Consistent feed, consistent eating, consistent results!

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Is there a problem here?

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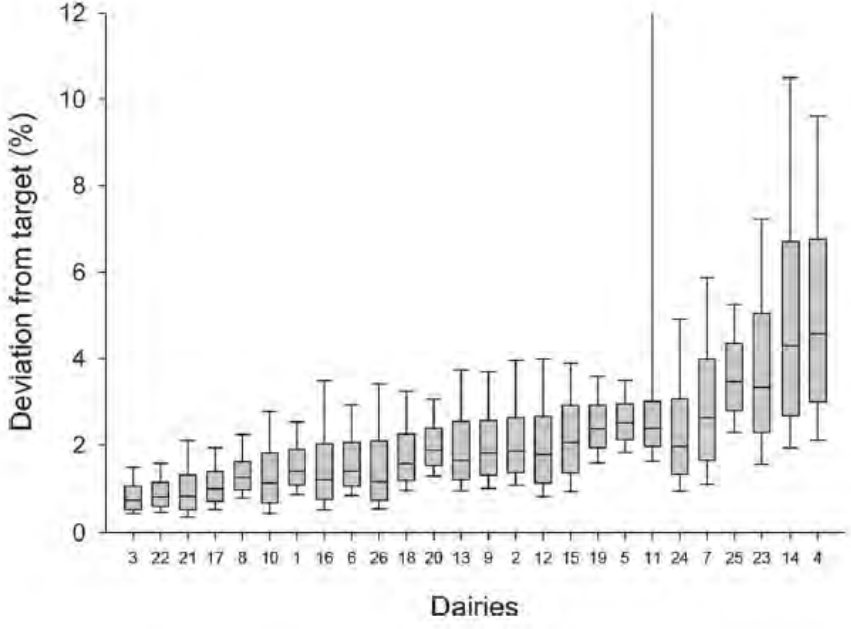
Is the feed delivered the same as what was formulated?

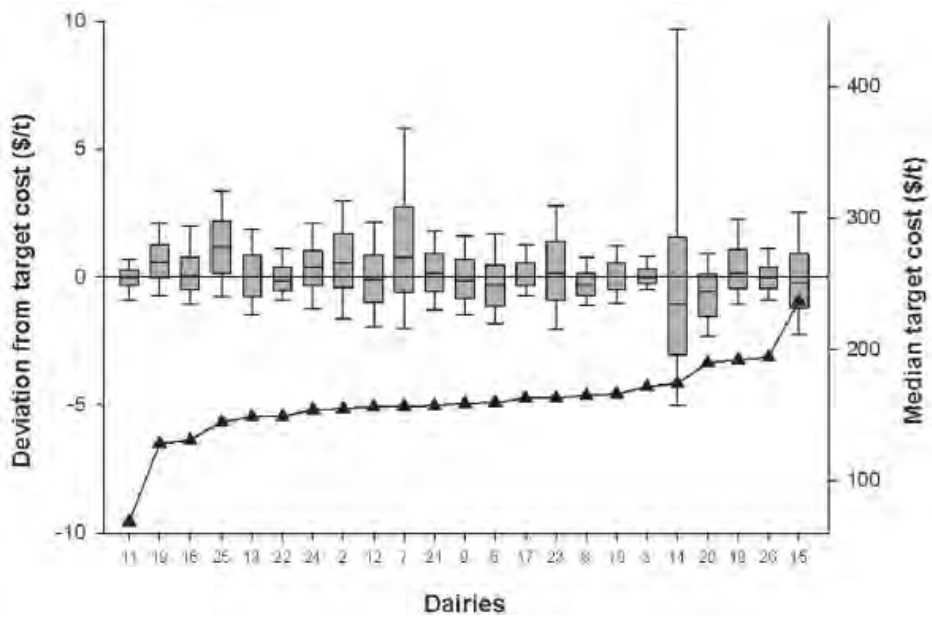
In a study of herds in Canada the average TMR fed…

- Exceeded TMR formulation for
  - NE_L (+0.05 Mcal/kg)
  - NFC (+1.5%)
  - ADF (+0.5%)
  - Ca (+0.1%)
- Underfed TMR formulation for:
  - CP (-0.4%)
  - NDF (-0.7%)
  - Na (-0.2%)

Sova et al. 2014. J. Dairy Sci. 97:562-571

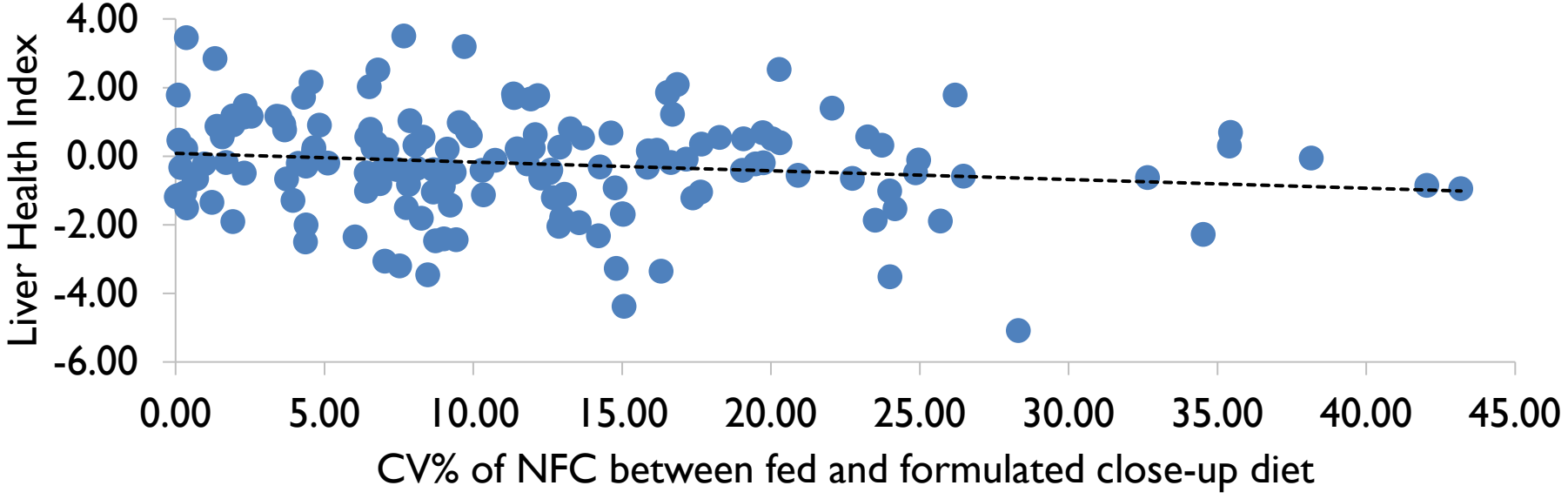
Deviation from the formulated target weight of ingredients loaded into high group TMR on 26 California dairies (1,100 to 6,900 cows)





Trillo et al. 2016. J. Dairy Sci. 99:5866-5878

Higher variability in close-up ration NFC content between formulation and fed diet = poorer liver health in early lactation cows on dairy farms



Gheller et al. in preparation

First step in ensuring cows eat the right ration:

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  - Feed quality
    - Forage management

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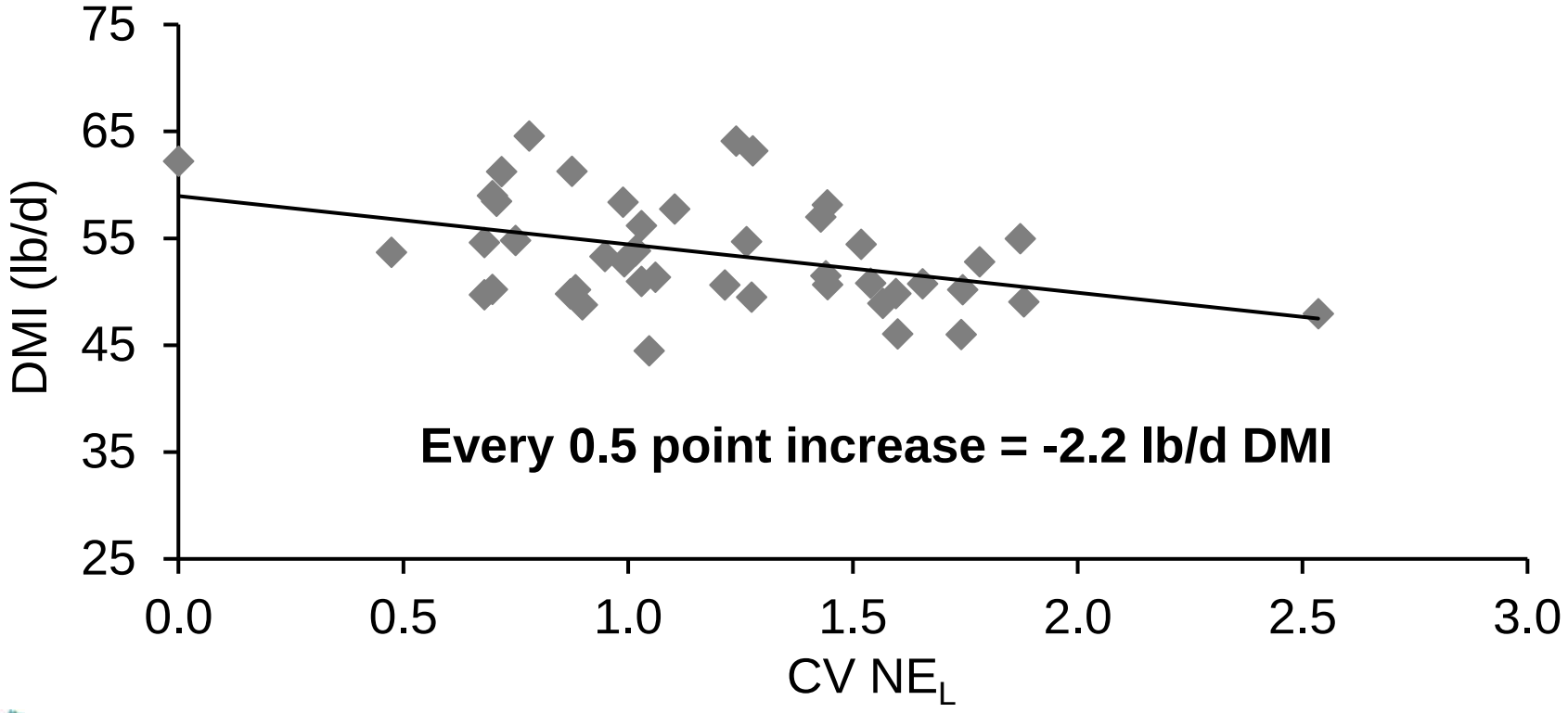
    - How often is feed dry matter (DM) checked?
    - How often are feed components analysed and rations re-formulated?
    - Are mixing protocols in place?
    - Are you able to track what is mixed?

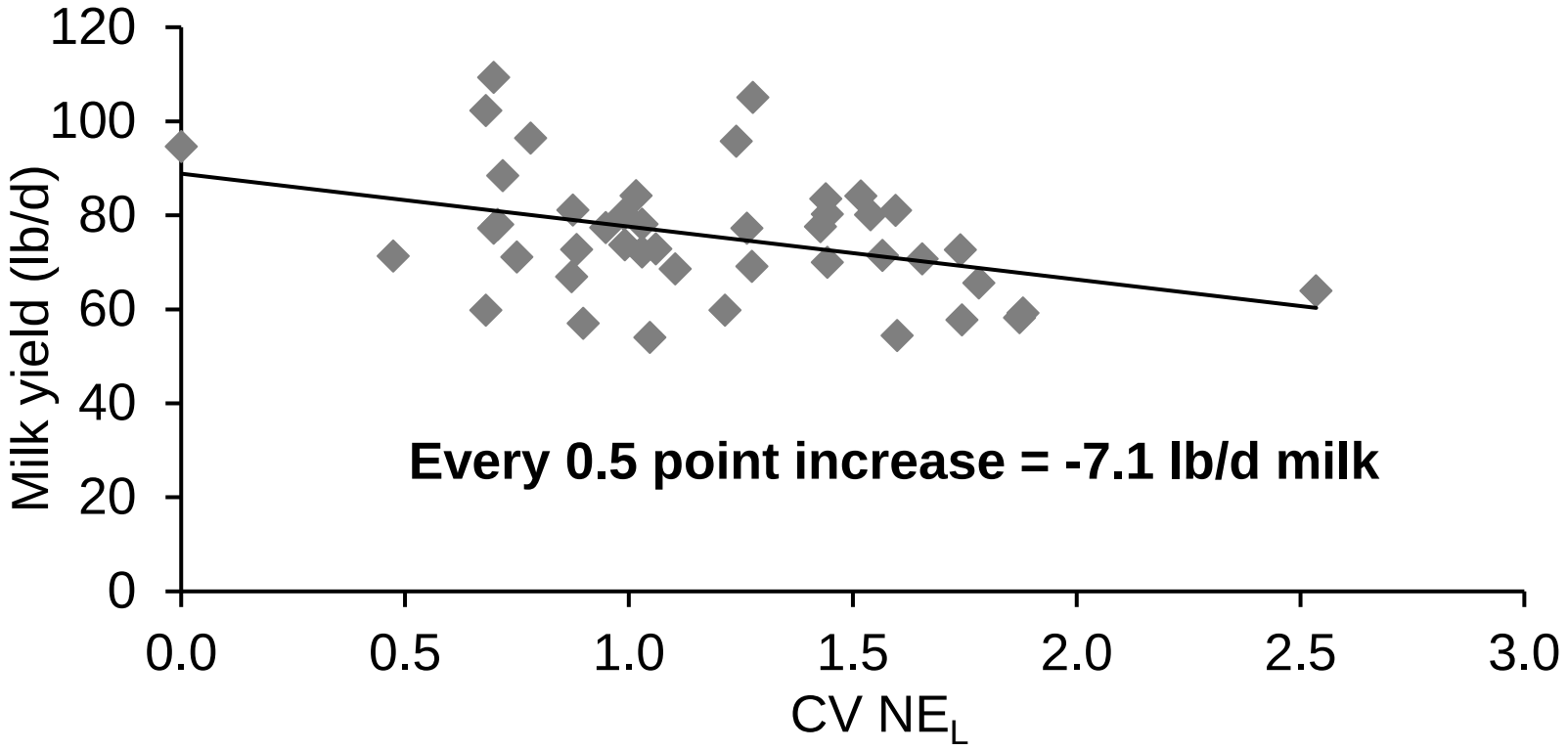
How precisely (consistent) are the rations being delivered?

More day-to-day variability in ration energy content = lower DMI



Adapted from Sova et al. 2014. J. Dairy Sci. 97:562-571

More day-to-day variability in ration energy content = lower milk yield



Adapted from Sova et al. 2014. J. Dairy Sci. 97:562-571

Cows love consistency!!!

Another step in ensuring cows eat their feed consistently…

- Make sure feed is mixed and delivered the same way each day

Ensure cows are delivered their ration consistently

- Tools?
  - SOPs and training

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  - TMR management programs!

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  - TMR management programs!
  - Automated feeding systems?

The problem is…

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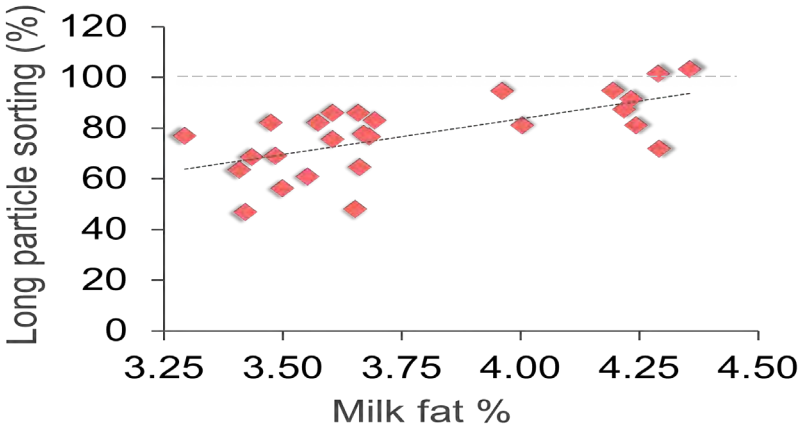
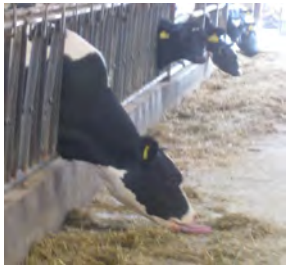
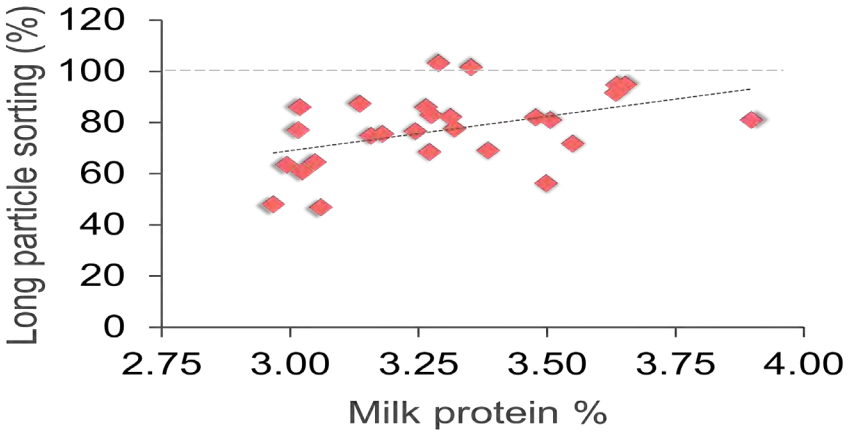
  - **There is the one that is consumed by the cows**

Cows do not always eat what is put in-front of them – leading to inconsistent results

More sorting at a cow level = lower milk components







Miller-Cushon and DeVries. 2017. J. Dairy Sci. 100:2213-2218.

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- To promote consistent consumption…diets should be designed to be difficult to sort

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- To promote consistent consumption…diets should be designed to be difficult to sort
  - Forage quantity
  - Forage type
  - Forage particle size
  - Moisture content

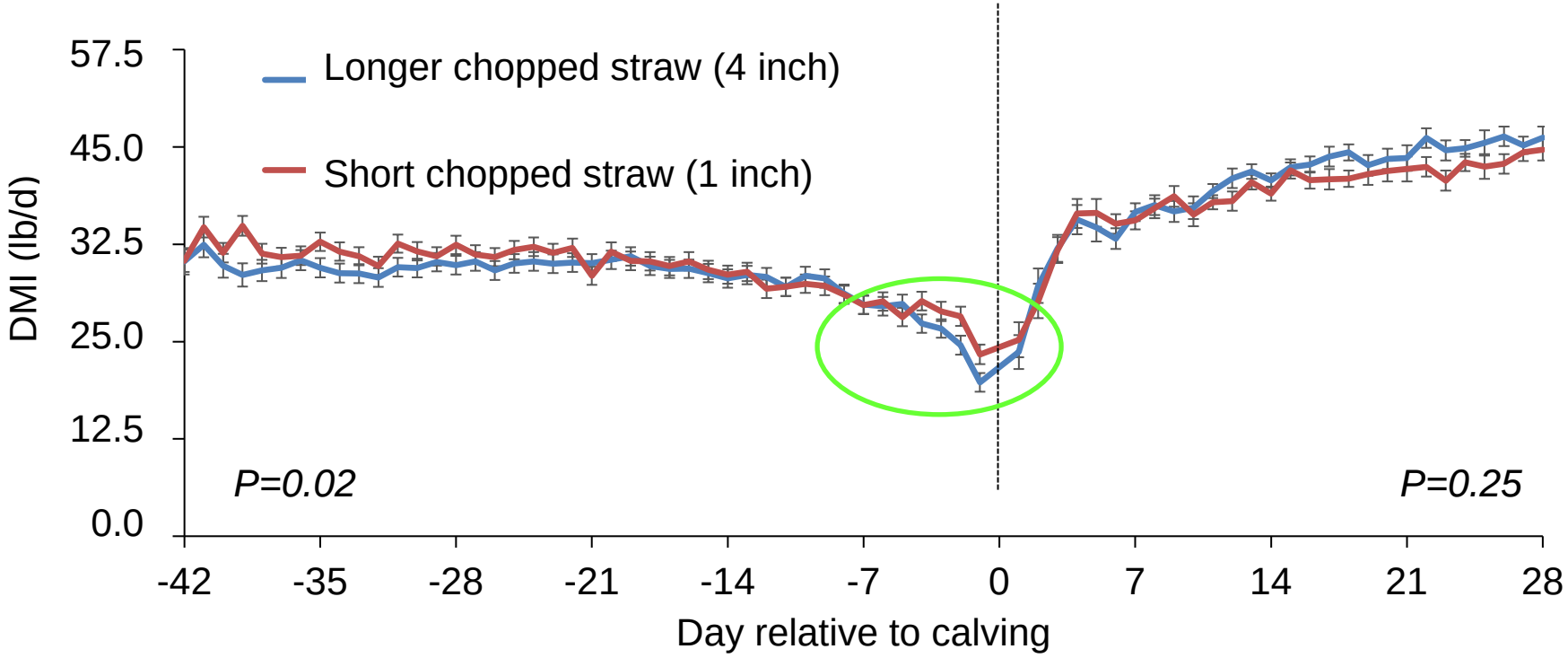
What is the ideal TMR particle distribution?

	Sieve, mm	Current, %	Rationale
Top	19	<5	Sortable material, too long; increases need for chewing, especially if >10%
Middle	8	50	Still long and functional pef, more so than 4 mm materials, do not exceed 50-60%
Bottom	4	10-20	Remainder of pef, top 3 sieves combined = pef
Pan	-	25-30	40-50% grain in diet results in at least 25-30% in the pan

Source: Grant, 2018

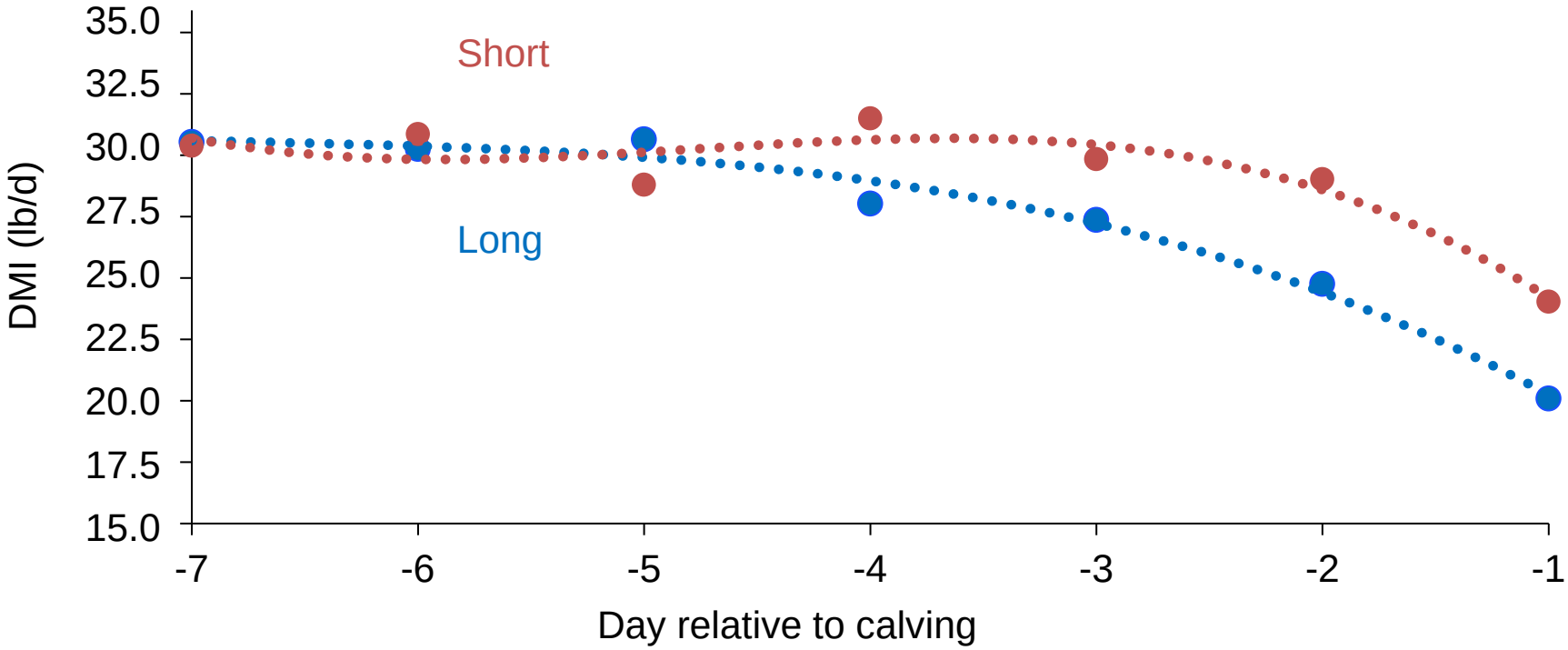
This can be just as problematic with dry cow diets…

Cows on shorter straw diet ate more during the dry period…



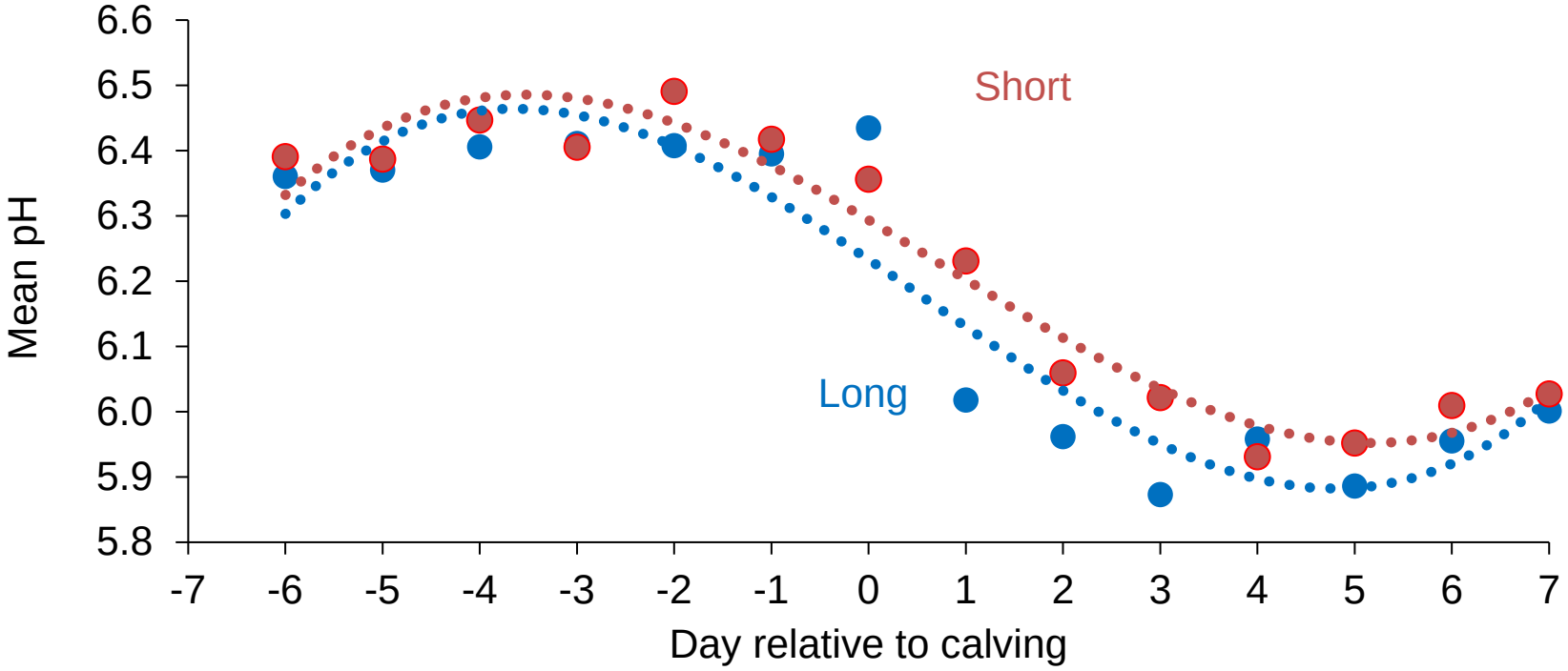
Havekes et al. 2020. J. Dairy Sci. 103:254-271

Cows on shorter straw diet had a lesser drop in DMI leading up to calving…



Havekes et al. 2020. J. Dairy Sci. 103:254-271

Cows on shorter straw diet had a lesser drop in reticulorumen pH post-calving…



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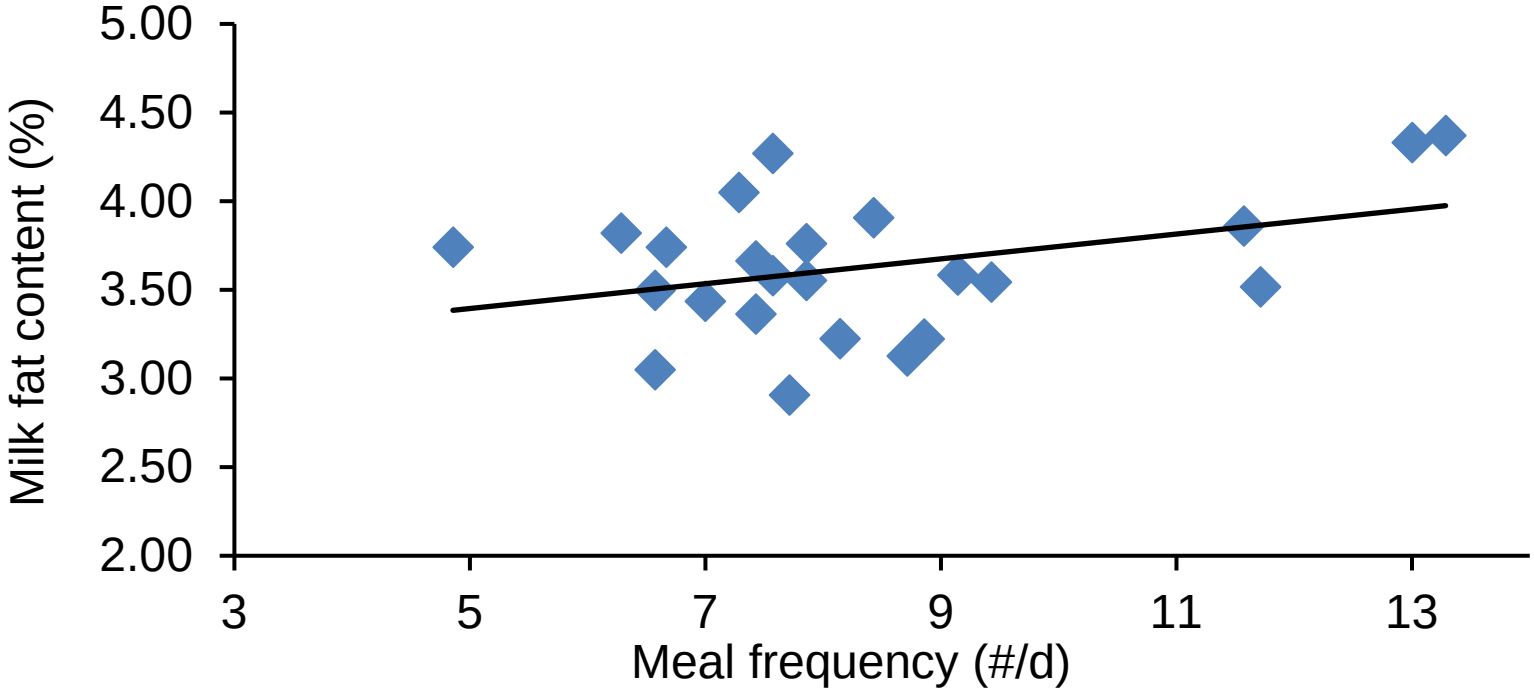
  - There is the one that is delivered to the cows
  - There is the one that is consumed by the cows
  - **There is the one that is digested by the cows**

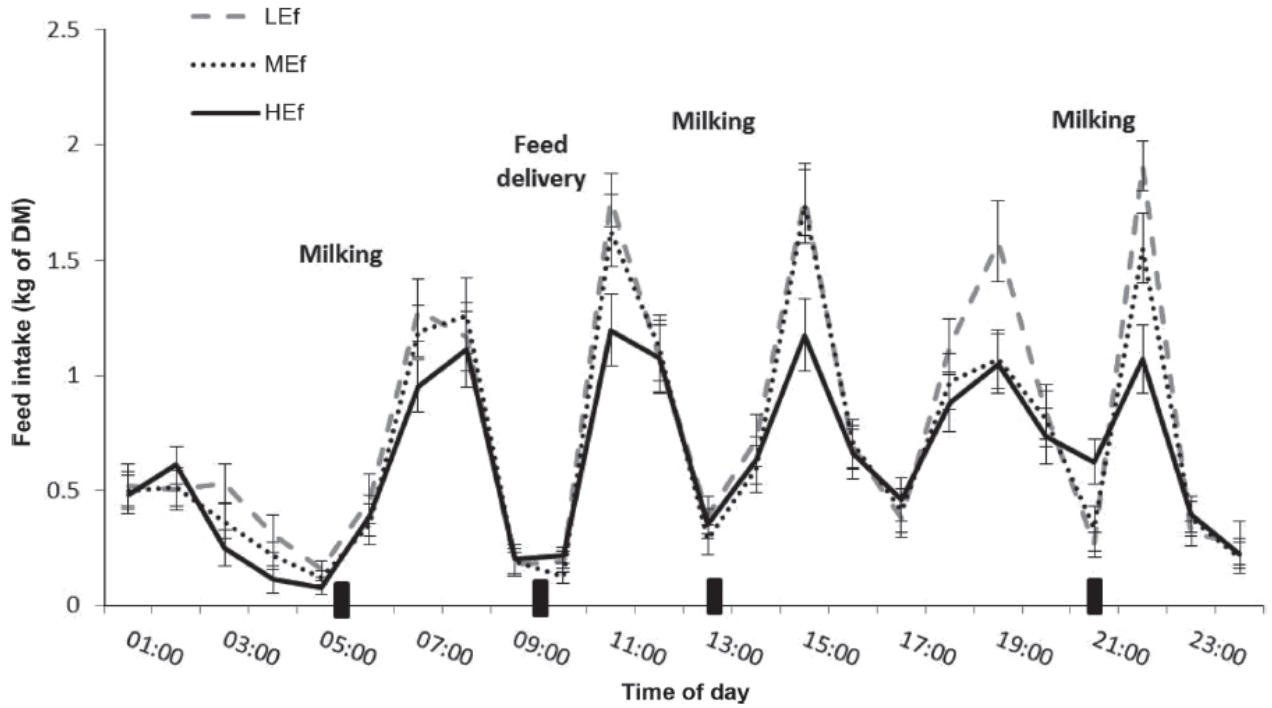
How the cow eats her feed has an impact on how she digests it…

More meals = greater milk fat %



Data from DeVries and Chevaux. 2014. J. Dairy Sci. 97:6499-6510

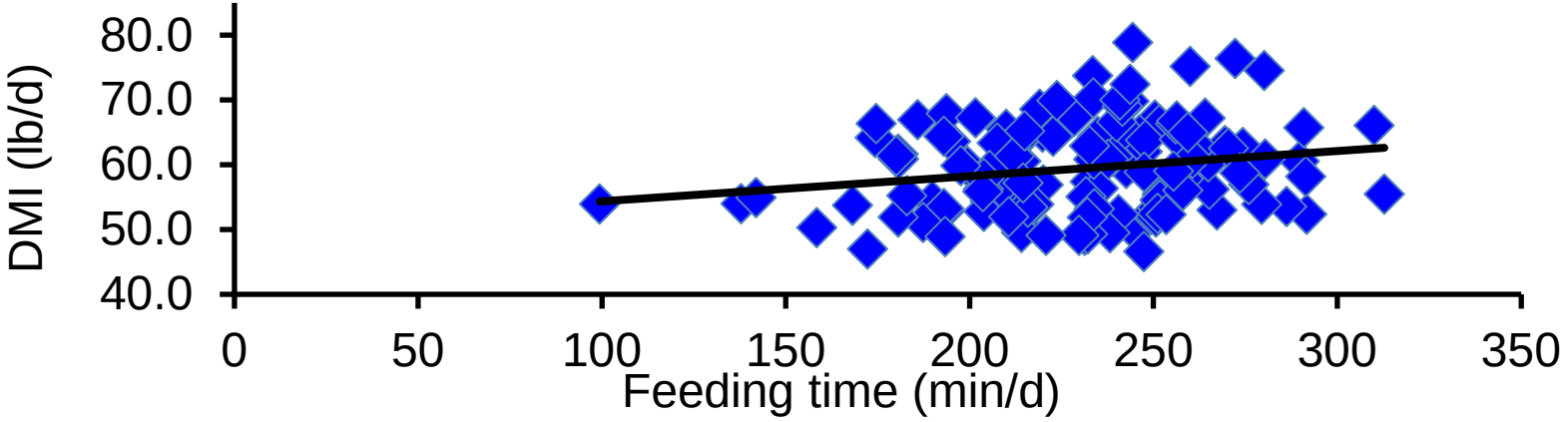
Highly efficient cows consume smaller meals and eat slower!



Data from Ben Meir et al. 2018. J. Dairy Sci. 101:10973–10984

More time and meals at the bunk = greater intake!

- DMI was associated with:
  - feeding time (+0.44 lb/10 min) and meal frequency (+0.44 lb/meal)



Data from Johnston and DeVries. 2018. J. Dairy Sci. 101:3367-3373

When does a cow go and eat at the feed bunk?

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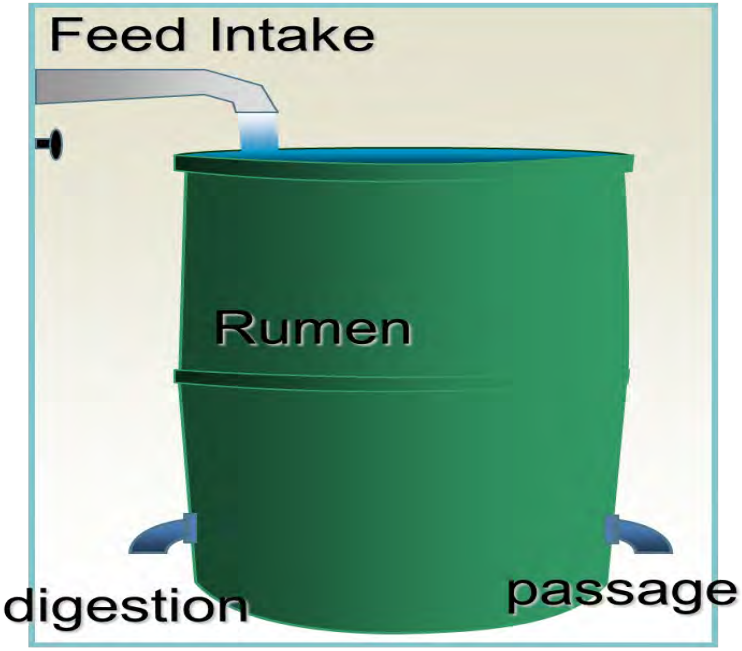
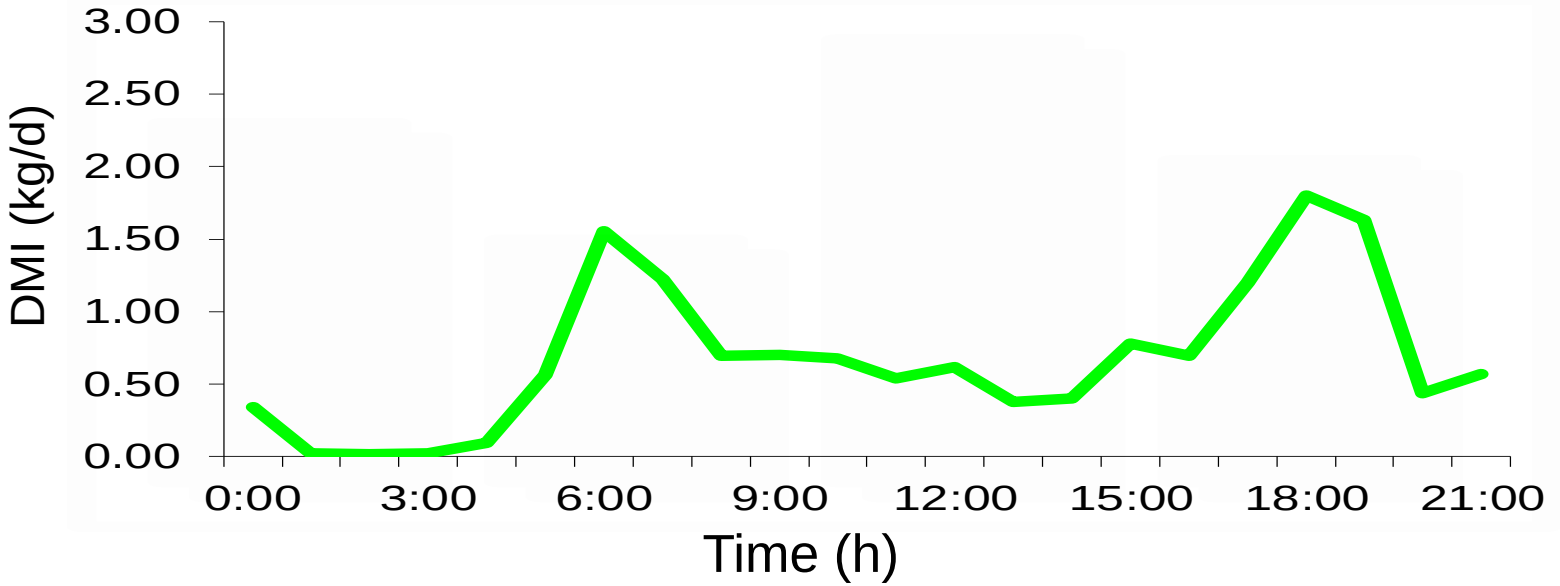
- When she is hungry

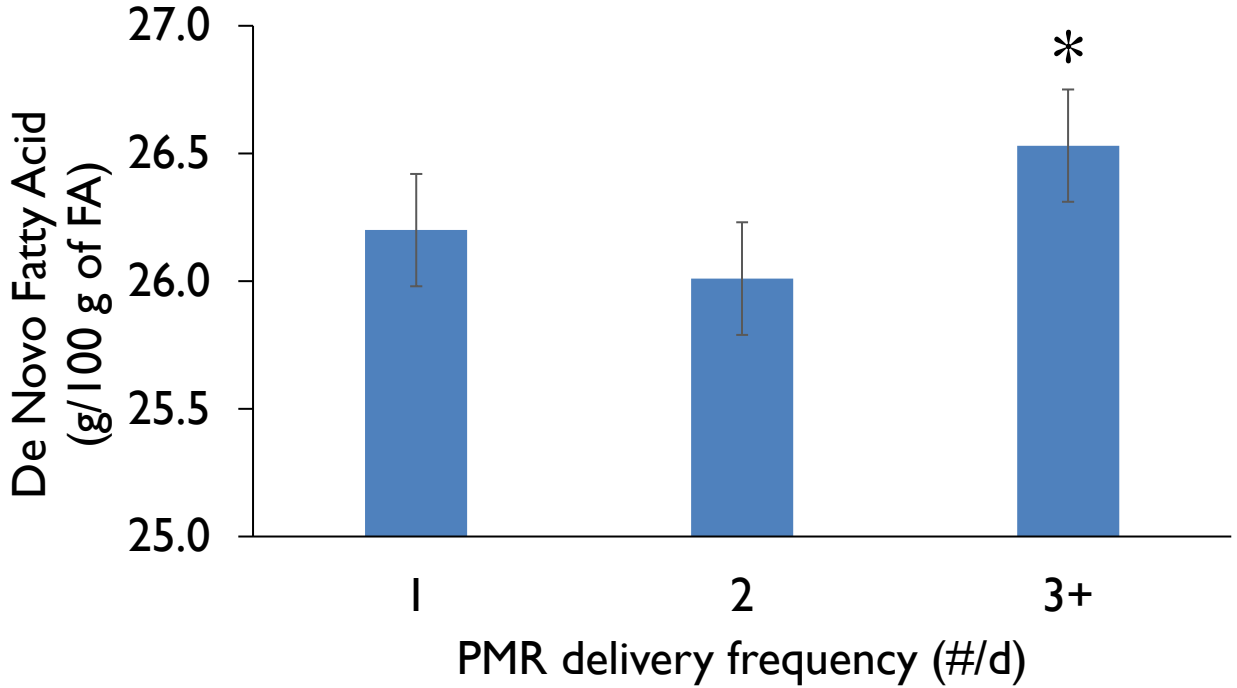


When does a cow go and eat at the feed bunk?

- When she is hungry
- After certain management events



More frequent feed delivery = more consistent consumption = improved rumen health

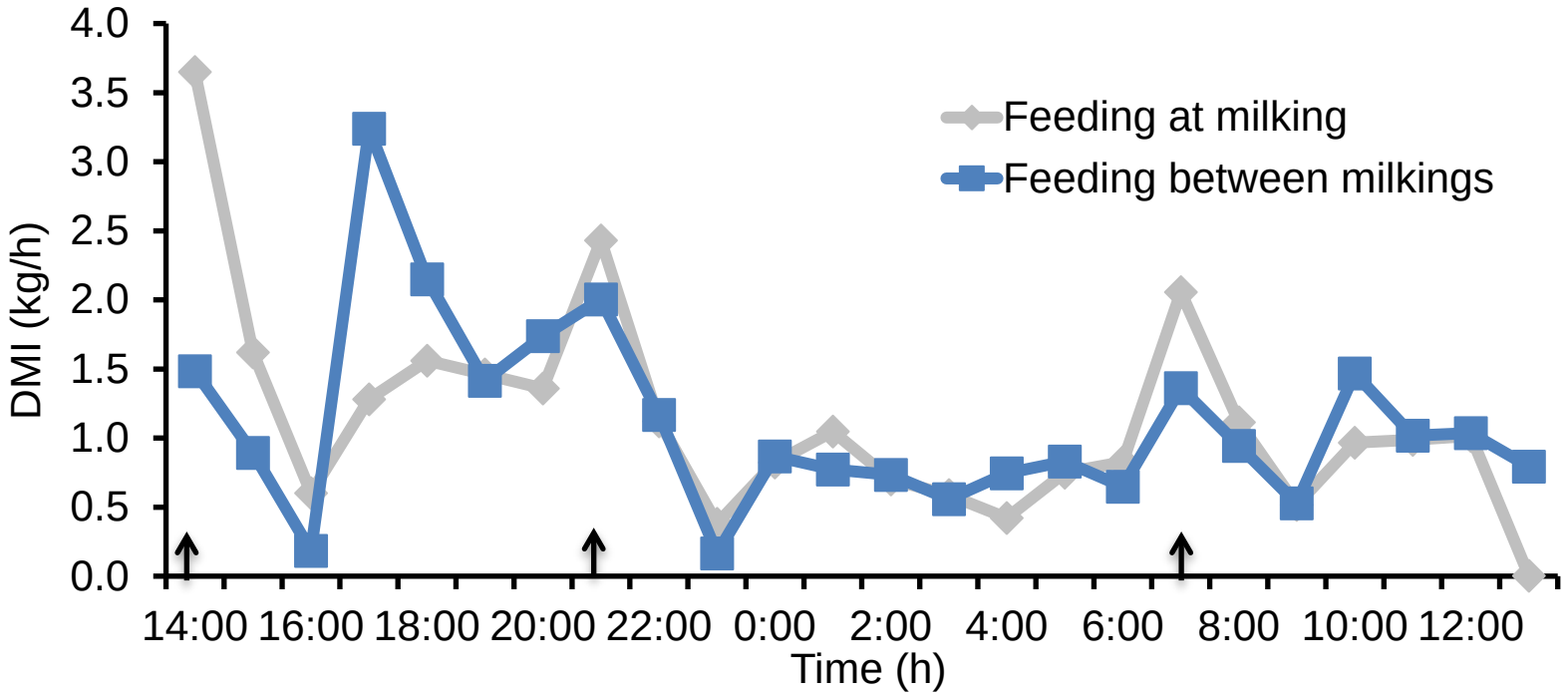


*P=0.05

Castro et al. 2022. J. Dairy Sci. 105:5097-5108

Delivering feed multiple times per day may not always be practical…

Manage milking and feed delivery times to encourage consistent bunk visits throughout the day = more meals = greater efficiency



↑ = milking

King et al. 2016. J. Dairy Sci. 99:1471–1482

Need to ensure feed is present when cows go to the bunk!

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Ensure cows have access to a consistent ration

- Feed needs to be consistently pushed up and available
  - 33 robot farms in USA Midwest
    - +10.8 lb/d (+4.9 kg/d) of milk for farms with an automated feed pusher vs manual

Siewart et al. 2018.
J. Dairy Sci. 101:8327-8334


Ensure cows have access to a consistent ration

- Feed needs to be consistently pushed up and available
  - 197 robot farms across Canada
    - Mean = 12.8 feed pushes/day (SD = 8.3)
    - For every 5 extra feed pushes…
      - +0.77 lb/d (0.35 kg/d) milk yield


Matson et al. 2021.
J. Dairy Sci. 104:7971-7983

Ensure cows have access to a consistent ration

- Feed needs to be consistently pushed up ***and available***

Impact of reduced feed access time increased with overcrowding

- Overcrowding and feed restriction (0100 to 0600 h):
  - Up to 9 h/d greater subacute rumen acidosis (pH < 5.8)
  - Reduces NDF digestion rate by up to 50%

Campbell and Grant, 2016

Take home messages:

- Improve consumption and efficiency by ensuring cows receive and consume the right ration!
  - Ensure feed is delivered as formulated and precisely!
  - Ensure feed is consumed as delivered and in a healthy manner

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NSERC
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Questions???

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