



# Decision Support Tools



UW-Dairy Management  
Decision Support TOOLS

**Victor E. Cabrera**

UW-Extension Central Wisconsin Series  
American Legion Hall, Elroy, WI, 27 February 2014

# DairyMGT.info

## Largest collection of Decision Support Tools

### Lots of info

- Projects
- Publications
- Presentations
- Links

### Core of DairyMGT.info Decision Support Tools

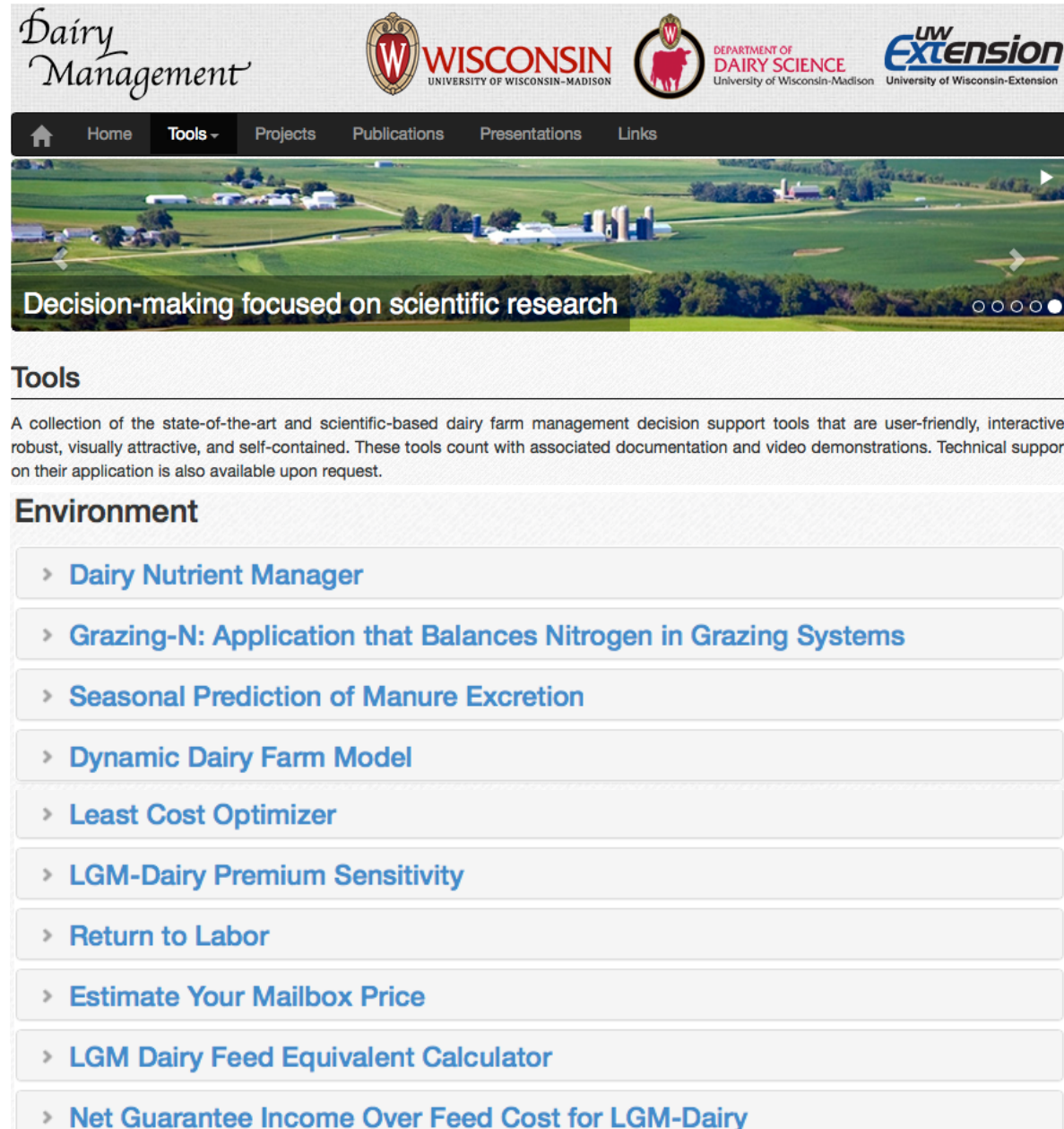
The screenshot shows the DairyMGT.info website. At the top, there are logos for Dairy Management, WISCONSIN UNIVERSITY OF WISCONSIN-MADISON, DEPARTMENT OF DAIRY SCIENCE, and UW Extension. Below the logos is a navigation menu with 'Home', 'Tools', 'Projects', 'Publications', 'Presentations', and 'Links'. The 'Tools' menu item is circled in red. Below the menu is a banner image of cows with the text 'Model-based decision support tools'. Below the banner is a paragraph: '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 paragraph is a red circle containing a blue icon of crossed wrench and screwdriver, with the text 'UW-Dairy Management Decision Support TOOLS' next to it. Below the icon is a list of links: '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', and 'UW Center for Dairy Profitability'. To the right of the icon is a 'Latest Projects' section with links: 'Improving Dairy Farm Sustainability', 'Genomic Selection and Herd Management', 'Dairy Reproduction Decision Support Tools', 'Strategies of Pasture Supplementation', and 'Improving Dairy Cow Fertility'. Below that is a 'Contact' section with a photo of Victor E. Cabrera and his contact information: 'Associate Professor', 'Extension Specialist in Dairy Management', '279 Animal Sciences', '1675 Observatory Dr.', 'Madison, WI 53706', '(608) 265-8506', 'vcabrera@wisc.edu', and 'More »'. To the right of the contact section is a 'Helpful Link' section with 'Repro Money Program'. Below that is a 'Tweets' section with two tweets from Victor E. Cabrera. At the bottom of the page are social media icons for LinkedIn, YouTube, RSS, and Google+.

# DairyMGT.info: Tools

>40 Decision Support Tools

## Many Dairy Farm Management Areas

- Feeding
- Heifers
- Reproduction
- Production
- Replacement
- Environment
- Financial
- Genomics
- Health



The screenshot shows the DairyMGT.info website interface. At the top, there are logos for Dairy Management, WISCONSIN UNIVERSITY OF WISCONSIN-MADISON, DEPARTMENT OF DAIRY SCIENCE, and UW Extension. Below the logos is a navigation menu with links for Home, Tools (selected), Projects, Publications, Presentations, and Links. A large banner image of a dairy farm is displayed with the text "Decision-making focused on scientific research". Below the banner, the "Tools" section is titled, followed by 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." Underneath, the "Environment" section lists various tools, each with a right-pointing chevron icon:

- > 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 a DairyMGT.info tool

## How to explore them

The screenshot shows a web page titled "The Economic Value of a Dairy Cow". The page content includes a list of links: "Online Tool (Open)", "Excel Spreadsheet (Download)", "Presentation (Download)", "Paper (Download)", "Magazine Article (Download)", and "Demo (Click to View/Hide the Video)". Below the links is a video player showing a screenshot of the tool's interface, which displays various economic metrics for a dairy cow. A red box with the text "Tech Support Always Available" is overlaid on the video player. At the bottom of the page, there are links for "Spanish Version" and "Herramienta (Abrir)".

**Title** → > [The Economic Value of a Dairy Cow](#)

**Links to the tool** → [Online Tool \(Open\)](#)  
[Excel Spreadsheet \(Download\)](#)  
[Presentation \(Download\)](#)  
[Paper \(Download\)](#)  
[Magazine Article \(Download\)](#)

**Short description** ← The Economic Value of a Dairy Cow

**Supporting Docs** ← [Paper \(Download\)](#)

**Video Demo** → [Demo \(Click to View/Hide the Video\)](#)

**Tech Support Always Available**

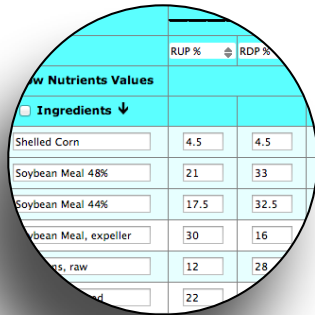
**Other Languages** ← [Spanish Version](#)  
[Herramienta \(Abrir\)](#)

Item	Value
Salvage Value, \$/lb live weight	0.38
Call Value, \$/call	100
Milk Price, \$/cwt	16
Milk Butterfat, %	3.2
Feed Cost Lactating Cows, \$/lb dry matter	0.1
Feed Cost Dry Cows, \$/lb dry matter	0.08
Interest Rate, %/year	5

Item	Value
Net Return, \$	1998
Milk Sales, \$	3834
Feed Cost, \$	-1522
Call Sales, \$	60
Non-Reprod. Culling Cost, \$	-198
Mortality Cost, \$	-38

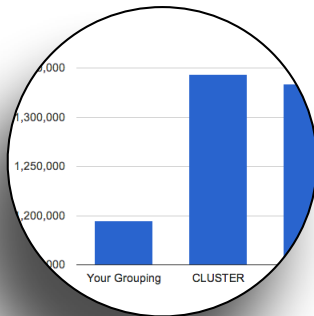
# Some Decision Support Tools

## Selected Tools for Practical Use



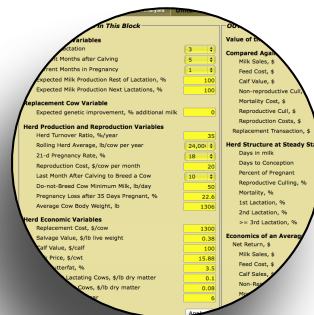
### FeedVal 2012

- Estimates the actual value of feed ingredients



### Grouping Strategies for Feeding Lactating Cows

- Evaluates the value of more feeding rations



### The Economic Value of a Dairy Cow

- Calculates the projected net return of a cow

# FeedVal 2012

## Should I buy this feed?

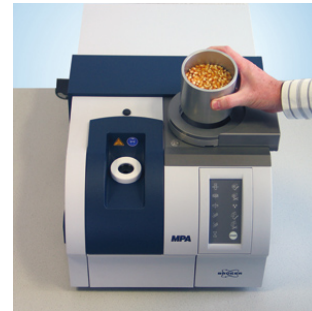


**Nutrient content**  
**Feed composition**



**Market price**

- DM basis \$/unit price



**Referee feeds**

- Composition
- Market prices

# FeedVal 2012

## January 2014 dairy feed prices

Ingredient	DM % Unit	Feed Prices (\$/Unit)		Actual Price as % of Predicted	Best-buy Ranking
		Market	Predicted		
Wet Distillers	45 ton	76.0	176.4	43	1
Distillers Dried Grains	89 ton	190.0	393.4	48	2
Barley	89 cwt	5.3	9.1	58	3
Corn Gluten Feed	89 ton	160.0	253.3	63	4
Hominy	89 ton	128.0	191.4	67	5
Corn Silage	35 ton	43.2	58.9	73	6
Corn Gluten Meal	89 ton	660.0	887.5	74	7
Shelled Corn	86 bu	4.3	5.5	79	8
Poor Quality Hay	87 ton	140.0	172.8	81	9
Canola Meal, expeller	89 ton	346.8	422.4	82	10
Cottonseed Meal	89 ton	403.0	476.2	85	11
Soybean Meal 48%	89 ton	474.0	532.8	89	12
Wheat Middlings	89 ton	175.0	194.9	90	13
Soy Hulls	89 ton	188.0	200.6	94	14
Wheat	89 bu	5.5	5.7	96	15
Linseed Meal	89 ton	375.0	388.2	97	16
Soybean Meal 44%	89 ton	462.0	468.6	99	17
Good Quality Hay	87 ton	218.3	205.0	107	18
Urea	99 ton	472.0	427.9	110	19
Soybeans, raw	87 bu	12.6	11.1	114	20
Blood Meal	94 ton	1800.0	1540.4	117	21
Sunflower Meal	89 ton	290.0	246.9	117	22
Oats	89 ton	236.9	194.1	122	23
Molasses	89 ton	205.0	144.1	142	24
Whole Cottonseed	89 ton	360.0	247.9	145	25
Beet Pulp	89 ton	270.0	179.6	150	26
Tallow	99 cwt	28.5	15.0	190	27



# FeedVal 2012

## January 2014 dairy feed prices

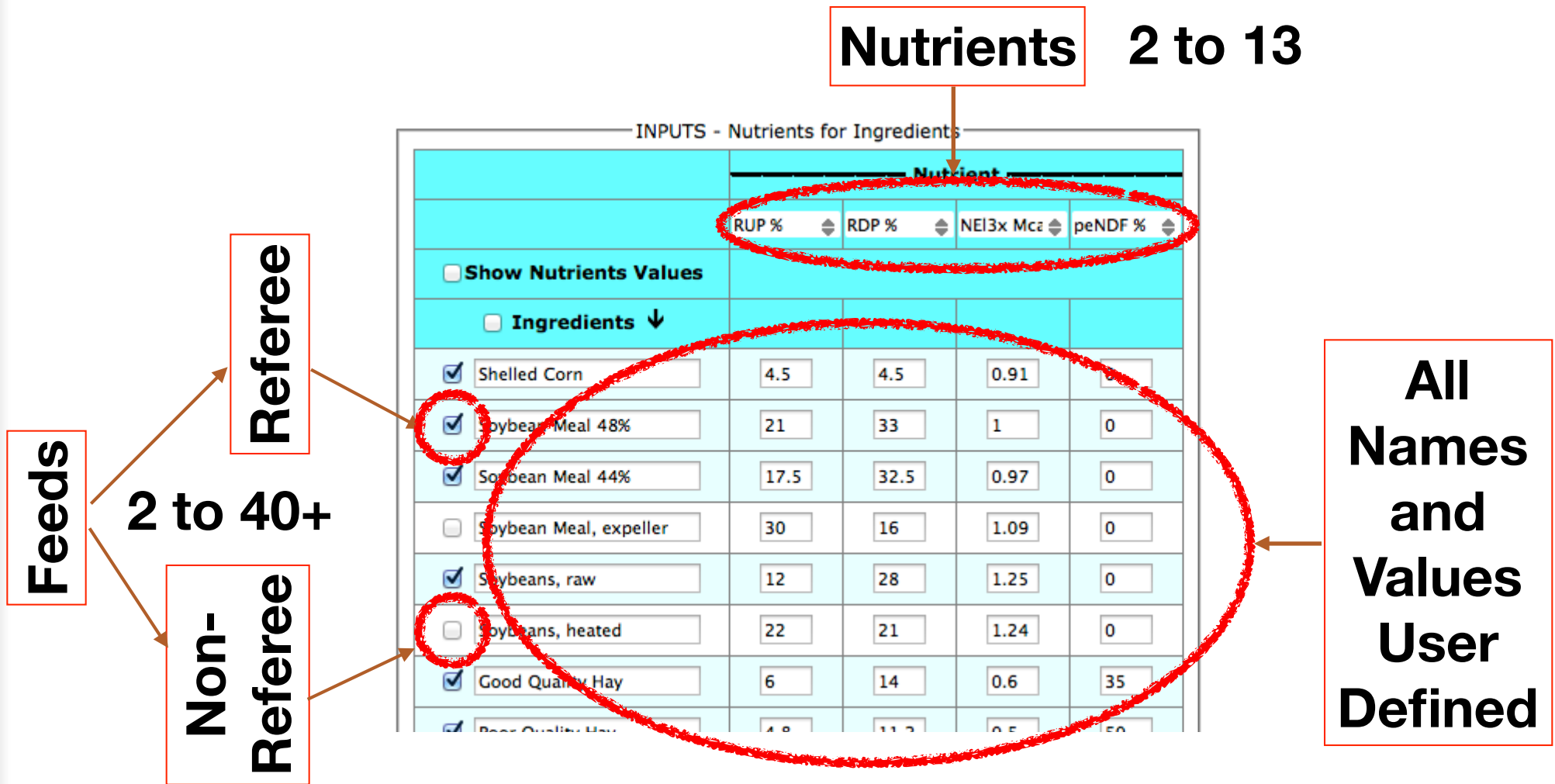
Feed	Market price	Predicted price	% of Predicted	Rank
Wet Distillers	\$76/ton	\$176/ton	43%	1 of 27
Corn Grain	\$4.3/bu	\$5.5/bu	79%	8 of 27
Soybean Meal 44%	\$462/ton	\$469/ton	99%	17 of 27
Oats Grain	\$237/ton	\$194/ton	122%	23 of 27





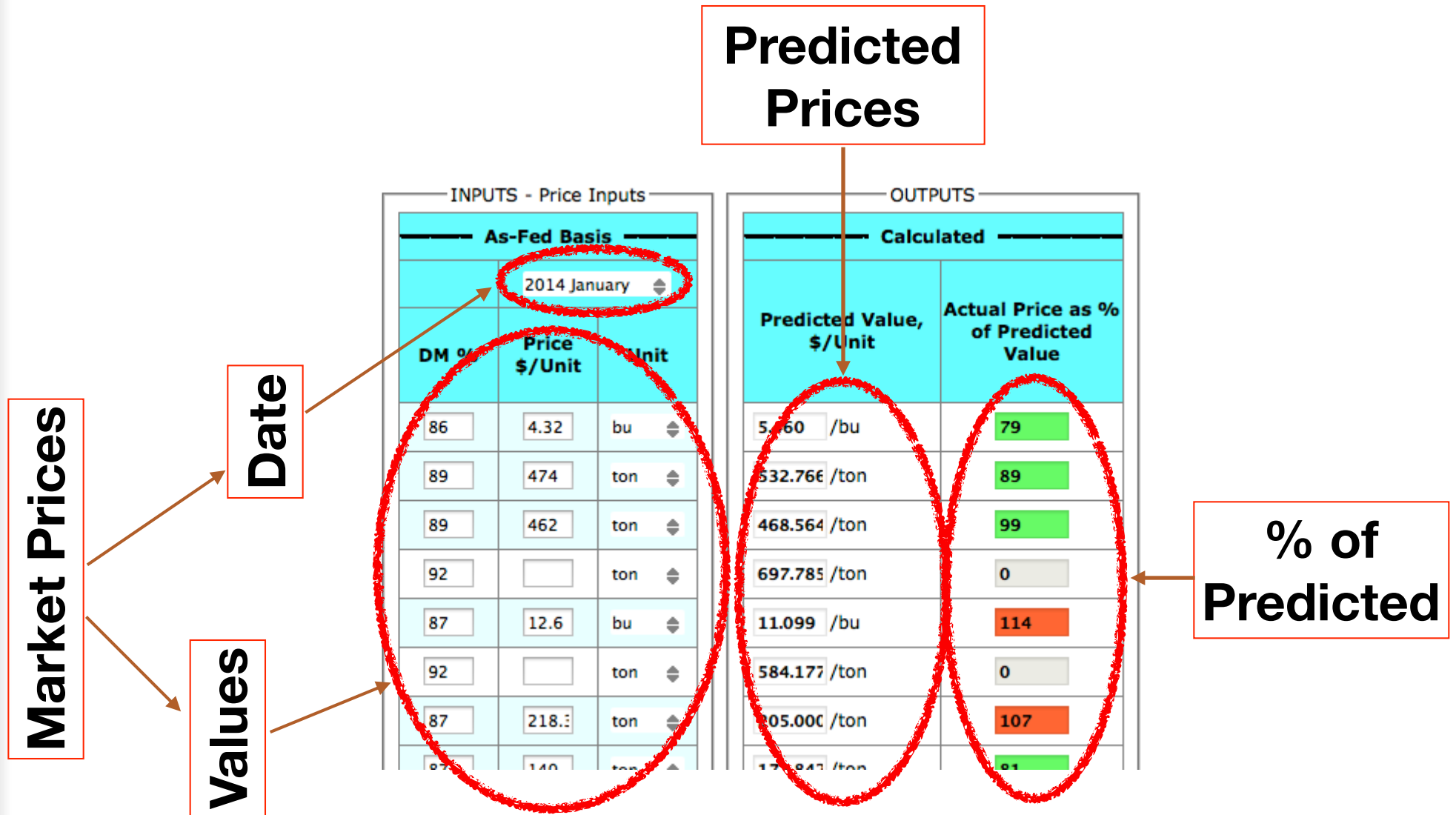
# FeedVal 2012

You can and you should do your own analyses



# FeedVal 2012

You can and you should do your own analyses



# FeedVal 2012

## Recap

### Calculates real value of a feed based on:

- Nutrient content
- Referee feeds
- Market prices

### Supports:

- Decreased feed costs
- Increased income over feed costs



### Help decisions of:

- Feed purchases
- Diet balancing
- Feed utilization



# Nutritional Grouping Strategies

## Rationale



### **Same ration to all lactating cows**

- All lactating cows receive same nutrient density
- Preferred “high” rations
- Low producing cows are overfed

### **Improved nutrient efficiency**

- Diet closer to requirements
- Less over-conditioned COWS
- Less environmental concerns
- **Higher milk income over feed costs**



# Why Farmers do not Group More?

## Exploring main constraints

### 2-page survey

- 196 farms in WI
- 211 farms in MI

### Constraints to feeding more ration groups

1. Milk drops when cows are moved
2. Desire to keep management simple
3. Conflicts with grouping for reproduction
4. Farm facilities do not allow it
5. Not enough labor or personnel to handle it

**A. BASIC DAIRY FARM INFORMATION**

A.1. Number of dairy cows you typically have on your farm:  
A.1.1. No. of lactating dairy cows (cows milking) \_\_\_\_\_  
A.1.2. No. of dry cows \_\_\_\_\_  
A.1.3. No. of replacement heifers (1<sup>st</sup> day of age to date of first calving) \_\_\_\_\_  
A.1.4. No. of calves for raising or veal \_\_\_\_\_

A.2. Milk production on your farm:  
A.2.1. What is the milking herd average (MHA) for your herd? \_\_\_\_\_ lbs per cow per day  
A.2.2. What is the typical daily milk tank or milk shipped for your herd? \_\_\_\_\_ lbs per cow per day

A.3. Describe the primary manager of the dairy operation:  
A.3.1.  Owner  Manager  Other \_\_\_\_\_  
A.3.2. Age \_\_\_\_\_ years  
A.3.3. Education:  High school or less,  graduated with 2-year degree or technical school,  graduated college with BS or higher

A.4. Who performs the role of specialist for the dairy operation (check all that apply):  
 Veterinarian or other family member  Feed company representative  
 Private consulting veterinarian  Veterinarian  Other \_\_\_\_\_

A.5. Do you consider your farm to be managed professionally as pasture-based systems during the grazing season?  
 YES  NO

A.6. Is your farm certified organic (or in the certification process)?  
 YES  NO

A.7. Describe your primary housing facility for lactating cows:  
A.7.1. Percentage (%) of cows housed individually in stalls or stall-like bars: \_\_\_\_\_  
A.7.2. 100%   Other %: \_\_\_\_\_  None  
A.7.3. Cows housed in groups:  
A.7.3.1. No. of groups, pens, or stalls \_\_\_\_\_  
A.7.3.2. Type of group housing (check all that apply):  
 Free stall bars  Stanchion structure  Open dry lot,  hauled back to home cowshed,  Computer hauled pen under roof,  None  Other \_\_\_\_\_

A.8. Physical Constraints of Lactating Cows. Indicate your level of agreement with the following statements regarding your management related criteria for grouping lactating cows. In each row, circle a number:  

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Grouping lactating cows based on:					
Readiness to be milked	1	2	3	4	5
Days in milk	1	2	3	4	5
1 <sup>st</sup> Lactation lactation group	1	2	3	4	5
Milk production	1	2	3	4	5
Body condition/body weight	1	2	3	4	5
Health (i.e. mastitis, SCC, milk, etc.)	1	2	3	4	5
Reproduction (i.e. breeding program, DHI, etc.)	1	2	3	4	5
I do not believe multiple groups are worth the effort	1	2	3	4	5
Other _____	1	2	3	4	5

**B. FEEDING & RATIONS FOR LACTATING COWS**

B.1. Describe your feeding system for lactating cows (check all that apply):  
 One or more total mixed rations (TMR) all feed ingredients for a given ration are mixed into one mix and offered to cows. **SKIP** → to question B.2.  
 Partial mixed rations (PMR) and concentrate mixed, but additional feed provided:  
 Additional concentrate fed to complete ration  
 Additional concentrate fed to milking parlor  
 Additional concentrate fed to other milking areas  
 Additional forage fed (describe: \_\_\_\_\_)  
 Other \_\_\_\_\_  
 Forage and concentrate each delivered separately (no mixing):  
 Concentration fed to complete ration  Concentration fed to robotic milking system  
 Concentration fed to milking parlor  
 Concentration top dressed in the stall/stanchion milking barn  Other \_\_\_\_\_

B.2. Do you feed different rations ( diets ) to lactating (milking) cows?  
 YES. Use the table below to describe rations.  NO. **SKIP** → to question B.4.

B.3. Feeding Groups of Lactating Cows. Indicate your level of agreement with the following statements regarding grouping lactating cows for feeding purposes. In each row, circle a number:  

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feed different rations based on:					
Fresh vs. all other lactating cows	1	2	3	4	5
Stage of lactation for non-dairy cows	1	2	3	4	5
Parity (lactation number)	1	2	3	4	5
Milk production	1	2	3	4	5
Body condition/body weight	1	2	3	4	5
Health related issues	1	2	3	4	5
Reproductive status (pregnant vs. open)	1	2	3	4	5
I do not believe more than one diet is needed	1	2	3	4	5
Other _____	1	2	3	4	5

B.4. Constraints on Feeding Groups of Lactating Cows. Indicate your level of agreement with the following statements regarding the constraints to having more feeding groups for your lactating cows. In each row, circle a number:  

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I do not feed more rations ( diets ) to my lactating cows because:					
Current facilities do not support it	1	2	3	4	5
Not enough labor or personnel to handle it	1	2	3	4	5
Doesn't fit in with my management	1	2	3	4	5
Milk drops when cows are moved to different groups	1	2	3	4	5
Conflicts with grouping for reproduction purposes	1	2	3	4	5
Management does not want to	1	2	3	4	5
I do not believe more than one feeding group is needed	1	2	3	4	5
Other _____	1	2	3	4	5

B.5. Would you consider becoming a demonstration farm for implementation of ideas?  YES,  NO  
Thank you very much for completing the survey! Your input is valuable and appreciated!

# Strategies for Grouping Cows

Depend on farm and herd characteristics



## Individual cow requirements

- Energy (NEL)
- Protein (CP)
- DMI



## Number of cows

- Lactating cows
- Stages of cows



## Farm characteristics

- Capacity to handle feeding groups

# Criteria for Nutritional Grouping

Several criteria exist and are used

## Days after calving, DIM

- Based on lactation stage: e.g., earlier, medium, late



## Fat (protein) corrected milk

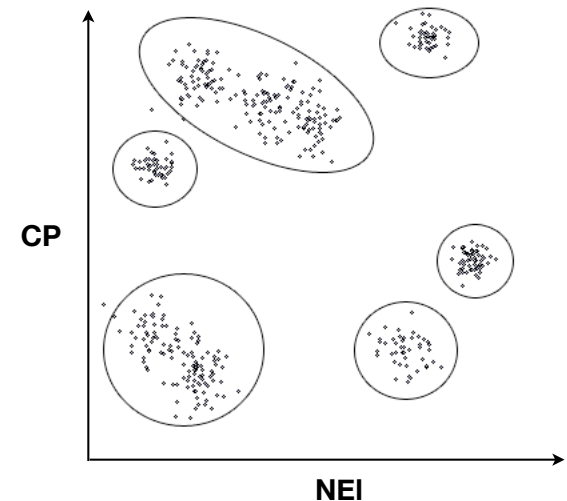
- Based on production level

## Dairy merit

- Function of both F(P)CM and BW

## Cluster

- Seems the MOST efficient criterion



# Grouping Strategies for Feeding Cows

You can and you should do your own analyses

Dairy Management UW-Extension  
University of Wisconsin-Madison

THE UNIVERSITY OF WISCONSIN MADISON UW Extension

Tools Projects Publications Presentations LGM-Dairy Links  
Contact Comments News People Opportunities Gallery

Navigation Tabs

Analyzed Farm

## Grouping Strategies for Feeding Lactating Dairy Cattle

Overview Upload Farm Details Group Cows Reap Benefits

Sample Farm: Total Cows = 470

Prices

	CP%	Nel, Mcal/lb	\$(Unit)
Corn	0.1	0.9	6.72 (\$/bu)
Soybean Meal	0.5	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 Parameters as Excel File  
Download Parameters File

Upload Parameters as Excel File  
Upload the Excel File:  No file chosen

Current File/Data Status  
Using Data from Default Parameters File

Milk Price

Nutrient Price

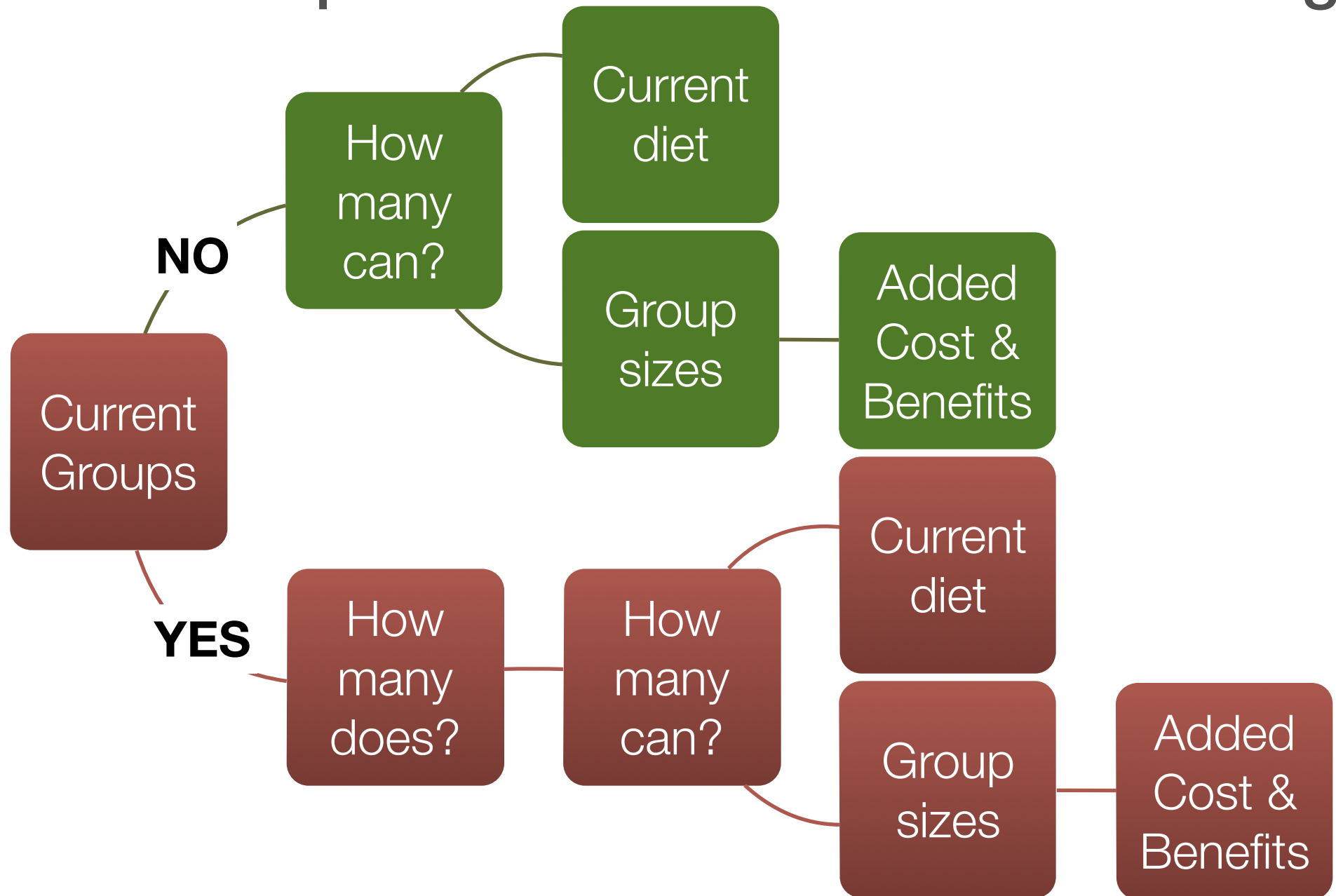
Herd/Farm Data

ID, LACT, DIM, MILK, FAT, PROT, BW



# Grouping Strategies

Farm/herd possibilities and decision-making



# Grouping Illustration

## Economic impact of nutritional grouping

Current Situation	
Lactating Cows	470
Current Groups	None
NEL Mcal/lb	0.80
CP, %	17



Possible Situation	
Groups	3
Group Sizes	100, 100, 270
Milk loss	5 lb/d x 4 d
Saved costs	None

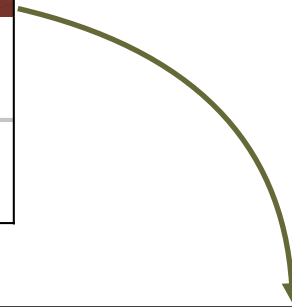
# Decision Support System Illustration

## Cluster grouping criteria

Current Situation				
Group	Cows	NEL	CP	IOFC
	#	Mcal/lb	%	\$/cow.d
All	470	0.80	17.00	6.9

Possible Situation				
Group	Cows	NEL	CP	IOFC
	#	Mcal/lb	%	\$/cow.d
1	100	0.62	13.07	4.7
2	100	0.65	14.18	7.2
3	270	0.71	16.05	9.3
All	470	0.68	15.02	7.9

**+\$147,000/year  
for 470 cows**



# Analysis from 30 Dairy Farm Records

30 Wisconsin dairy farms

## Prices

- Milk: \$15.89/cwt
- CP: 0.1434/lb
- NEL: 0.1174/Mcal

## Grouping criteria

- Cluster

## No groups vs. 3 groups

- Same size groups



## Projected BW

- 1st lactation: 1,100 lb
- >1st lactation: 1,300 lb

# Grouping Strategies on 30 Farms

## Cluster grouping on Wisconsin farms

	Lactating cows (n=30)	No grouping	3 Groups	Gain
		Income Over Feed Cost \$/cow.yr		
Minimum	<200	697	1,059	161
Mean	788	2,311	<b>2,707</b>	<b>396</b>
Maximum	>1,000	2,967	3,285	580

# The Economic Value of a Dairy Cow

**CRUCIAL** for multiple on-farm decisions

## Keep or replace

- Herd is better off with or without the cow
- What are the least valuable animals
- What are the most valuable animals



## Breed or do-not-breed

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

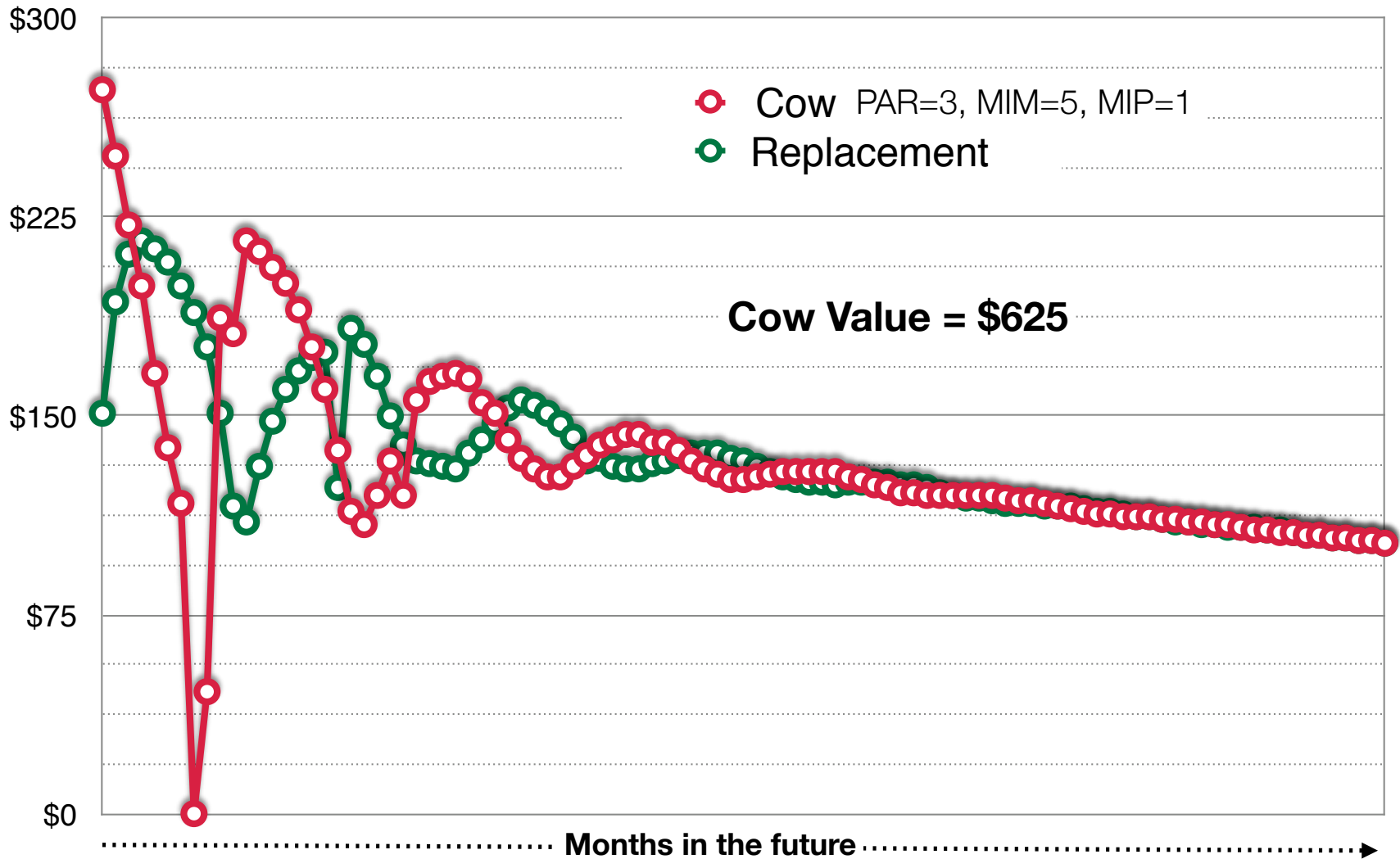


## Treat or do not treat

- How much investment a cow is worth?

# Projected Economic Net Return

Expected future profitability



# Economic Value of a Dairy Cow

You can and you should do your own analyses

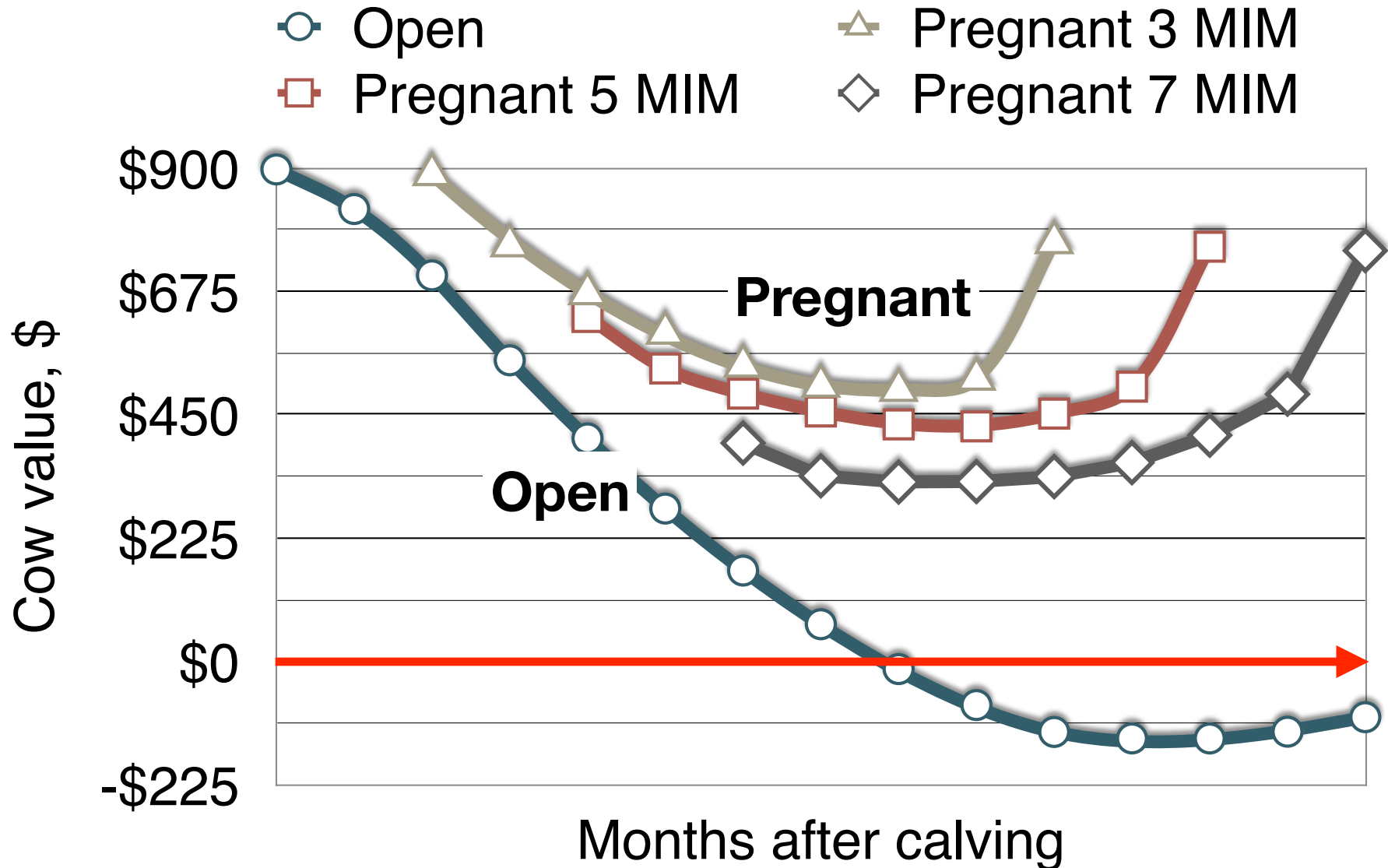
The screenshot shows a software interface for dairy cow economic analysis. The 'Herd Analysis' tab is selected and circled in red. The interface is divided into 'INPUTS' and 'OUTPUTS' sections. Annotations on the left side point to various input categories: 'Cow' points to 'Evaluated Cow Variables', 'Replacement' points to 'Replacement Cow Variable', 'Herd' points to 'Herd Production and Reproduction Variables', and 'Market' points to 'Herd Economic Variables'. On the right side, annotations point to specific output results: 'Herd analysis' points to the 'Value of the Cow, \$' (627), 'Value of a Cow' points to 'Calf Value, \$' (26), 'Herd structure' points to 'Reproductive Culling, %' (52), and 'Herd net return' points to 'Net Return, \$' (1969). A vertical 'RESULTS' label is also present on the right side of the interface.

Category	Variable	Value
INPUTS	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
	Expected genetic improvement, % additional milk	0
	Herd Turnover Ratio, %/year	35
	Rolling Herd Average, lb/cow per year	2400
	21-d Pregnancy Rate, %	18
	Reproduction Cost, \$/cow per month	20
OUTPUTS	Value of the Cow, \$	627
	Value of a Cow	
	Calf Value, \$	26
	Value of a Cow	
	Reproductive Culling, %	52
	Herd structure	
	Net Return, \$	1969
	Herd net return	
	Net Return, \$	1969
	Milk Sales, \$	3806



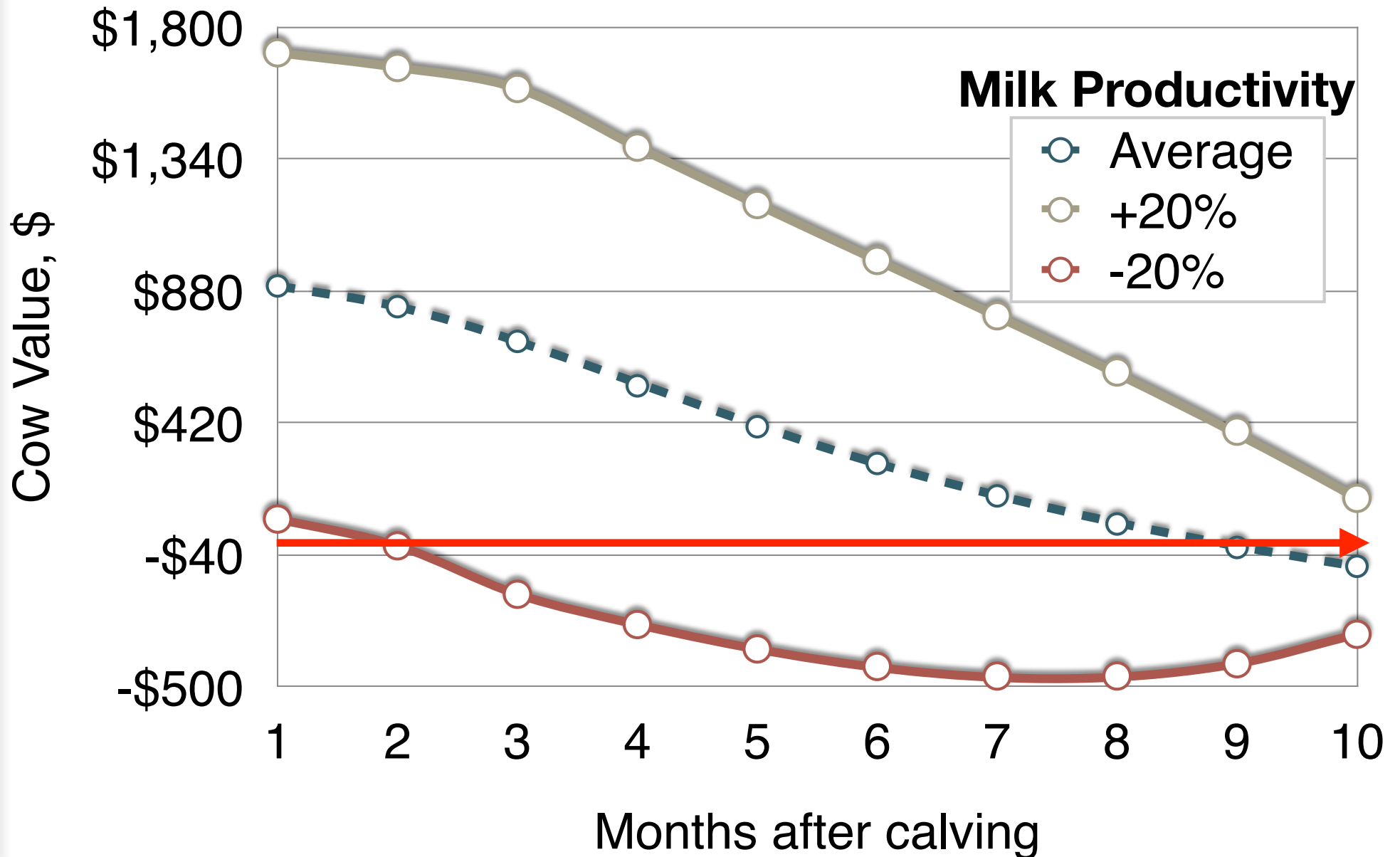
# The Value of an Average Cow

## Open vs. pregnant in second lactation



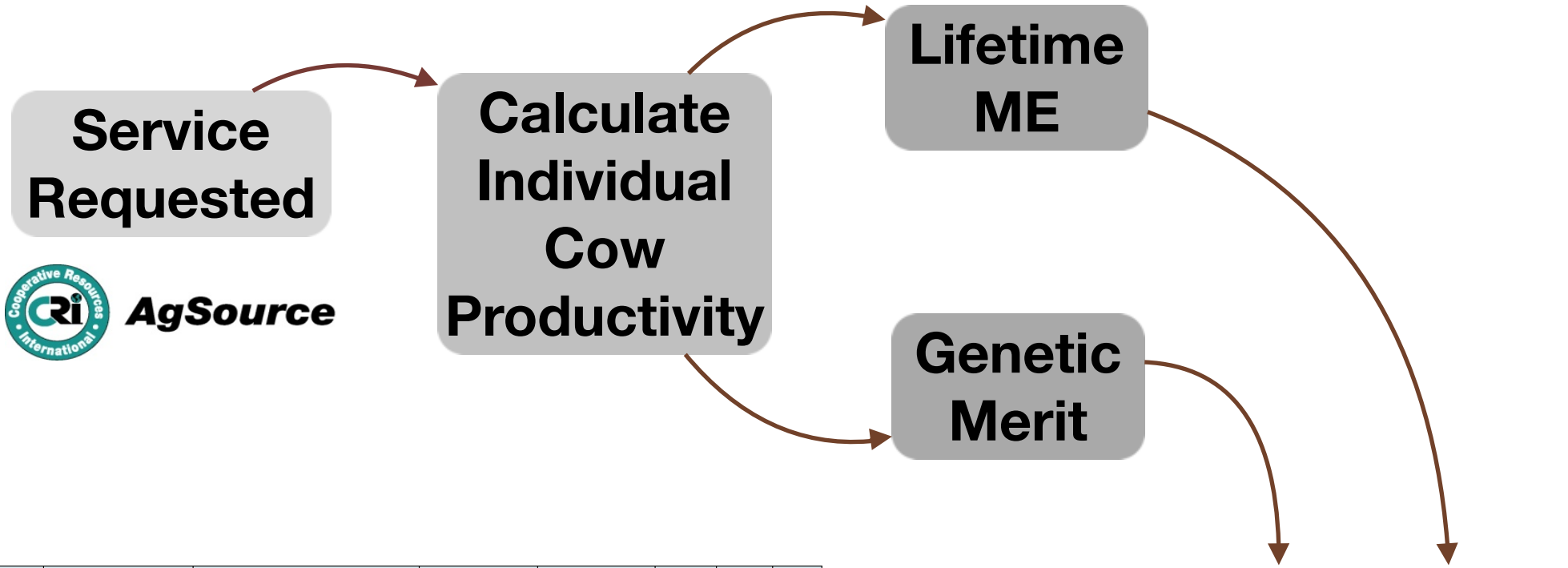
# Milk Productivity and Value of a Cow

## Impact of projected productivity



# AgSource Herd Selection Guide

## Individual cow value for all herd



Identification and Status				Reproduction				Current Lactation			Lifetime Average			Genetics		Test Day		Exp. Rel. \$		
Ctrl Num	Barn Name	Lact	Calv date	DIM	Last Bred	Serv Sire	No. Serv	Days Open	Repro Status /DCC	ME Milk	LS SCC	TCI	ME Milk	LS SCC	TCI	NMS	Gen Ind.		Milk	LS SCC
3241	1522	1	9/25/11	DRY	3/29/12	7HO08946	2	186	P/233	46513	1.1		46513	1.1		99				\$4,576
3304	1585	1	1/21/12	301	5/16/12	7HO09420	2	116	P/185	43440	0.8		43440			142		78	0.9	\$3,684
3377	1658	1	8/6/12	103	10/21/12	7HO09893	1	76		42577	1.9		42577			146		131	1.3	\$3,571
3327	1608	1	3/14/12	248	6/11/12	7HO09229	2	89	P/159	42690	1.4		42690			567		109	0.9	\$3,468
3326	1607	1	4/15/12	216	7/20/12	7HO10176	2	96	P/120	41259	1.6		41259			340		112	1.5	\$3,156
3359	1640	1	6/4/12	166	10/24/12	7HO10091	2	142		42777	2.4		42777			20		125	2.2	\$3,130
3077	1358	2	1/25/12	297	11/10/12	7HO09471	6	290		39417	5.4	2404	35436	0.5	2404	318		128	3.9	\$278
3085	1367	2	7/15/12	125					N	33255	0.9	428	35944	1.5	428	71		131	1.2	\$276
2871	1154	3	1/14/12	DRY	3/25/12	7HO09052	1	71	P/237	33183	1	-913	34185	1.7	76	344				\$273
3253	1534	2	10/28/12	20						31578	1.4	3517	34188	3.8	3517	295		119	1.4	\$273
3289	1550	1	1/22/12	DRY	3/31/12	7HO09420	1	89	P/231	34011	3.8		34011	3.8						\$270
3281	1582	1	2/4/12	287	4/15/12	7HO09165	1	71	P/216	33609	1.6		33609			185		59	1.9	\$266
2945	1228	3	9/25/12	53						27406	0.8	612	36670	1.9	226	194		115	1	\$265
3371	1652	1	8/19/12	90						33556	0.9		33556			124		100	0.8	\$256
3217	1499	2	10/8/12	40						17783	1.2	-6148	26926	3.3	-6148			47	1.1	(\$3,473)
3429	1710	1	10/29/12	19						23564	2.1		23564					53	2.1	(\$3,654)
3421	1702	1	10/30/12	18						19546	1.7		19546					34	1.7	(\$5,128)
3428	1709	1	10/11/12	37						19173	1.6		19173					41	0.8	(\$5,151)
3400	1681	1	10/18/12	30						18936	1.6		18936					41	1.6	(\$5,384)
3389	1670	1	10/18/12	30						17321	1.3		17321					34	1.3	(\$5,958)

### The Economic Value of a Dairy Cow



# Thanks

## DairyMGT.info



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