The Economic Value of a Dairy Cow

Victor E. Cabrera
University of Wisconsin-Madison

What is the cow value?

What the cow value means?

Discounted future net return of a cow
Compared to a replacement

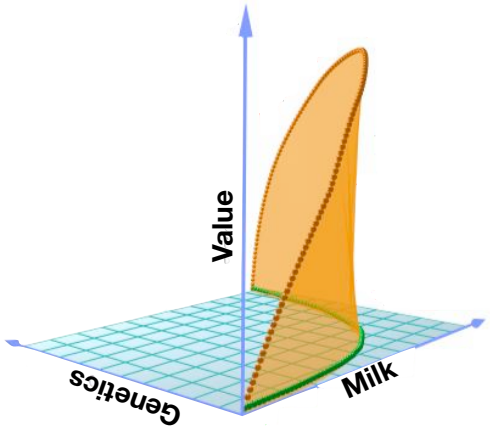
Net return of a cow minus net return of a replacement
Includes the replacement transaction cost

Vs.

General interpretation
- Positive cow value = keep
- Negative cow value = replace

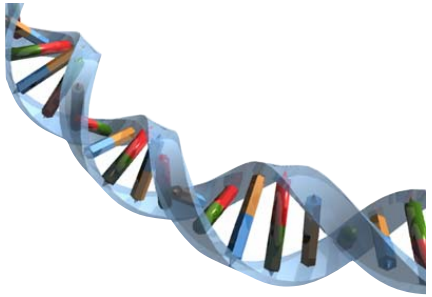
Important factors

Variables with large impact



Cow expected milk production

- This lactation
- Future lactations



Replacement

Expected genetic gain

Why to worry about the cow value?

Critical economic implications

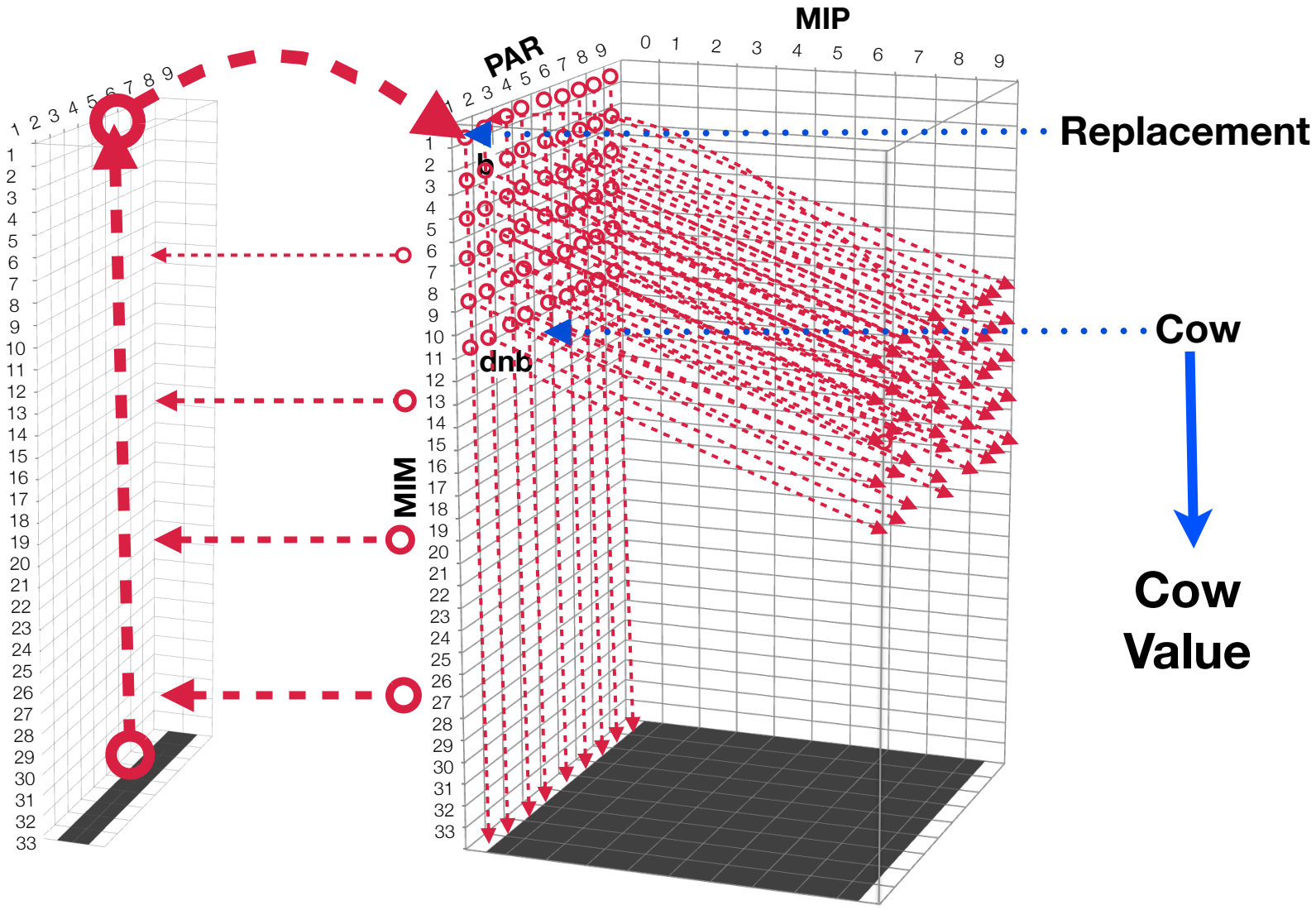
Optimal management
Keep or replace

Crucial decisions
Breed or not breed

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

How to calculate the cow value?

Markov chains to simulate herd dynamics



Cabrera, 2012

Data required for model

Evaluated cow

Current state

- Lactation (PAR)
- Months after calving (MIM)
- Pregnancy (MIP)

Expected milk production

- Rest current lactation
- Next lactations

Data required for model

Replacement heifer

Genetic improvement

- Expected productivity gain with the replacement

Data required for model

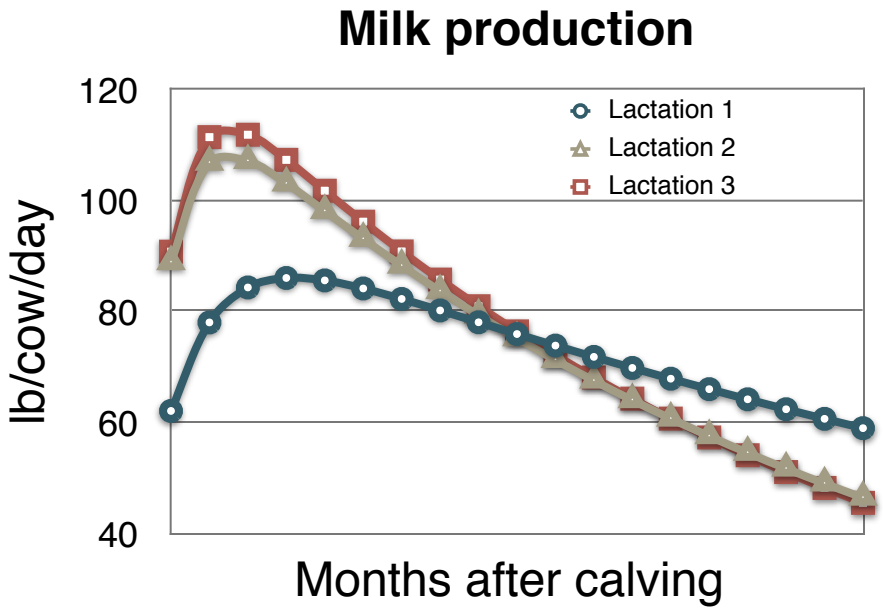
Herd level

Milk production

- Rolling herd average
- Butterfat content

21-d pregnancy rate

Percentage of cows becoming pregnant every 21 days



Data required for model

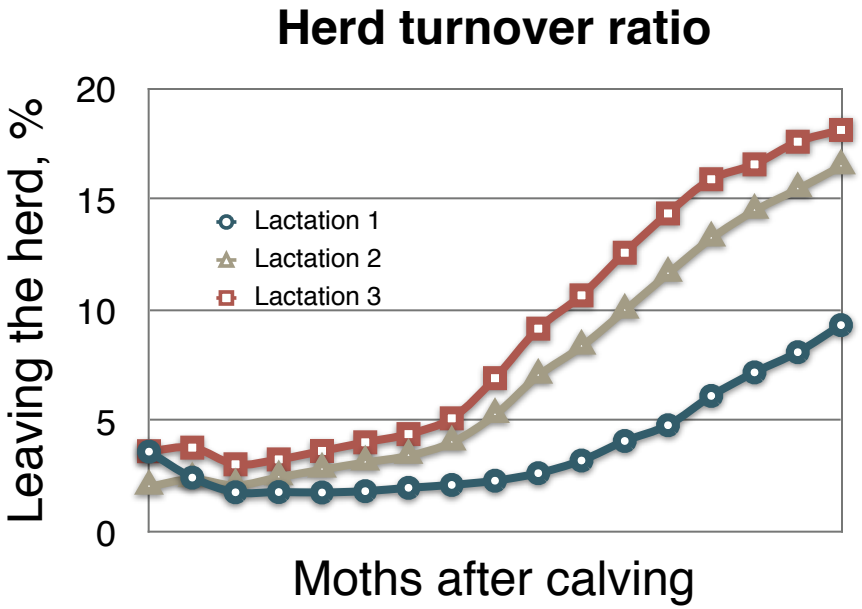
Herd level

Herd turnover ratio

Percentage of animals leaving the herd

Reproductive replacement

- Last month to breed non-pregnant cows
- Milk threshold to replace do-not-breed cows



Data required for model

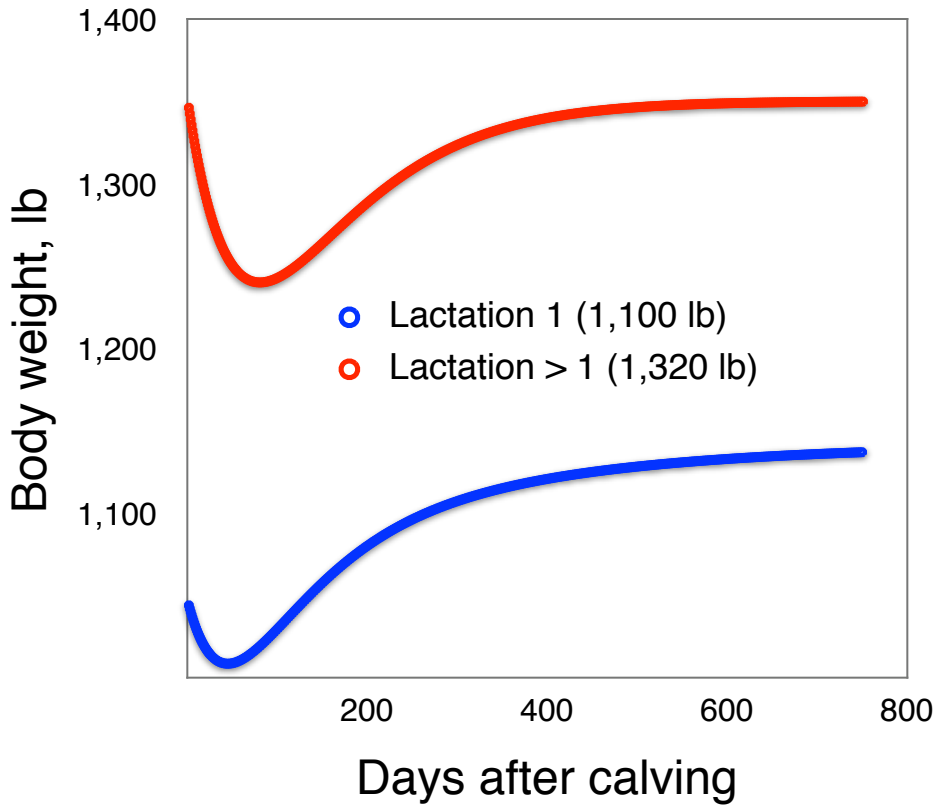
Herd level

Body weight

- Within a lactation
- Between lactations

Pregnancy loss

Abortion of pregnant cows between 35 days and end of gestation



Data required for model

Farm data, economic variables

Milk price

Feed cost

Reproductive cost

Replacement cost

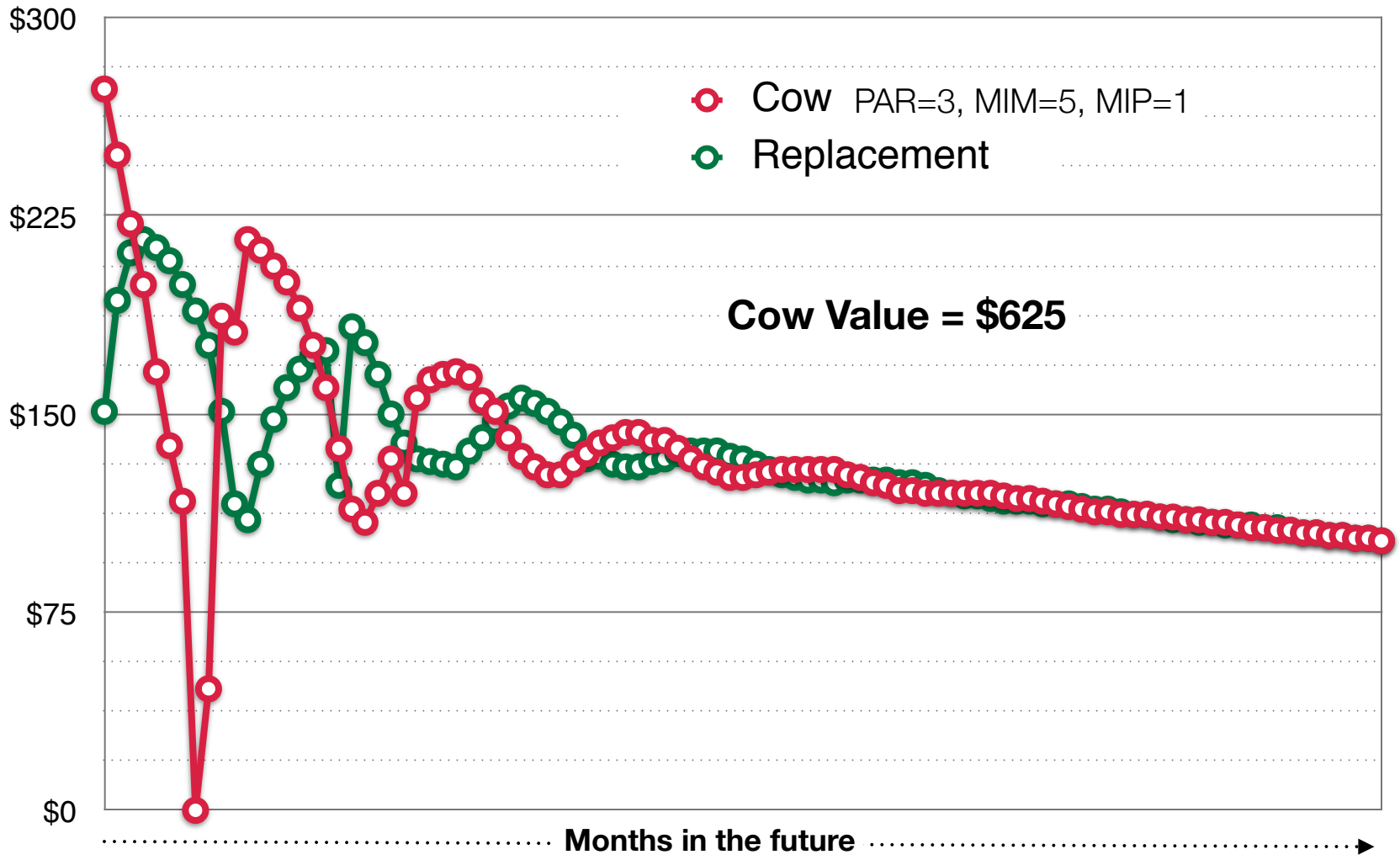
Salvage value

Calf value

Interest rate

Economic net return

Expected future net returns

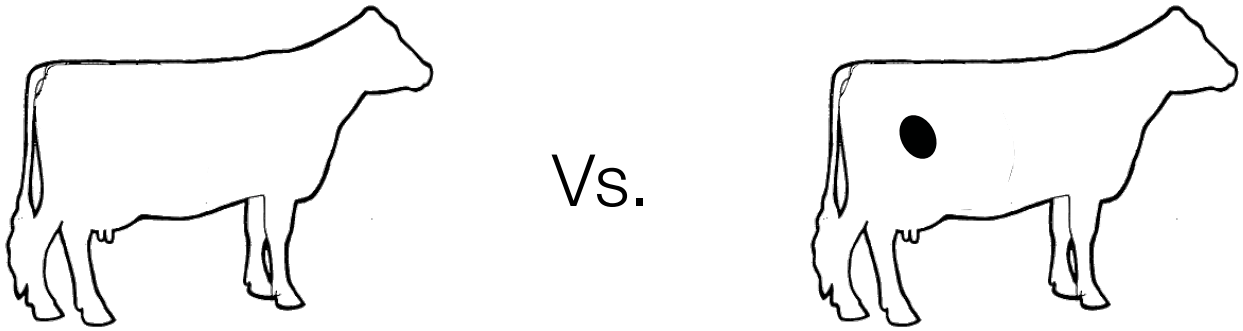


The value of a new pregnancy

How much more when a cow becomes pregnant?

Difference in cow value:

- Cow becoming pregnant
- Cow remaining non-pregnant

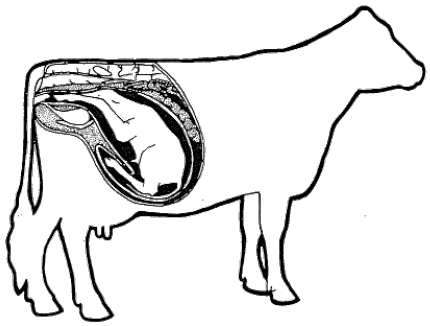


The cost of a pregnancy loss

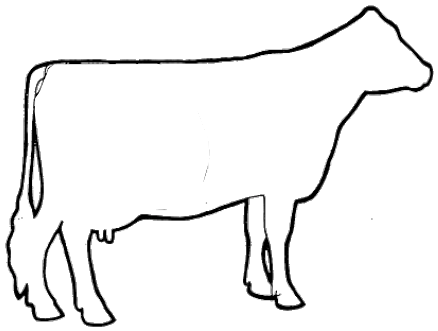
How much less when a cow aborts?

Difference in cow value:

- Cow being pregnant
- Cow losing pregnancy



Vs.



Model illustration

Herd baseline data

Herd turnover ratio, %/year	35
Rolling herd average, kg/cow per year	10,896
21-d pregnancy rate, %	18
Reproduction cost, $/cow per month	20
Last MIM to breed a cow	10
Milk threshold, kg/cow per day	22.7
Pregnancy loss after 35 d pregnant, %	22.6
Average cow body weight, kg	593

Cabrera, 2012

Model illustration

Herd baseline data

Replacement cost, $/cow	1,300
Salvage value, $/kg live weight	0.84
Calf value, $/calf	100
Milk price, $/kg	0.35
Milk butterfat, %	3.5
Feed cost for lactating cows, $/kg dry matter diet	0.22
Feed cost for dry cows, $/kg dry matter diet	0.18
Interest rate, %/year	6

Cabrera, 2012

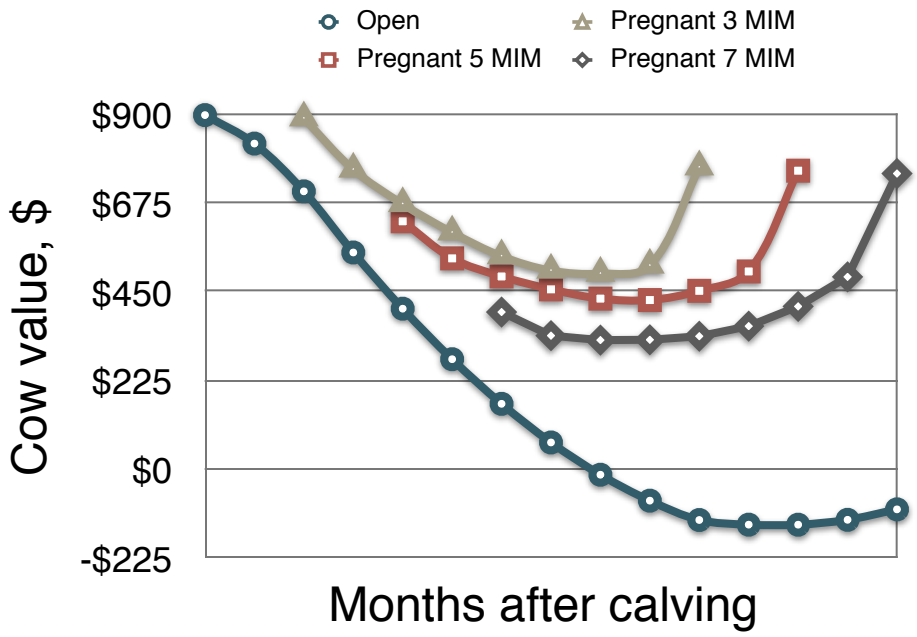
Model illustration

Average cow and replacement

Open cow value
- Decreases
- Becomes negative

Pregnant cow value
- Higher than open
- U-shaped
- Similar value at calving

Overall cow value
- Increases to 3rd or 4rd lactation



Model illustration

The value of a new pregnancy, $

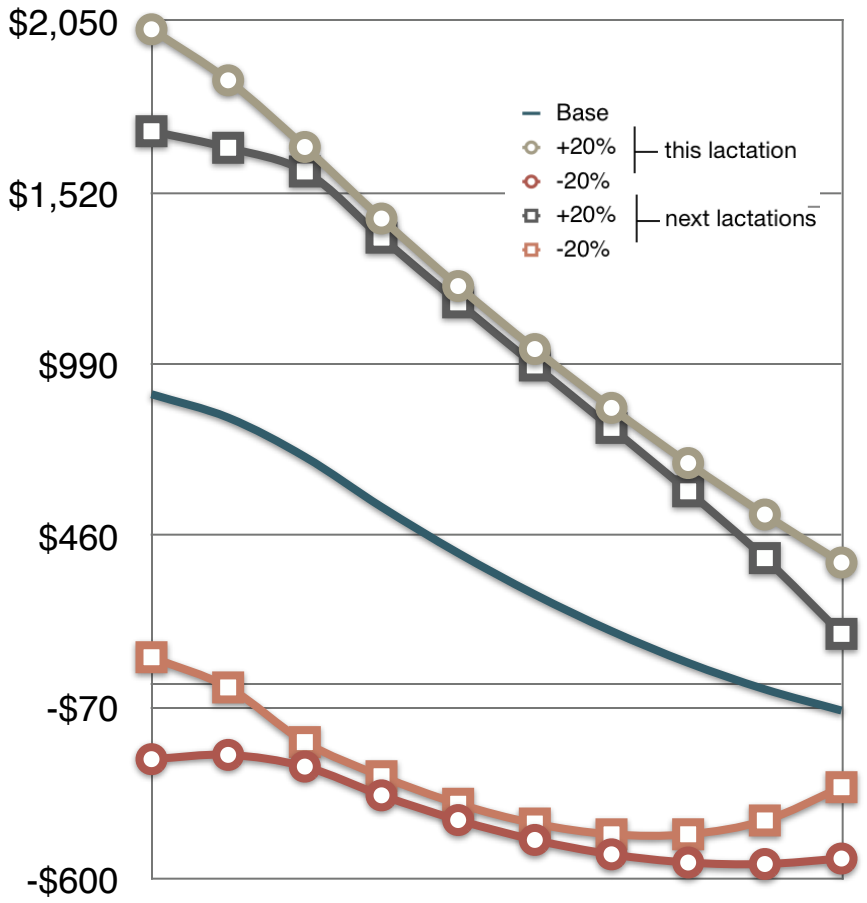
					Culling				
PAR	MIM	**Cow value**	Milk	Feed	Repro.	Non-Repro.	Morta-lity	Calf	Repro. cost
1	4	**151**	36	-34	45	26	5	29	45
1	6	**194**	40	-40	73	39	8	32	41
1	8	**233**	22	-43	116	55	10	36	36
3	4	**202**	46	-17	43	46	9	26	49
3	6	**215**	39	-25	69	50	9	27	47
3	8	**203**	-9	-29	108	53	10	27	43
5	4	**196**	36	-17	37	55	10	26	49
5	6	**203**	25	-22	60	57	11	26	47
5	8	**186**	-24	-25	94	61	12	26	44

Model illustration

The impact of expected milk productivity

Cow MIM = 8 and MIP = 2

Rest lact.	Next lact.	1st lact.	2nd lact.	3rd lact
120	120	2,458	2,038	2,002
120	100	1,045	877	829
120	80	-380	-284	-345
100	120	1,891	1,499	1,477
100	**100**	**479**	**338**	**304**
100	80	-934	-823	-870
80	120	1,325	961	952
80	100	-88	-200	-221
80	80	-1,501	-1,361	-1,395

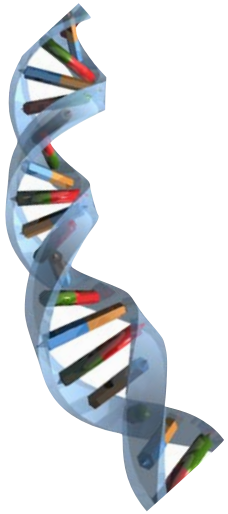


Model illustration

The impact of genetic gain with a replacement

Replacement genetic gain

- Cow value is $211 lower for every 1% expected milk productivity of replacement



Decision support system

Perform your own calculations

Cow value is farm specific
Every farm is different



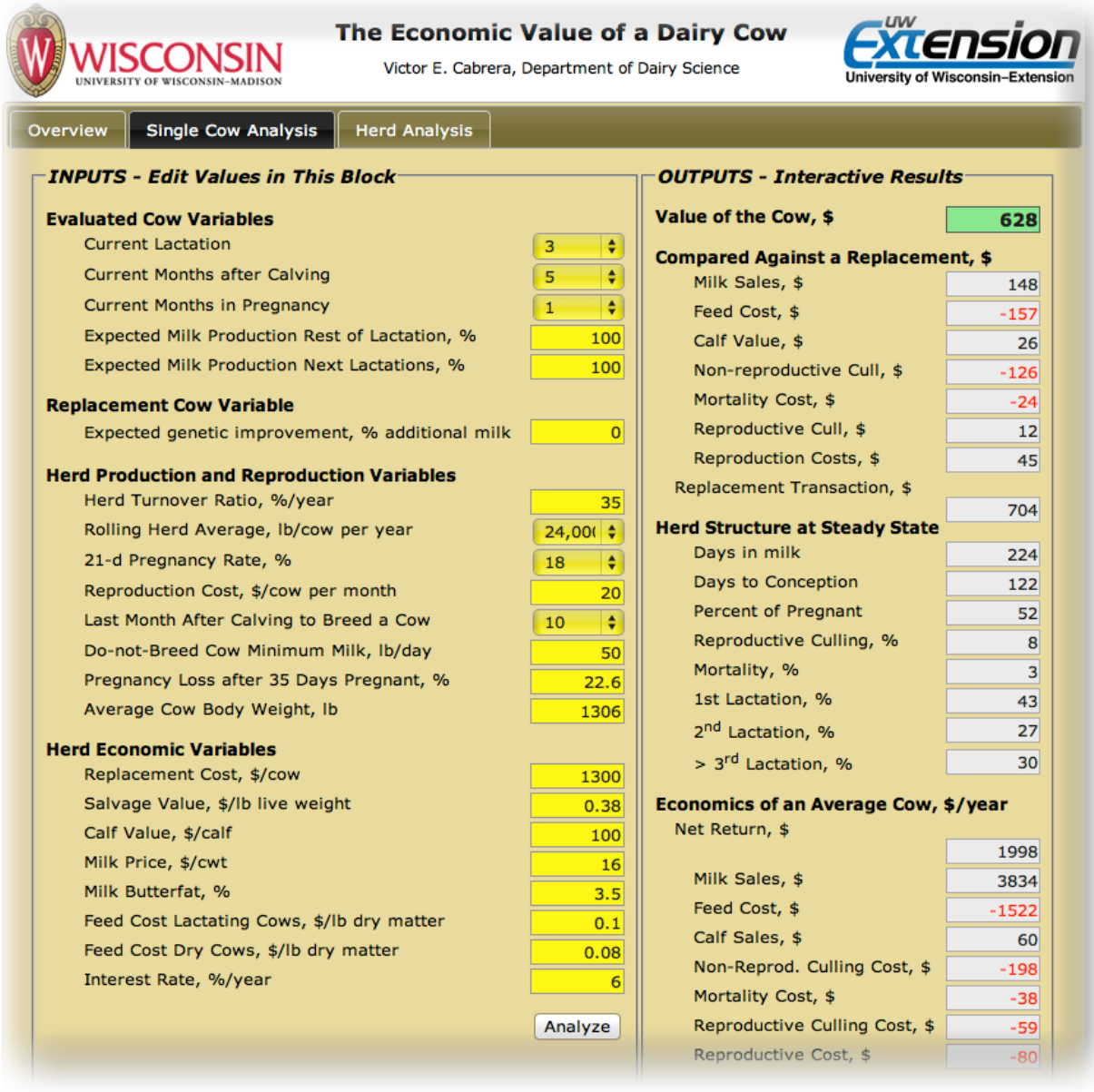

Farm conditions change dynamically
Cow value and cow net return change

Market conditions change permanently
Might impact decisions

User-friendly application
Easy to use, still robust

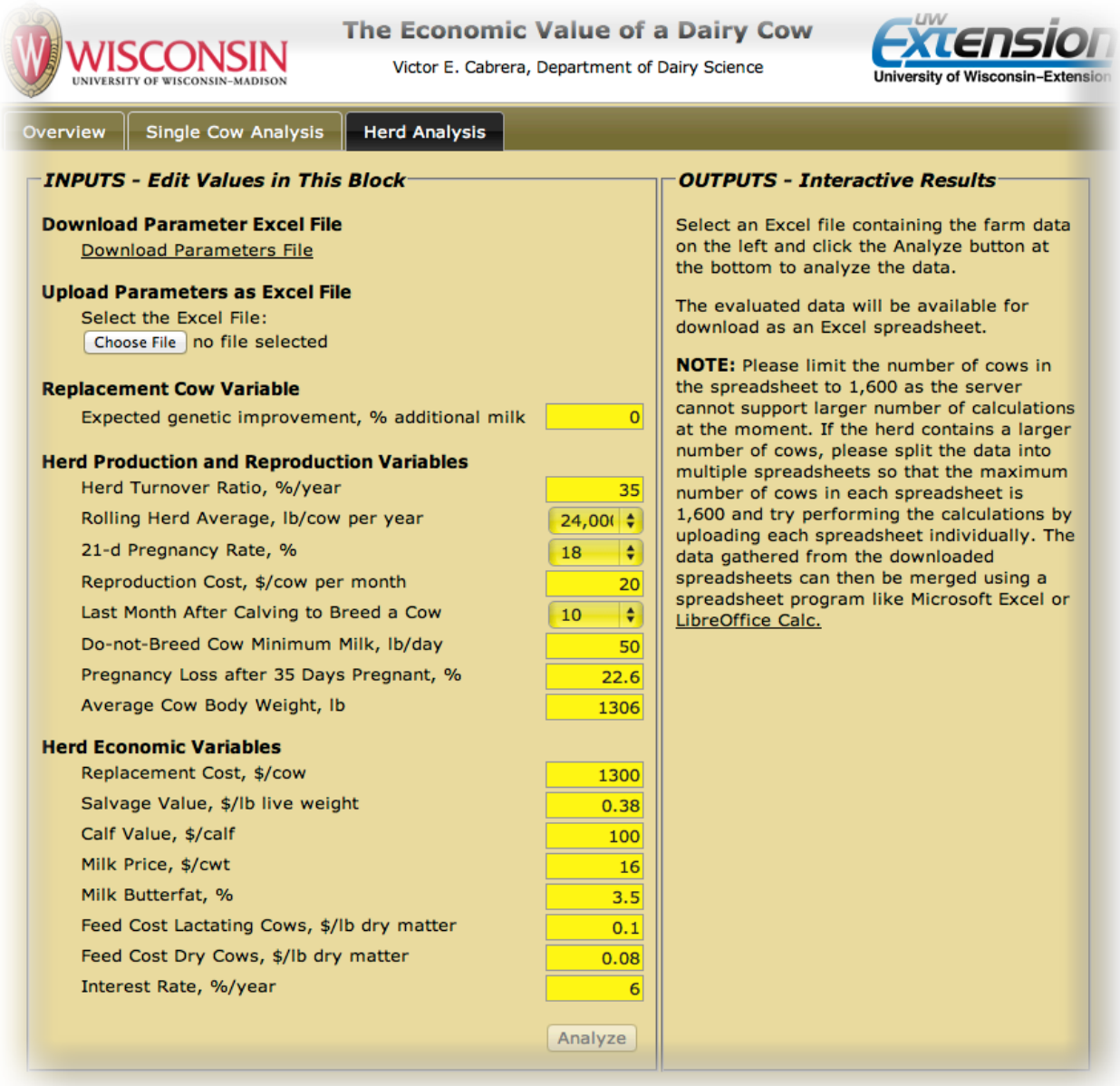
The economic value of a dairy cow

Freely and openly available



The economic value of all cows in a herd

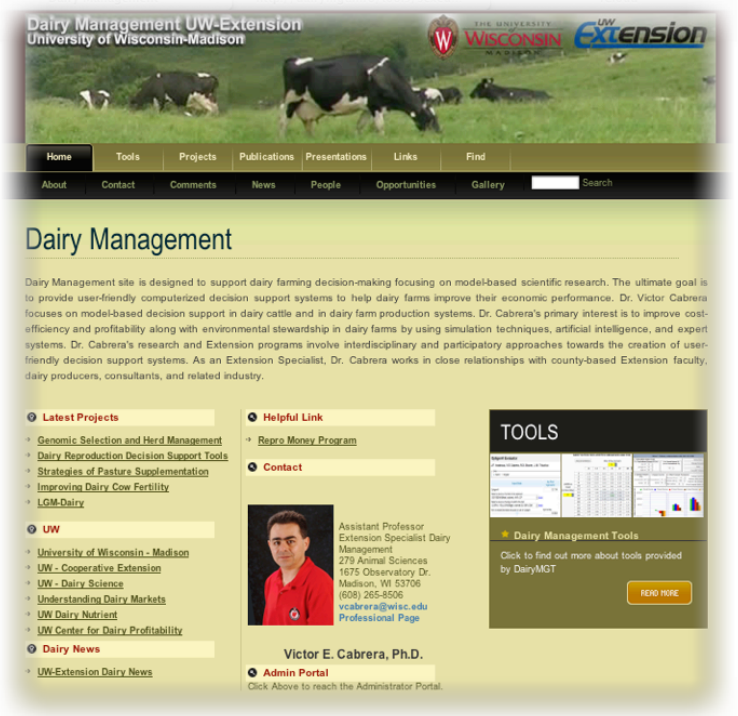
Use the herd analysis



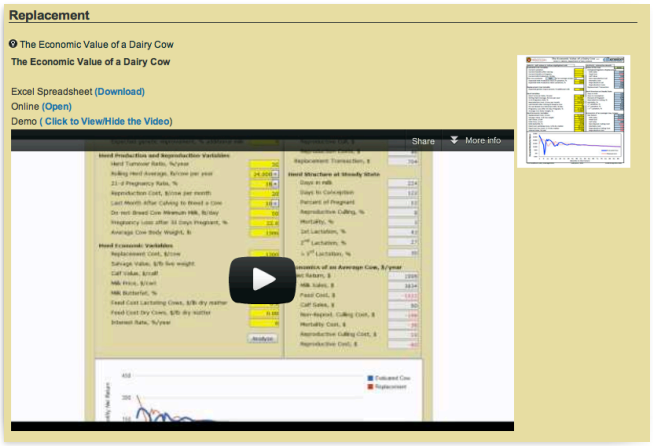
The economic value of a dairy cow

Where to find it

DairyMGT.info



Tools



Examples of uses

How the tool could help decision making

Time to replace a cow
- Cow value is negative
- Include milk expectancy
- Include genetic gain

Herd performance
- Herd demographics
- Herd net returns

The value of a:
- Pregnancy
- Day open
- Pregnancy loss

Sorted list of cow values
- Candidates for replacement
- Best performing animals
- Treatment decisions

Cow ID	Cow value, $
5892	-1,123
6344	-243
435	-10
221	269
5543	2,213

Acknowledgement

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