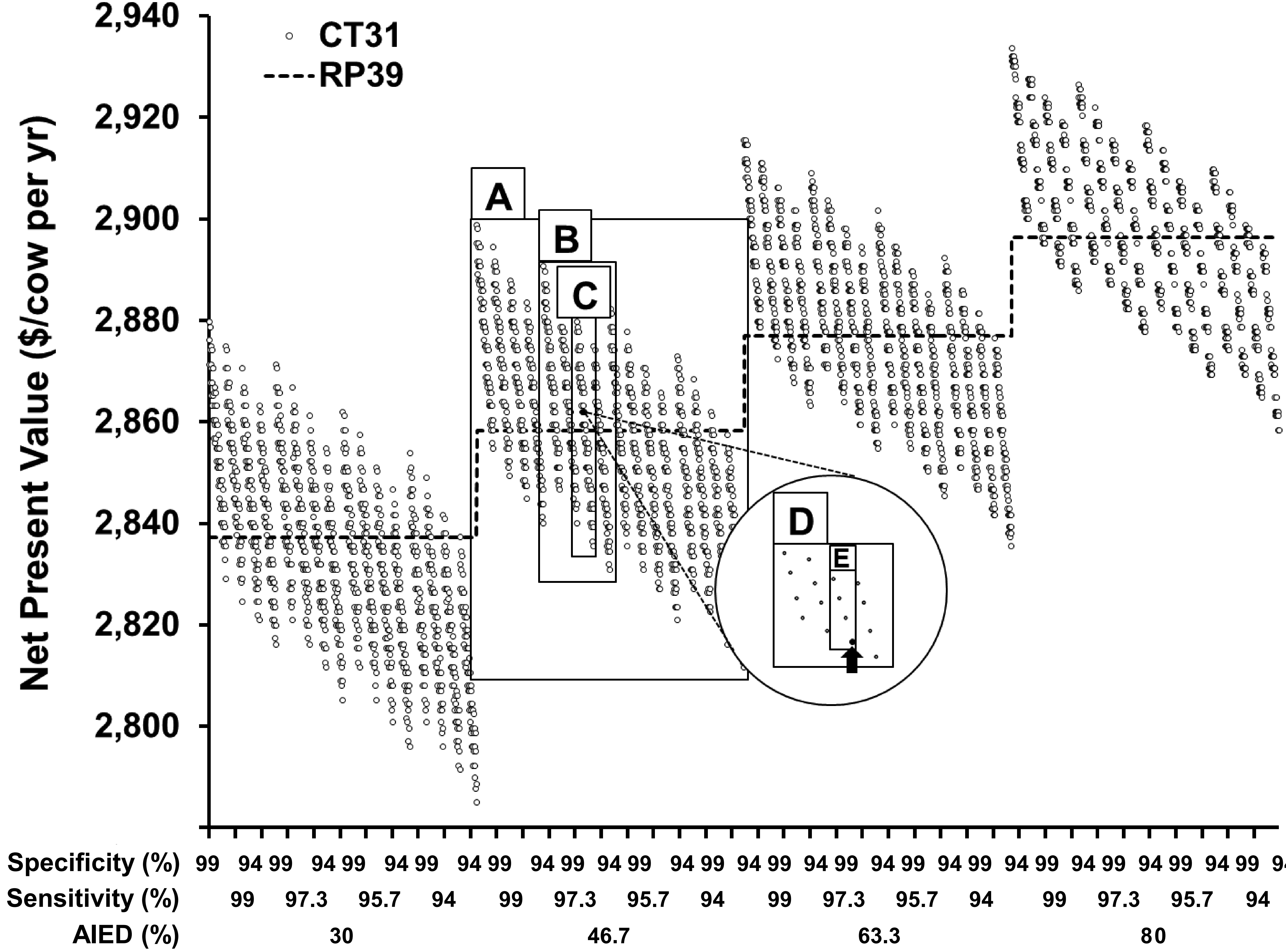
Assess the economic value of decreasing the interval between services and the impact of inaccuracies of earlier chemical tests

Giordano, J. O., P. M. Fricke, and V. E. Cabrera. *Accepted*. Economics of resynchronization strategies including chemical tests to identify non-pregnant cows. Journal of Dairy Science 00:00-00.


Chemical Test 31 d - 35 d Interbreeding interval
ED + AI
24 d
6 d
CT
1 d
56 h
TAI
GnRH
PGF
GnRH
1st AI
ED + AI
31 d
7 d
RP
56 h
TAI
GnRH
PGF
GnRH
Rectal Palpation 39 d – 42 d Interbreeding interval



IBI 28 d
IBI 35 d
IBI 42 d
IBI 49 d
IBI 56 d
Net Present Value ($/cow per yr)
2,990
2,940
2,890
2,840
2,790
2,740
30
40
50
60
70
80
90
Cows inseminated after detection of estrus (%)
CT
TU
RP



CT31
RP39
Net Present Value ($/cow per yr)
2,940
2,920
2,900
2,880
2,860
2,840
2,820
2,800
A
B
C
D
E
Specificity (%) 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94 99 94
Sensitivity (%) 99 97.3 95.7 94 99 97.3 95.7 94 99 97.3 95.7 94 99 97.3 95.7 94
AIED (%) 30 46.7 63.3 80

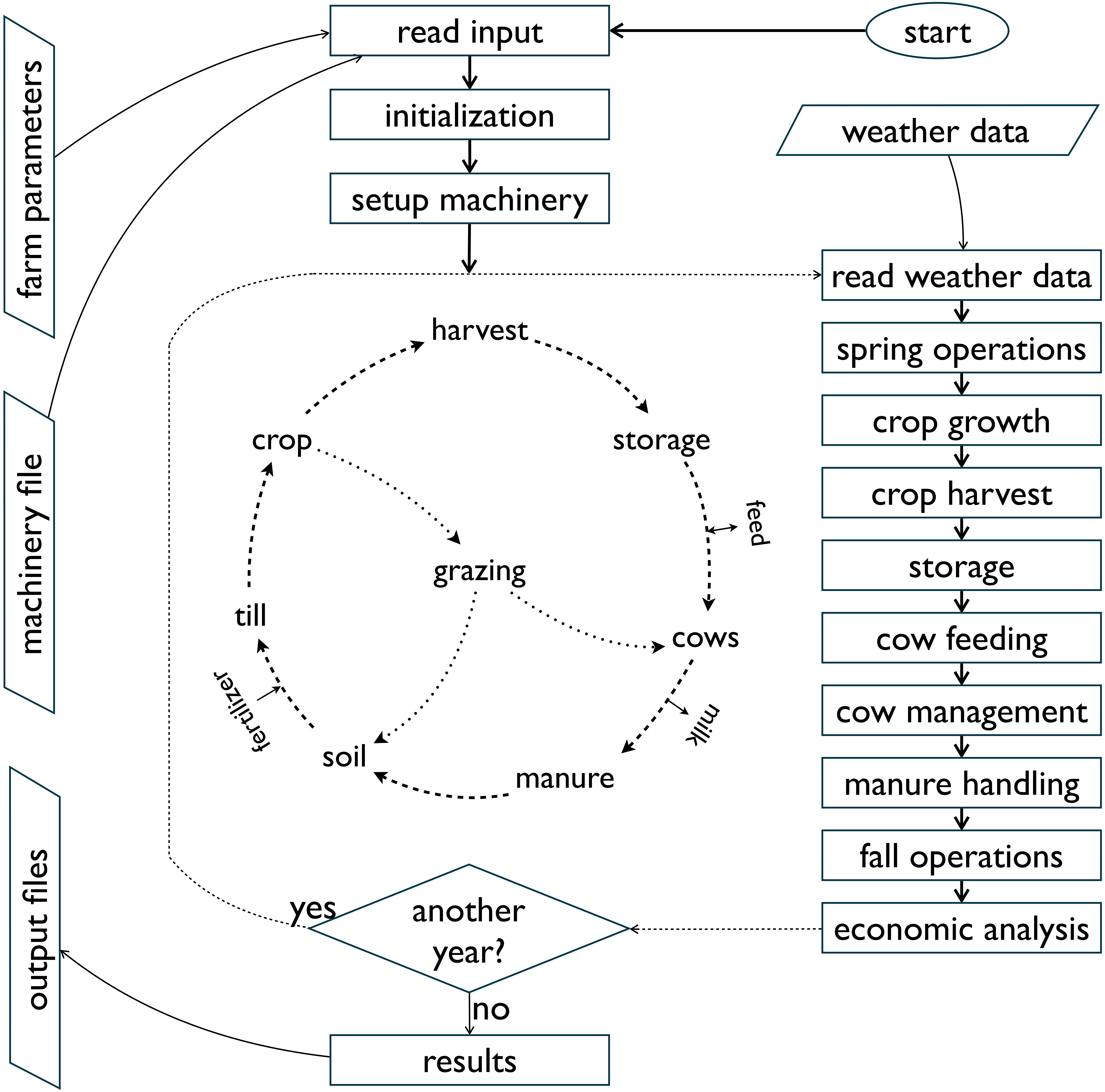
Animal Density and Green House Gas

Test the impact of animal density on GHG on 3 different dairy production systems in Wisconsin

Dutreuil, M., V. E. Cabrera, R. Gildersleeve, C. A. Hardie, and M. A. Wattiaux. 2012. Impact of animal density on predicted greenhouse gas emission on selected conventional, organic, and grazing dairy farms in Wisconsin. Journal of Animal Science 00 (E-Suppl. 1):00.

Farm system type	Non organic or grazing		Organic		Grazing	
Density	Current	Double	Current	Double	Current	Double
Number of cows	75	150	80	160	80	160
Stocking, cow/ha	0.46	0.92	0.49	0.99	0.59	1.18
Milk, kg/cow/year	25,725	25,544	10,480	10,480	11,002	11,002
Forages, ha	162.3		132.3		135.2	
Alfalfa, ha	57.1		69.6		135.2	
Grass, ha	28.3		62.7		0	
Corn, ha	76.9		0		0	

Integrated Farm System Model

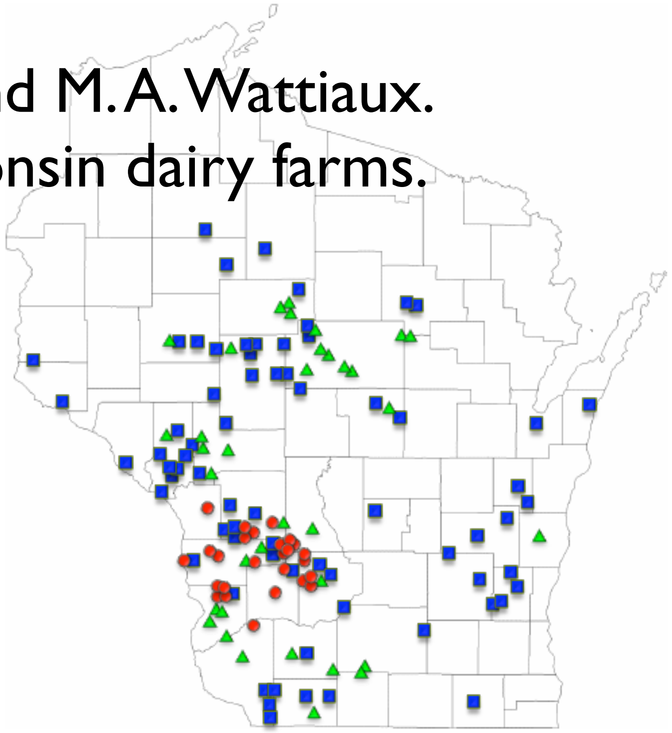


Farm system type	Non organic or grazing		Organic		Grazing	
Density	Current	Double	Current	Double	Current	Double
PGHGE (kg CO_2 eq /kg milk)	0.53	0.66	0.70	0.75	0.77	0.74
	(% total PGHGE)					
Housing	46.6	42.8	39.0	37.1	30.7	33.0
Manure	4.0	39.0	5.6	5.2	15.6	9.3
Feed	19.4	37.1	6.3	8.4	7.8	7.3
Grazing	4.9	30.7	34.7	31.8	13.6	15.4
CO_2	-34.4	33.0	-31.5	-30.0	-25.0	-25.9
Fuel	4.1	3.6	2.4	2.7	2.6	2.1
Secondary sources	21.1	5.6	11.9	14.8	29.7	32.8

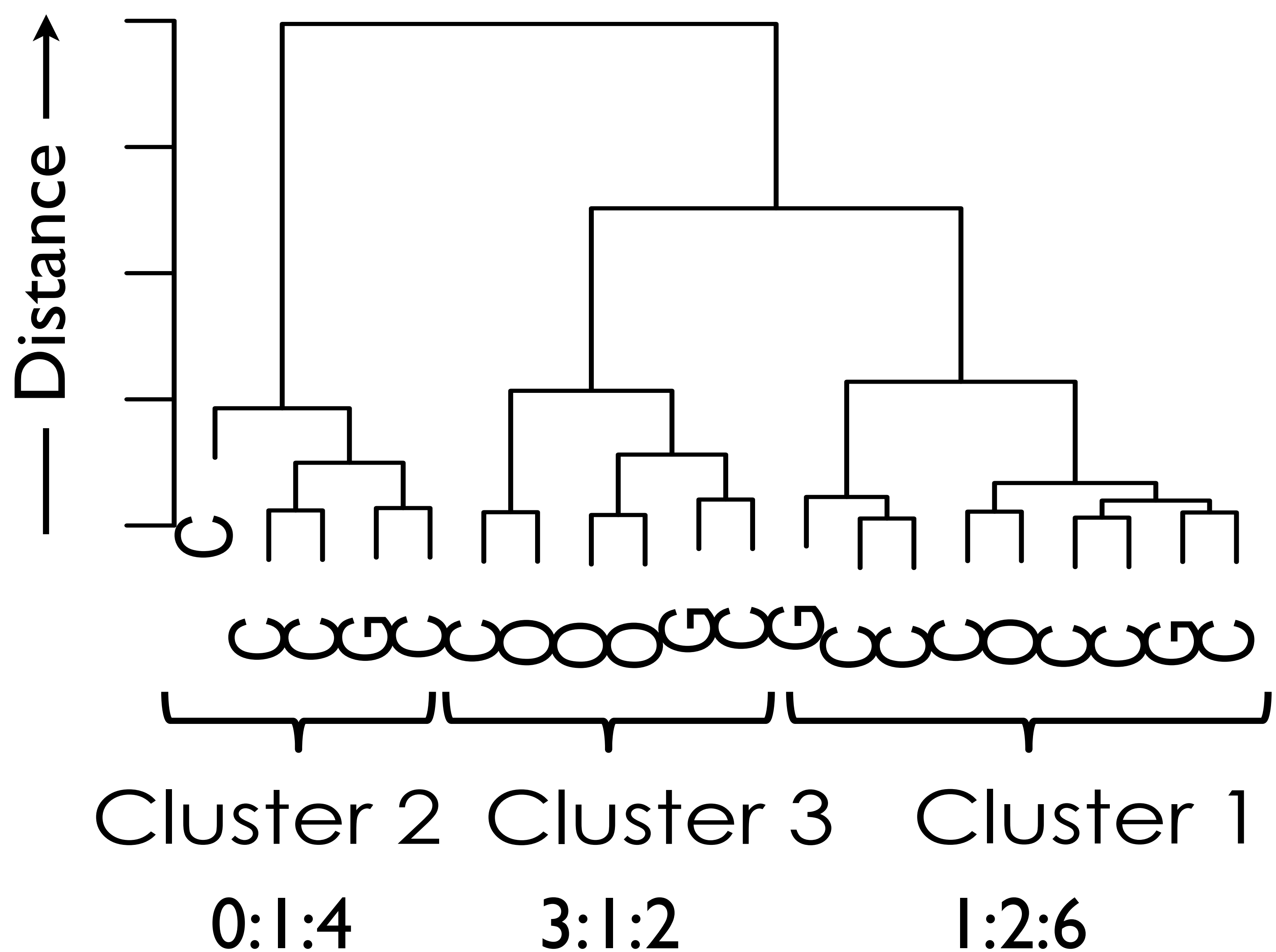
Profitability Cluster Analysis

Characterize and understand main factors associated with profitability on Wisconsin dairy farms

Dutreuil, M., V. E. Cabrera, R. Gildersleeve, C. A. Hardie, and M. A. Wattiaux. 2012. A cluster analysis to describe profitability on Wisconsin dairy farms. Journal of Animal Science 00 (E-Suppl. 1):00.



Factors Affecting Profitability



	Cluster 1	Cluster 2	Cluster 3
Total acres	287	236	134
Age of the respondent	49	44	49
Number of cows	72	71	48
Milk production (lbs/cow/year)	15,517	23,630	9,104
Fat content (%)	3.78	3.56	4.36
Protein content (%)	3.00	3.03	3.25
SCC (x1,000 cells/ml)	287	204	317
Milk price ($/cwt)	16.77	15.86	21.88
% milk not sold	1.65	0.49	3.08
Total DMI in winter (lbs/cow/day)	52.8	44.4	39.6
% grass/legume silage in winter	19.3	37.8	15.0
% hay in winter	37.8	0.9	61.8
% corn silage in winter	12.0	18.2	4.6
% concentrates in winter	30.0	42.4	16.2
% vitamins and minerals in winter	0.9	0.7	2.4
IOFC in winter ($/cow/day)	5.97	8.09	5.22

Cluster 2

Productive efficient, $8.09 IOFC

- Large land and herd size
- Highest milk productivity
- Highest concentrate in diet
- Poorest milk composition
- Lowest milk price

Cluster 1

Intermediate, $5.97 IOFC

- Largest land base
- Intermediate milk productivity, composition and price,
- highest DMI
- Intermediate levels of ingredients

Cluster 3

Low input, $5.22 IOFC

- Smallest land and herd size
- Lowest milk productivity
- Lowest DMI
- Best milk composition
- Best milk price


Thanks
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