Dairy Management

WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

DEPARTMENT OF DAIRY SCIENCE
University of Wisconsin-Madison

UW Extension
University of Wisconsin-Extension

The effect of parasitic diseases on fertility and the economy of dairy herds

Victor E. Cabrera
University of Wisconsin-Madison

CEVA Turkey Symposium

Parasitic diseases on dairy cattle

Caused for:
Internal or external parasites

Impair:
Health
Reproduction
Growth
Productivity

Internal:
Roundworms
Tapeworms
Flukes
Protozoa

External:
Mites
Lice
Ticks
Flies and Mosquitoes

Economics of reproduction

Economic net return: Strongly associated to reproductive performance

⇧**Reproductive performance:**

Most efficient part of lactation curve

Ferguson and Galligan, 1999

⇩ Costs of replacement and mortality

Galvao et al., 2013

⇧ On-farm replacements

Giordano et al., 2012

⇩ Relative reproductive costs

Giordano et al., 2012

21-d Pregnancy Rate (PR): Best single index of reproductive performance

Ferguson and Galligan, 1999

Measure **Standardize** **Benchmark**

Rate at which eligible cows become pregnant in successive 21-d periods

Integrates many other parameters that indicate reproductive performance

Managers of modern US commercial dairy herds use 21-d PR index

Economic impact of reproductive programmes: Difficult to assess

Series of recent simulation studies: Provide interesting clues and further direction

Giordano et al., 2011:
Partial budgeting, DSS

Giordano et al., 2012:
Daily Markov chains, DSS

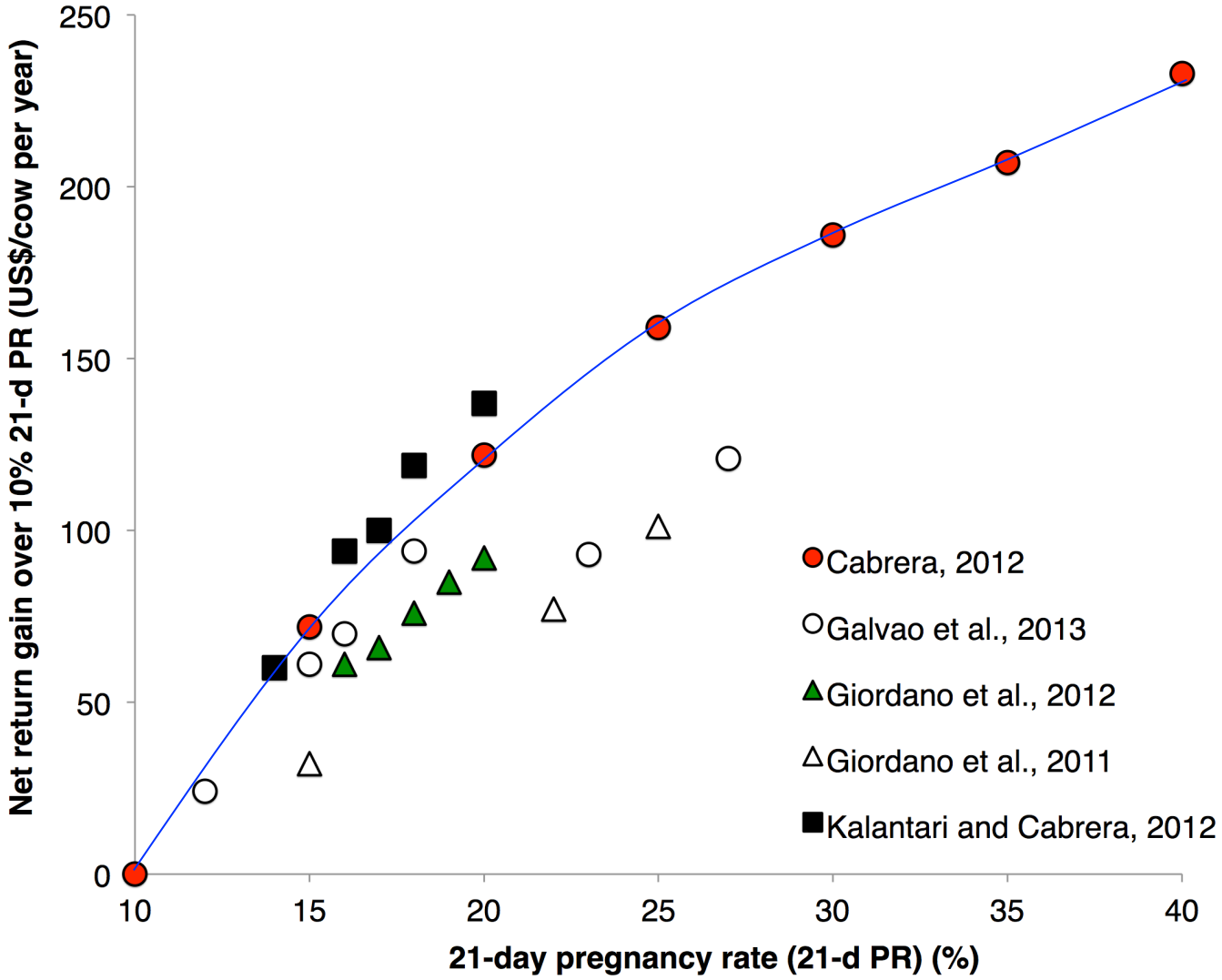
Cabrera, 2012:
Markov-Chain, DSS

Kalantari and Cabrera, 2012:
Markov-Chain, DSS

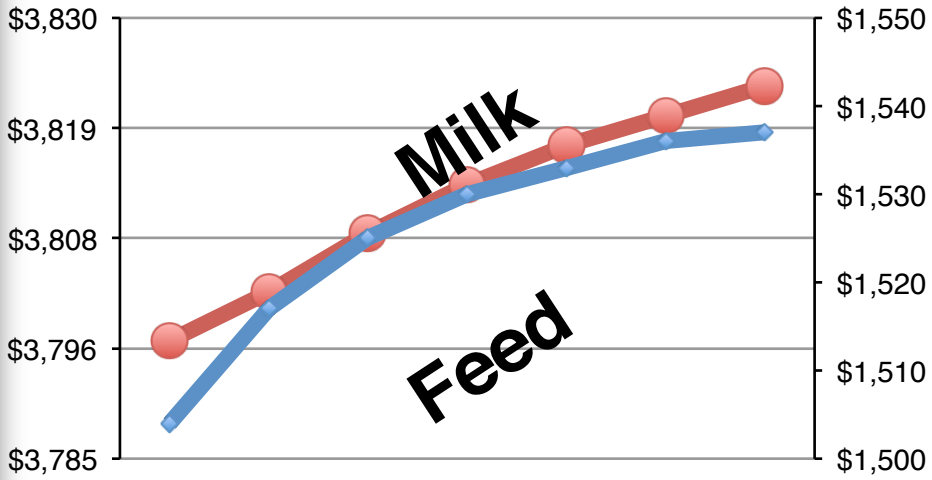
Giordano et al., 2013:
Decision theory

Galvao et al., 2013:
Monte Carlo

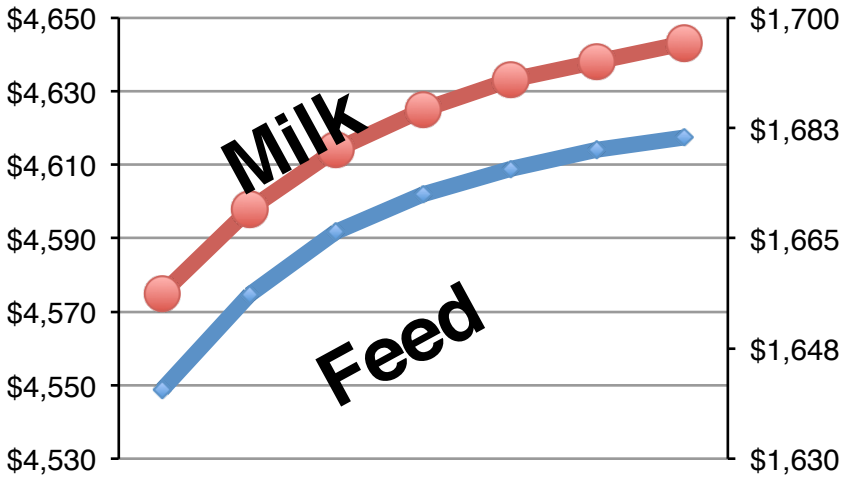
The economic value of improving reproductive performance



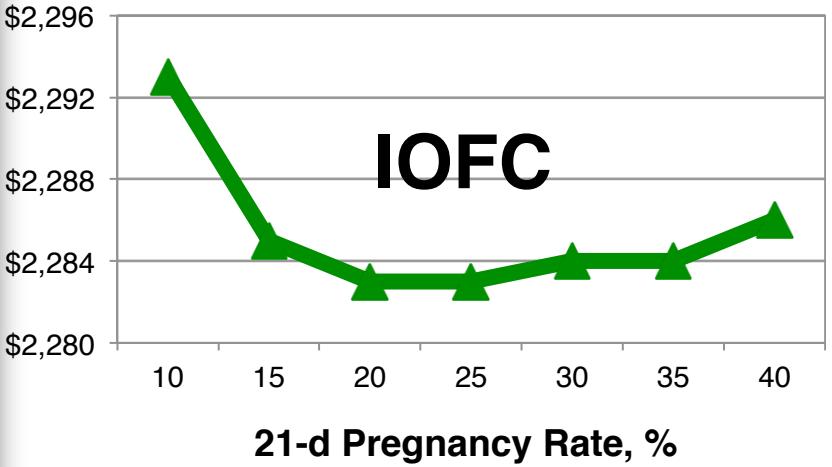
PR vs. milk, feed, and IOFC ($/cow.yr)

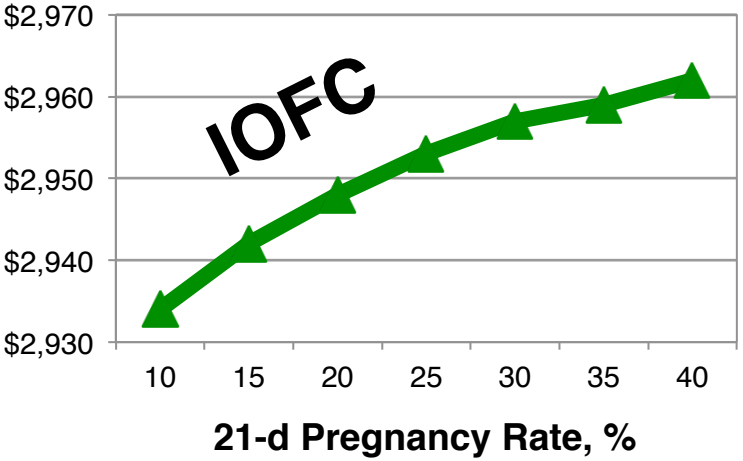


11,000 kg/cow.yr



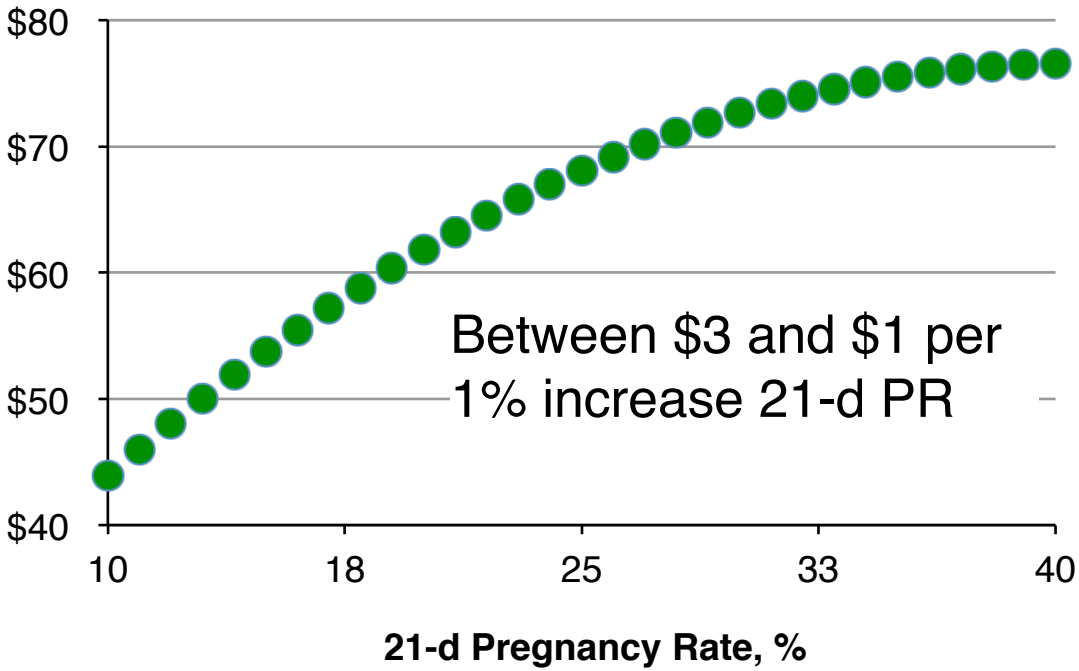
13,600 kg/cow.yr





Cabrera, 2012

PR vs. calf sales ($/cow.yr)



Return ($/cow.yr) =

$- 0.0352 (21\text{-d PR})^2$

$+ 2.8476 (21\text{-d PR})$

$+ 18.93 \quad (R^2=0.996)$

♂♀Calf value = $100

Cabrera, 2012

Study	♂♀Calf value, $	Gain, $/1% 21-d PR
Galvao et al., 2013	*$140*	***$1 to $3****
Giordano et al., 2012	*$90*	***$2 to $1***

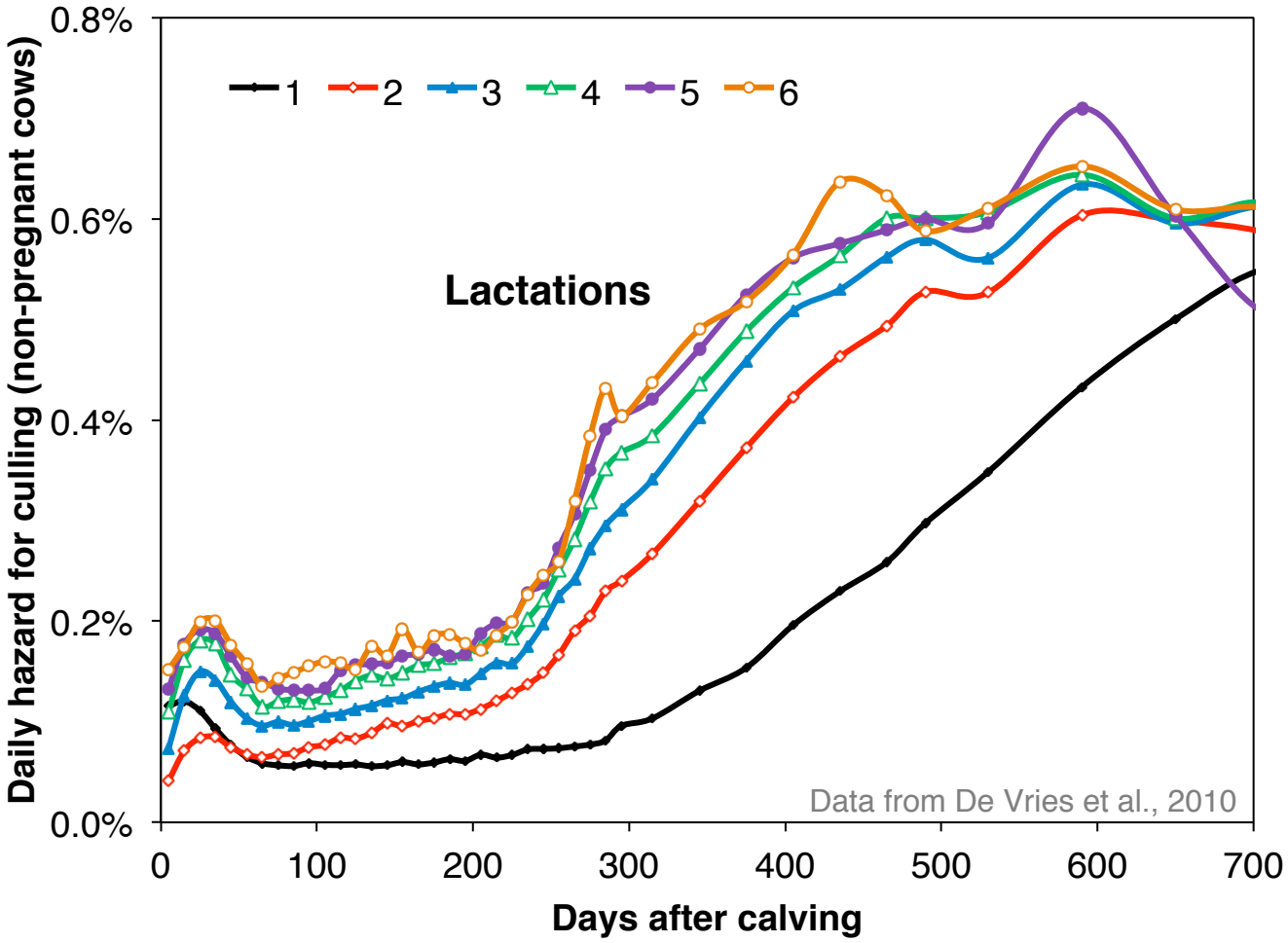
PR vs. replacement supply

⇧21-d PR →⇧Selective culling Souza et al., 2013

21d-PR, % (different reproductive programs)	Replacement balance (per 1,000 cow herd) when breeding cutoff was at 300 DIM	NEW breeding cutoff to balance the heifer supply and demand, DIM	Approximated net return change compared to 300 DIM breeding cutoff, $/cow.yr
14	*-14*	*310*	*-5*
15	*0*	*300*	*0*
16	*15*	*281*	*+5*
17	*20*	*270*	*+6*
18	*38*	*240*	*+7*
19	*40*	*240*	*+8*
20	*48*	*235*	*+9*

From Giordano et al., 2012

PR vs. replacement & mortality costs



Lower Costs
$/cow.yr
⇧1% 21-d PR

$4 to $1
Cabrera, 2012

$4 to $3
Giordano et al., 2012

$27 to $4
Galvao et al., 2013

Pregnant **= Less risk than non-pregnant (e.g., 75% less risk)**

Mortality **= Proportion of culling risk (e.g., 17% of that risk)**

PR vs. reproductive costs

- ⇧PR (no investment) → ↓ Reproductive costs
- ⇧PR may require ↑ investments
- Depends on investments vs. ⇧PR
- Seems to be inconsistent among studies

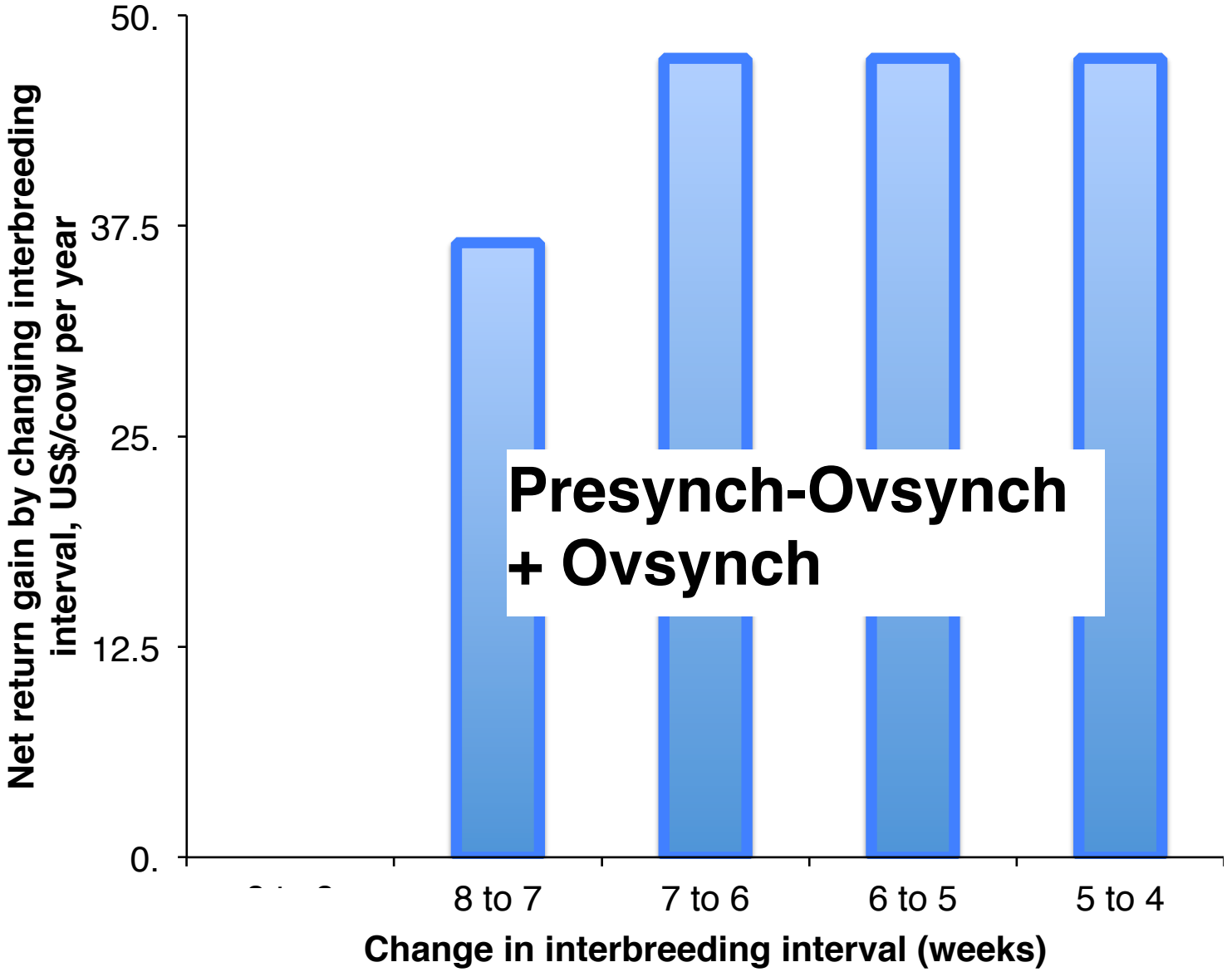
$/cow.yr ⇧1% 21-d PR

-$4 **+$4**

http://DairyMGT.info/Tools

The Wisconsin-Cornell Dairy Repro$ Tool could be used for farm-specific assessments

Interbreeding interval vs. net return



Adapted from Giordano et al., 2013

Anoestrus and parasitic diseases

- Anoestrus is a major problem in the tropics and subtropics, where inadequate nutrition, high ambient temperature, **high parasite burdens** and disease **exacerbate** the problem. FAO (www.fao.org)

- Anoestrus therefore decreases the herd's PR

- Economic loss can be expected between $30 to $10/cow per year for each 1 percentage point decrease in 21-d PR

Worms and fertility

- Fertility rates in adult cows can be improved by worm treatments (mydairyvet.com)

- Elimination of parasites around calving can be associated with improved transition period (improved energy balance) and therefore improved fertility (norbrook.com)

- Remember that every 1 percentage 21-d PR would mean as much as $30 or $10 per cow per year

The value of a cow and reproduction

Important relationship for decision-making

Opportunities for cow-level reproductive management. E.g.,

High value cow → more inseminations
High value cow → better care (parasites)
Low value cow → lower quality semen

Associated economic values could be used to enhance the value of reproductive programs. E.g.,

The value of a new pregnancy
The cost of a pregnancy loss
The cost of an additional day open

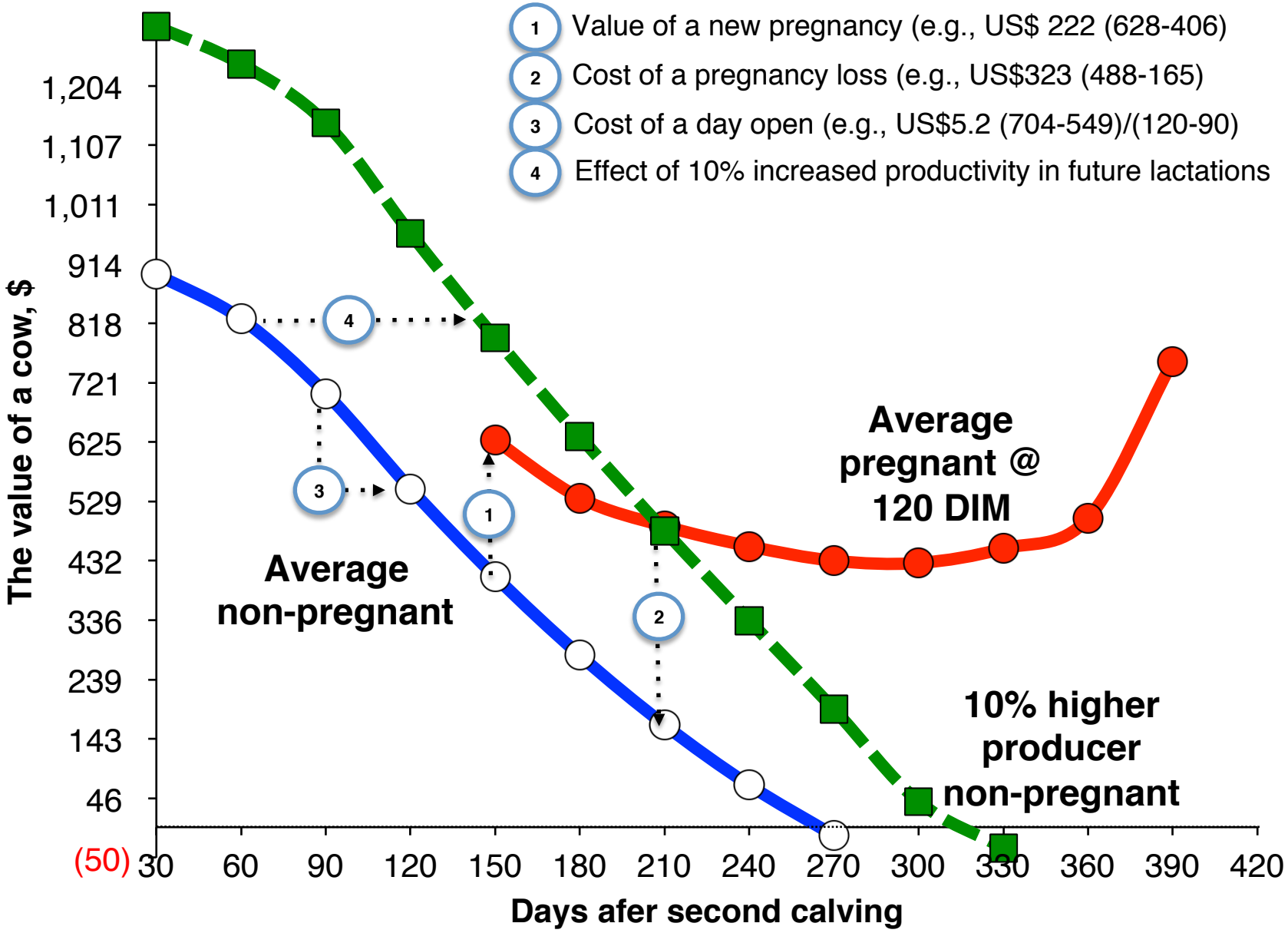
The value of a cow

Long-term expected net return of a cow compared with that of an imminent replacement

Critical factors

- **Cow's productivity level in relation to herd mates**
- **Replacement's genetic improvement in relation to herd mates**
- **Cow's current conditions**
    - **Lactation**
    - **Days after calving**
    - **Pregnancy status**

The value of a cow



Cost of abortion because of parasites

Neospora caninum is a protozoal parasite that appears to cause abortions, sporadically in the middle of gestation (4-5 months), although they can occur anywhere from about 3 months onward (Virginia Tech Extension)

Trichomoniasis. Another protozoan parasite known as Tritrichomonas foetus causes uterine infection and abortions, which may be accompanied by discharge of pus (NSW Australia)

The cost of a pregnancy loss

INPUTS - Edit Values in This Block	
Evaluated Cow Variables	
Current Lactation	2
Current Months after Calving	8
Current Months in Pregnancy	6
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, kg/cow per year	10890
21-d Pregnancy Rate, %	18
Reproduction Cost, $/cow per month	20.00
Last Month After Calving to Breed a Cow	10
Do-not-Breed Cow Minimum Milk, kg/day	22.68
Pregnancy Loss after 35 Days Pregnant, %	22.6
Average Cow Body Weight, kg	592.39
Herd Economic Variables	
Replacement Cost, $/cow	1300.00
Salvage Value, $/kg live weight	0.84
Calf Value, $/calf	100.00
Milk Price, $/kg	0.35
Milk Butterfat, %	3.5
Feed Cost Lactating Cows, $/kg dry matter	0.22
Feed Cost Dry Cows, $/kg dry matter	0.18
Interest Rate, %/year	6

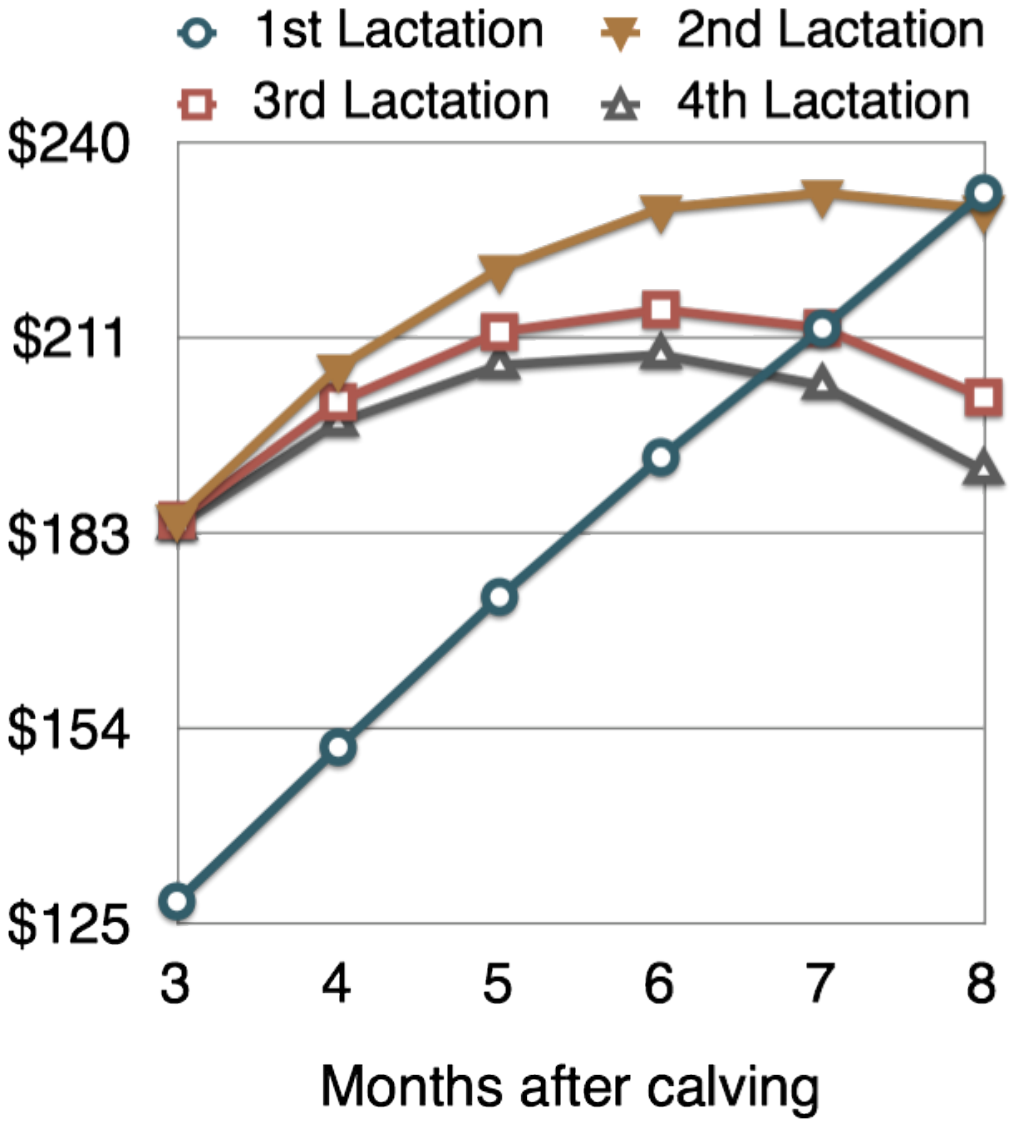
OUTPUTS - Interactive Results	
Value of the Cow, $	507
Compared Against a Replacement, $	
Milk Sales, $	-67
Feed Cost, $	-111
Calf Value, $	71
Non-reproductive Cull, $	-111
Mortality Cost, $	-21
Reproductive Cull, $	21
Reproduction Costs, $	20
Replacement Transaction, $	704
Herd Structure at Steady State	
Days in milk	224
Days to Conception	122
Percent of Pregnant	52
Reproductive Culling, %	8

Changes to $71 if **aborted**
So, a loss of **$436**

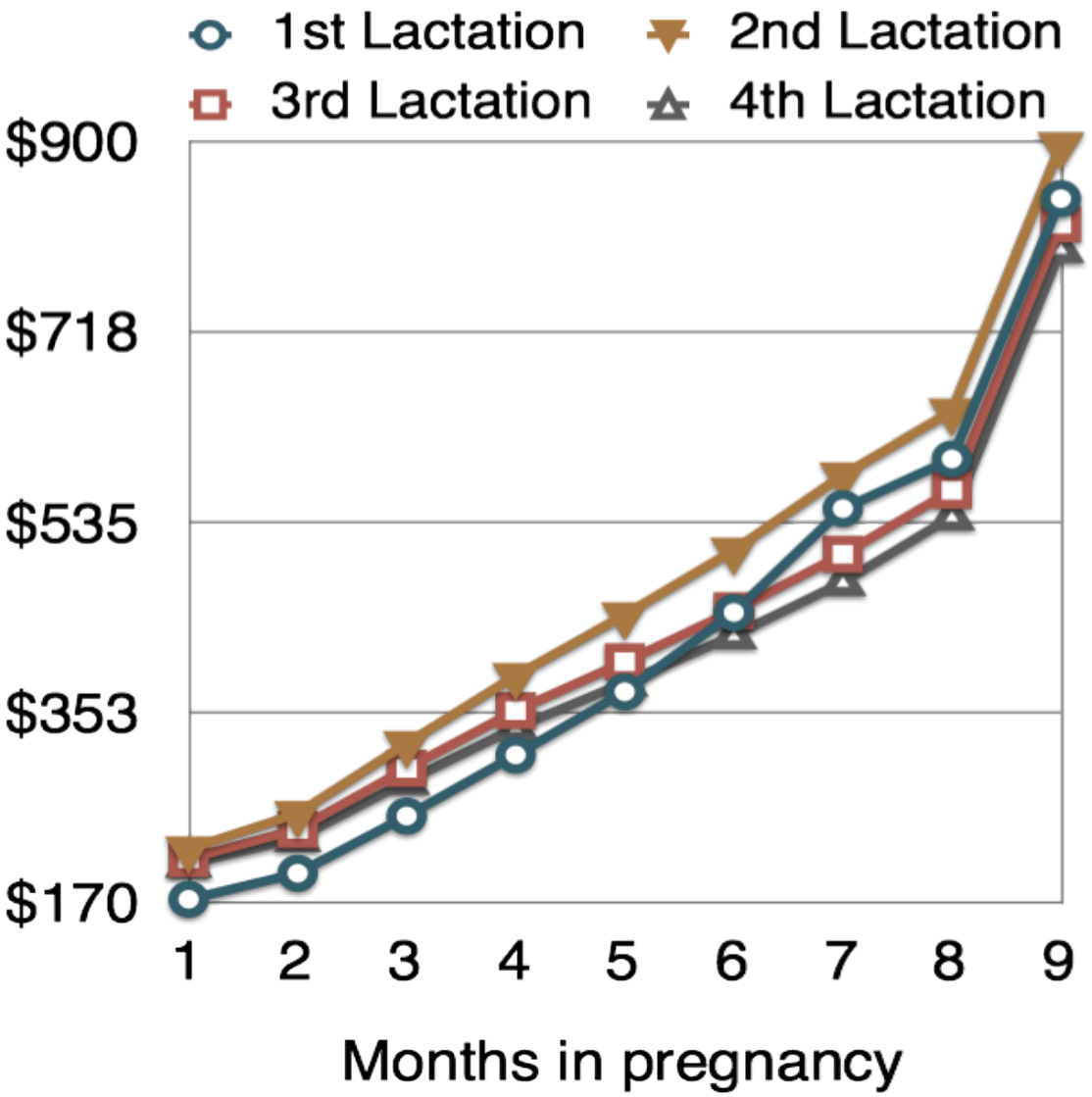
The tool Economic Value of a Dairy Cow can be used to calculate the cost of a pregnancy loss, value of a new pregnancy, or cost per day open

http://DairyMGT.info/Tools

The value of a new pregnancy



The cost of a pregnancy loss



The cost of a pregnancy loss

Depends on many other factors

Higher loss when

- **Cow's higher productivity**
- **Herd's low 21-d PR**
- **Higher milk price**
- **Higher replacement cost**

Conclusions

- **Reproductive efficiency has a large economic impact on dairy cattle production**
- **Parasitic diseases impair, directly or indirectly, fertility of dairy cows**
- **Therefore, parasitic diseases appear to have an important economic impact on dairy cow fertility**
- **No study has quantified the actual impact of parasitic diseases on dairy cow fertility**

Conclusions

- **Studies indicate some parasitic diseases increase the risk of abortion in mid gestation**
- **Abortions happening between 4 and 6 months in pregnancy cost between $350 and $500 for an average cow**
- **Parasitic diseases also decrease the overall herd fertility and consequently the 21-d PR**
- **Every 1 percentage point lower 21-d PR can be associated with $30 to $10/cow per year less net return**