Dairy Management

WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

DEPARTMENT OF DAIRY SCIENCE
University of Wisconsin-Madison

UW Extension
University of Wisconsin-Extension

Helping dairy farmers to improve economic performance utilizing data-driven DSS tools

UW-Dairy Management
Decision Support TOOLS

Victor E. Cabrera
University of Wisconsin-Madison

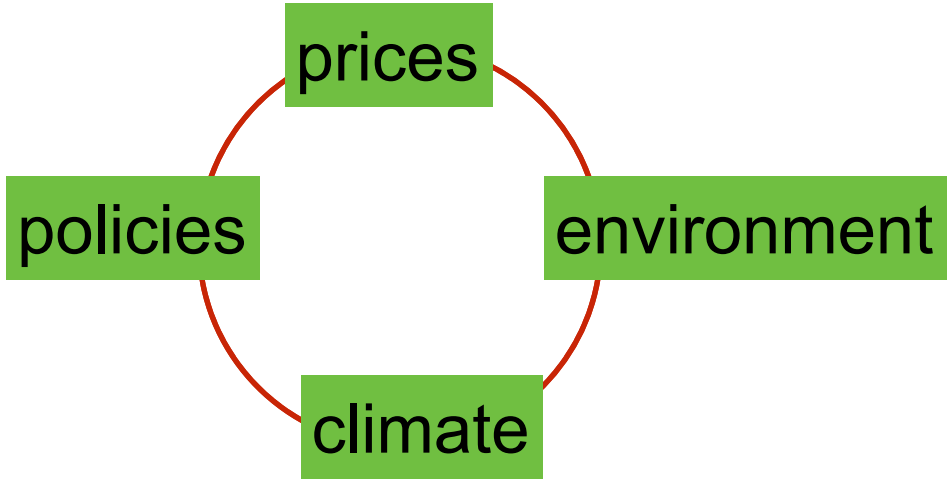
USDA

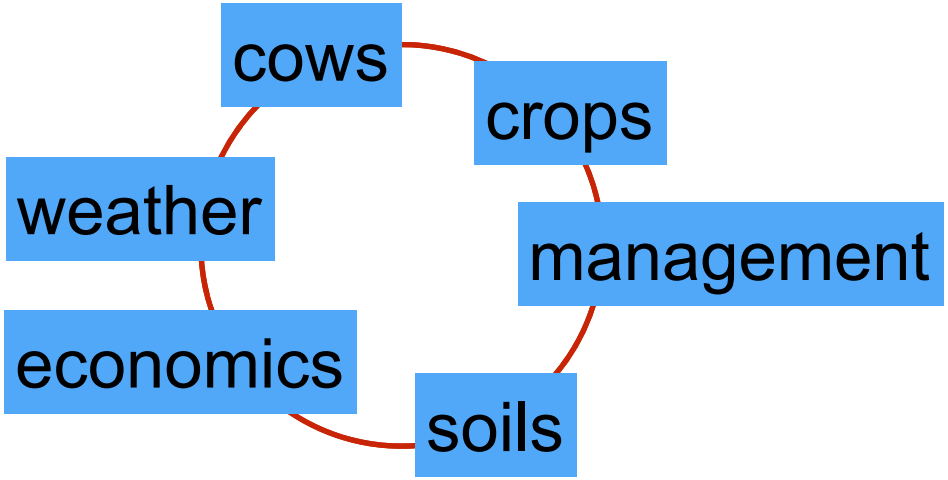
Supported by several USDA National Institute of Food and Agriculture and Hatch USDA Grants from College of Agriculture and Life Sciences from the University of Wisconsin-Madison

NIFA

Rationale - dairy farming decision-making

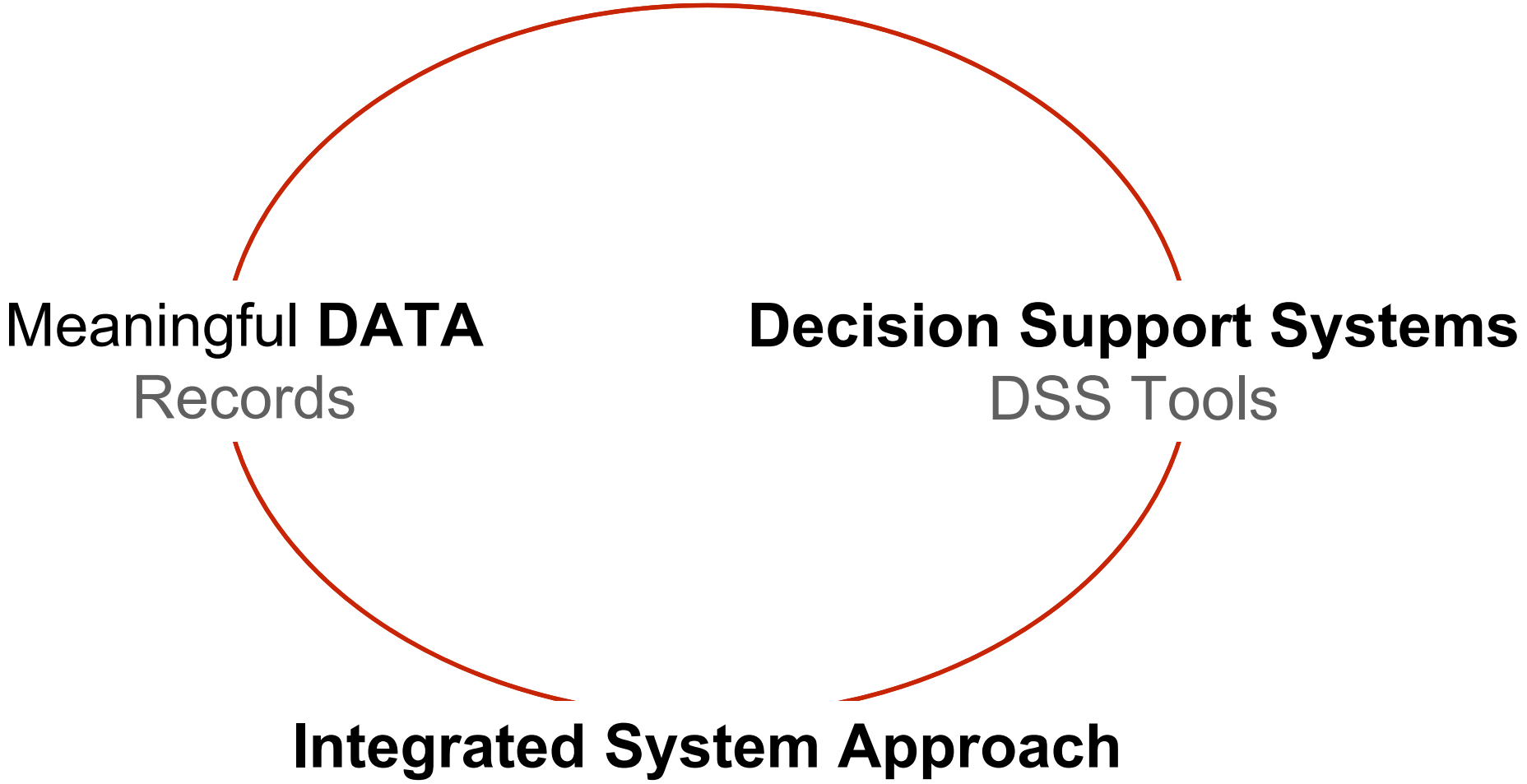
Highly **dynamic**
Always changing





Highly **integrated**
Interrelated components

Successful dairy farming decision-making



Outline - description

Describe DSS development

- DairyMGT.info
- > 40 DSS tools
- assist dairy farm decision makers
- decision-making and problem solving
- describe sample tools by management area

UW-Dairy Management Decision Support TOOLS

Methods

- no single or special
- combination
- adaptation
- empirical

Outline - description

Overarching goal

- farm specific
- user-friendly
- scientifically sound
- relevant throughout time

Providing answers

- fast
- concrete
- simple
- relevant

Outline - description

Innovative DSS tools

- many areas of dairy farm management
- practical and real-life applications
- impact documentation
- DSS tools performance

Vision for the future

- new technologies
- opportunities
- chalenges

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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 Follow

UW-Madison @UWMadison 11 Apr

Drop everything, this time-lapse will make you want to shout from the mountaintops, "I love Madison!" youtu.be/_8cGpjARTvw

Retweeted by Victor E. Cabrera

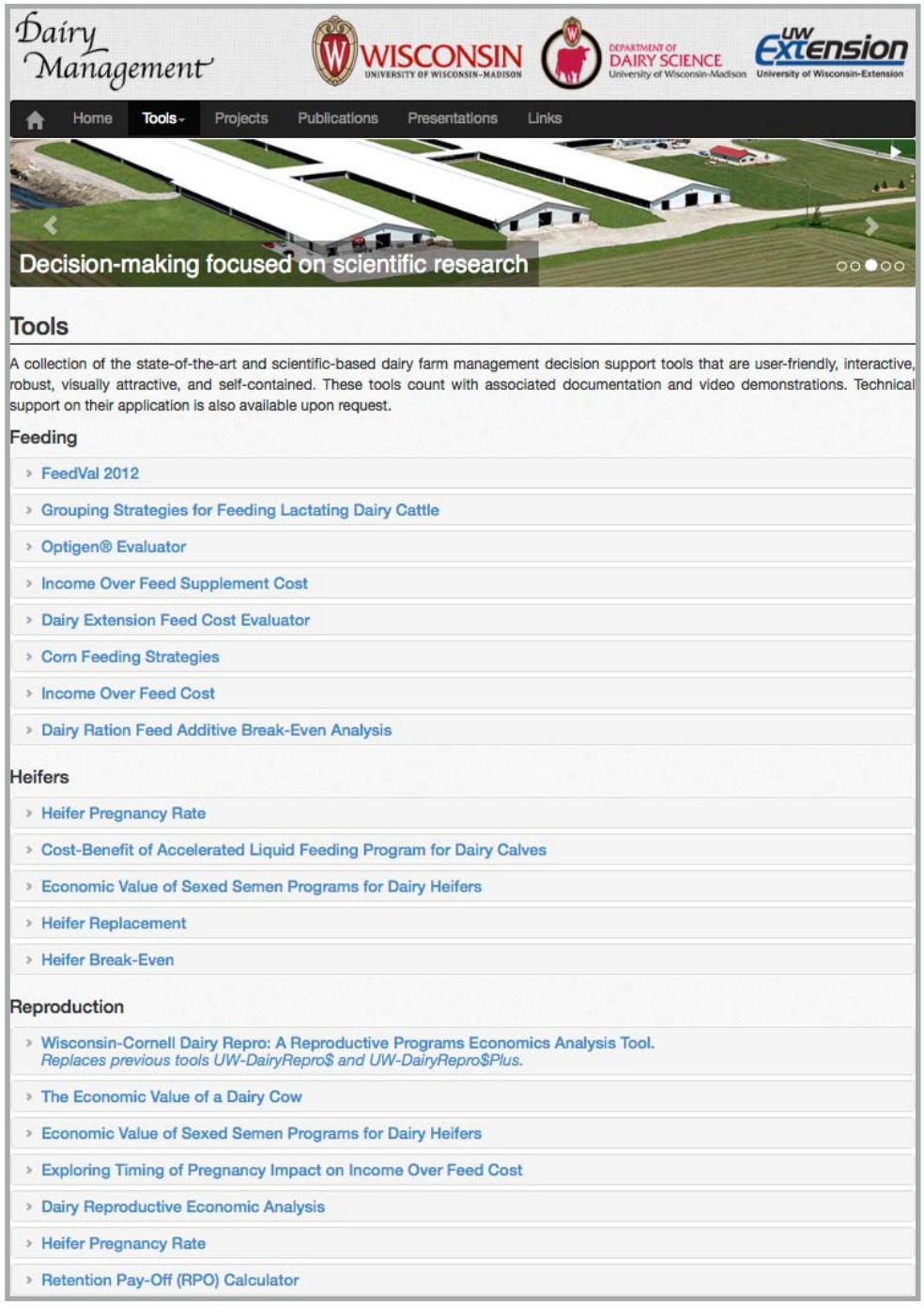
Show Media

Victor E. Cabrera @vecabrera 18 Mar

wisc.edu fb.me/6lOXw7HsFF

Tweet to @vecabrera

Share



> 40 tools

Production

- Characteristics of organic, grazing, and conventional dairy farms in the state of Wisconsin
- Milk Curve Fitter
- Decision Support System Program for Dairy Production and Expansion
- Economic Analysis of Switching from 2X to 3X Milking
- Lactation Benchmark Curves for Wisconsin
- Economic Evaluation of using rbST
- Alfalfa Yield Predictor: Using a Computer Application to Predict Irrigated Alfalfa Yield

Replacement

- The Economic Value of a Dairy Cow
- Value of a Springer
- Heifer Replacement
- Heifer Break-Even
- Herd Structure Simulation
- Retention Pay-Off (RPO) Calculator

Health

- Economic Evaluation of CholiPEARL
- Improve Milk Bulk Tank SCC

Financial

- LGM-Dairy Analyzer
- Working Capital Decision Support System
- The Wisconsin Dairy Farm Ratio Benchmarking Tool
- Decision Support System Program for Dairy Production and Expansion
- 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

Price Risk

- LGM-Dairy Premium Sensitivity
- Least Cost Optimizer
- LGM Premium
- LGM Dairy Feed Equivalent Calculator
- Milk Component Price Analysis

Environment

- Dairy Nutrient Manager
- Grazing-N: Application that Balances Nitrogen in Grazing Systems
- Seasonal Prediction of Manure Excretion
- Dynamic Dairy Farm Model

Decision support tools

Farm-specific assessments

Farm conditions change
Decisions should adjust

Every farm is different




Market conditions change permanently
Prices and cost impact decisions

Applications should be user-friendly
Still scientifically sound and robust

Elements of Decision Support Tools

UW-Dairy Management

Category

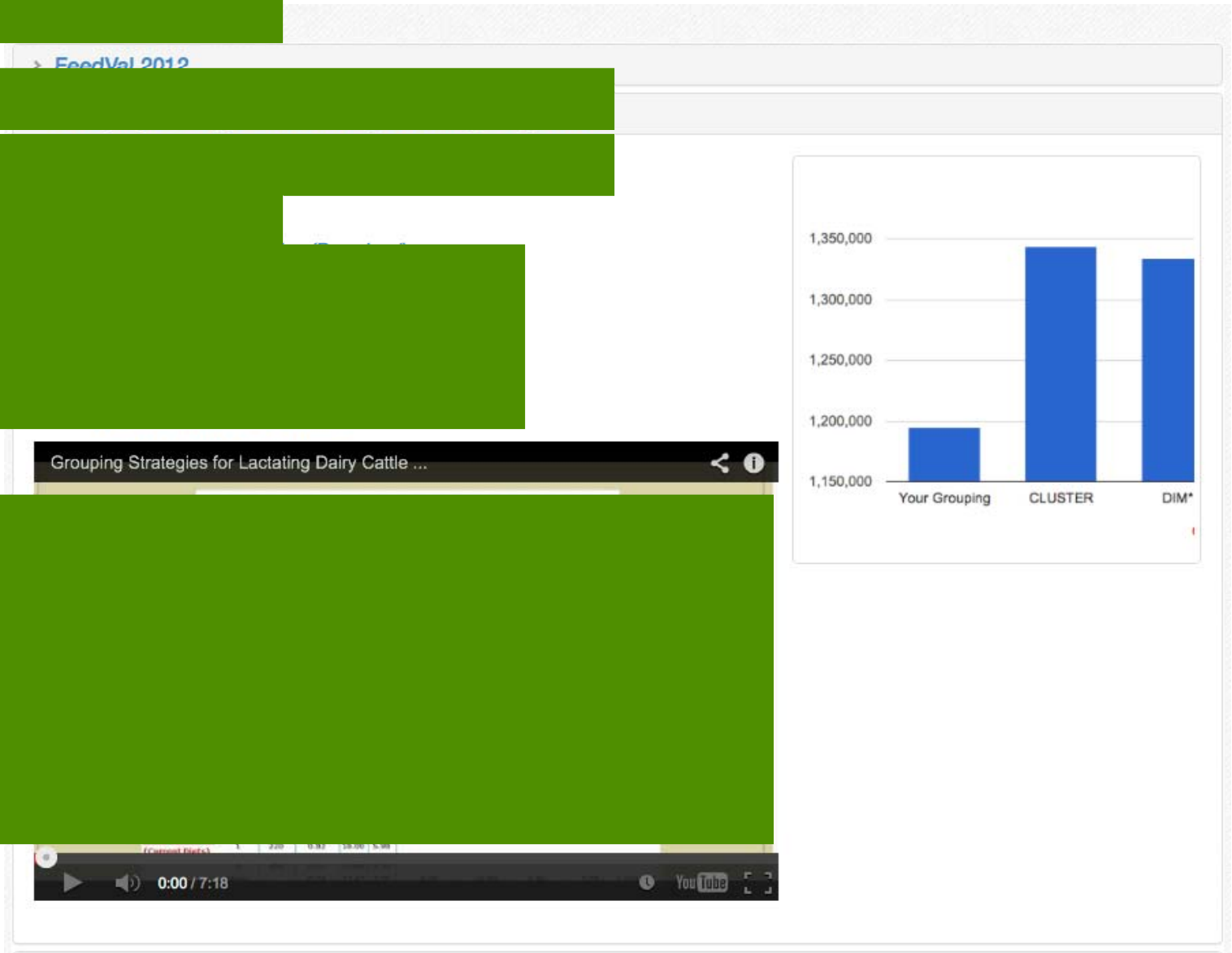
Name

Short description

Link

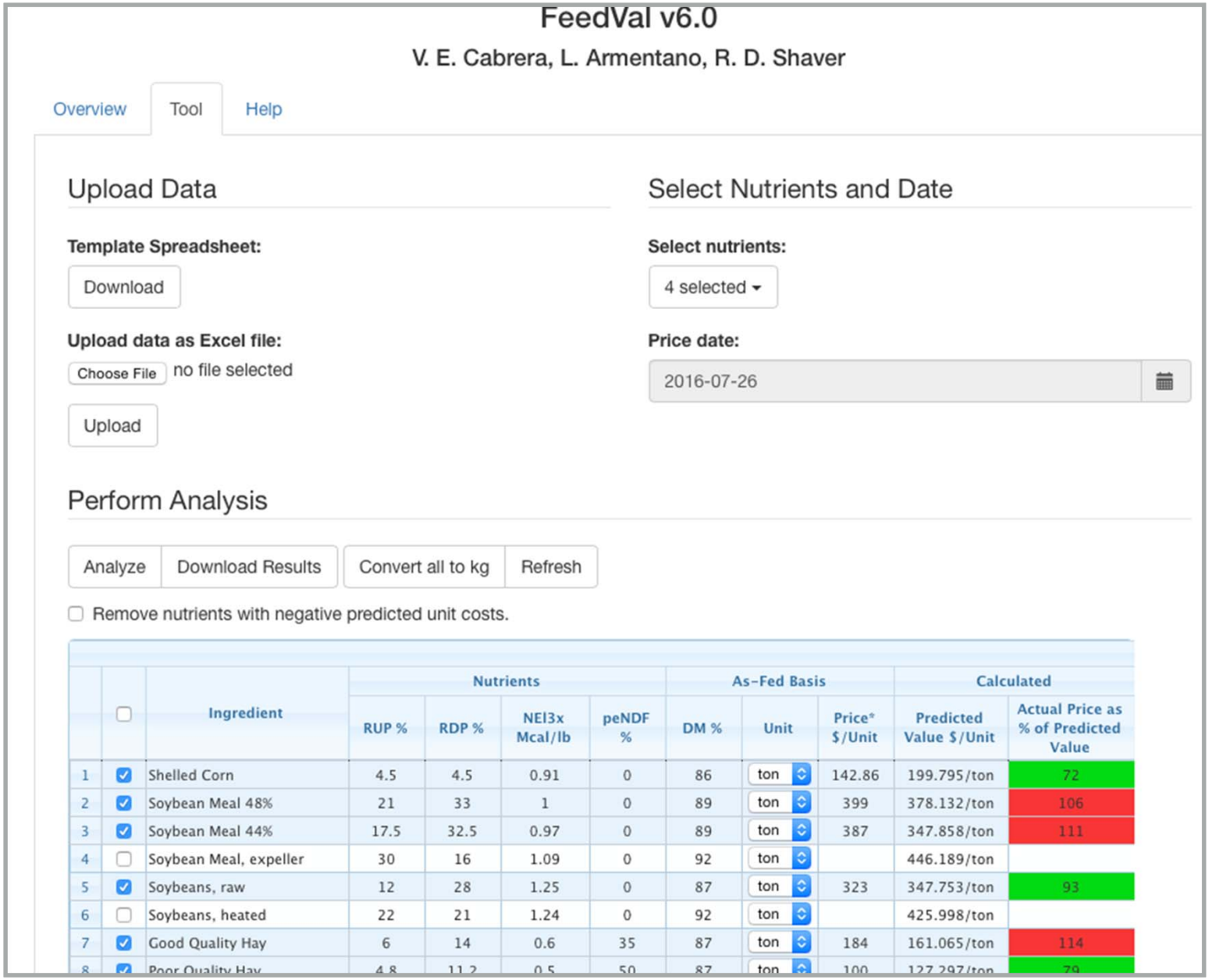
Supplementary documentation

Video demonstration



FeedVal

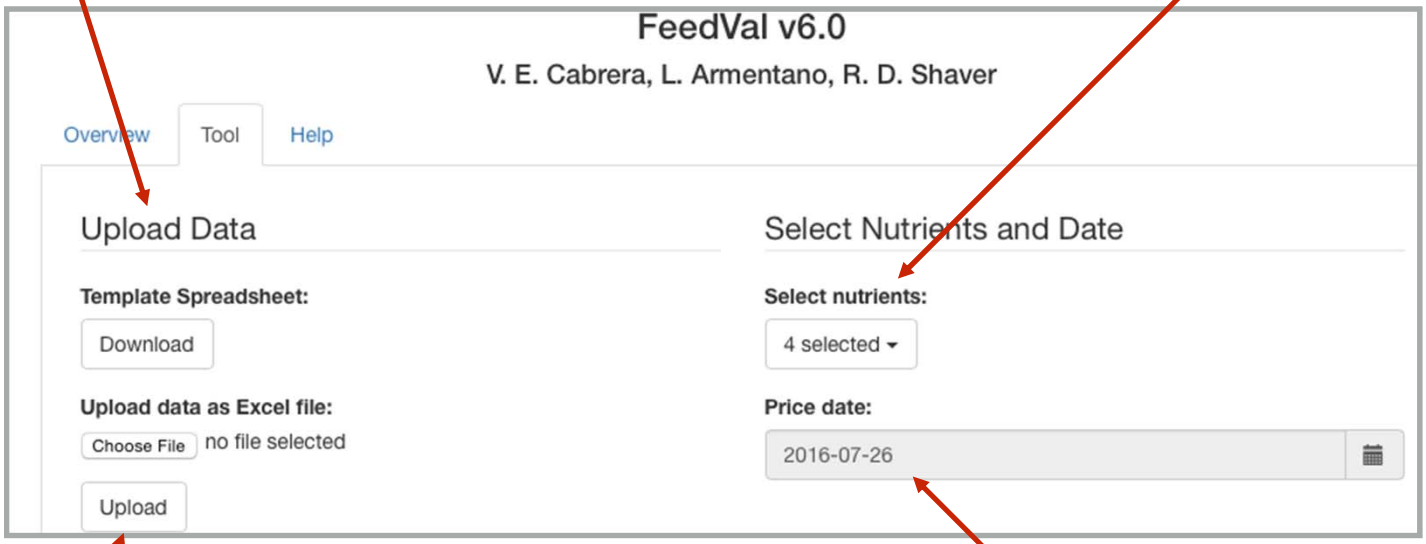
Actual value of dairy feed ingredients



		Ingredient	Nutrients				As-Fed Basis			Calculated	
			RUP %	RDP %	NEl3x Mcal/lb	peNDF %	DM %	Unit	Price* $/Unit	Predicted Value $/Unit	Actual Price as % of Predicted Value
1	☑	Shelled Corn	4.5	4.5	0.91	0	86	ton	142.86	199.795/ton	72
2	☑	Soybean Meal 48%	21	33	1	0	89	ton	399	378.132/ton	106
3	☑	Soybean Meal 44%	17.5	32.5	0.97	0	89	ton	387	347.858/ton	111
4	☐	Soybean Meal, expeller	30	16	1.09	0	92	ton		446.189/ton	
5	☑	Soybeans, raw	12	28	1.25	0	87	ton	323	347.753/ton	93
6	☐	Soybeans, heated	22	21	1.24	0	92	ton		425.998/ton	
7	☑	Good Quality Hay	6	14	0.6	35	87	ton	184	161.065/ton	114
8	☑	Poor Quality Hay	4.8	11.2	0.5	50	87	ton	100	127.297/ton	79

farm specific
DATA

referee
NUTRIENTS

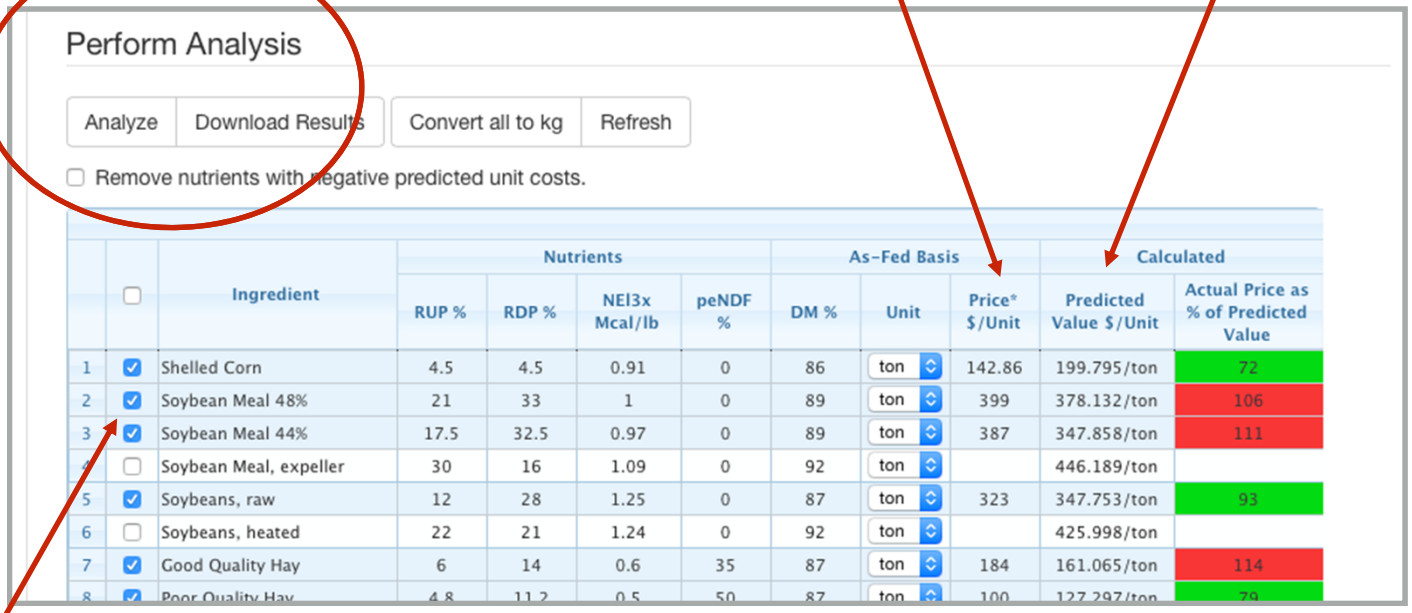


ingredients
nutrients
prices
DATA

PRICES
daily for midwest US
as reference

market
PRICE

ACTUAL
price



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REFEREE
ingredients
(market price)

VALUE
good or bad
ingredient purchases

SPECIFIC
location & time

FeedVal v6.0 predicted dairy feed prices and rankings for June 2016[1]

V.E. Cabrera, P. Hoffman, and R. Shaver

Ingredient	DM %	Unit	Feed Prices ($/Unit) Market	Predicted	Actual Price as % of Predicted Value	Best-buy Ranking
Wheat Middlings	89	ton	95.0	192.9	49	1
Hominy	89	ton	102.0	199.4	51	2
Corn Gluten Feed	89	ton	128.0	222.7	57	3
Soy Hulls	89	ton	110.0	177.6	62	4
Distillers Dried Grains	89	ton	185.0	292.3	63	5
Shelled Corn	86	ton	142.9	200.0	71	6
Corn Silage	35	ton	40.0	53.9	74	7
Poor Quality Hay	87	ton	89.0	117.7	76	8
Oats	89	ton	155.0	194.2	80	9
Wheat	89	ton	172.7	213.0	81	10
Sunflower Meal	89	ton	170.0	202.8	84	11
Barley	89	cwt	9.0	9.7	92	12
Soybeans, raw	87	ton	323.0	348.0	93	13
Blood Meal	94	ton	750.0	786.9	95	14
Beet Pulp	89	ton	160.0	166.4	96	15
Cottonseed Meal	89	ton	315.0	318.7	99	16
Urea	99	ton	472.0	466.6	101	17
Canola Meal, expeller	89	ton	301.0	296.1	102	18
Soybean Meal 48%	89	ton	399.0	378.3	105	19
Molasses	89	ton	185.0	168.7	110	20
Soybean Meal 44%	89	ton	387.0	348.0	111	21
Good Quality Hay	87	ton	172.0	154.4	111	22
Corn Gluten Meal	89	ton	605.0	522.1	116	23
Tallow	99	cwt	29.0	21.4	136	24
Whole Cottonseed	89	ton	308.0	221.7	139	25
Linseed Meal	89	ton	420.0	267.0	157	26

BEST
purchases

WORST
purchases

NON-REFEREE
ingredients

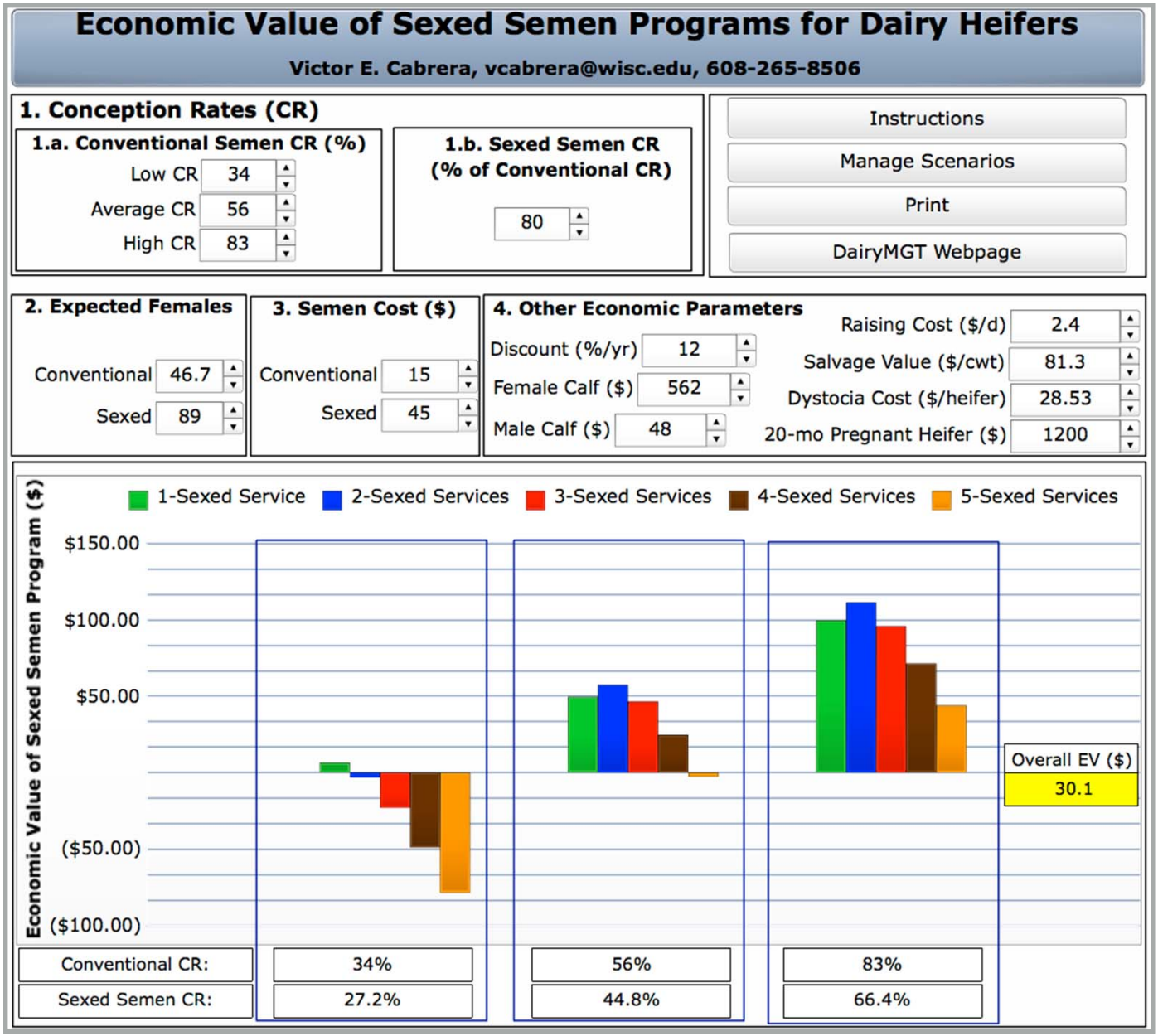
Soybean Meal, expeller	92	ton	446.3	
Soybeans, heated	92	ton	426.2	
Earlage/Snaplage	60	ton	125.0	
High-Moisture Corn	70	ton	164.9	
Straw	85	ton	76.2	
Canola Meal, solvent	89	ton	266.1	
Hi-Pro Distillers	89	ton	350.4	
Wet Distillers	45	ton	141.5	
Brewers Dried Grains	89	ton	269.9	
Wet Brewers	25	ton	71.3	
Malt Sprouts	89	ton	219.0	
Wheat Bran	89	ton	180.5	
Corn Stover	80	ton	60.9	
Whey	20	ton	40.1	

CALCULATED
prices

[1]Analysis performed using UW-Madison FeedVal v6.0: http://dairymgt.info/tools/feedval_12_v2/index.php including 26 feed ingredients displayed in top part of the table, 4 nutrients: RUP, RDP, NEL, and peNDF; and using general wholesale FOB Midwest input prices. These results might change substantially depending on: local input prices, nutrients, and feed ingredients used for price formation. For more in-depth analyses please use the FeedVal v6.0 decision support tool and local input prices.

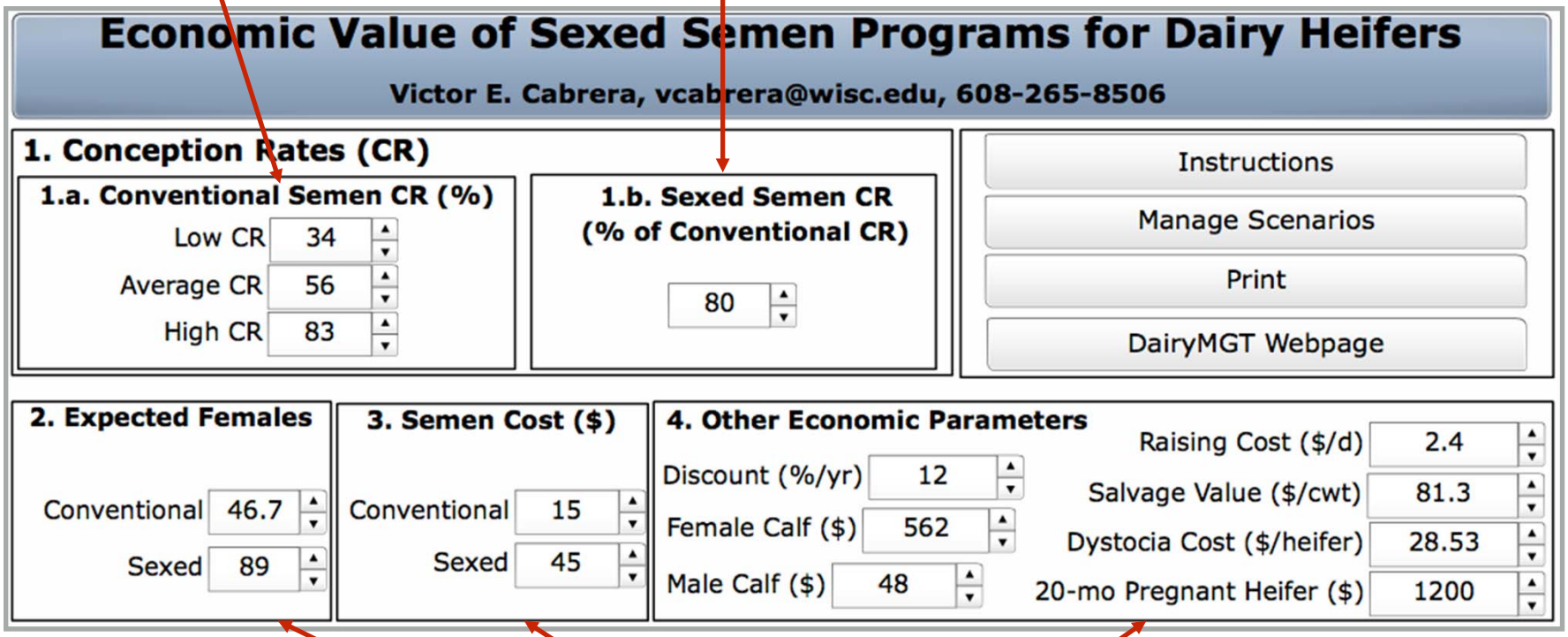
Economic Value of Sexed Semen

Value of using sexed semen on dairy heifers



farm specific reproductive performance **DATA**

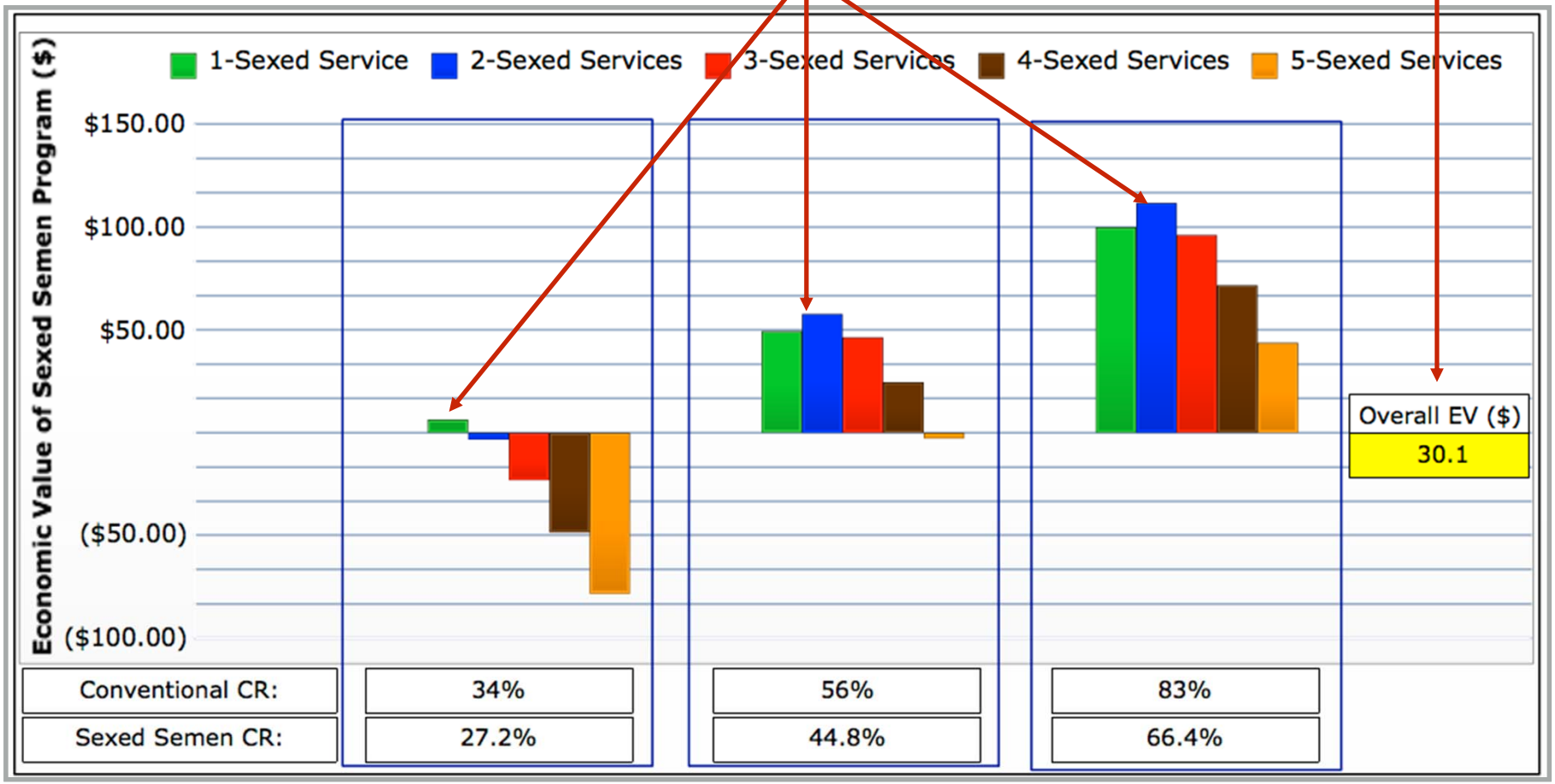
EXPECTED performance with sexed semen



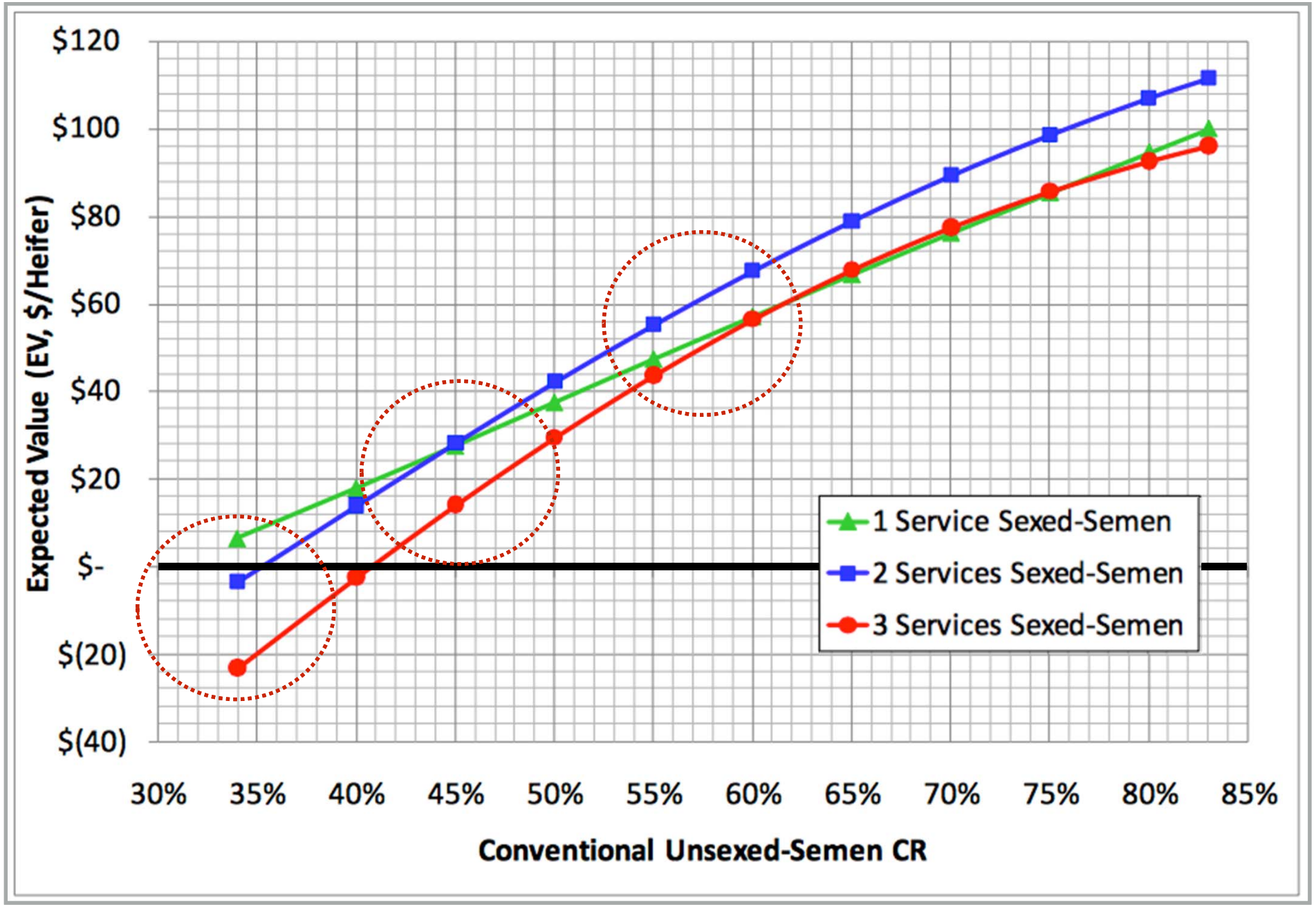
ADDITIONAL production and economic information

best
DECISIONS

overall
VALUE

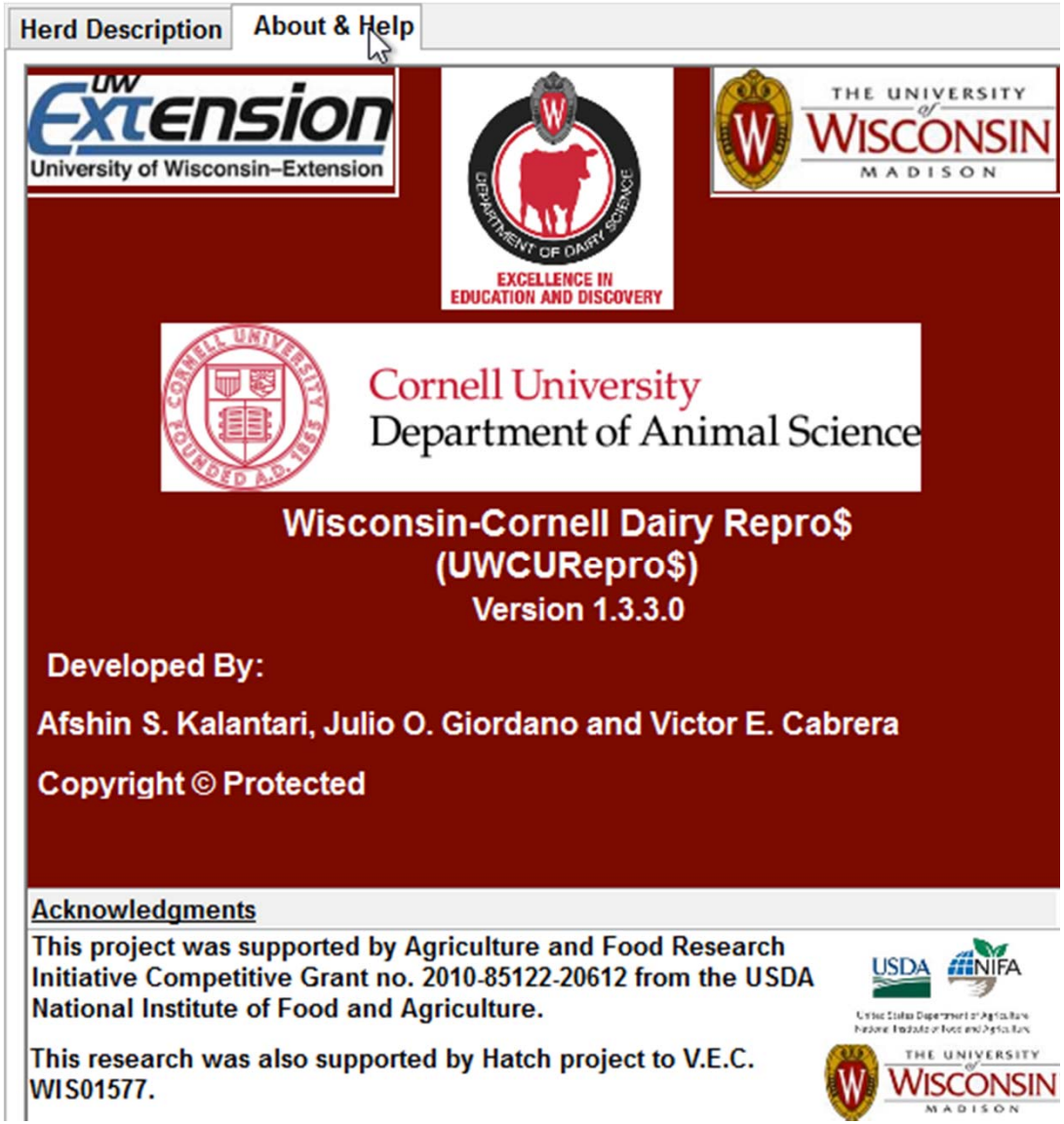


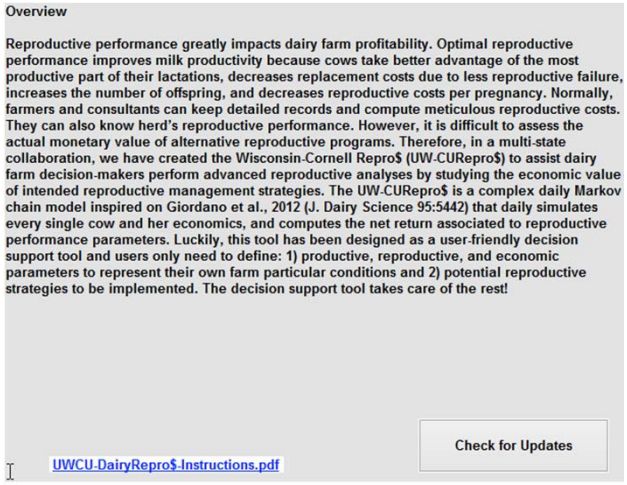
SCENARIOS
plausible for a farm


$120
$100
$80
$60
$40
$20
$-
$(20)
$(40)
Expected Value (EV, $/Heifer)
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
Conventional Unsexed-Semen CR
1 Service Sexed-Semen
2 Services Sexed-Semen
3 Services Sexed-Semen

Wisconsin-Cornell Dairy Repro$

Value of specific reproductive programs





J. Dairy Sci. 95:5442–5460
http://dx.doi.org/10.3168/jds.2011-4972

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. Cabrera[2]
Department of Dairy Science, University of Wisconsin-Madison 53706

farm specific

DATA

Herd Description | Reproduction | Results | About

Herd Parameters

Herd Size (#)	100
Average Body Weight (lb)	1,400
Involuntary Culling (%/yr)	35.0
Mortality Rate (%/yr)	4.0
Stillbirth (%)	4.9
Pregnancy Loss (%)	10.0

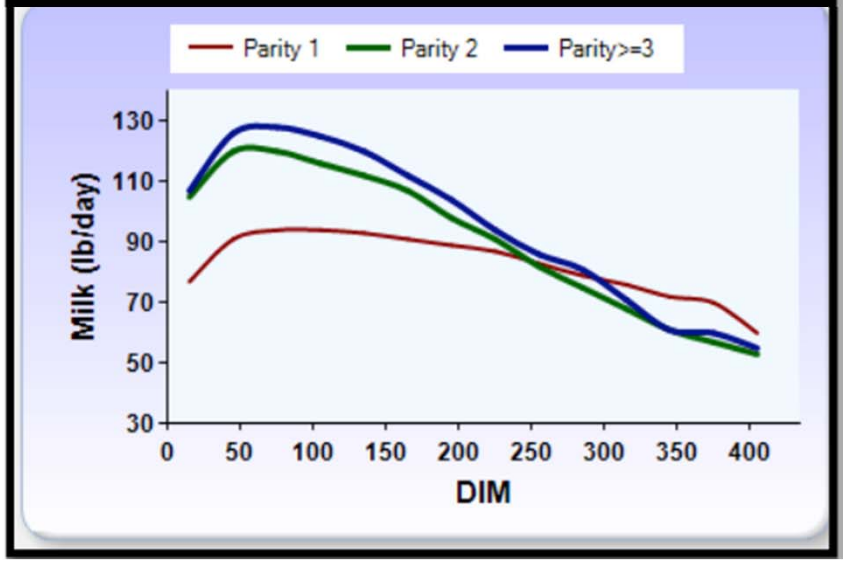
Economic Parameters

Milk Price ($/cwt)	18.50
Cost Feed Lactating ($/lb DM)	0.13
Dry Period Fixed Cost ($/d)	0.06
Female Calf value($)	200
Male Calf value ($)	50
Heifer Replacement Value($)	1,500
Salvage Value ($/lb)	0.550

Lactation Curves (lb/cow/test)

Own Farm Lactations (Enter/Edit NUMBERS Below)

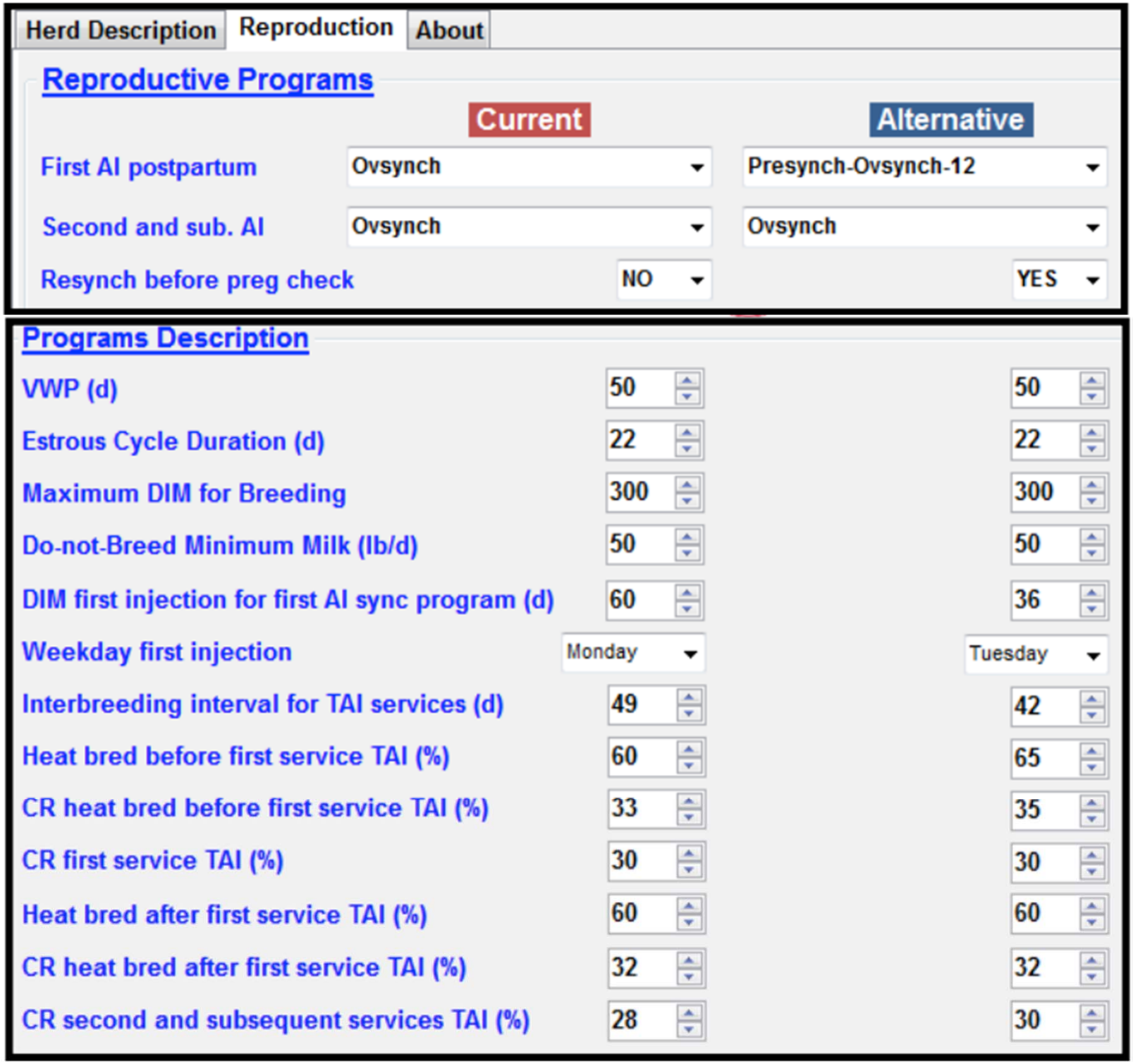
DIM	Parity 1	Parity 2	Parity ≥3
15	77	105	107
45	91	120	126
75	94	120	128
105	94	116	125
135	93	112	120
165	91	107	112
195	89	98	104
225	87	91	94
255	83	82	86
285	79	75	81
315	76	68	71
345	72	61	61
375	70	57	60
405	60	53	55



test **ALTERNATIVE** strategies

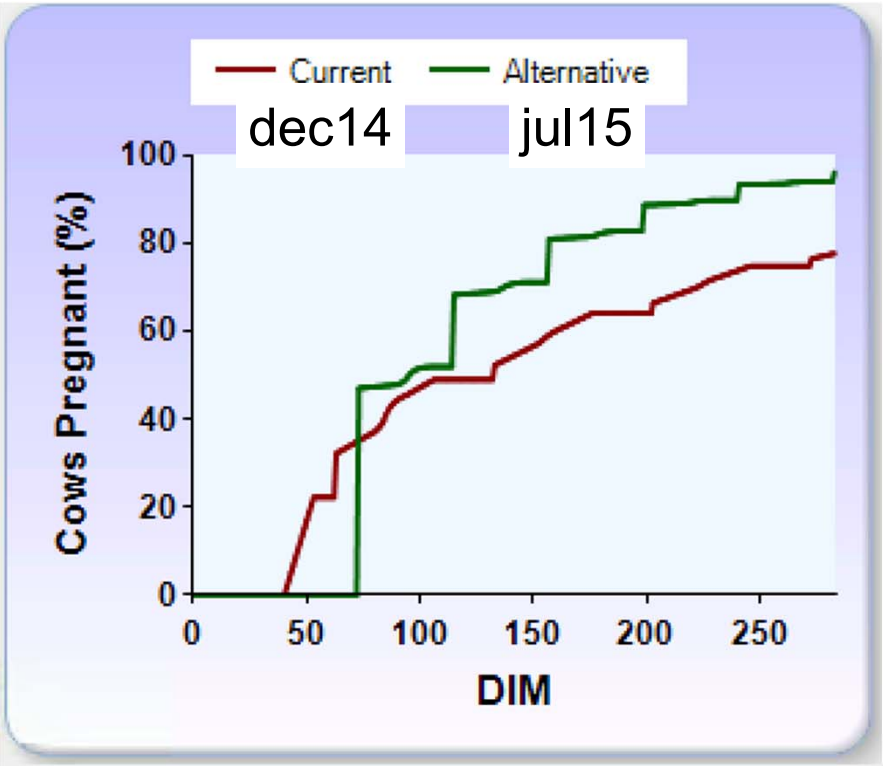
farm specific reproductive detailed **DATA**

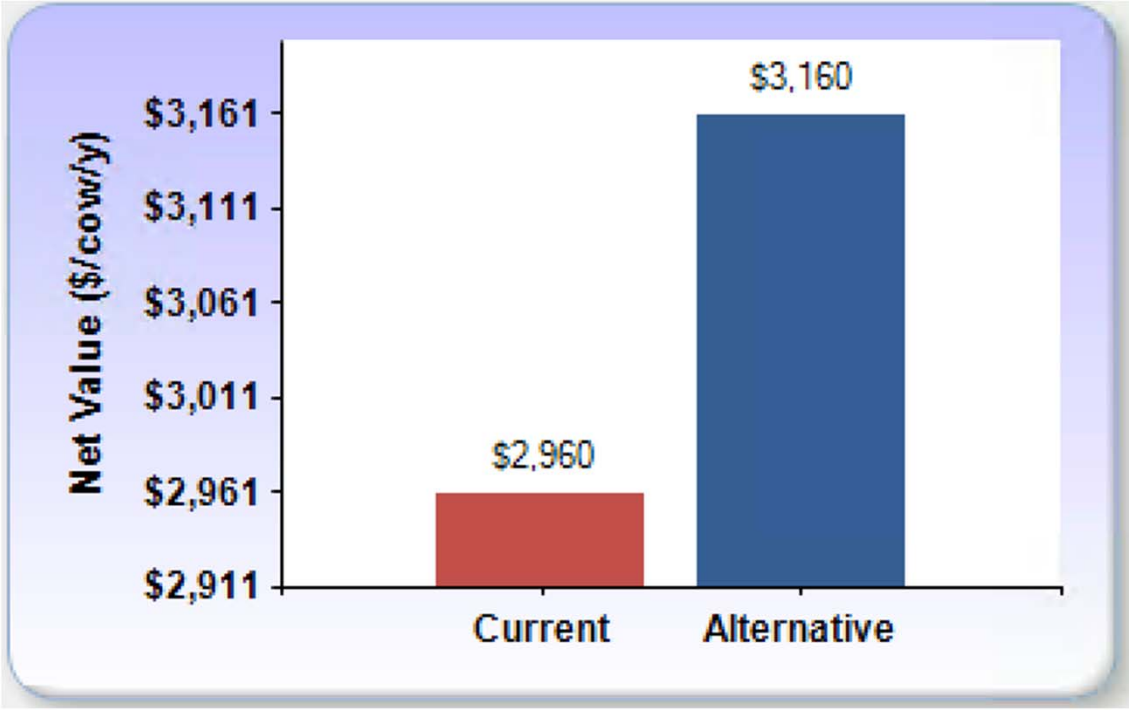
required additional specific **DATA**



case study in **WI**

estimated whole herd: $**188,000**/year



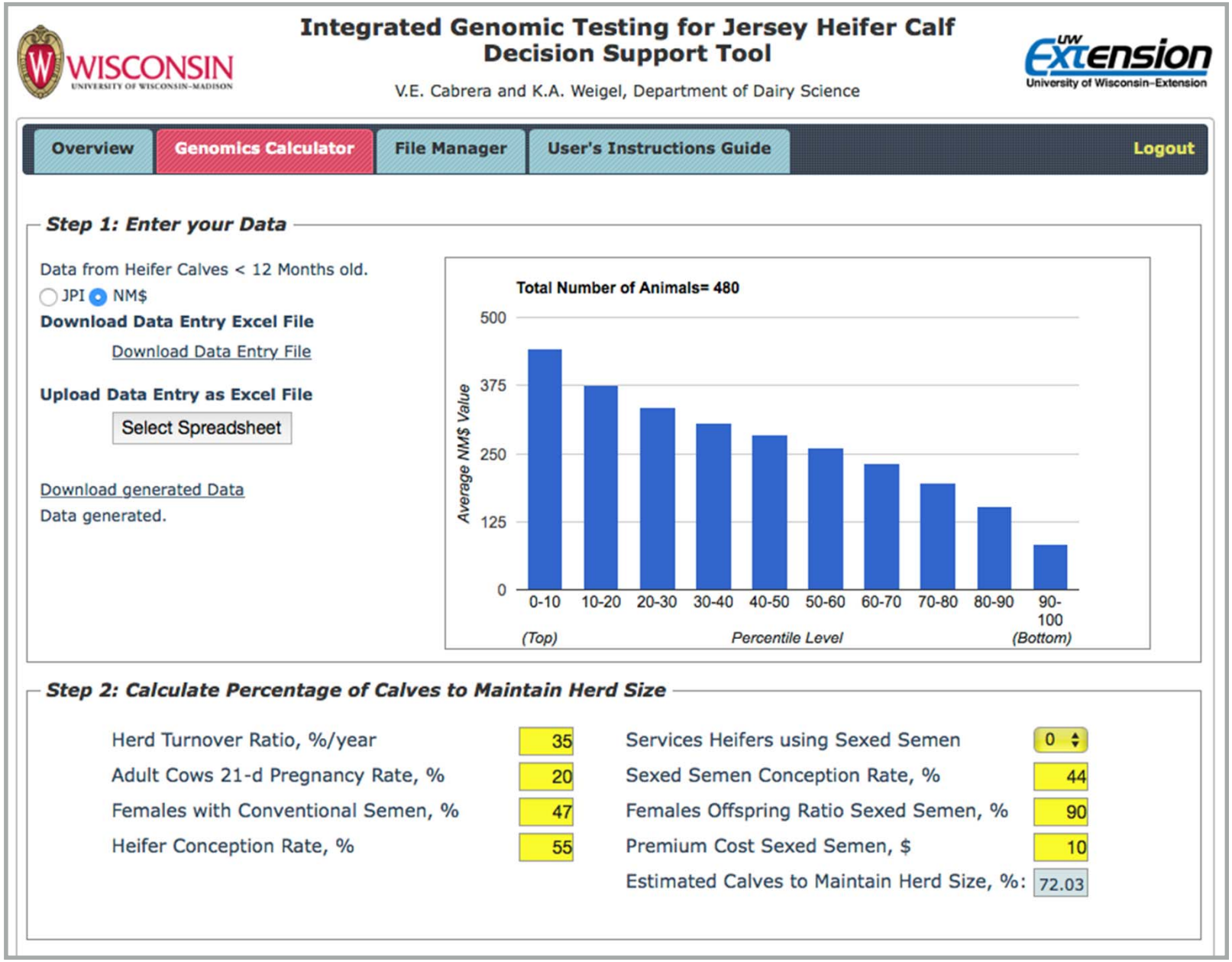


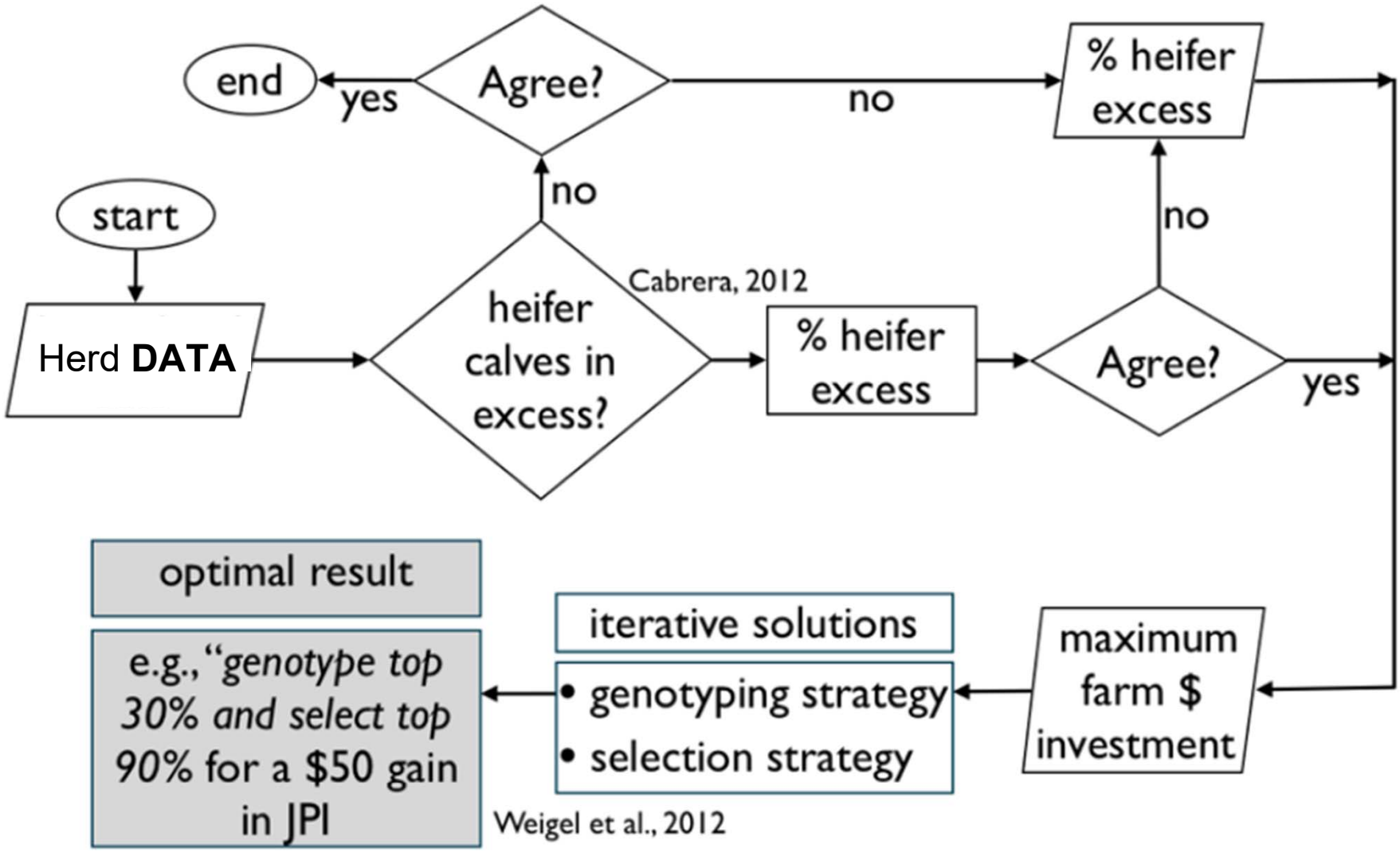
Contribution to Net Value

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

Integrated Genomic Testing Tool

Value of using genomic testing on heifer calves

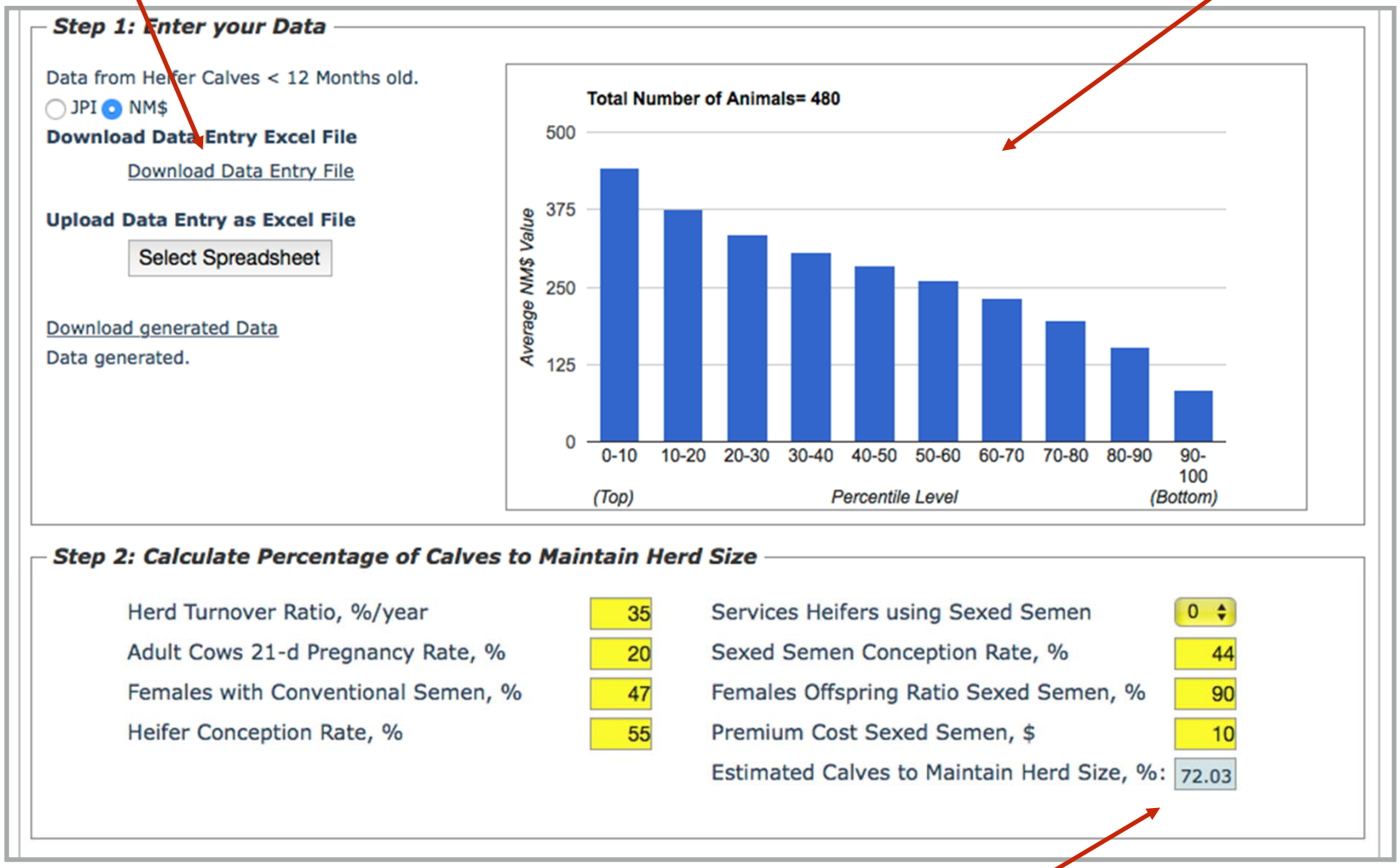




Ovals=starting and ending actions, parallelograms=user-entered information, diamonds=binary decisions (yes/no), and rectangles=results calculated by the decision support system. JPI=Jersey Performance Index.

farm specific
DATA

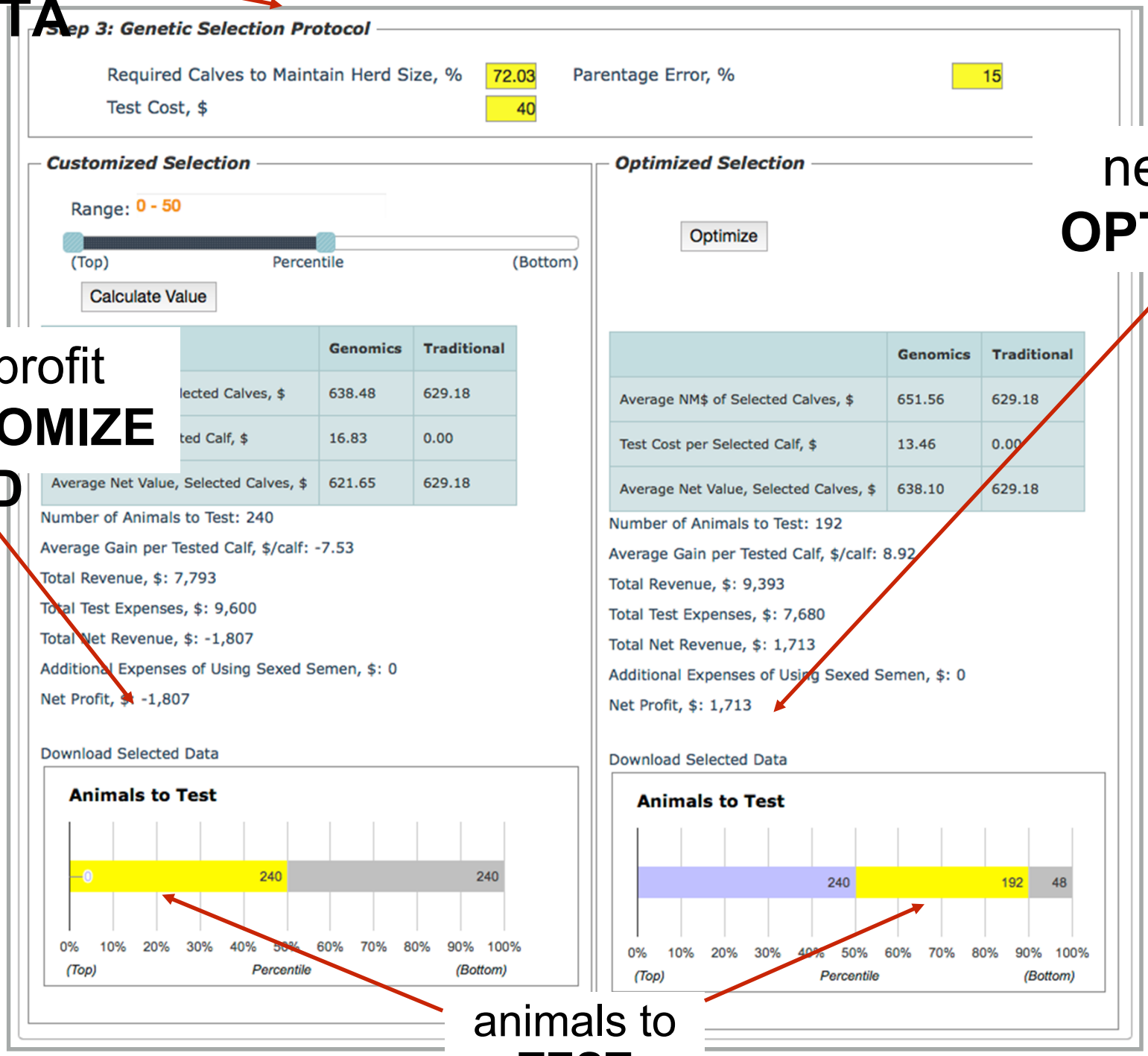
visual display
DATA



replacements
AVAILABLE

farm specific

DATA



net profit

CUSTOMIZED

net profit

OPTIMIZED

animals to

TEST

The Economic Value of a Dairy Cow

Projected net return of a cow vs. replacement

The Economic Value of a Dairy Cow

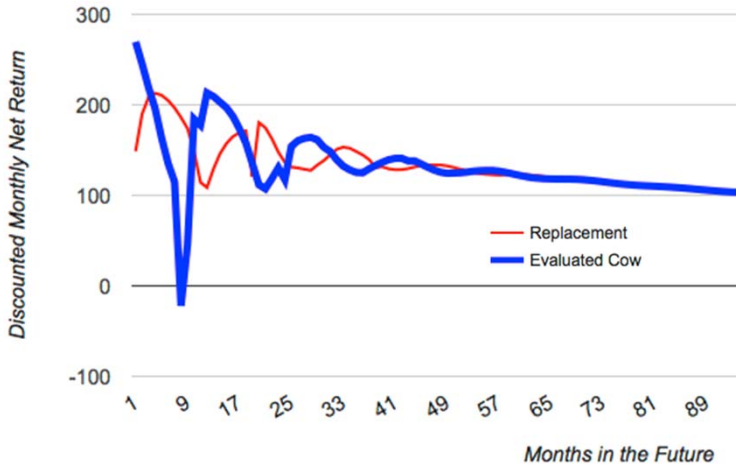
V.E. Cabrera, UW-Madison Dairy Science

English | Spanish | Czech **Units:** US English | US Metric | UK | Czech

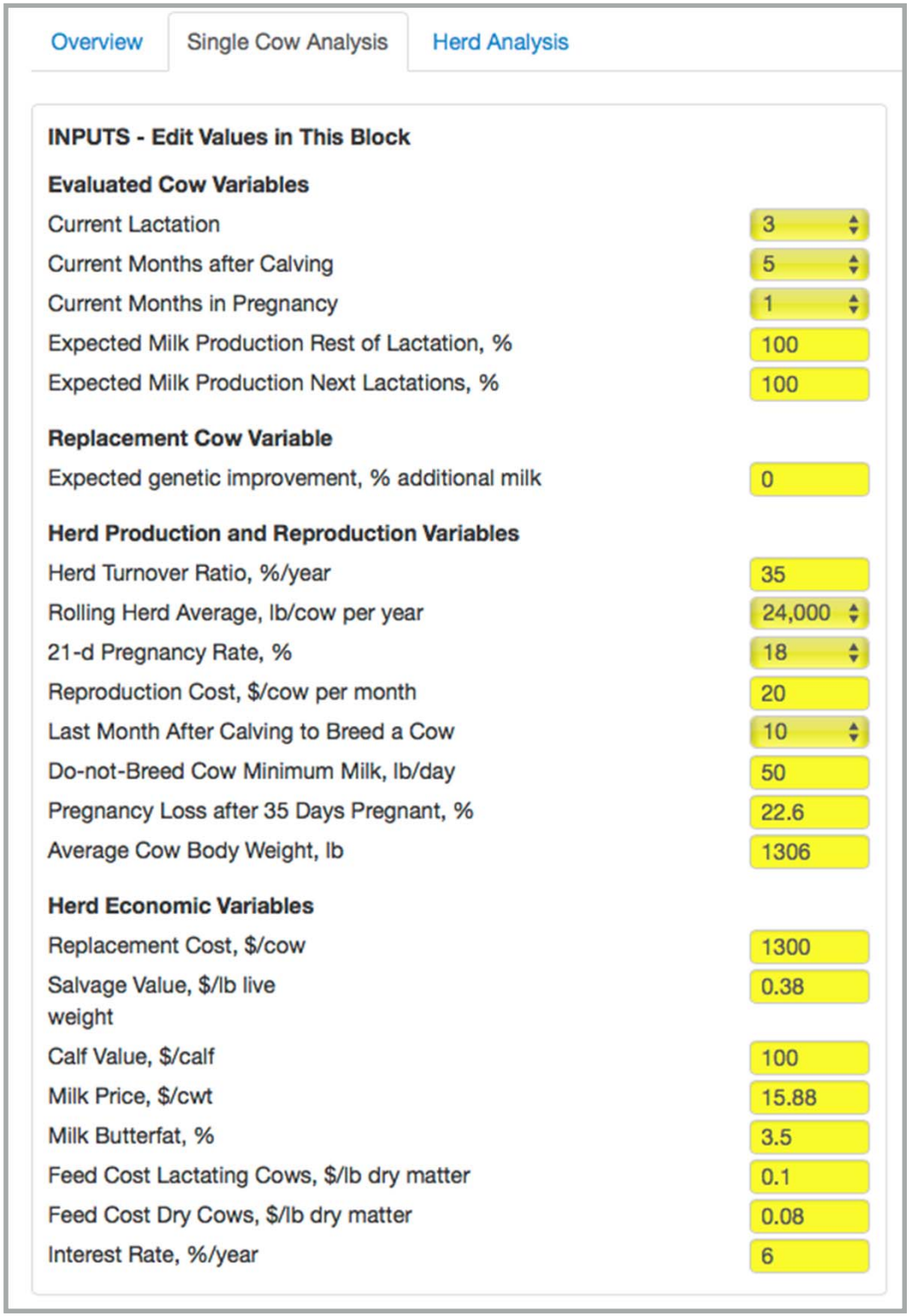
Overview | Single Cow Analysis | Herd Analysis

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



farm & herd specific **DATA**



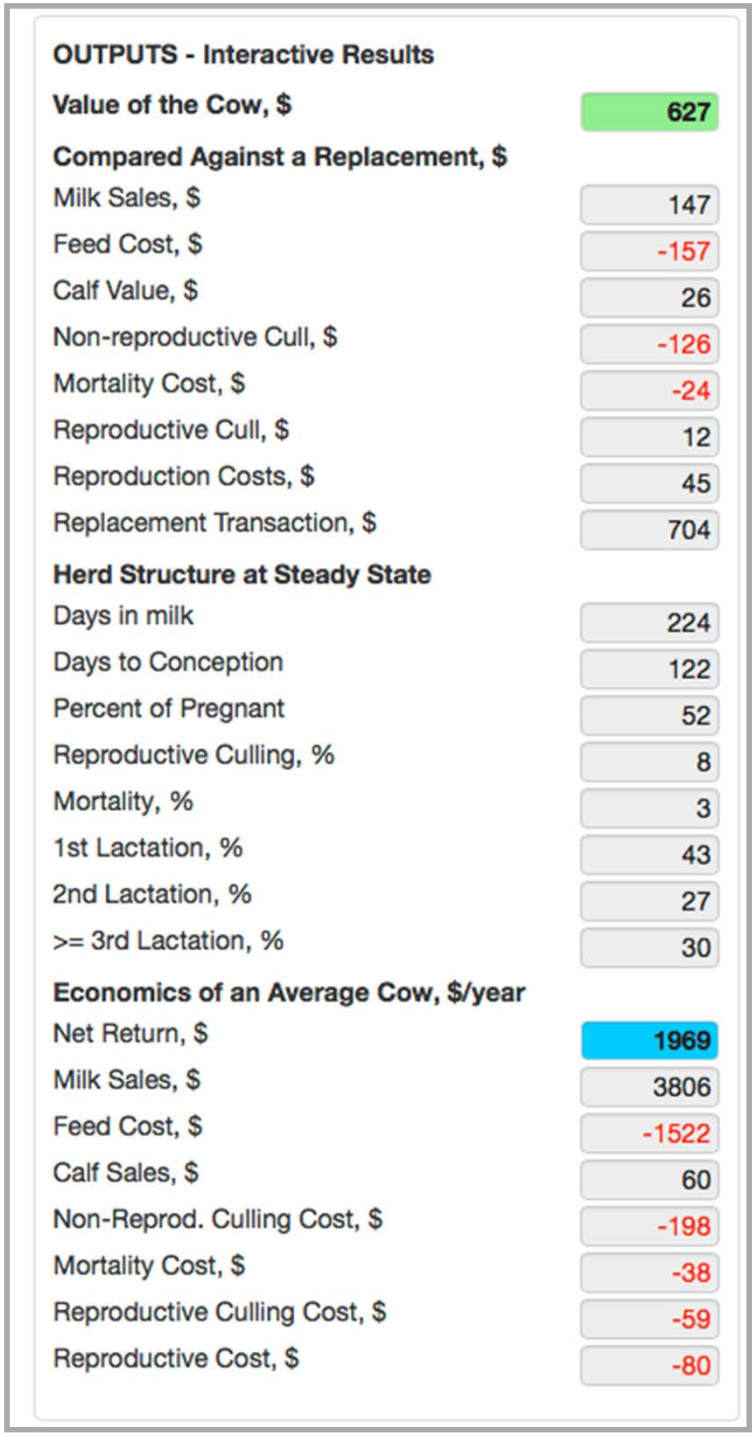
COW

REPLACEMENT

HERD

ECONOMICS

cow specific
RESULTS



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

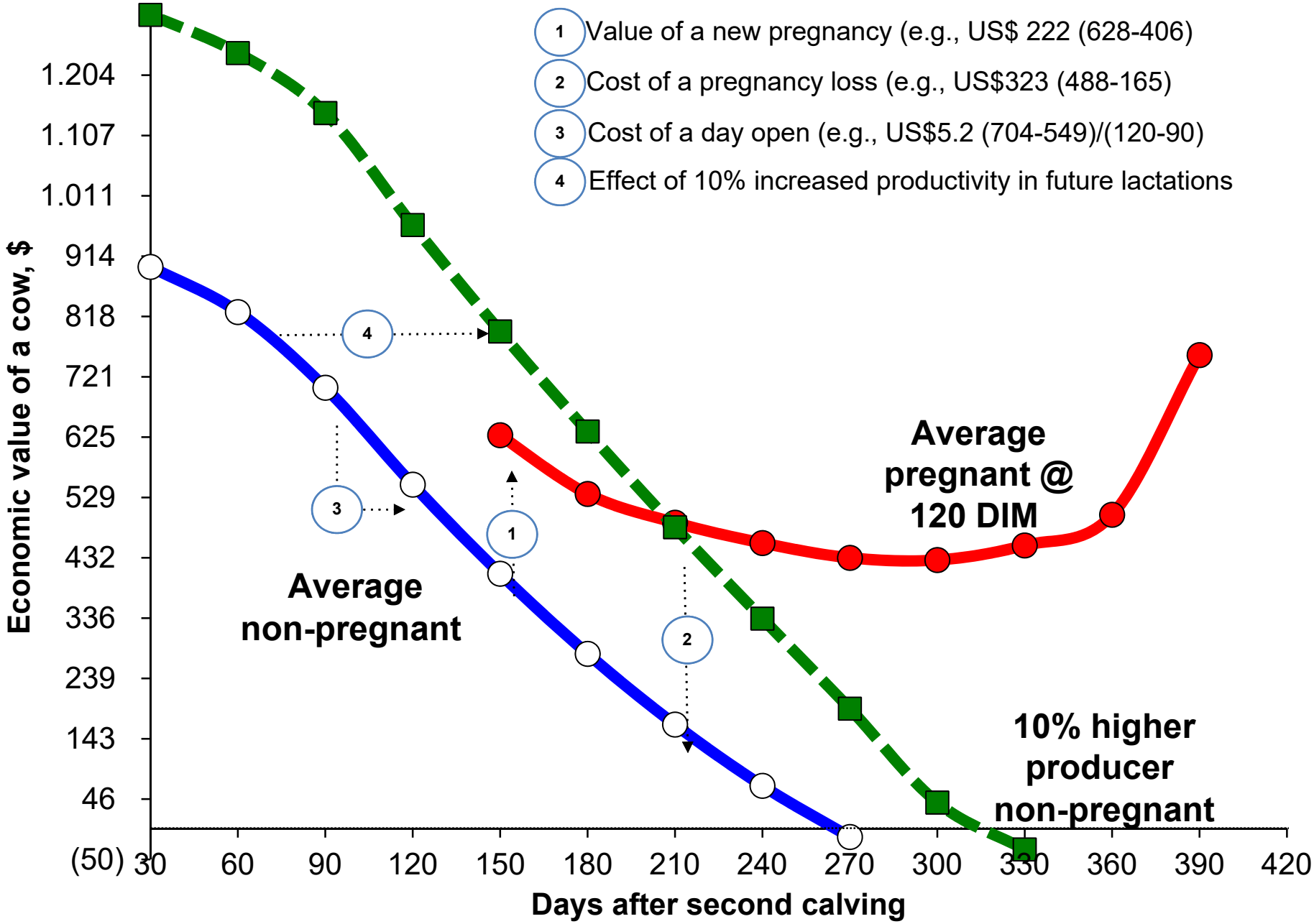
COW VALUE

VALUE
components

HERD
structure

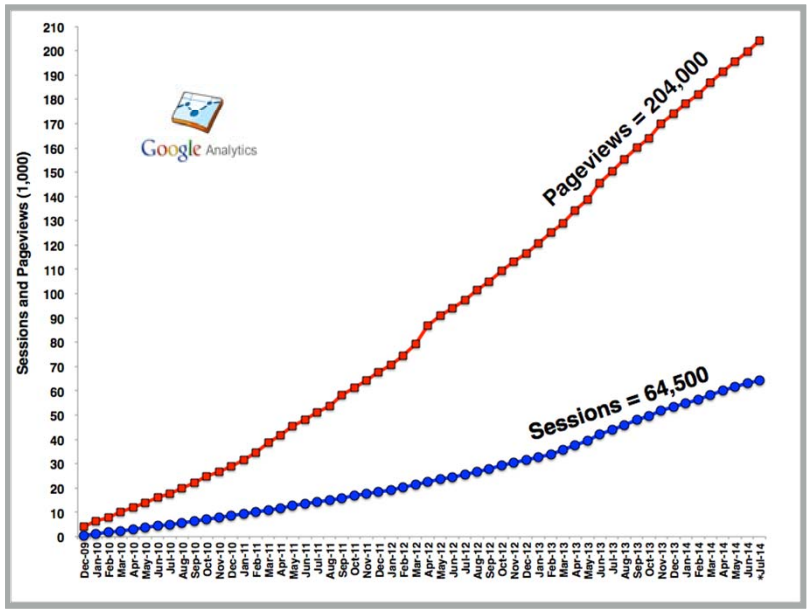
HERD
net return

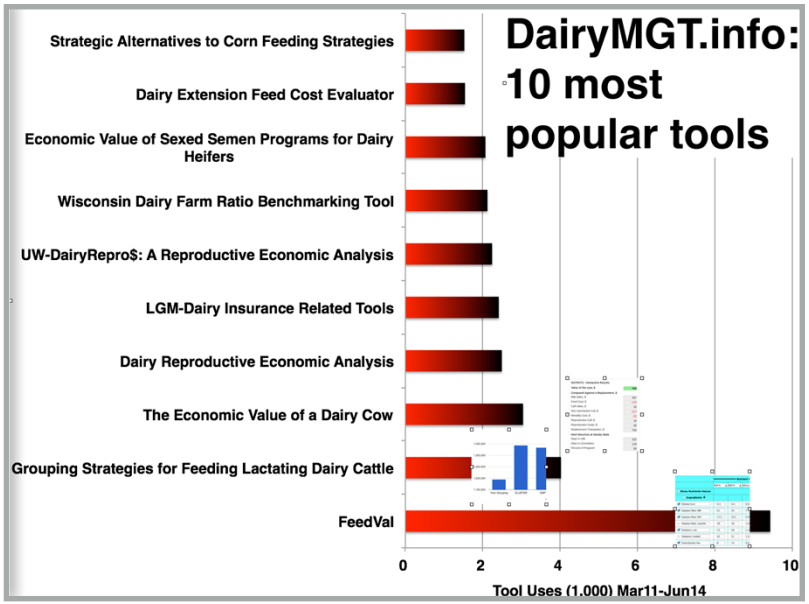
The value of a cow

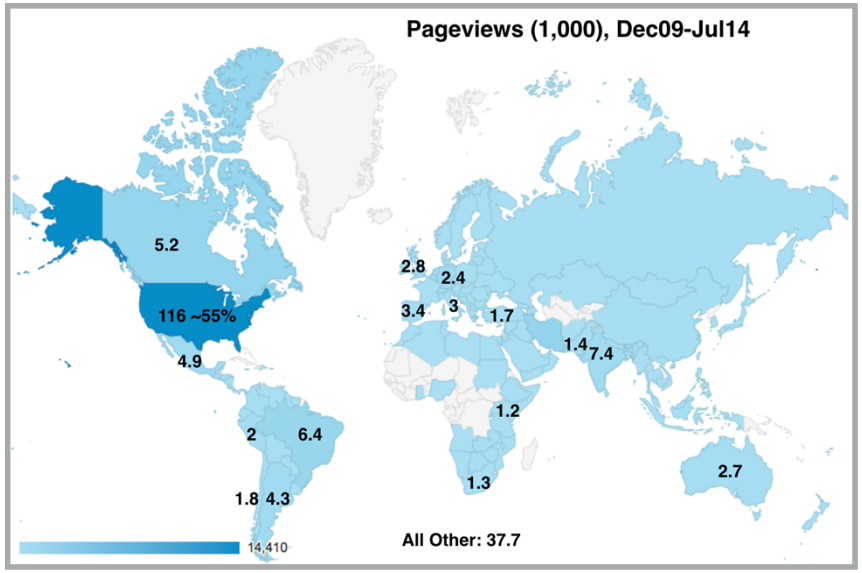


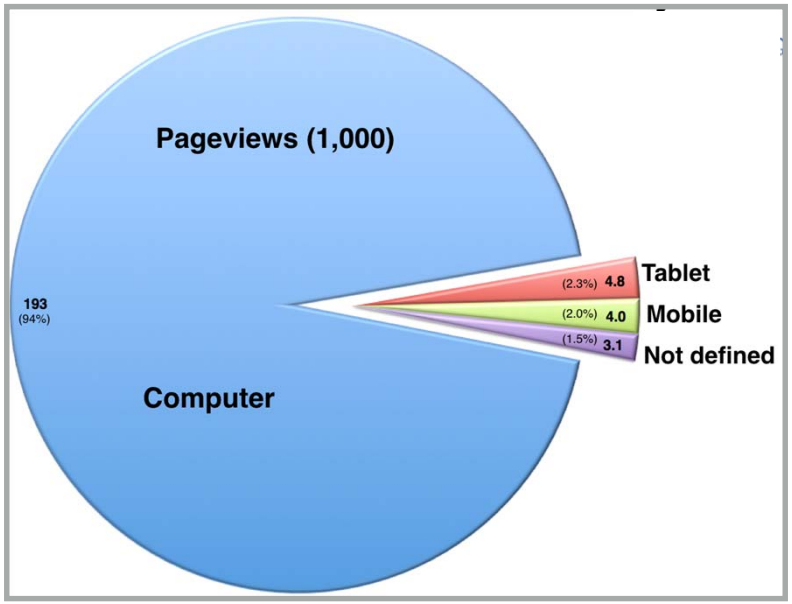
DairyMGT.info

Quick stats









A vision for the future

Keep up with the needs

INTEGRATION

- cows
- crops
- heifers
- …
- hardware
- software
- …
- financial
- …
- environmental
- …

TECHNOLOGY

- tablets
- smartphones
- sensors
- monitors
- AMS
- precision feeding
- …

FUNCTIONALITY

- beyond record keeping
- decision-making
- artificial intelligence
- …