

Sorting Activity by Dairy Heifers

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It is well accepted that lactating dairy cows sort their TMR, picking out the most desirable particles, and leaving the “least tasty” particles in the bunk. This results in unbalanced eating behavior, with cows consuming a disproportionate amount of small particles in the hours following feed put-down, and eating long (forage) particles later in the day. As a result, the supply of rumen-available carbohydrate, protein, and fiber becomes inconsistent throughout the feeding period, reducing rumen efficiency. The measurable consequences are increased feed waste, sub-acute rumen acidosis, and reduced milk and component production.

Sorting activity by dairy heifers is less frequently evaluated, and measurable consequences are less obvious, as there is no daily measure of productivity (other than feed intake). Research has quantified sorting activity by heifers, and is beginning to link consequences to sorting activity by heifers to reduced productivity.

Heifers sort their TMR!

Recently published research studies have quantified sorting activity by growing dairy heifers. Regardless of heifer size, or diet dry matter, heifers have obvious sorting behavior. In these studies, sorting activity was measured through 3-screen Penn State Particle Separator evaluation, comparing actual consumption of a particle size, to expected. As shown in the table below, heifers exhibit TMR sorting behavior similar to lactating cows, reducing consumption of long particles, and preferring short particles.

Particle Lengths for 3-screen Penn State Particle Separator: Long: ≥0.75” Medium: 0.31” – 0.75” Short: 0.05” – 0.31” Fine: <0.05” Note: Average Starting TMR Particle Distribution: Long: 19.7%; Medium: 39.8%; Short: 35.5%; Fine: 5.1%	Study	Diet DM %	Heifer Weight	Sorting Activity
	JDS 93:3730-3737 (2010)	52.1	580 lb.	↓ Long ($P<0.05$) ↓ Fine ($P<0.10$)
	JDS 93:1668-1676 (2010)	53.3	365 lb.	↓ Long ($P<0.05$) ↑ Short ($P<0.05$) ↓ Fine ($P<0.05$)
	JDS 92:1161-1168 (2009)	85.7	370 lb.	↑ Short ($P<0.15$) ↓ Fine ($P<0.05$)
	JDS 92:3922-3929 (2009)	44.6	520 lb.	↓ Long ($P<0.05$) ↑ Medium ($P<0.05$) ↑ Short ($P<0.05$)

Sorting activity against long particles, and for short particles is not surprising, as these particle fractions have markedly different palatability. However, in several studies, heifers sorted against fine particles, which is surprising. Sorting against fine particles may have several causes:

- 1) Attempt to attenuate ruminal acidosis. (Research has shown that cattle experiencing rumen upset will reduce consumption of the “offending” particle fraction in an attempt to normalize rumen function (DeVries et al., 2008. JDS 91:3958-3967).)
- 2) Palatability of the fine particle fraction. In the above 4 studies, the fine particle fraction was a very small amount of the TMR particles (5.1%). The finest particles of the ration (<0.05”) will often include dry minerals, which are very unpalatable. However, they are essential for normal growth, reproductive development, and health. Reduced consumption of fine particles will likely reduce mineral and vitamin consumption, which could have long term implications for heifer productivity.



Dry minerals sifting out of a ration

The Consequences.....

Sorting activity by dairy replacement heifers:

- 1) Alters diet energy density
- 2) Increases overconditioning risk
- 3) Increases TMR waste
- 4) Reduces Diet Forage:Concentrate Ratio for heifers that actively sort.

Research has shown that altering diet forage:concentrate ratio has an effect on rumen fermentation, as shown in the table to the right:

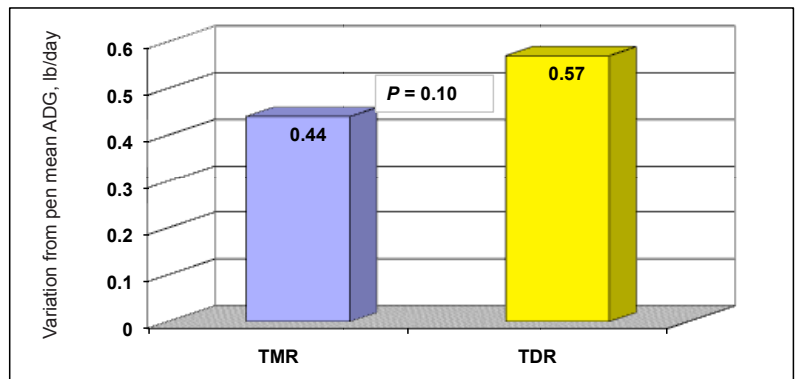
F:C Ratio	77:23	33:67	P-Value
Heifer Rumen pH <6.0, hr/d	3.8	7.1	0.06
Corn Silage In Situ DMD, %/hr	1.5	1.1	0.08

(2007). JDS 90:5580-5586

Reducing rumen pH and forage digestion increases waste of the forage resource and reduces nutrients available to the heifer! In addition, heifers that are less aggressive at the bunk, who do not have opportunity to sort, will be eating the “leftovers”. Consequently, they will receive a diet lower in energy and protein, which will reduce rumen efficiency, and nutrients available for growth.

Minimizing sorting activity helps promote consistent feeding behavior by dairy replacement heifers. Research has shown that inconsistent feeding behavior has a negative effect on uniformity of heifer growth, as shown in the graph below. In this study, researchers fed a 65:35 Forage:Concentrate diet to heifers beginning at 365 lbs, until heifers reached 615 lbs. The concentrate portion of the diet was fed in TMR (TMR), or Top Dressed (TDR) on forage. Compared to TMR, TDR ($P < 0.006$)

- ↑ Sorting activity
- ↑ Feeding time 2 h post feed delivery
- ↑ Displacements from bunk
- ↓ Fecal Score
- ↑ ADG Variation within Pen ($P = 0.10$)



(2010). JDS 93:1668-1676.

The overall conclusion from this study is not comparing the feeding methods of top dressing and TMR feeding; as the dairy industry is well aware that TMR feeding improves ration efficiency. The results indicate that inconsistent feeding behavior has a detrimental effect on heifer uniformity. Increased variation in average daily gain can lead to increased days on feed for heifers that are managed as a pen group. As some heifers gain more quickly, they will likely become overconditioned as other heifers are “catching up.” Consequently, feed and nutrients are wasted, and reproductive efficiency is reduced.

Liquid Supplement Application

Liquid supplements offer an excellent opportunity to aid rumen function, and improve consistency of heifer feeding behavior.

- Sugars and degradable protein stimulate rumen microbes and aid forage digestion.
- Added palatability improves diet acceptance and intake consistency.
- Convenient, precise delivery and distribution of micronutrients and additives to ensure all heifers receive the needed amounts to aid metabolic processes and promote efficiency.
- Reduce sorting. Including a liquid supplement at 2-3% of the TMR for lactating cows has successfully reduced sorting behavior in QLF Farm Demonstrations. QLF Heifer products are typically fed at ~2% of the diet as-fed, and can help reduce sorting behavior. Consequently, feed waste is reduced, and nutrient supply to heifers is optimized.