



# Financial Advantages of Grouping & Feeding Dairy Cows by Nutritional Need

Dr. Victor E. Cabrera  
Associate Professor &  
Extension Specialist  
University of Wisconsin Madison  
Dairy Science Department

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# Grouping and Feeding by Nutritional Need

## Benefits of Nutritional Grouping

### 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

58% WI & MI farms use 1 TMR

Contreras-Govea et al., 2015

1 TMR

2 TMR

3 TMR

4 TMR





# Grouping and Feeding by Nutritional Need Recommended Research

Needed: continued assessment of nutritional grouping's economic efficiency

## **Economic impact of nutritional grouping in dairy herds**

A.S. Kalantari L.E. Armentano, R.D. Shaver, and V.E. Cabrera<sup>1</sup>

Department of Dairy Science, University of Wisconsin-Madison, Madison 53706

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<http://dx.doi.org/10.3168/jds.2015-9810>



# Grouping and Feeding by Nutritional Need Simulated Research per Cow

## Application (Reads an input .CSV herd file)

### Initializer (Instantiate the herd)

Simulation Period (d)  
Milk Price (\$/kg)  
NE Cost (\$/Meal)  
RUP cost (\$/kg)  
RDP cost (\$/kg)

### Cow

Cow ID  
Parity  
Days in milk (d)  
Days in pregnancy (d)  
Days open (d)  
Days dry (d)  
Milk Potential (%)  
Milk Production (kg/d)  
Milk fat (%)  
Milk Protein (%)  
Dry matter intake (kg)  
Body weight (kg)  
Body condition score (1-5)  
Body energy (Meal)

1

### Herd

Herd ID  
Herd Size  
Number of groups  
Group Size  
Abortion (%)  
Milk depression (kg/d)  
Duration of milk depression  
Involuntary culling (%)  
Cut-off DIM (d)  
Cut-off Milk threshold  
Conception rate (%)  
Estrous detection rate (%)

2

3

Add  
cows to  
groups

### Group (List of cows in the herd)

Group ID  
Group type (obligated, optional)





# Grouping and Feeding by Nutritional Need

## Different Nutritional Grouping Strategy

### Obligated Groups

#### Fresh Group (0-21 DIM)

COW 1      COW 2      ...      COW n

#### Dry Group

COW 1      COW 2      ...      COW n

### Optional Groups

#### Group 1

COW 1      COW 2      ...      COW n

#### Group 2

COW 1      COW 2      ...      COW n

#### Group 3

COW 1      COW 2      ...      COW n

TMR

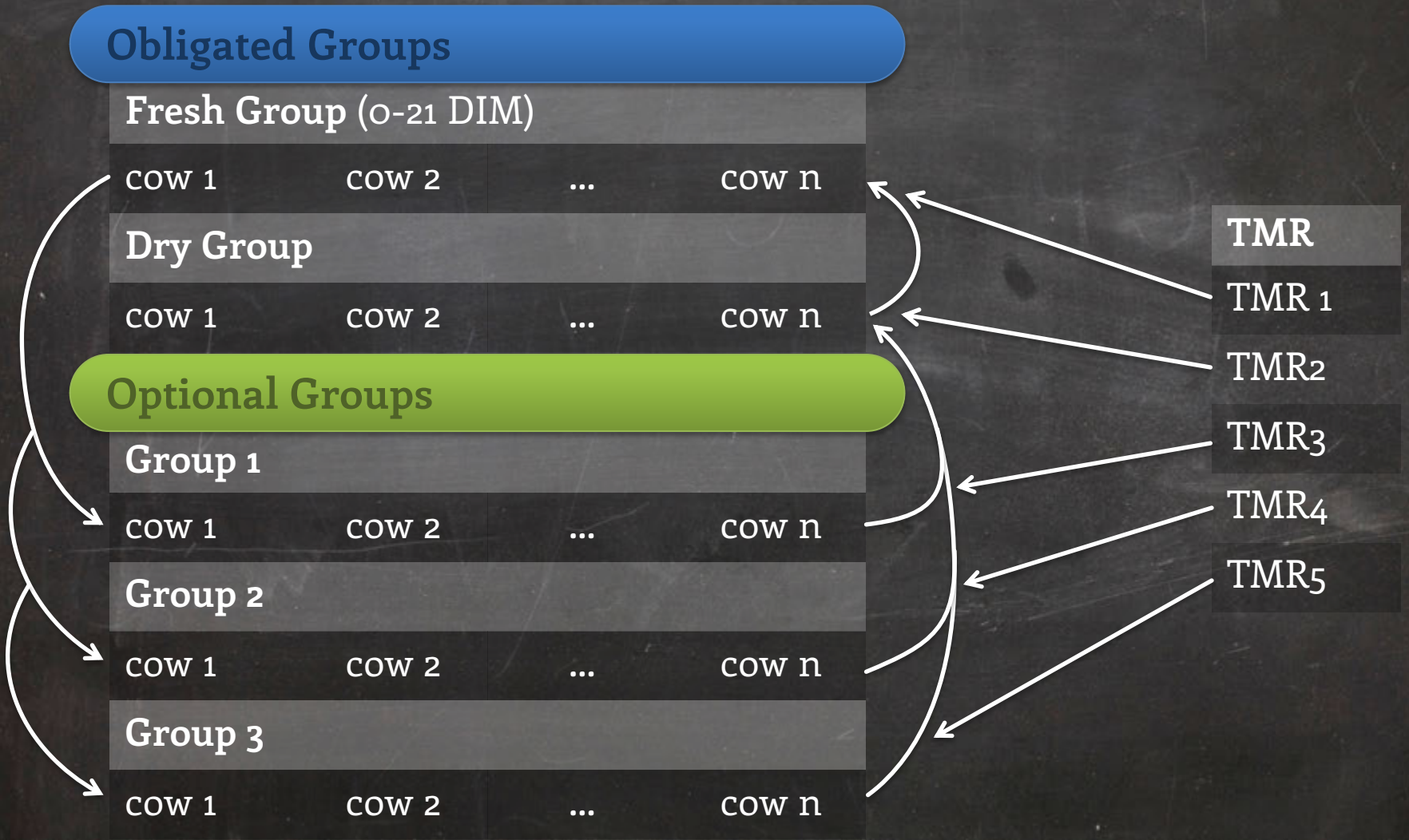
TMR<sub>1</sub>

TMR<sub>2</sub>

TMR<sub>3</sub>

TMR<sub>4</sub>

TMR<sub>5</sub>





# Grouping and Feeding by Nutritional Need

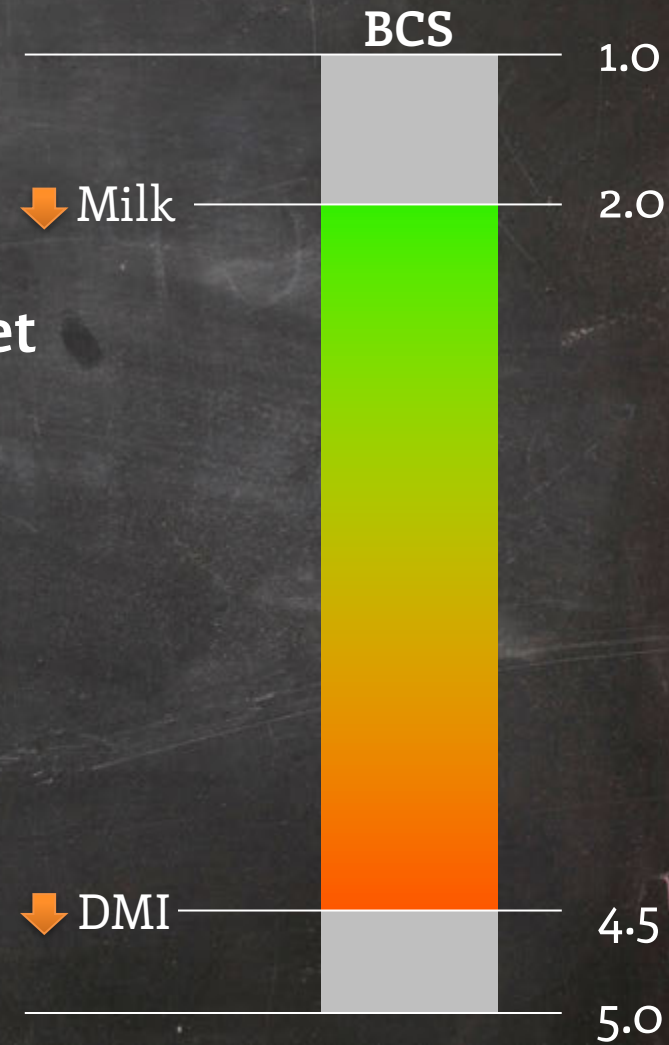
## Group According to Nutrient Requirements

### Cow-level requirements

- NE<sup>L</sup>
- MP<sup>L</sup>

### Cow-level projections according to diet

- Milk
- Fat
- Protein
- BW
- BCS





# Grouping and Feeding by Nutritional Need

## Nutritional grouping

- Post-fresh (>21 d) lactating cows
- Same size groups:  
 $\text{Available cows} \div \text{no. of groups}$

## Monthly regrouping

- NEL and MP requirements  
McGilliard et al., 1983

## Group diet formulation

- Average NEL
- 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





# Grouping and Feeding by Nutritional Need

## Testing Consistency of Nutritional Grouping

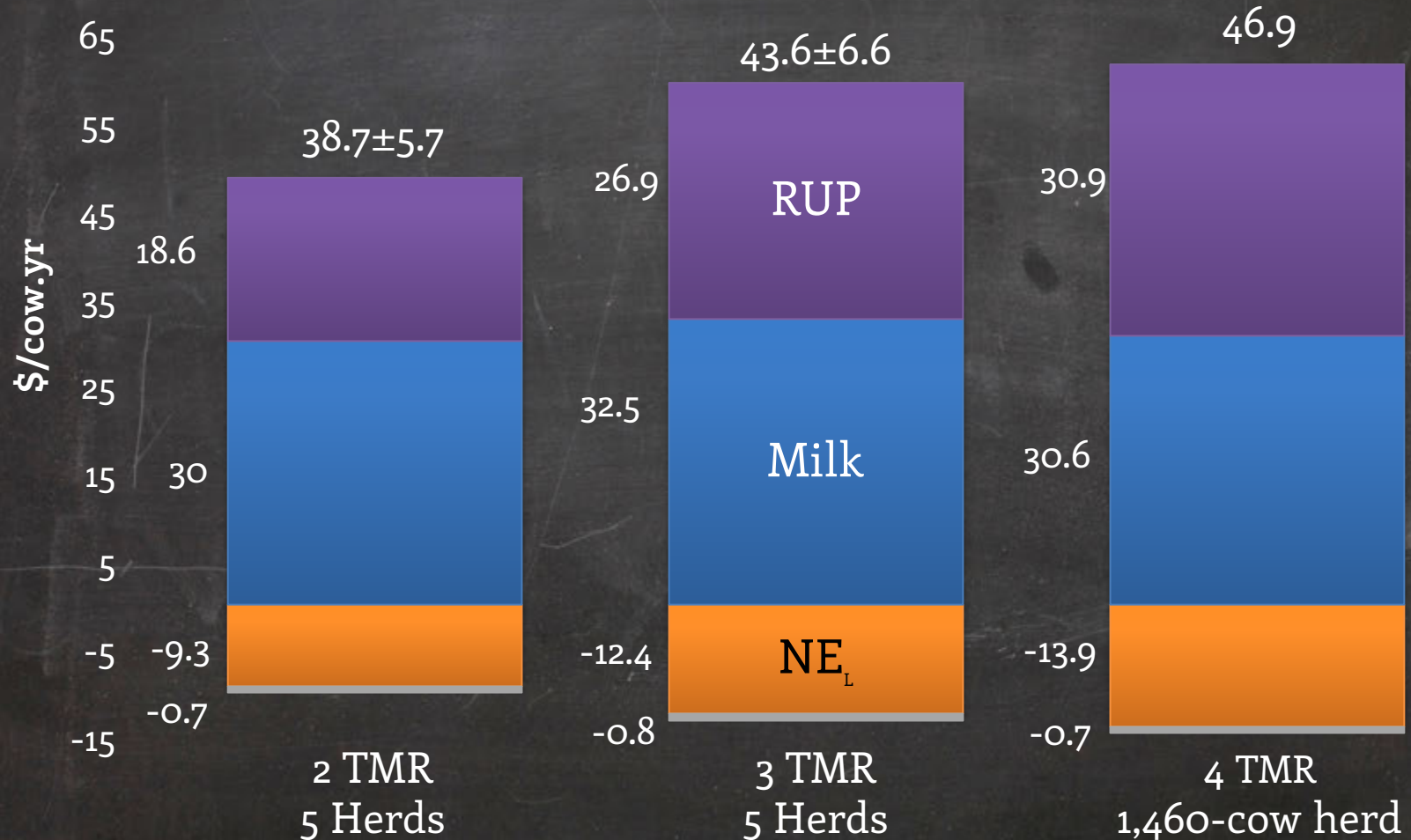
Herd Size (Lactating + Dry)

Characteristics	331	570	727	787	1,460
Average Herd ME <sub>305</sub> (kg/cow per year)	13,348	16,140	13,897	12,884	14,188
1 <sup>st</sup> 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



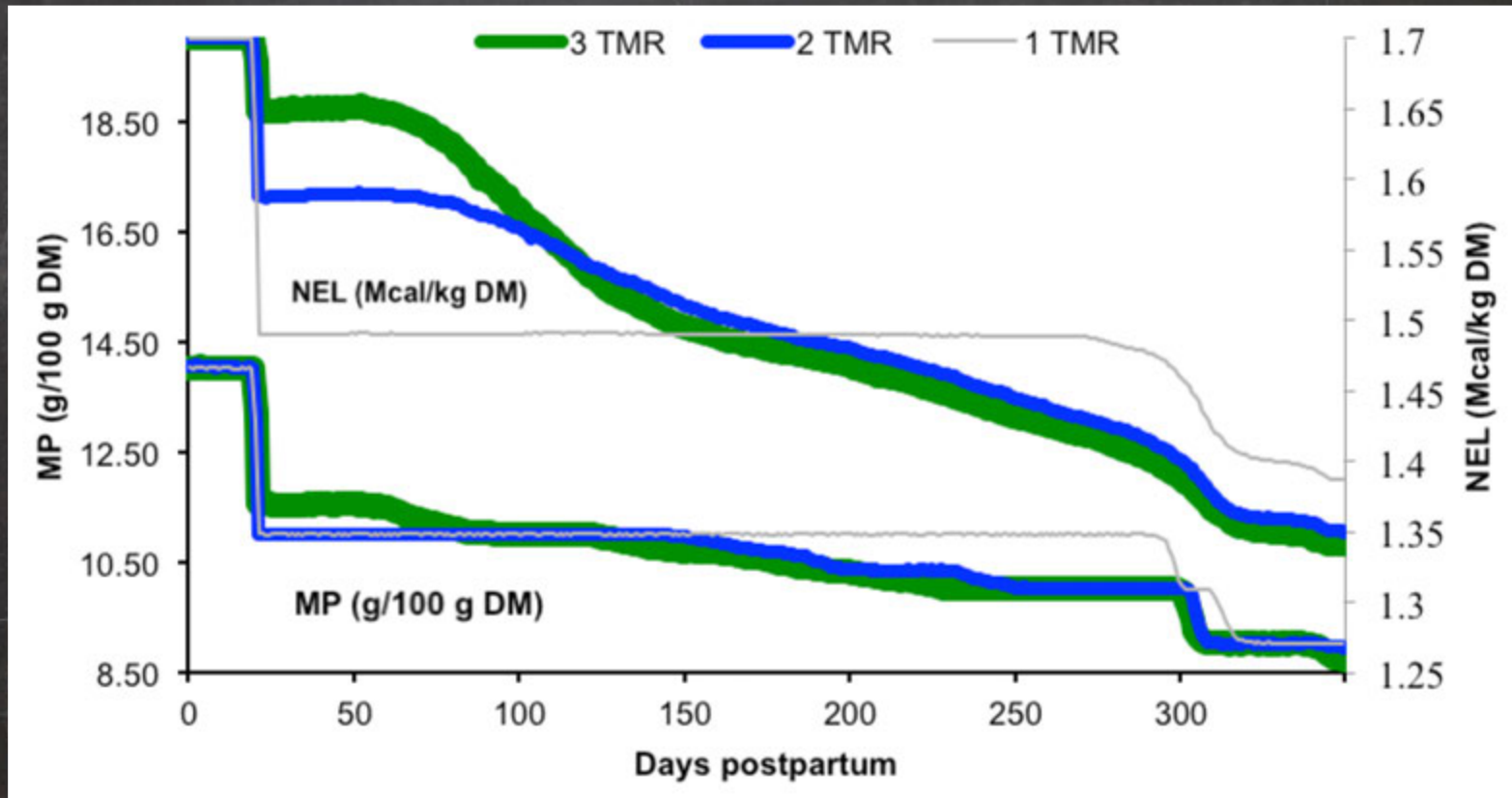


## Grouping and Feeding by Nutritional Need IOFC Difference from 1 TMR





# Grouping and Feeding by Nutritional Need Density Diets According to Animal Needs







# Grouping and Feeding by Nutritional Need Resulting Herd BW

## Change in BW

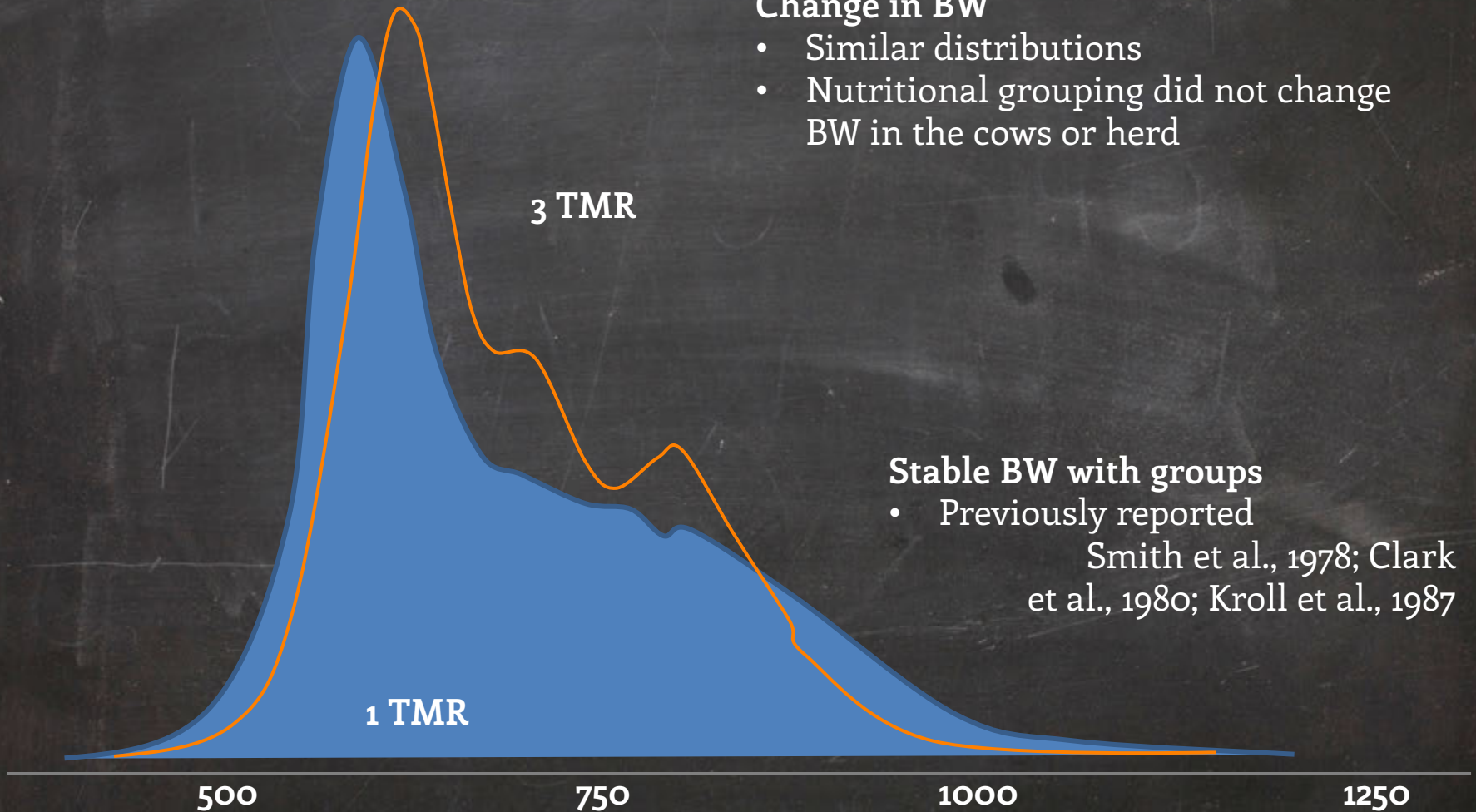
- Similar distributions
- Nutritional grouping did not change BW in the cows or herd

3 TMR

1 TMR

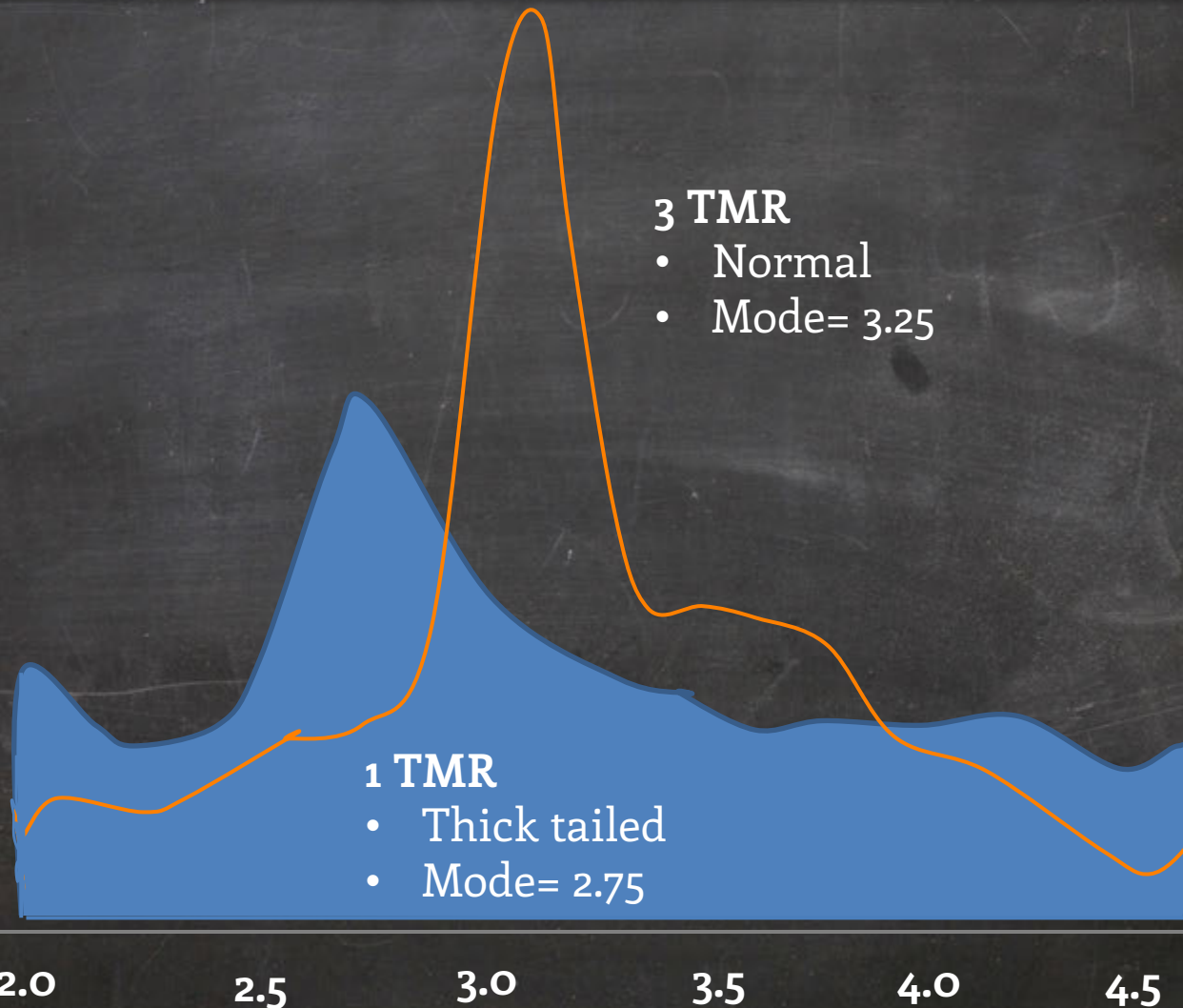
## Stable BW with groups

- Previously reported  
Smith et al., 1978; Clark  
et al., 1980; Kroll et al., 1987





## Grouping and Feeding by Nutritional Need Resulting Herd BCS

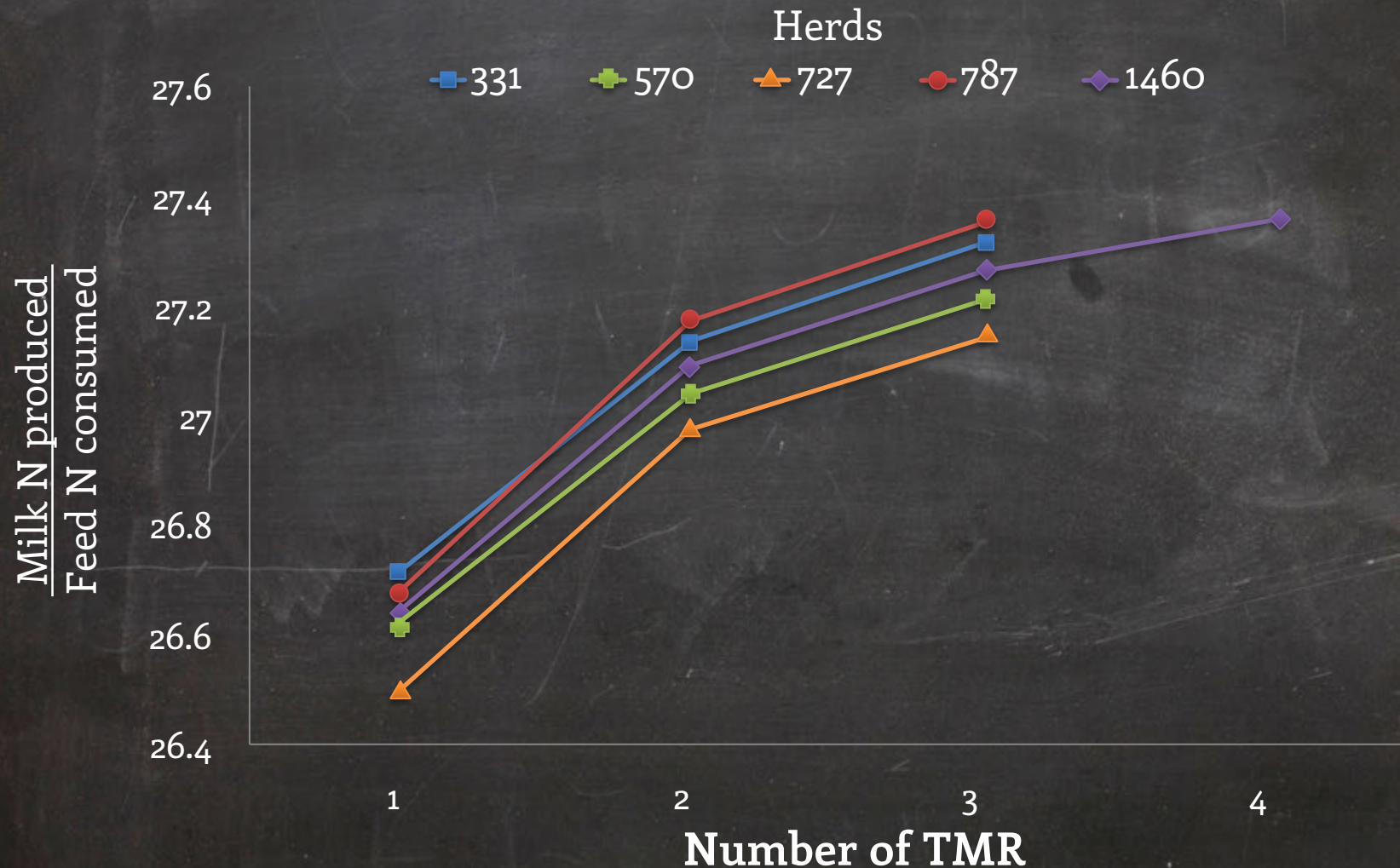






# Grouping and Feeding by Nutritional Need

## Nutrient Efficiency Increase due to TMR Increase





# Grouping and Feeding by Nutritional Need Sensitivity Analysis

Scenario	Milk \$/kg	NE <sub>L</sub> \$/Mcal	RDP \$/kg	RUP \$/kg	Difference from 1 TMR (\$/cow per yr)		
					2 TMR	3 TMR	4 TMR
Base	0.39	0.1	0.18	1.04	38.7	43.6	46.9
Worst	0.29	0.14	0.26	1.52	35.5	44.9	47.4
Best	0.52	0.05	0.09	0.52	44.3	50.2	48.8
Milk Loss	5 d, 1.8 kg milk loss group change				20.5	25.9	23.5
1 <sup>st</sup> Lactation	1 <sup>st</sup> Lactation are a separate group				32.6	38.8	38.5

4 TMR- Only for 1,460 cow herd





## Grouping and Feeding by Nutritional Need 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, so greater milk income minus feed costs
- Potential losses due to regrouping cows would have a deleterious economic impact, but not high enough to overcome the gains



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