



Dairy Technical Bulletin

Research Review: Sorting Activity in Commercial Dairy Herds

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Sorting is a common activity for dairy cattle, as cows select and consume ration components they prefer most. Sorting activity can negatively affect nutrient intake, rumen function, and feed waste. An on-farm survey of 50 freestall dairy farms in Minnesota published in the Journal of Dairy Science characterized sorting behavior of commercial dairy herds. The high group (117 ± 51 cows) TMR was sampled 5 times during the feeding period to quantify particle distribution (Penn State Particle Separator) and nutrient change over time.

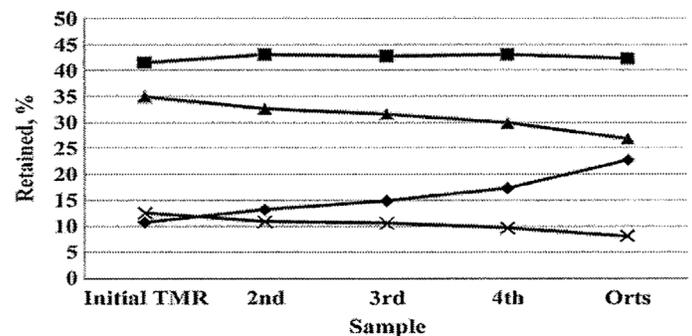
Characteristics of herds in study:

# Cows	>150
Feeding Frequency	70% feed 1x/daily
Frequency of feed pushup	3-12x daily
Linear Feed bunk space/cow	18"
Daily Milk Yield/Cow	88 lbs.

Diet Nutrient characteristics of herds in study (Formulated, % of DM)

Forage Content	52.1
DMI, LB/d	53.6
DM	51.9
NDF	29.8
ADF	19.8
CP	17.9
NFC	39.3
NEI, mcal/lb	0.78

Change in Penn State Particle Distribution over time:

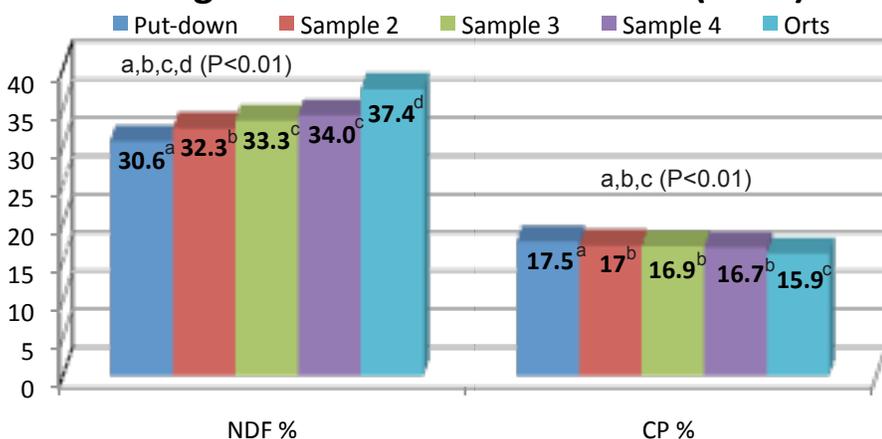


Average percentage of material retained on each sieve of the Penn State TMR Particle Separator over time [top (◆;>0.75"), second (■;>0.31"), third (▲;>0.05"), and bottom (×; pan). Samples represent the initial TMR collected at feed delivery; the second, third, and fourth samples collected every 2 to 3h after feed delivery; and refusals.

The above data shows that cows are preferentially consuming short particles (<0.31"), and leaving long particles (>0.75") in the bunk, as the short and long particle concentrations change dramatically over time. This change in particle distribution leads to differences in nutrient concentration in the TMR over time, as shown in the chart to the left.

Based on the previous chart, sorting activity (change in TMR particle distribution) over time profoundly affects the concentration of two essential nutrients fueling milk production. Adequate protein and NDF consumption are required for normal rumen function, TMR digestion, milk and component production.

Change in NDF and CP Over Time (DMB)



Source: Endres, M.I., and L.A..Espejo.2010. J Dairy Sci. 93:822-829



Nutrition and More . . .

#TB-4330

Researchers also evaluated the rate of change in NDF over time, and its association with ration and production parameters. NDF composition over time was ranked as having a “high” or “low” rate of change based on TMR sample analyses. Researchers found that herds which experienced a higher rate of NDF change over time had ($P < 0.05$):

- Greater proportions of long particles ($>0.75''$) in the ration (13.8% vs. 5.8%)
- More forage (54.6% vs. 50.0%)
- Lower milk production (84.4 lb/day vs. 91.3 lb/day)

Long particles and forage provide a large portion of the ration NDF. Rapid NDF changes over time may indicate variable consumption of long particles during the feeding period, which is especially detrimental when diets contain low levels of forage (~50%). High forage diets often contain high NDF levels, allowing the NDF to change more easily over time, but still maintain adequate consumption of physically effective fiber. Although in this study cows receiving more forage had lower milk production, other research has shown that milk production is maintained and feed efficiency enhanced when feeding a 60% forage diet (JDS 90:2826-2838 & JDS 92:3211-3221). Increasing diet forage levels using high quality forages improves rumen efficiency and utilizes greater amounts of home-grown feeds, reducing purchased feed costs. Minimizing ration sorting improves consistency of nutrient intake, reduces TMR waste, and enhances milk production!

Unique Factors for Ration Sorting

Research has identified several interesting factors that affect ration sorting by comparing the particle distribution of TMR at put-down to particle distribution of ration refusals, using a Penn State Particle Separator.

Cow Age

Compared to mature cows, first calf heifers exhibited significantly greater sorting behavior ($P < 0.05$):

- Against long ration particles ($>0.75''$)
- For fine ration particles ($<0.05''$)

In this study, primiparous cows also sorted significantly for short particles (0.31" to 0.05"), while mature cows consumed expected levels of short particles. (Source: DeVries et al., 2011. JDS Vol. 94, E-Suppl. 1; Abstract #T324)

◆ **Take Home Message – QLF:**

First-Calf heifers are often at a disadvantage for nutrient intake due to their smaller size, and the social dominance of mature cows. Sorting against long ration particles, and for short and fine particles will reduce rumen efficiency and nutrients available to fuel growth, and milk production of primiparous cows. Using a QLF Dairy product at 2 – 4 lb/day helps reduce ration sorting and enhance intake consistency!

Diet Forage Level

Researchers studied sorting behavior of cows fed a 62% forage diet or 51% forage diet. In both treatments, diet forage was 39% corn silage and 61% grass silage.

- All cows sorted against particles $>0.75''$ and $<0.30''$, but the magnitude of sorting for cows receiving the 51% forage diet was significantly greater ($P < 0.001$) than cows on the 62% forage diet.
- 51% forage cows sorted against ($P = 0.001$) medium particles, while 62% forage cows consumed expected levels of medium particles. (Source: DeVries et al. 2007. JDS 90:5572-5579)

◆ **Take Home Message – QLF:**

Although all cows exhibited sorting behavior, cows receiving more forage had more consistent intake of all particle sizes. High forage diets contain less concentrate, which reduces cows' ability to preferentially refuse long particles and consume small ones, improving rumen efficiency. QLF cane molasses-based liquid supplements improve forage digestion, facilitating use of high forage diets!

TMR Particle Length

Researchers evaluated the effects of increasing dry hay particle length on overall TMR particle length and particle distribution over time. Increasing mean hay particle length in stepwise increments 0.2" to 2.5" raised overall TMR particle length. Cows receiving TMR's with the greatest mean particle length (longest hay) exhibited greater sorting activity against long particles, and for small particles on the bottom pan. (Maulfair et al. 2010. JDS 93:4791-4803).

◆ **Take Home Message – QLF:**

Forage processing can have a profound effect on sorting activity. Consistent forage processing helps aid consistent TMR intake. QLF liquid supplements enhance diet palatability and stick ration particles together, reducing ration sorting.

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