



Impact of Nutritional Grouping on the Economics of Dairy Production Efficiency



UW-Dairy Management
Decision Support TOOLS

Victor E. Cabrera

Nutritional grouping can be beneficial by

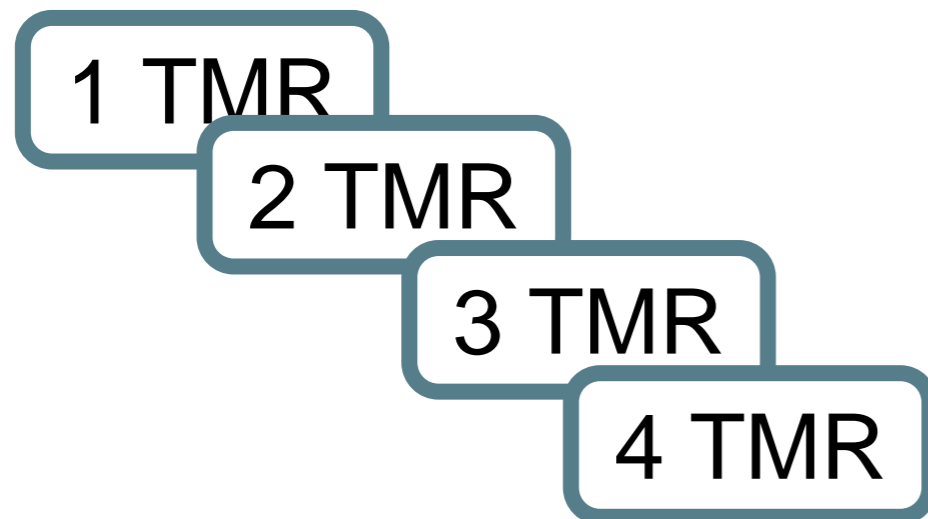
- ↓ feed costs
- ↑ feed efficiency
- ↑ productivity
- ↑ herd health
- ↓ emissions

Cabrera and Kalantari, 2016

One TMR for all lactating cows

- ↑ over-conditioned COWS
- ↑ nutrient excretion issues

Allen, 2009



One TMR is standard

- e.g., 58% WI & MI farms use 1 TMR

Contreras-Govea et al., 2015

One TMR formulation

- high producing
- overfeed low producing

Cabrera and Kalantari, 2016

Groups with more precise diets

- ↑ feed efficiency
- ↑ profitability

VandeHaar, 2011

Nutritional grouping

- ↑ body condition
- ↑ health

Allen, 2009

More precise diets

- ↑ productivity

Bach, 2014

Nutritional groups

- ↓ group variation
- ↑ inter-group variation
- ↓ competition at the feed bunk

Grant and Albright, 2001

Needed

- continued assessment of nutritional grouping's economic efficiency



Cabrera and Kalantari, 2016



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Economic impact of nutritional grouping in dairy herds

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Available

- important previous studies

Model

- daily
- stochastic
- Monte Carlo
- next event

de Vries, 2001

Initialization

- commercial dairy herds
- list of stochastic

2-step process

- event occurs (y/n)
- day of occurrence

Herd data

- lactation
- day postpartum
- reproductive status
- ...

Stochastic events

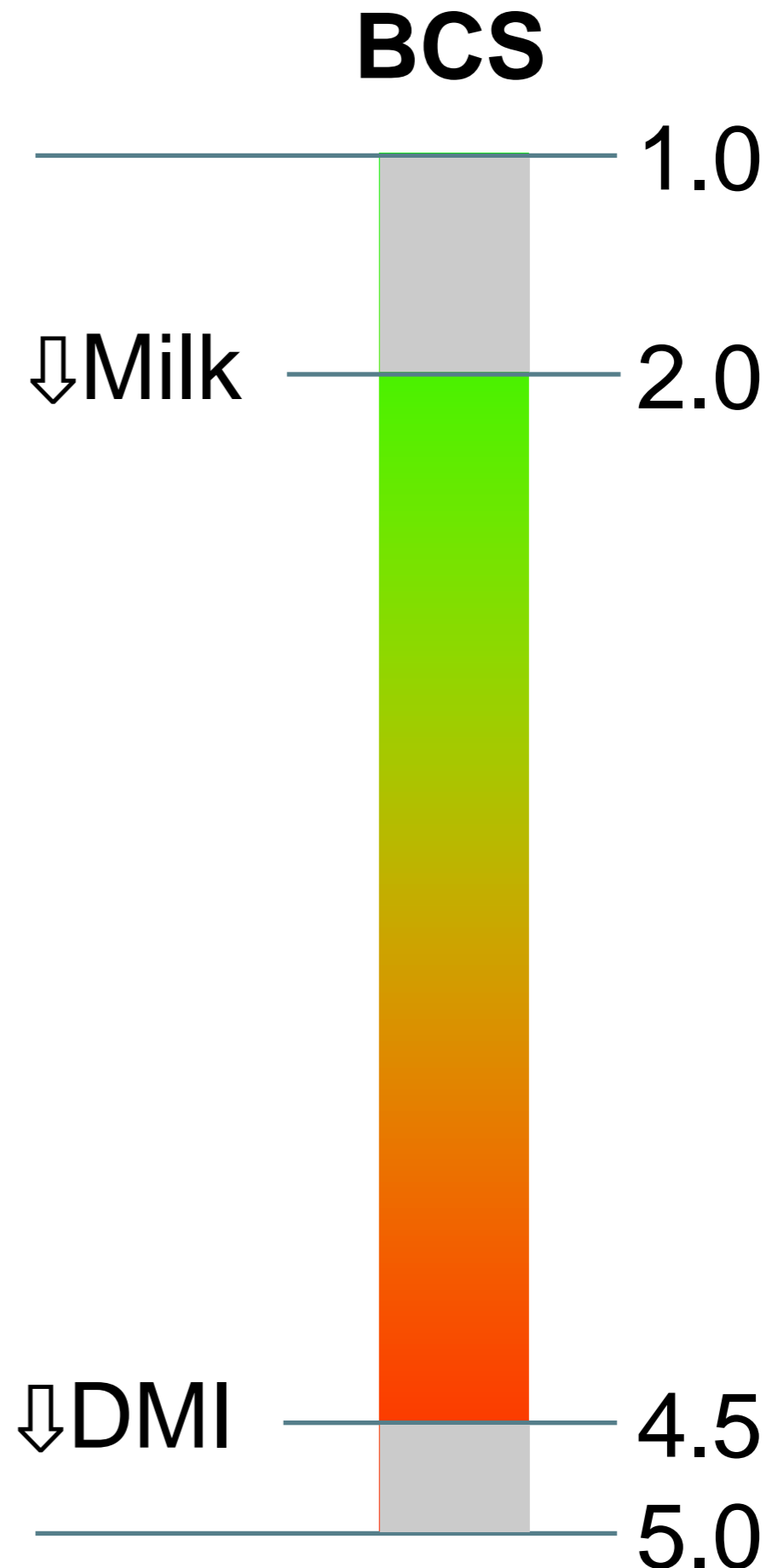
- pregnancy
- culling
- death
- abortion
- dry-off
- parturition
- ...

Cow-level requirements

- NE_L
- MP

Cow-level projections according to diet

- milk
- fat
- protein
- BW
- BCS



Nutritional grouping

- post-fresh (>21 d) lactating cows
- monthly regrouping (clustering; McGilliard et al., 1983)
- Same size groups:
Available cows ÷ number of groups

Monthly regrouping

- NE_L and MP requirements

McGilliard et al., 1983

Group diet formulation

- Average NE_L and
- Average MP+1SD

Kalantari et al., 2016

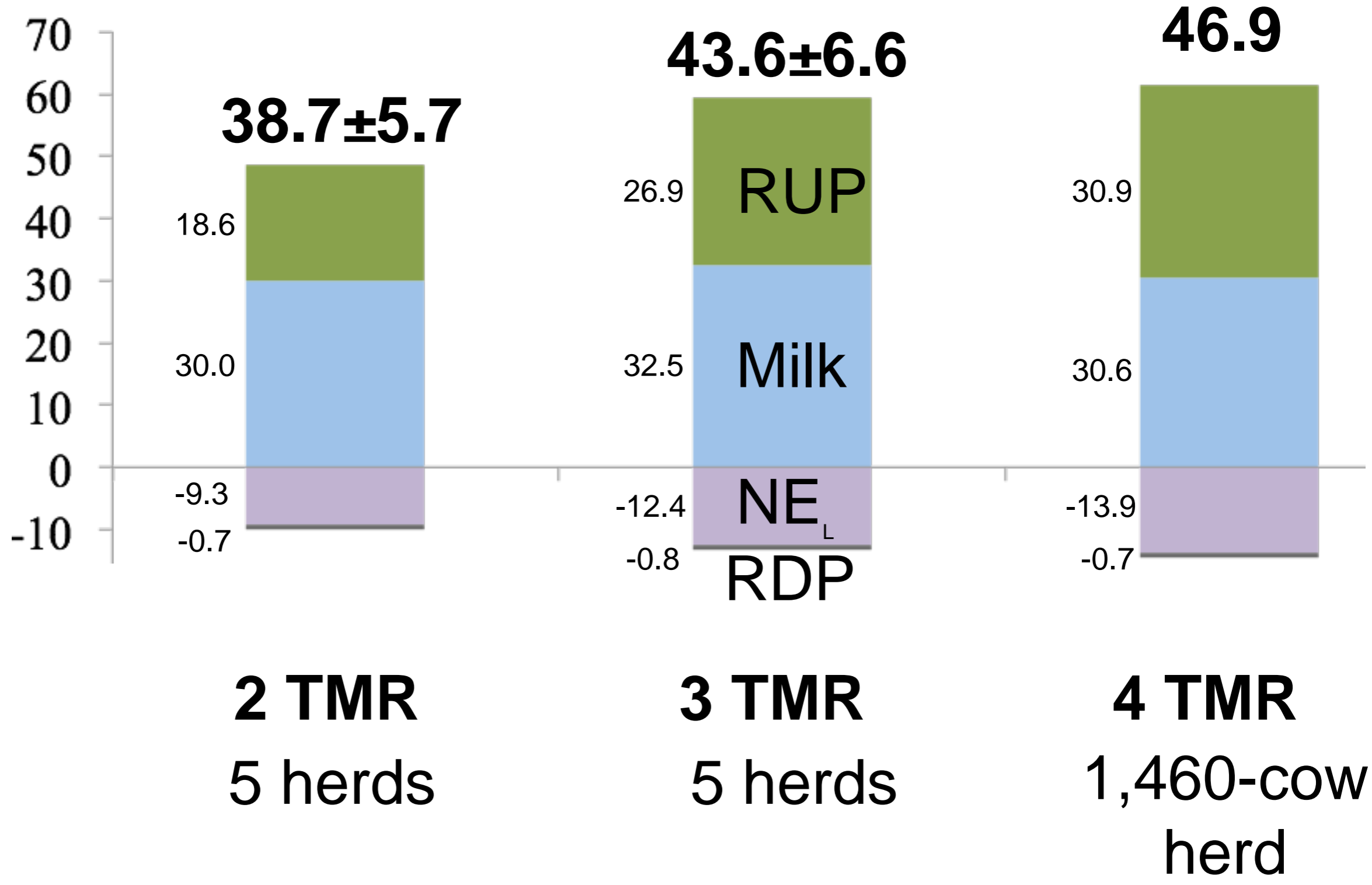
Economic parameters

- 2005-2014 Wisconsin prices
 - \$0.39/kg milk
- DairyMGT.info/FeedVal
 - \$0.1/Mcal
 - \$0.18/kg RDP
 - \$1.04/kg RUP

Kalantari et al., 2016

	Herd Size (Lactating + Dry)				
Characteristics	331	570	727	787	1,460
Average Herd ME305 (kg/cow per yr)	13,348	16,140	13,897	12,884	14,188
1st Lactation (%)	38	43	39	39	45
Average days in milk (d)	193	169	181	165	174
Average days in Pregnancy (d)	134	140	141	133	157
Average lactation number (#)	2.03	1.99	2.29	2.21	2.02
21-d Pregnancy Rate (%)	17	18	19	19	18
Conception Rate (%)	35	32	36	37	40
Estrus Detection (%)	49	57	51	51	45
Culling (%/yr)	35	32	36	37	40
Abortion (%/gestation)	16	7	11	11	7

**IOFC difference
from 1 TMR, \$/cow-yr**



Production kg/305-d	IOFC difference 3 TMR vs. 2 TMR \$/cow per yr
8,000	21
9,000	33
10,000	40

Williams and Oltenacu (1992)



2 and 3 TMR

- Increased net return

Østergaard et al. (1996)



	IOFC difference vs. 1 TMR \$/cow per yr
2 TMR	44
3 TMR	77

St-Pierre and Thraen (1999)

Nutritional grouping

- Increases IOFC
- Would increase profitability

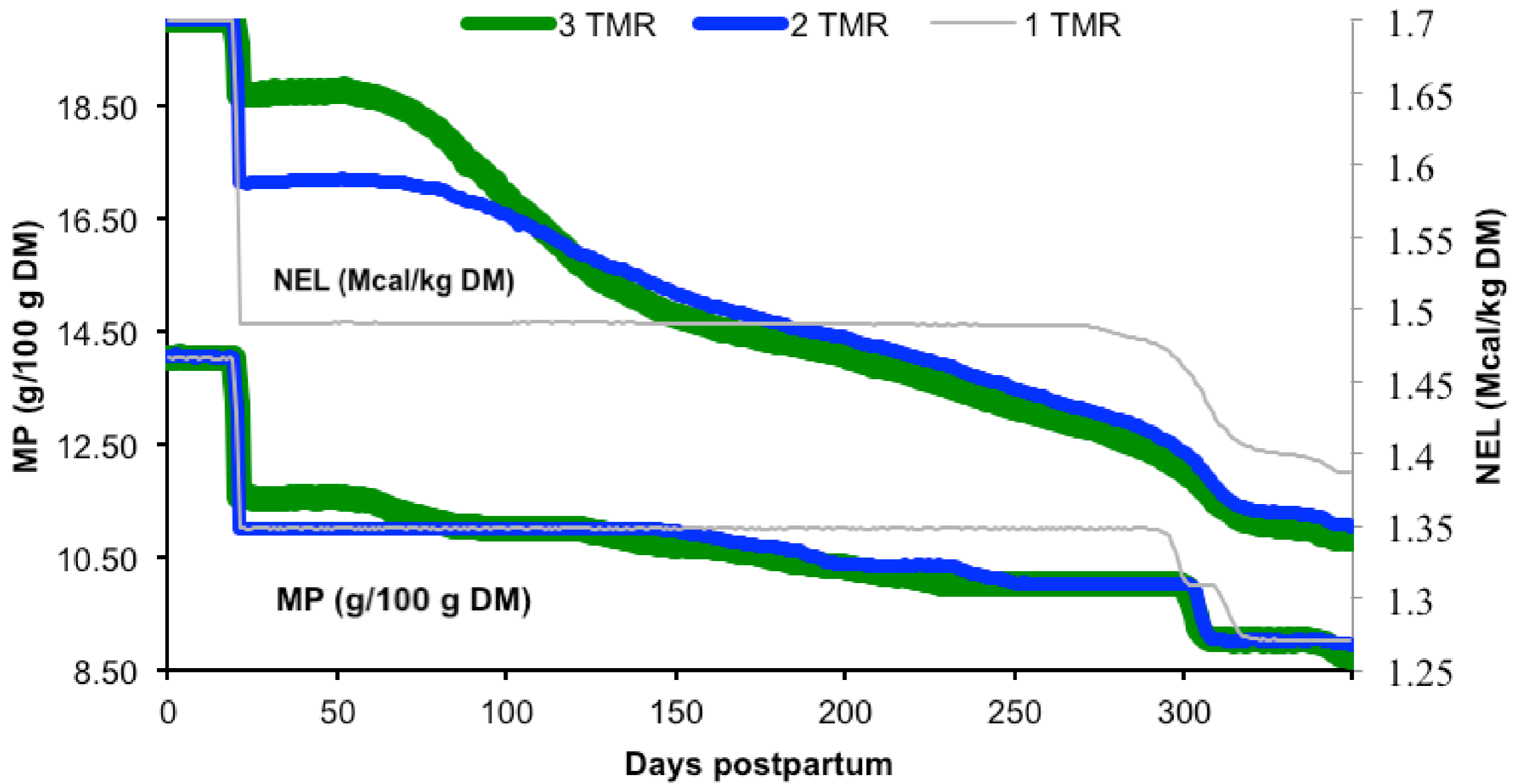
Profitability and feasibility are highly related to

- Farm conditions
- Market situation

Optimal number of nutritional groups

- 3 TMR, in general
- 4 or more in larger herds





Nutritional grouping

- Cows are fed closer to their requirements throughout lactation
- More in early and less in late lactation

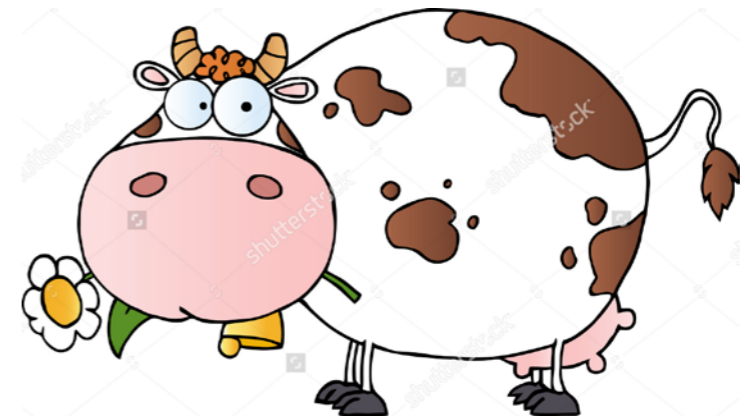
NE_L provided

- More efficiently according to DIM and productivity

Excess NE_L late lactation

- Over conditioned cows and complications next lactation

Cameron et al., 1998



Resulting herd BW

Change in BW

- Similar distributions
- Nutritional grouping did not change BW in the cows or herd

Stable BW with groups

- Previously reported

Smith et al., 1978; Clark et al., 1980; Kroll et al., 1987

3 TMR

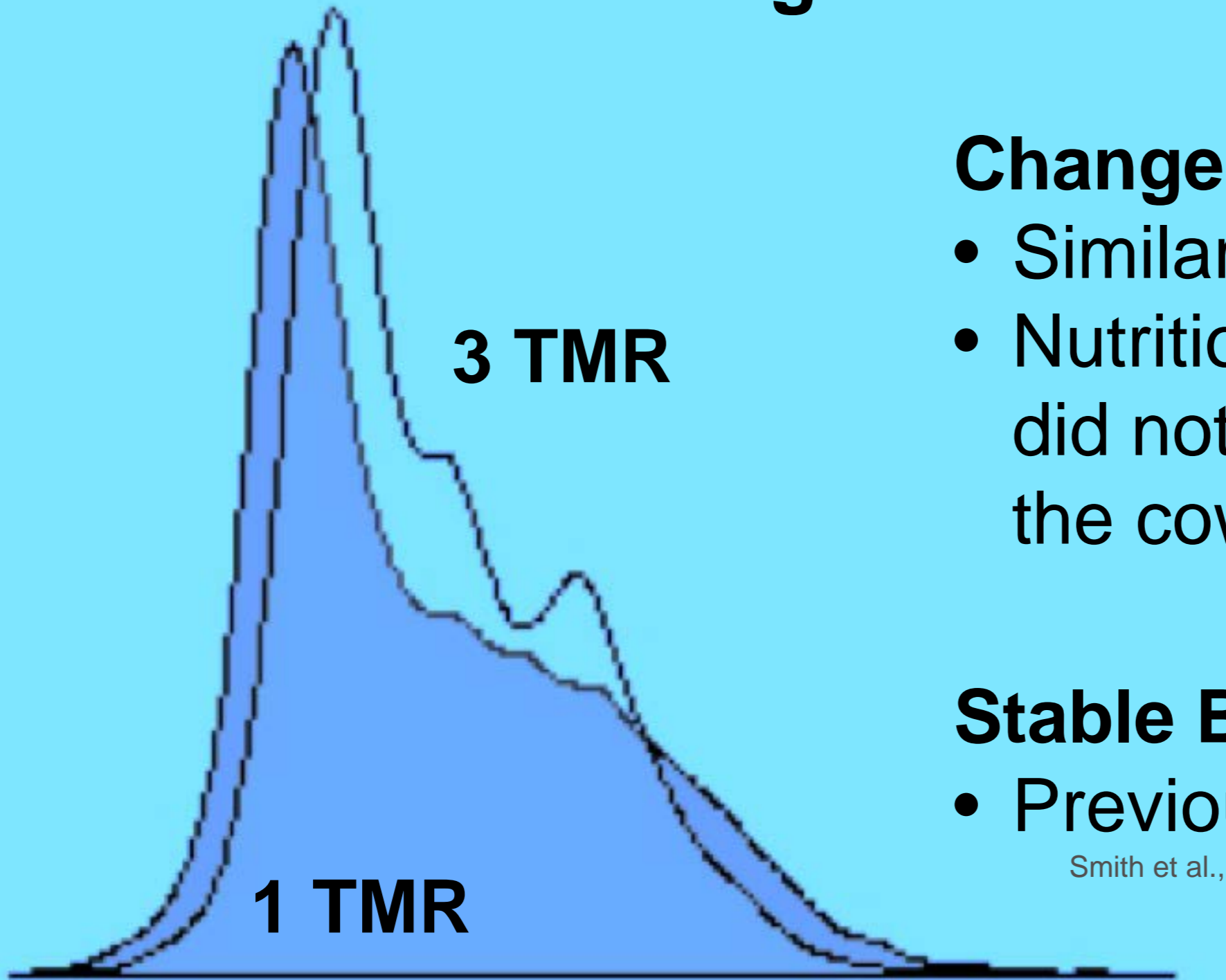
1 TMR

500

750

1000

1250



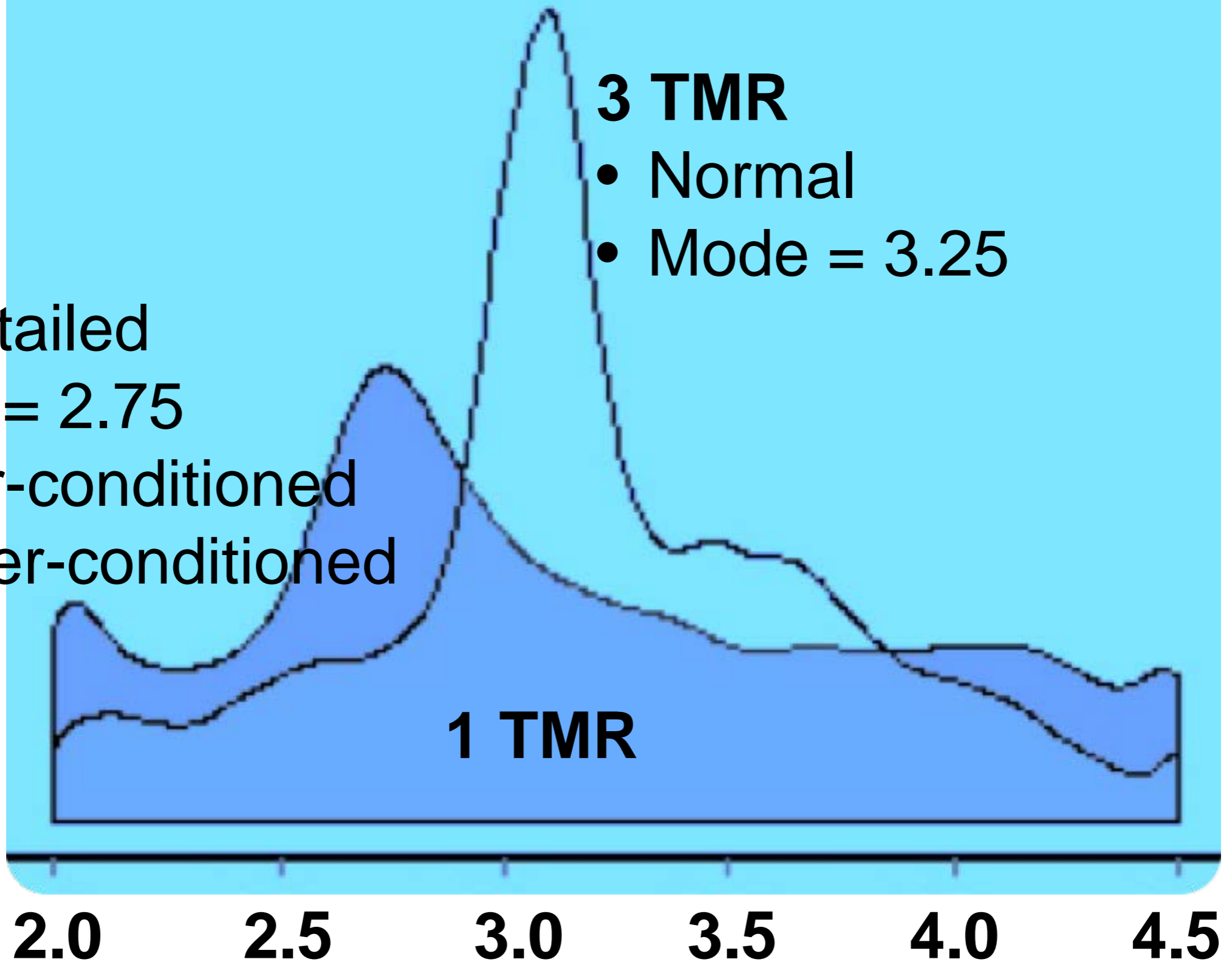
Resulting herd BCS

1 TMR

- Thick tailed
- Mode = 2.75
- ↑ over-conditioned
- ↑ under-conditioned

3 TMR

- Normal
- Mode = 3.25



BCS distribution

- Similar for 2 TMR

Nutritional grouping

- Appears to ensure that energy is better distributed and cows are healthier

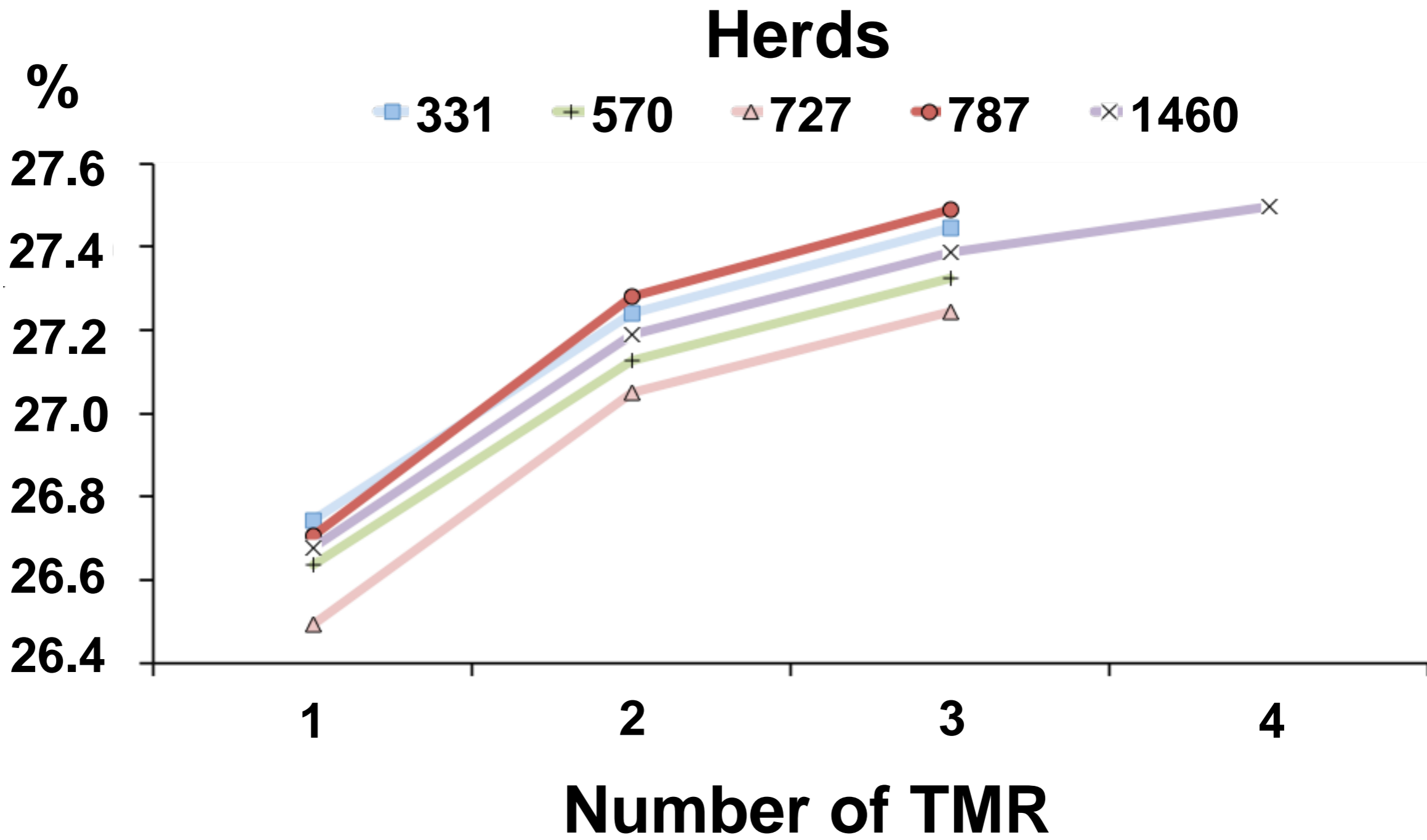
N use efficiency

- More N is captured in milk with groups
- 2.7% higher in 3 TMR than 1 TMR

N emission

- Nutritional groups decrease the N excreted

Milk N produced
Feed N consumed



Conclusions

- Nutritional grouping has an economic value and should be promoted
- The difference of milk income minus costs of NE_L , RUP and RDP (\$/cow per yr) from 1 TMR were:
 - \$39 for 2 TMR
 - \$46 for 3 TMR
 - \$47 for 4 TMR
- Gains are explained by more milk production and less RUP costs
- Potential losses due to regrouping cows would have a deleterious economic impact, but not high enough to overcome the gains

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

Tool Overview

This tool evaluates grouping strategies for feeding lactating dairy cattle. It uses different criteria to group cows, optimizes the cows belonging to a feeding group, suggests a group diet ration based on Net Energy (NEL, MCal/lb) and Crude Protein (CP, %), computes the expected Income Over Feed Cost (IOFC), and the additional economic benefits of feed grouping after additional costs of management, labor and an expected milk depression on lactating cows re-grouped.

A herd test file is needed to use the tool. This should contain information regarding Cow ID, Lactation, Days in Milk (DIM), Milk Produced, and Milk Fat Content. Optionally, for more accurate calculations, Body Weight (BW) could be added (if BW is not provided, the tool calculates BW based on lactation and DIM after a user-entered average BW for primiparous and multiparous cows). The tab with name upload farm details helps the user upload an excel file with those parameters. It is suggested to first download the parameters file to a local computer and then use this as a template to enter farm specific data. The tool will always indicate which file is being used. The number of lactating cows in the file will be automatically counted and displayed. Also in this tab the user defines indirectly the price of feed energy (\$/MCal) and feed protein (\$/ lb CP), which are based on nutritive content and prices of refereed feeds (Corn and Soybean meal). The user can over-write these calculated values, if desired.

Once the data have been entered, the user could move to the tab with name 'Group Cows'. This tab is self-explanatory and follows a decision tree structure to help the user analyze grouping strategies. After following the questions in the decision tree, the user could hit the 'Analyze' button and get the results in the 'Reap Benefits' tab. This last tab of the tool ('Reap Benefits') displays the economic benefit of different group strategies compared to the farm defined current strategy.

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DairyMGT.info

Thanks

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