



Critical aspects to maximize dairy farm profitability



UW-Dairy Management
Decision Support TOOLS

Victor E. Cabrera

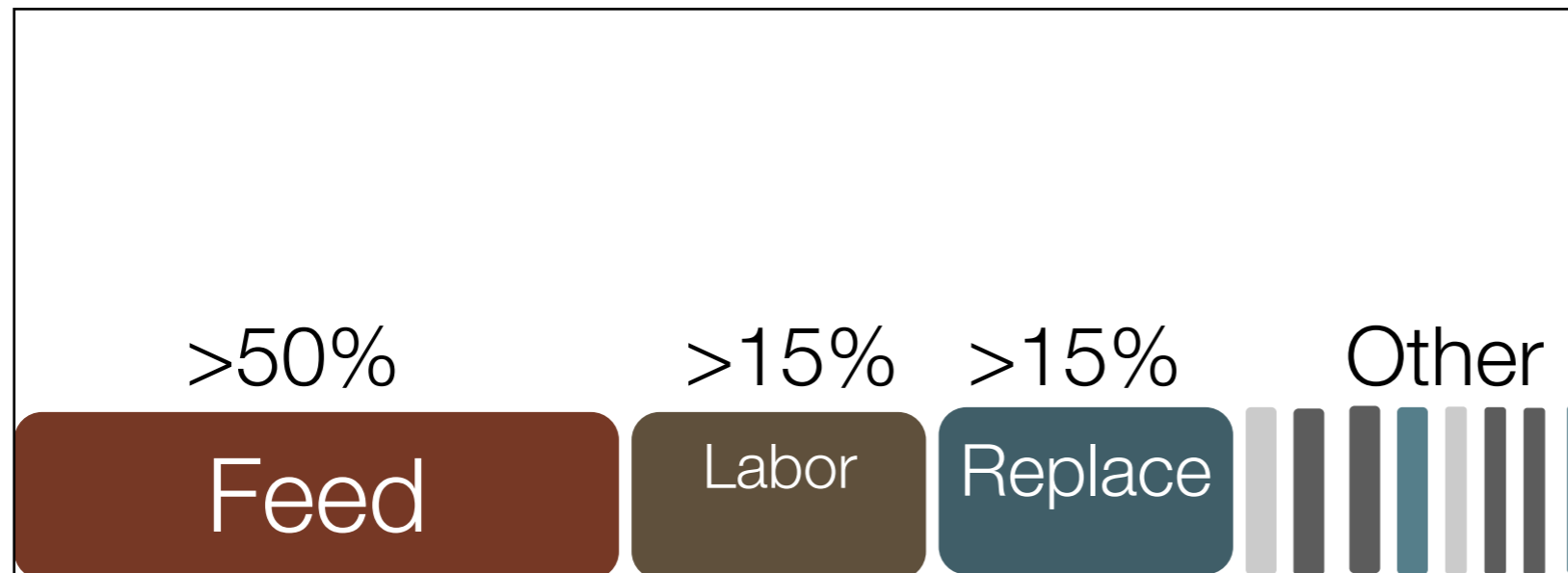
UAB - Barcelona - 11/16/15

Net margin of a dairy enterprise

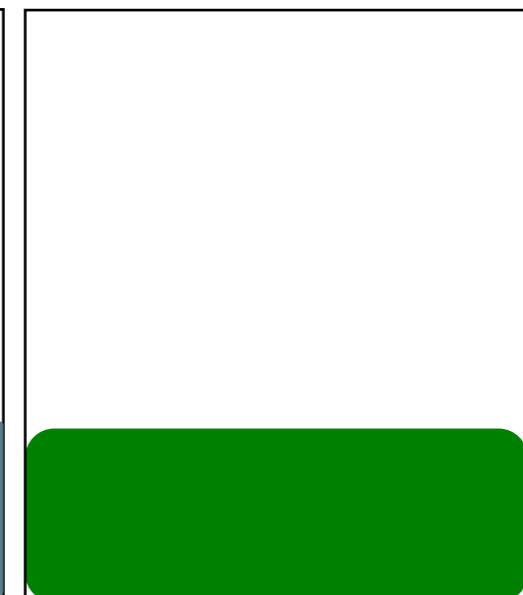
Income



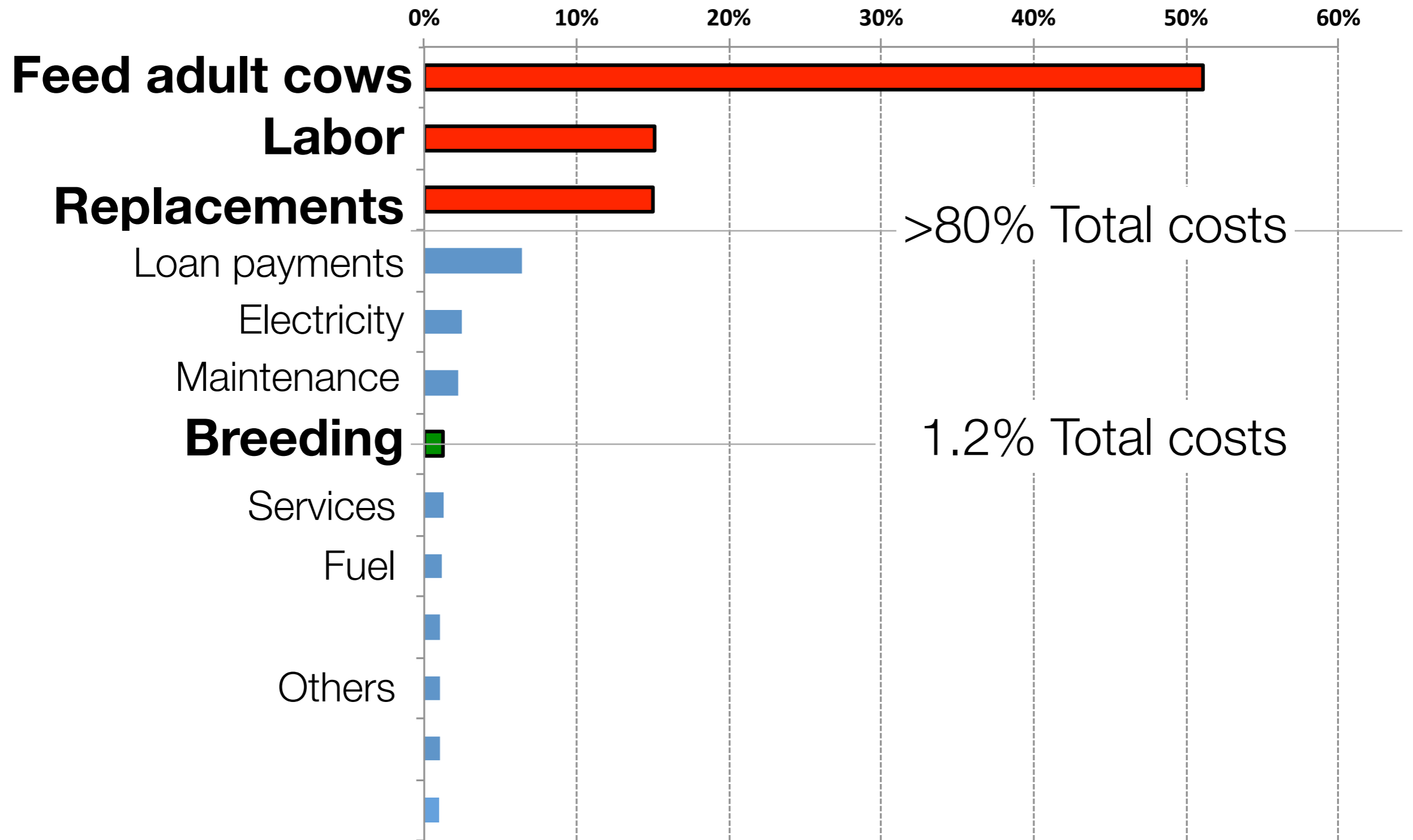
Cost



Net return



Structure of costs on a dairy farm



Data from a farm in north Spain

Milk income over feed cost

IOFC

$$\text{(Milk) x (Price) - (Feed) x (Cost) = Margin}$$



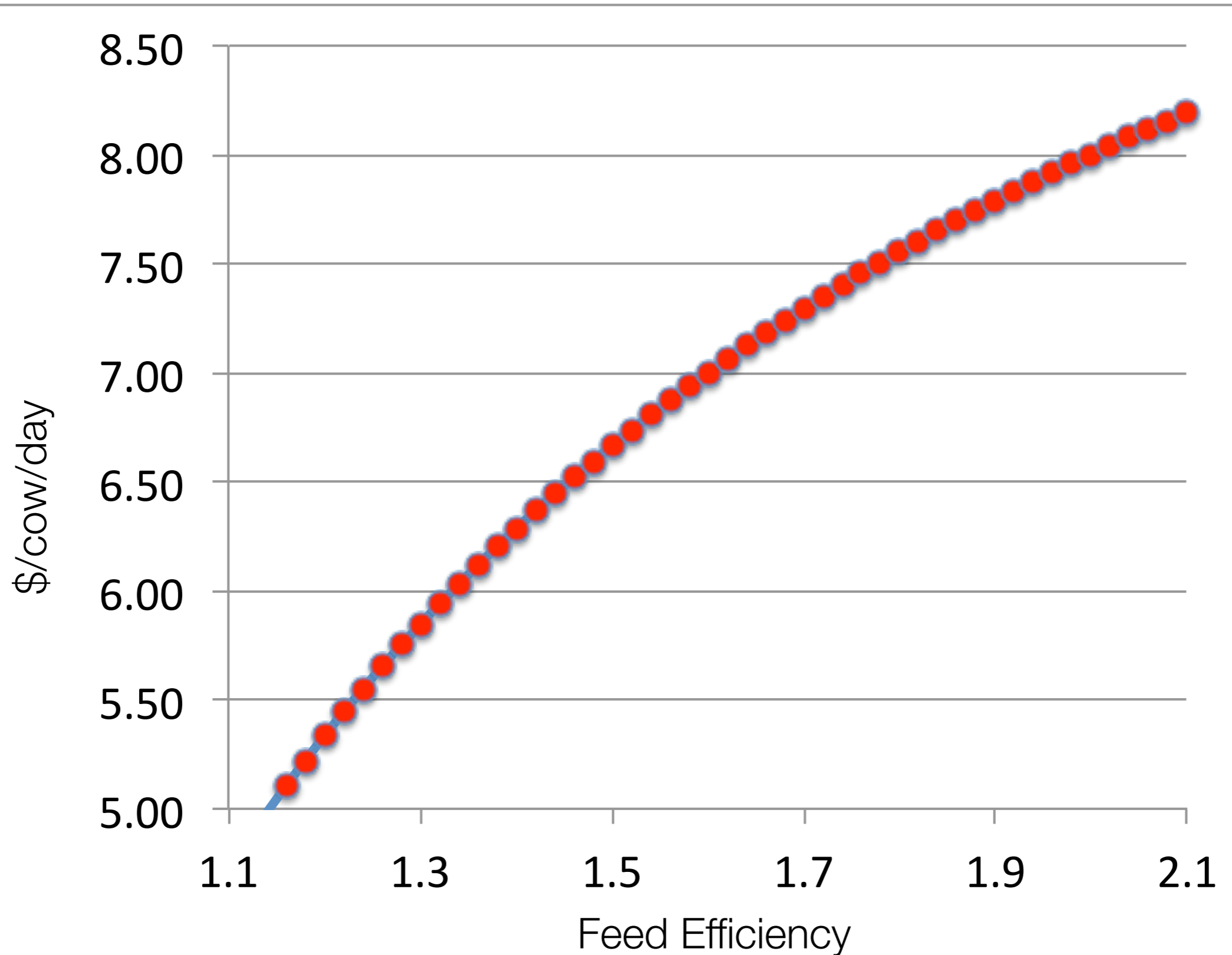
$$\text{(Milk) x (Price) -$$

Feed Price

Feed Efficiency

40kg di latte a €0,3/kg e €0,2/kg di alimenti

IOFC



BIG Costs make the difference

Feed

- 1 [Better purchase of feeds](#)
 - [Nutritional grouping](#)
- 2 Efficiency of use of protein
 - Formulation for maximum IOFC
 - ...

Replacements

- Control of mortality of calves and heifers
- Fast growth of replacements
- Weight and height to first breeding
- Genomic selection of best animals
- ...

Other opportunities of improvement

- 3 [Better decisions of replacement](#)

- 4 [Other important considerations](#)

DairyMGT.info

The largest selection of dairy farm decision support tools

Large information

- Projects
- Publications
- Presentations
- Links

Heart of DairyMGT.info

Tools

to Support
Decision-Making

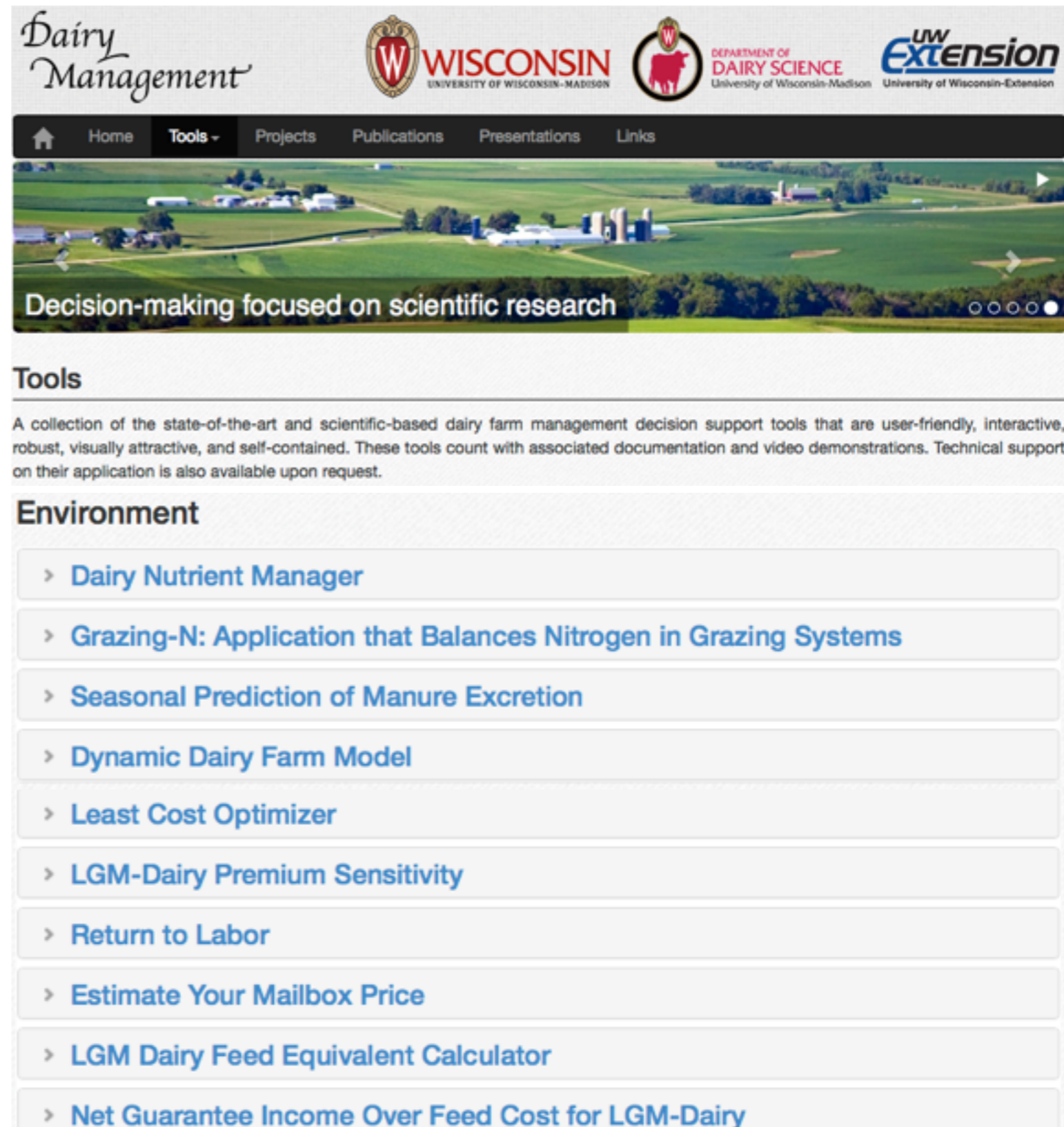
The screenshot shows the DairyMGT.info website. At the top, there are logos for Dairy Management, Wisconsin, Dairy Science, and UW Extension. Below these is a navigation bar with links for Home, Tools, Projects, Publications, Presentations, and Links. The 'Tools' link is circled in red. Below the navigation bar is a banner image of cows with the text 'Model-based decision support tools'. A paragraph below the banner describes the site's purpose: '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.' Below this is a red dashed circle around a logo that says 'UW-Dairy Management Decision Support TOOLS'. A red arrow points to this logo. To the right of the logo are sections for 'Latest Projects', 'Contact', and 'Helpful Link'. The 'Contact' section includes a photo of Victor E. Cabrera, Ph.D., and his contact information. The 'Helpful Link' section includes a tweet from Victor E. Cabrera. At the bottom, there are social media icons for LinkedIn, Facebook, Twitter, and YouTube.

DairyMGT.info: Tools

>40 Decision Support Tools

Many areas of dairy farm management

- **Feed**
- **Replacements**
- **Reproduction**
- **Production**
- **Replacement**
- **Environment**
- **Finances**
- **Genetics**
- **Health**
- ...



The screenshot shows the DairyMGT.info website. At the top, there is a navigation bar with links for Home, Tools (selected), Projects, Publications, Presentations, and Links. The header includes the 'Dairy Management' logo and logos for WISCONSIN UNIVERSITY OF WISCONSIN-MADISON, DEPARTMENT OF DAIRY SCIENCE, and UW Extension. Below the navigation is a large banner image of a dairy farm with the text 'Decision-making focused on scientific research'. Underneath the banner is a section titled 'Tools' with a descriptive paragraph: '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.' Below this is a section titled 'Environment' containing a list of tools with expandable arrows:

- > 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 of tools

How to explore and use them

Title



Link to the tool



Brief description
Supporting Docs.



Video Demo



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

Reproduction Variables	Value	Reproduction Costs, \$	Value
Herd Turnover Ratio, %/year	35	Replacement Transaction, \$	704
Roloff Herd Average, b/cow per year	24,000	Herd Structure at Steady State	
21-d Pregnancy Rate, %	18	Days in milk	224
Reproduction Cost, \$/cow per month	20	Days to Conception	122
Last Month After Calving to Breed a Cow	10	Percent of Pregnant	52
Do-not-Breed Cow Minimum Milk, lb/day	30	Reproductive Culling, %	8
Pregnancy Loss after 35 Days Pregnant, %	22.6	Mortality, %	3
Average Cow Body Weight, lb	1306	1st Lactation, %	43
		2nd Lactation, %	27
		> 3rd Lactation, %	30
Herd Economic Variables		Economics of an Average Cow, \$/year	
Replacement Cost, \$/cow	1300	Net Return, \$	1998
Salvage Value, \$/lb live weight		Milk Sales, \$	3834
Calf Value, \$/calf		Feed Cost, \$	-1522
Milk Price, \$/cwt		Calf Sales, \$	60
Milk Butterfat, %		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, \$	-99
Interest Rate, %/year	6	Reproductive Cost, \$	-80

[Analyze](#)

Spanish Version
Herramienta ([Abrir](#))

Other languages



Better purchase of feeds

Better price of feeds

- Ideal to have feeds that provide better price per nutrient
- Cows require nutrients, not feeds

How to know which feeds have better nutrient price?

- Estimate the price per nutrient in different feeds

Feeds provide different amounts of nutrients

- Price per unit of:
- Protein
- Energy
- Ecc.

Has to consider the wastage

- Different feeds have different levels of waste

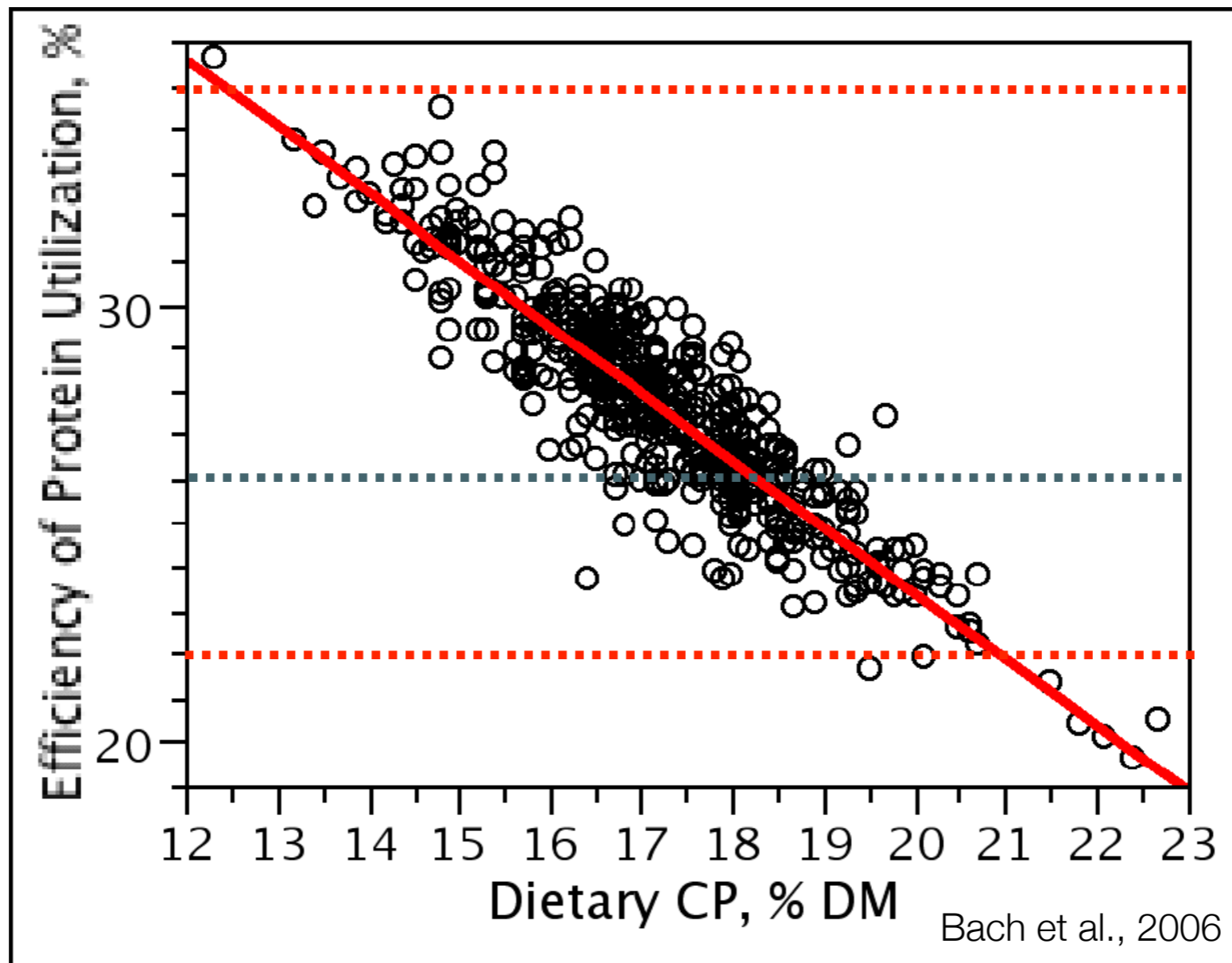
Analyze the value per nutrient

An example of protein

- How much cost the protein from alfalfa with respect to the one of soybean meal (SBM)?

Feed	Protein	DM	€/Tm	€/Tm protein
FEED	%NUT	%DM	COST	(COST)÷(%NUT) (%DM)
Alfalfa	18%	87%	220	1405
SBM	44%	89%	460	1175

Protein from alfalfa is 20% more expensive than the one from SBM!



Feed	Protein	DM	€/Tm	€/Tm protein
SBM	44%	89%	460	1175
Efficiency of conversion		22%		5341
		26%		4519
		35%		3357

Perform your own analysis with multiple feeds and multiple nutrients

- Use FeedVal v 6.0
- Provides you the ACTUAL value of feeds according to nutrient composition and market prices

	<input type="checkbox"/>	Ingredient	Nutrients				As-Fed Basis			Calculated	
			RUP %	RDP %	NEI3x Mcal/lb	peNDF %	DM %	Unit	Price* \$/Unit	Predicted Value \$/Unit	Actual Price as % of Predicted Value
1	<input checked="" type="checkbox"/>	Shelled Corn	4.5	4.5	0.91	0	86	kg	0.15	0.197/kg	76
2	<input checked="" type="checkbox"/>	Soybean Meal 48%	21	33	1	0	89	kg	0.38	0.411/kg	92
3	<input checked="" type="checkbox"/>	Soybean Meal 44%	17.5	32.5	0.97	0	89	kg	0.36	0.374/kg	96
4	<input type="checkbox"/>	Soybean Meal, expeller	30	16	1.09	0	92	kg		0.496/kg	
5	<input checked="" type="checkbox"/>	Soybeans, raw	12	28	1.25	0	87	kg	0.35	0.358/kg	98
6	<input type="checkbox"/>	Soybeans, heated	22	21	1.24	0	92	kg		0.457/kg	
7	<input checked="" type="checkbox"/>	Good Quality Hay	6	14	0.6	35	87	kg	0.19	0.170/kg	112
8	<input checked="" type="checkbox"/>	Poor Quality Hay	4.8	11.2	0.5	50	87	kg	0.10	0.137/kg	73
9	<input checked="" type="checkbox"/>	Corn Silage	2.8	4.2	0.67	30	35	kg	0.04	0.056/kg	71
10	<input type="checkbox"/>	Earlage/Snaplage	3.6	5.4	0.82	0	60	kg		0.123/kg	
11	<input checked="" type="checkbox"/>	Distillers Dried Grains	15	15	0.9	0	89	kg	0.15	0.312/kg	48
			3.6	5.4	0.95	0	70	kg		0.161/kg	
			0	0	2.06	0	99	kg	0.54	0.395/kg	137
			76	19	1.06						
			0	287	0						

+30 years of experience in Wisconsin

Algorithms similar to the ones used in St. Pierre and Glamocic, 2000. JDS 83:1402 1411.

FeedVal v6.0

Acquire the best feeds in September 2015. All in \$/Tm with market prices for Midwest (USA).

Feed	Market price	Estimated price	% of the estimated	Rank from 26	
Corn	\$150	\$198	76%	7	✓
SBM	\$360	\$375	96%	13	✓
Wheat	\$200	\$191	105%	19	✗
Cotton seed	\$340	\$236	144%	26	✗

% Estimate: $(\text{Market price} / \text{Estimated price}) * 100$
Therefore: Less % is better.

FeedVal v6.0

Summary

Estimates the price of feeds based on

- Nutrient content
- Referee feeds
- Market price

Supports:

- Less costs of feeds
- Greatest IOFC and profitability



Help decisions regarding:

- Purchase feed
- Diet formulation
- Use of feeds



2 Nutritional grouping: +TMR

Logic



Use of only one diet for all lactating (e.g., 1 TMR):

- All cows receive same diet
- High diets are preferred
- Cows with lower production or requirements are heavily over-fed

Feed efficiency improves with multiple groups:

- Saving costs of nutrients
- Less cows under or over fed
- Less environmental concerns
- **Greater IOFC**



Strategies for grouping

Depends on the farm and herd

Needed individual requirements:

- Energy (NEL)
- Protein (CP)
- Dry matter intake (DMI)



Number and states of cows

- Total cows in production
- States of the cows



Characteristics of the farm

- Capacity of handle different groups

Criteria to group the cows

Several criteria, some are better

Days in milk (DIM)

- Based on state during lactation: early, medium, late, ...



Milk corrected by fat (protein)

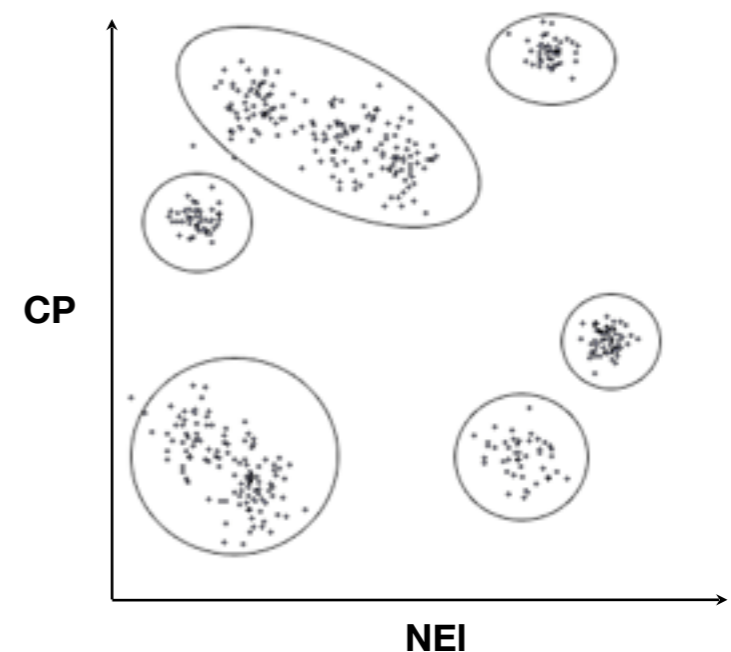
- Based on production level: high, medium, low, ...

Milk and BW

- Function of production and weight

Cluster

- Seems the most **EFFICIENT**



Strategies of grouping tool

Analyzes the value of GROUPING

Grouping Strategies for Feeding Lactating Dairy Cattle

V.E. Cabrera, UW-Madison Dairy Science

Sample Farm: Total Cows = 470

Overview Upload Farm Details Group Cows Reap Benefits

Prices

	CP%	Nel, MCal/lb	\$(Unit)
Corn	10	0.9	6.72 (\$/bu)
Soybean Meal	50	0.88	350 (\$/ton)

Please note that the values highlighted with this color will be used by the tool.

	Calculated Values	
\$/lb CP	0.14337	Edit
\$/Mcal NEL	0.1174	Edit

Milk Price 15.89 (\$/cwt)

Download Parameter Excel File (xls or xlsx version)

Download xls

Download xlsx

Upload Parameters as Excel File

Choose File

no file selected

Upload

Current Farm Data Status

Using Data from Default Parameters

Milk price

Nutrient costs

Data from the farm

ID, LACT, DIM, MILK, FAT, BW

Analysis of 30 farms in Wisconsin

Data collected at cow level

Consistent prices for all

- Milk: \$0,35/kg
- CP: 0,32/kg
- NEL: 0,1174/Mcal

Criteria for grouping

- Cluster

1 group vs. 3 groups

- Groups of same size



BW estimated based on

- 1° Lactation: 500 kg
- >1° Lactation: 590 kg

Nutritional groups on 30 farms

Cluster grouping in Wisconsin

	Size of farms (n=30)	1 group	3 groups	Improvement
		Income over feed cost (IOFC) \$/cow/year		
Min	<200	697	1,059	161
Avg	788	2,311	2,707	396
Max	>1,000	2,967	3,285	580

Improvement (\$/cow/year)

- Range 7% to 52%
- Average = \$396
- Range = \$161 to \$580

Valuation of grouping published

Reference	T ¹	G ²	Difference in income over feed cost (\$/cow per yr)		
			3-TMR ³ - 1-TMR	3-TMR - 2-TMR	2-TMR - 1-TMR
Smith et al., 1978	F	DIM			+30
Cassel et al., 1984	F	DIM			-117 ⁴
Williams and Oltenacu, 1992	S	C		+31	
Østergaard et al., 1996	S	DIM/M	3-TMR > 2-TMR > 1-TMR net revenue ³		
St-Pierre and Thraen, 1999	S	C		+33	+44
Earleywine, 2001	S	DIM	+44		+38
Cabrera et al., 2012	S	NE _L	+396		
Cabrera and Kalantari, 2014	S	NE _L	+46	+25	+21
Kalantari et al., 2015 ^b	S	C	+46	+8	+39

Cabrera and Kalantari, 2015 (accepted 13 September 2015, JDS)

Grouping strategies

Summary:

Opportunity to improve efficiency of nutrition

Considering that each group is more homogeneous in requirement

Diets are closer to requirements

Less costs of nutrients and therefore higher IOFC

Better productivity

It is probably to improve productivity

Additional benefits

- ↓ environmental concerns
- ↑ health conditions

Economic value of a cow

Knowing its value is critical for decision-making

- Base for important decisions

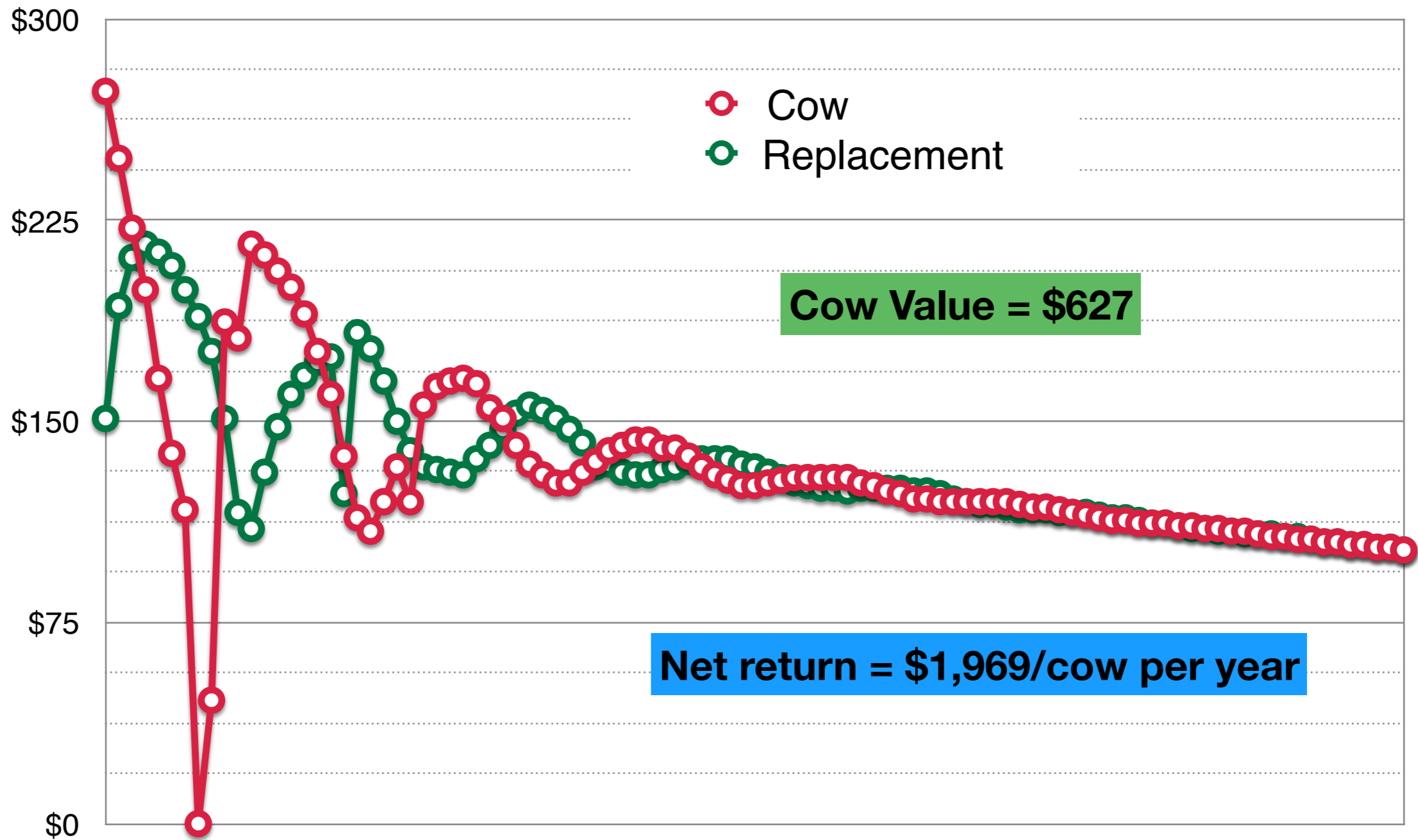
Knowing the value of all cows in the herd is crucial

- Decisions of replacement
- Optimize individual management according to value

Use a tool like “economic value of a dairy cow”

- Estimates the long-term net return of a cow (with respect to a potential replacement)

OUTPUTS - Interactive Results	
Value of the cow, \$	764
Compared Against a Replacement, \$	
Milk Sales, \$	287
Feed Cost, \$	-175
Calf Value, \$	33
Non-reproductive Cull, \$	-117
Mortality Cost, \$	-22
Reproductive Cull, \$	19
Reproduction Costs, \$	36
Replacement Transaction, \$	704
Herd Structure at Steady State	
Days in milk	222
Days to Conception	119
Percent of Pregnant	55



Graph of the net return of a cow (blue), with respect to a replacement (red). Difference of the long term of the cow and the replacement values becomes the economic value of a dairy cow.

2

Enter the input parameters.

.....

Skip ← Back **Next →**

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

Parameters can be defined directly in the yellow cells

Results are immediate!

For example, \$627 (green cell) is the value of the cow and \$1,969/year is the average net return of cow in the herd

University of Wisconsin 4

View the output as the input changes

.....

Skip ← Back Next →

Value of the Cow, \$	627
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Reproductive Culling Cost, \$	-59
Reproductive Cost, \$	-80

Tool economic value of a cow

Summary

Better profitability

Knowing the value of each cow allows to do more individual decisions: E.g., which animal to breed first and with what semen or if to treat an animal

Fundamental optimal decisions

keep or replace animals

Better efficiency of the herd

Over time, best animals will be selected in the herd

Additional usage

- Average net return of a cow responds to management parameters

4

Other FUNDAMENTAL considerations for profitability

Maximize the IOFC

- Not the production

Efficiency of the use of nutrients

- Specifically the use of protein in diet

Management of the information

- Up-to-date, rigorous record keeping, ...

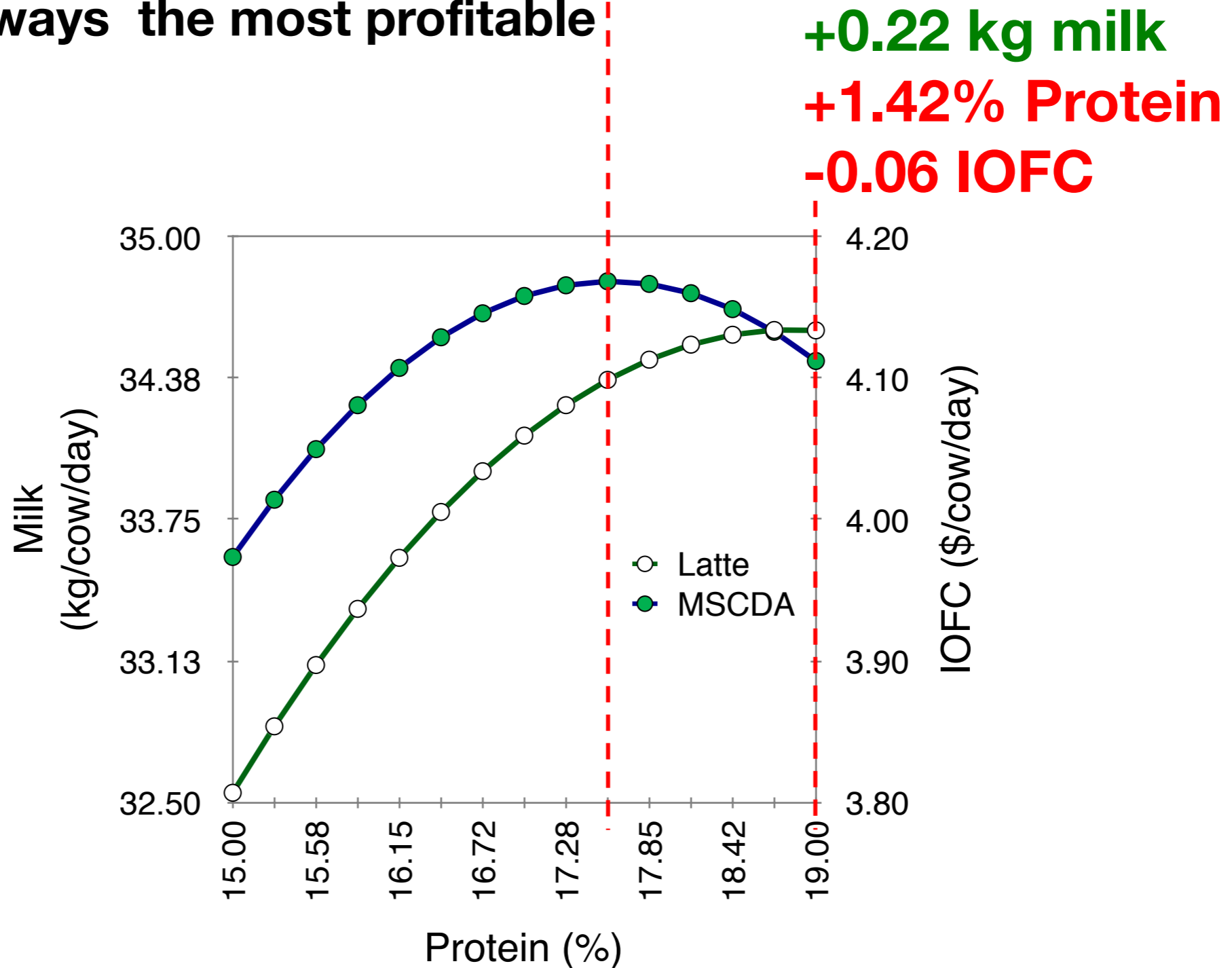
Use of “benchmarking”

- Compare against the past and other similar farms

Investment in training

- Managers using the best technology

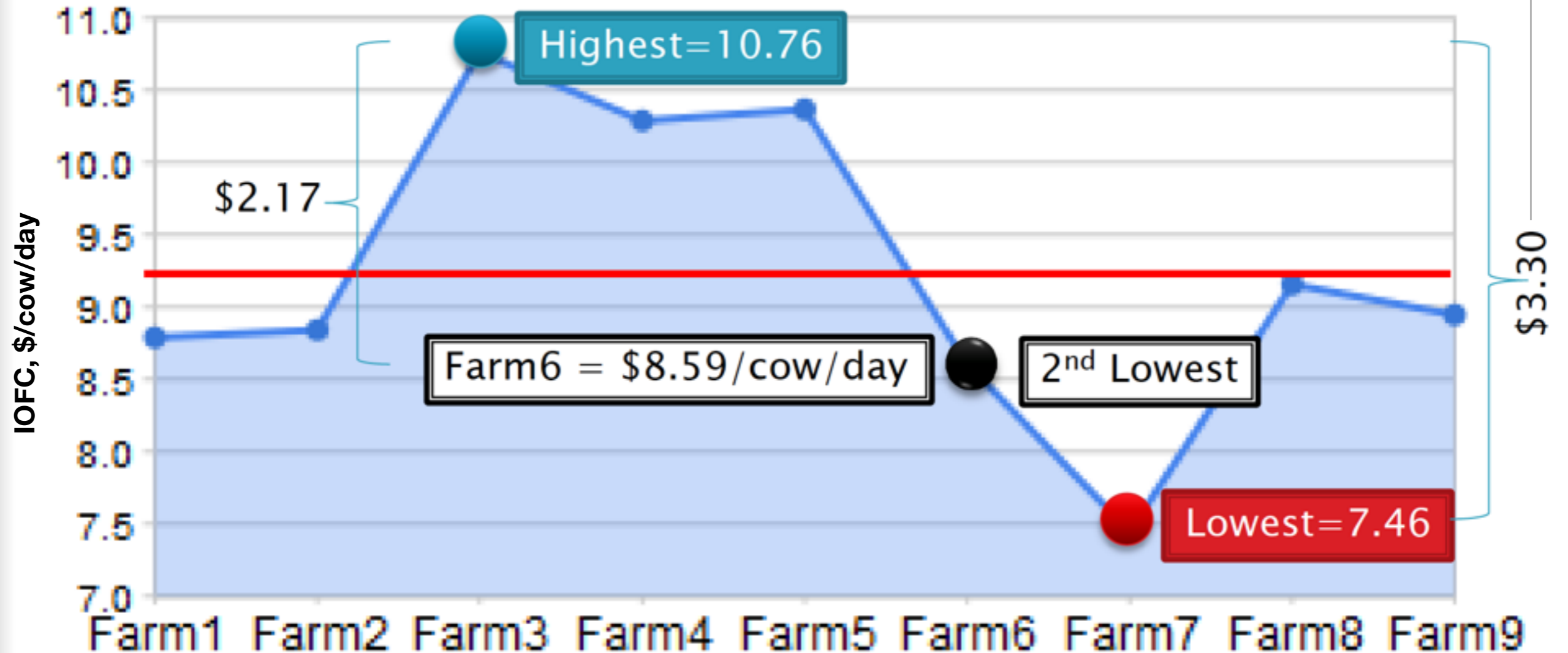
Maximum production is not always the most profitable



Estimates with tool income over feed supplement cost (DairyMGT.info), that uses functions from NRC (2001) Milk = f(RUP, RDP).

Systematic comparisons “benchmarking”

Why the big differences



Estimated with the Dairy Extension IOFC tool (DairyMGT.info)

Thanks

DairyMGT.info



*Dairy
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