



Should you feed concentrate in the AMS or in the PMR?

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Typical Concentrate Feeding Strategy

- Prescott *et al.* (1998) showed that cows had more motivation to consume concentrate than to be milked
- Used in automatic milking systems (AMS) to encourage voluntary attendance and improve milking frequency
- Amount fed ranges from 1.8 to 7.7 kg/day (Rodenburg, 2011)

Typical Concentrate Feeding Strategy

- Suggested that larger quantities of concentrate act as a stronger attractant, resulting in greater milking frequency
 - Concentrate added in addition to feeding a TMR, or
 - Energy balance of diet is adjusted by lowering the inclusion rate of concentrate in the PMR

Concerns with Strategy

- Research does not support the concept that higher concentrate allocations acts as a stronger attractant to the milking station (Halamachi et al., 2005; Bach et al., 2007)

	Halamachi <i>et al.</i> (2005)		Bach <i>et al.</i> (2007)	
Allocation	High	Low	High	Low
Milking Frequency, milkings/day	3.2	3.2	2.1	1.9

- Note: studies not performed under iso-caloric and iso-nitrogenous conditions

Concerns with Strategy

- Traffic systems:
 - Influence milking frequency in conjunction with concentrate allocation
 - Semi-guided traffic system: Placement of selection system allows use of the cow's motivation to consume PMR to direct to AMS
 - Differs from free-flow traffic system
- Necessary to use high allocations of concentrate in the AMS?
- Risk Involved

Risks Involved

- Sub-acute Rumen Acidosis (SARA)
- Costly to producers
 - Decreased and erratic DMI
 - Increased incidence of lameness
 - Decreased milk fat
 - Decreased milk production

Hypothesis and Objectives

- Objective: determine the effect of offering **high-** or **low-** concentrate allowance in an AMS when total dietary protein and energy levels are balanced
 - Using a complimentary **high-** or **low-**energy PMR
 - Feed-first semi-guided traffic system
- Hypothesis: Cows would have a greater motivation to consume a high-energy PMR, resulting in a greater milking frequency when used with a feed-first semi-guided traffic system

What we did:

- Fed two allowances of concentrate in the AMS
 - **High**: 5.80 kg/d; **Low**: 0.60 kg/d
- Complimented concentrate allowance with energy- and protein-balanced PMR
 - **Low** concentrate allowance + High-energy PMR
 - **High** concentrate allowance + Low-energy PMR
- Used DeLaval Voluntary Milking System (VMS)

Experimental Design

- Cross-over experimental design
- Two 26-d periods; first 19-d for adaptation, last 7-d for sampling and data collection
- 5 primiparous and 3 multiparous Holstein-Friesian COWS
 - Start of Trial: 139 ± 77 DIM
 - Mean BW = 685 kg
- Randomized by parity, DIM, and average milk yield and fed one of two dietary treatments

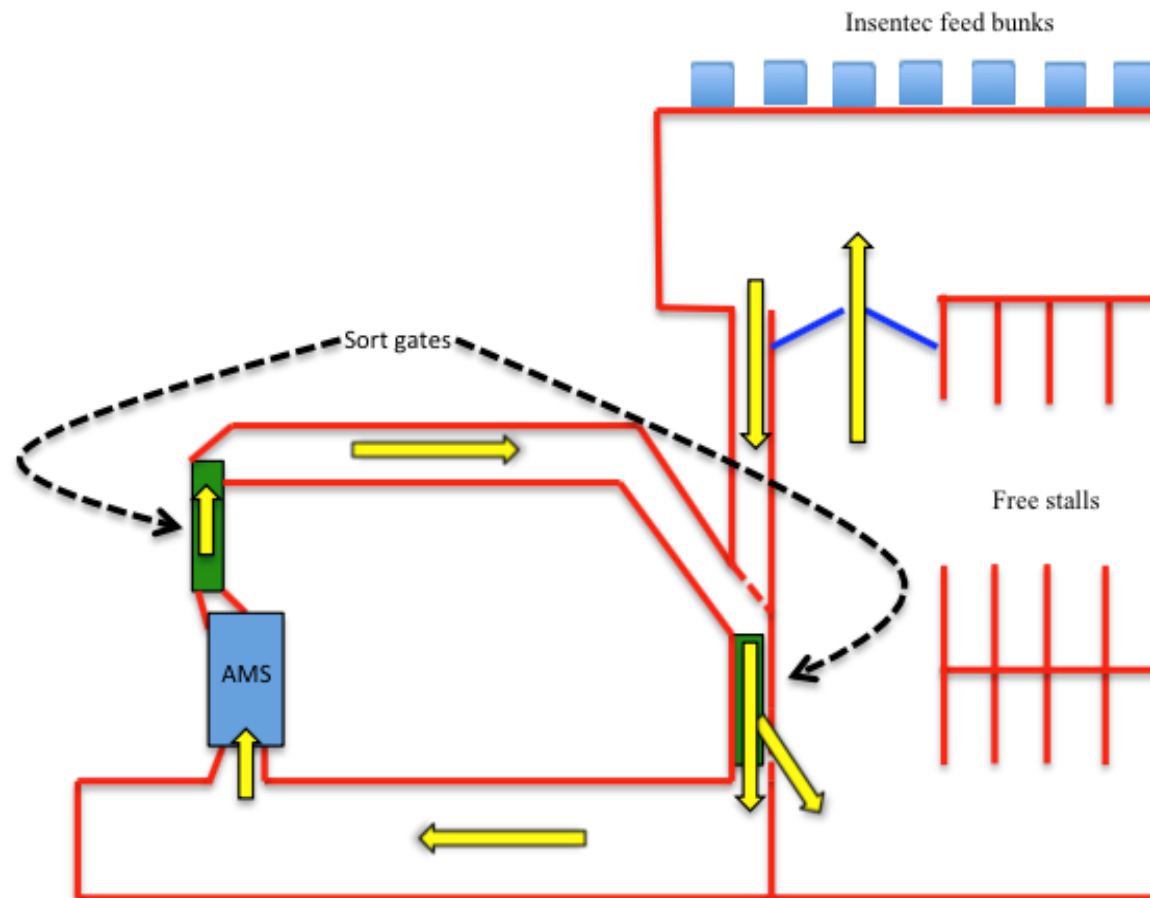
Diets Fed

	Low-Energy PMR	High-Energy PMR
Ingredients, % DM		
PMR		
Barley Silage	31.6	31.8
Alfalfa Hay	15.8	15.9
Concentrate Supplement	31.3	47.3
Palmitic Acid	1.4	1.4
Canola Meal	1.6	1.6
AMS Concentrate	18.4	1.9
Forage, % DM	47.4	47.7

Diet Nutrient Composition

	Low-energy PMR	High-energy PMR
Chemical Composition, % DM		
Dry Matter	49.8	49.6
Organic Matter	91.1	91.3
Crude Protein	15.9	15.9
Neutral Detergent Fiber	31.2	31.2
Acid Detergent Fiber	21.0	21.3
Starch	23.0	22.1
Calcium	0.9	0.9
Phosphorous	0.4	0.4
Net Energy of Lactation (Mcal/Kg)	1.66	1.66

Rayner Dairy Barn Layout



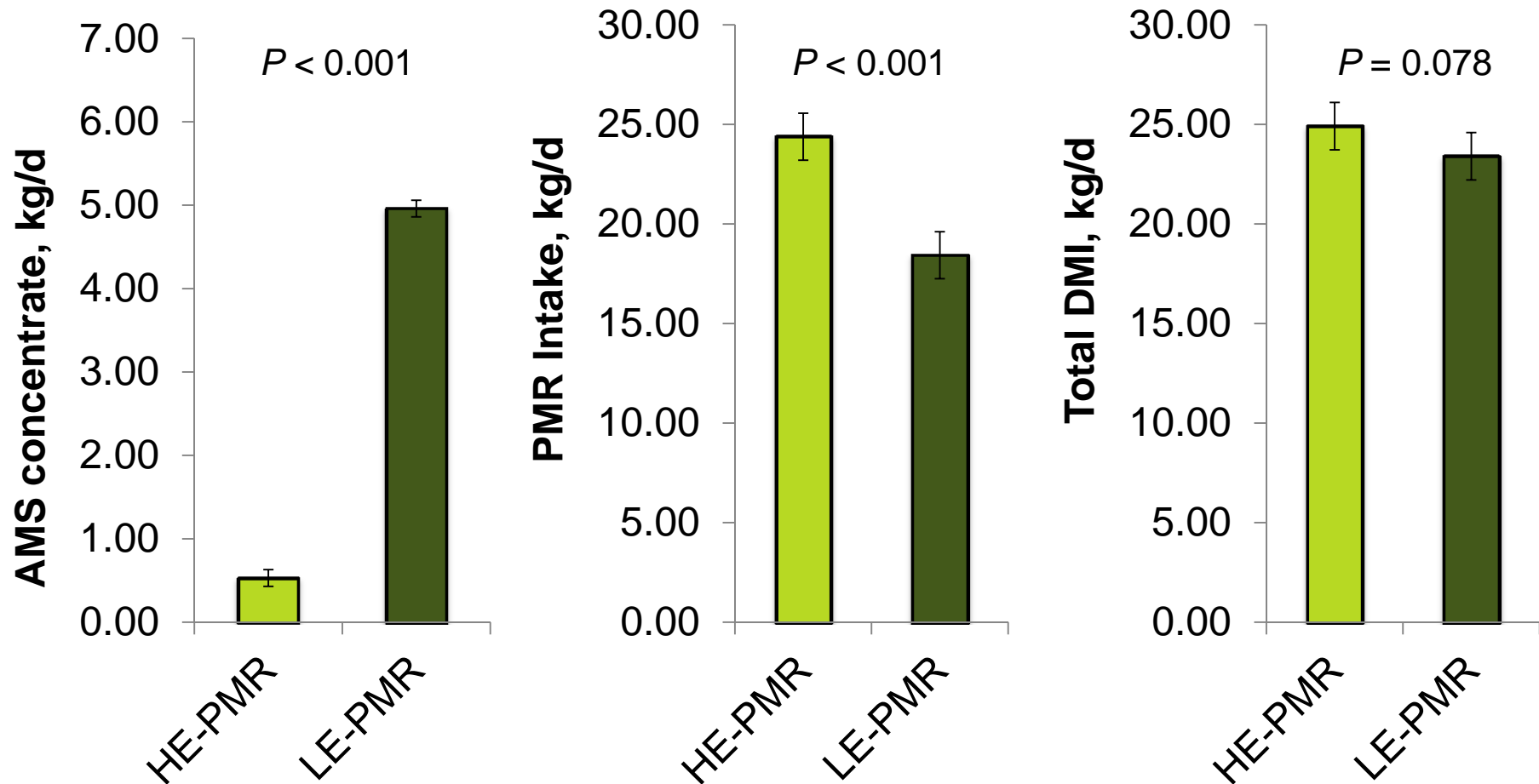
Milking Permissions

- Early Lactation: 1 to 100 DIM
 - Permission given 4 hr after last milking
 - Or if expected yield > 8 kg (primiparous cows) or 9 kg (multiparous)
- Mid Lactation: 101 to 200 DIM
 - Permission given 5 hr after last milking
 - Or if expected yield > 9 kg (primiparous cows) or 11 kg (multiparous)
- Late Lactation: 201 DIM to dry off
 - Permission given 6 hr after last milking
 - Or if expected yield > 10 kg (primiparous cows) or 12 kg

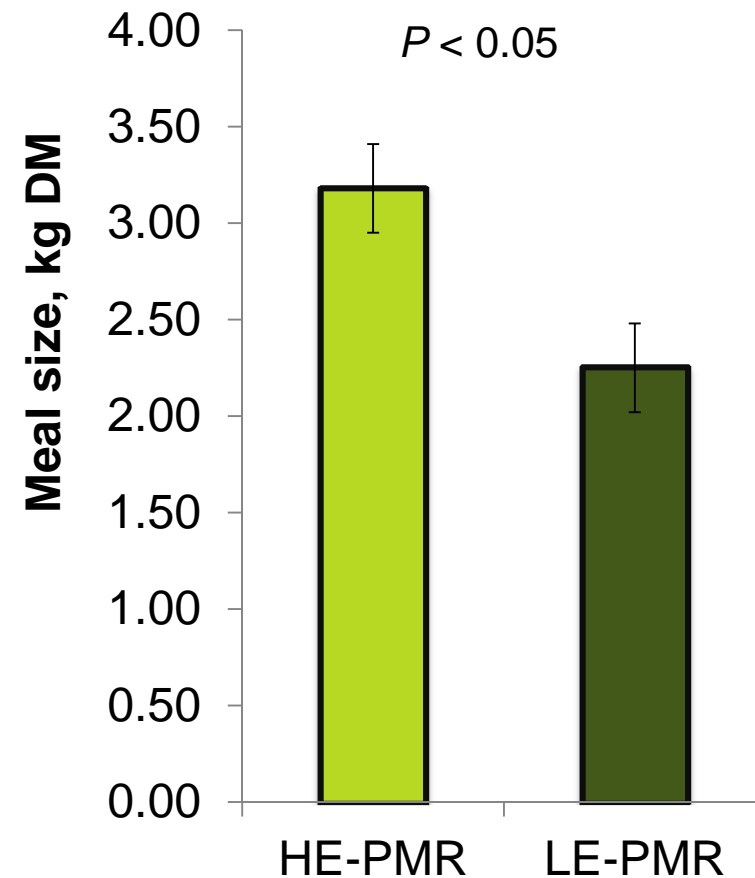
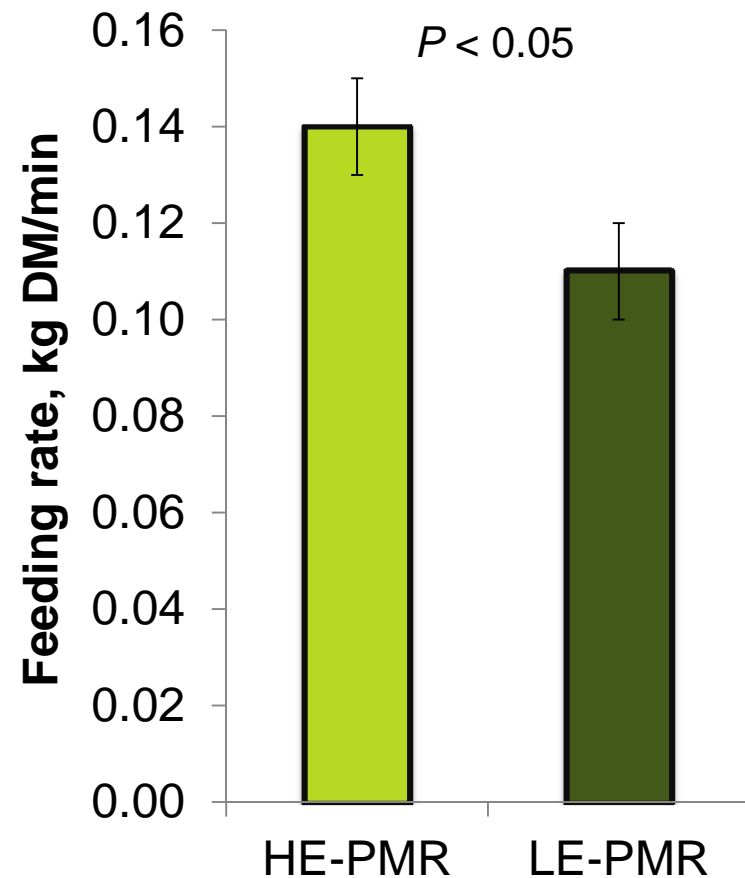
What we did:

- Recorded:
 - Milking behaviour (inter-milking interval, milking duration, **milking frequency**)
 - **Milk yield and composition**
 - Feed sorting and feeding behaviour (**DMI, PMR DMI, AMS concentrate DMI**, feeding rate, meal size, intermeal interval, meal duration)

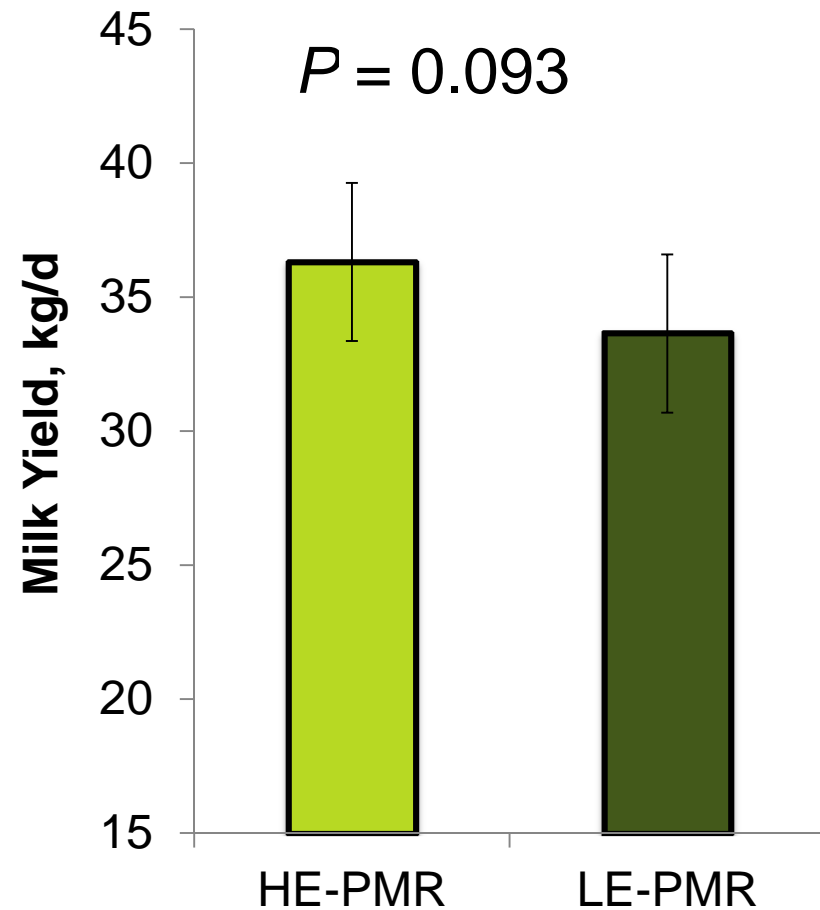
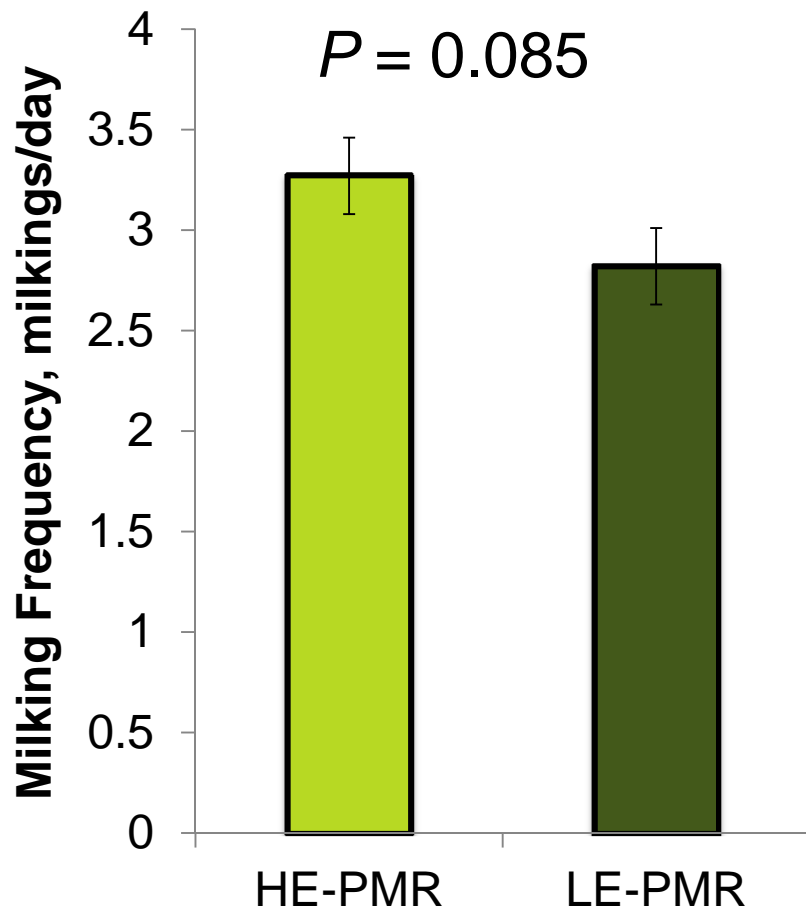
Feeding Behavior



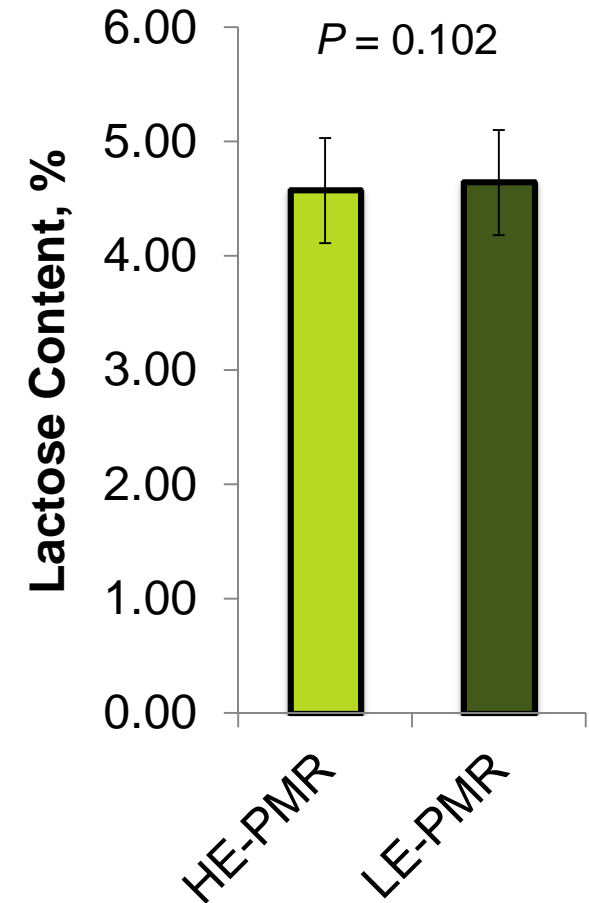
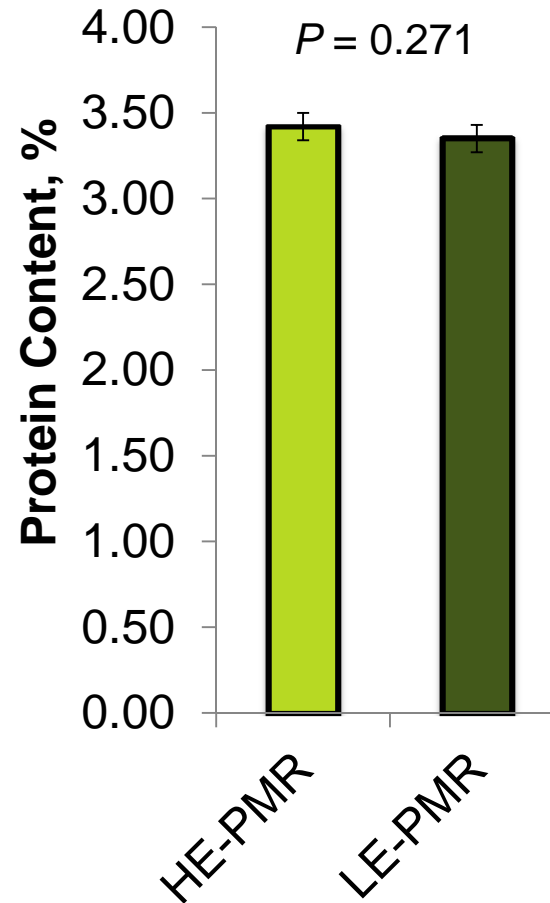
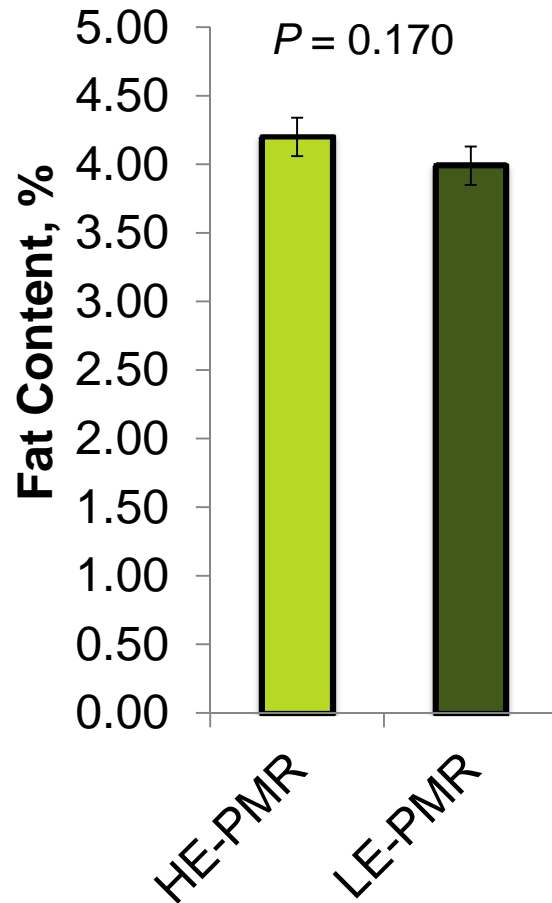
Feeding Behavior



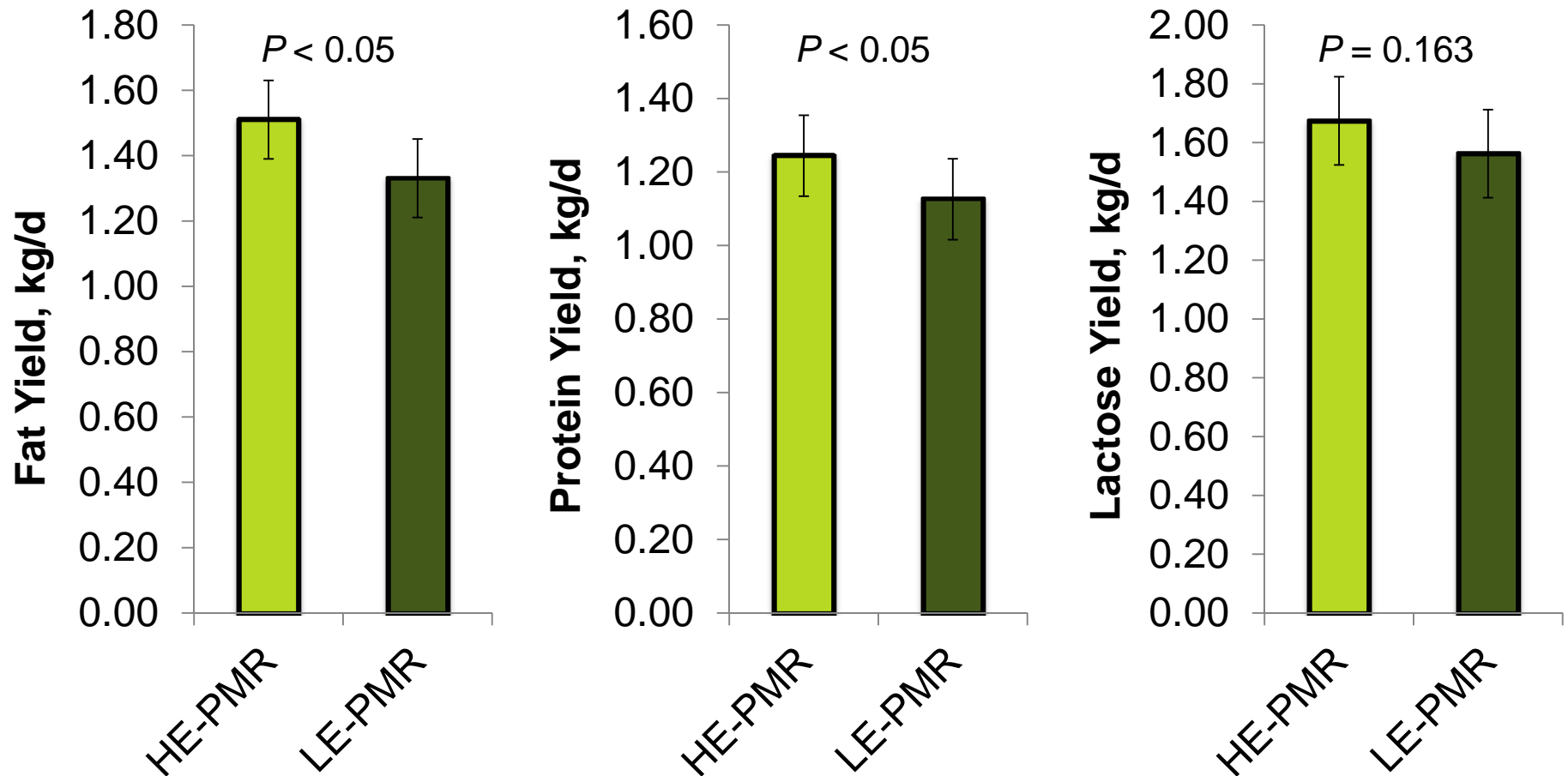
Milking Frequency and Milk Yield



Milk Composition



Milk Component Yield



Study Conclusions

- Observations with low concentrate allowance and high-energy PMR:
 - Tendency for increased total dietary DMI, milking frequency, and increased milk yield
 - Increased PMR DMI and increased milk fat and protein yield

Study Conclusions

- High concentrate allowance in the AMS did not improve milking frequency and milk yield when diets were balanced for protein and energy

Feeding greater quantities of concentrate in the PMR rather than the AMS could be beneficial to Saskatchewan dairy producers and improve farm profitability

Questions?

