



Water Addition to Dairy TMR's Increased Sorting and Reduced DMI

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Many dairy producers add water to TMR's in an effort to increase ration moisture and palatability, and lessen sorting behavior. However, recent research showed that water addition to a silage-based TMR increased sorting behavior, lowered DMI, and altered nutrient composition of the ration consumed.

Materials & Methods

Twelve lactating Holstein cows received two treatments in a crossover experiment with 21-day periods. Treatments were: 1) "Dry" Control diet (57.6% DM) and 2) "Wet" diet (Control diet with water added to reduce DM to 47.9%). Cows were individually fed TMR once daily. Diet and orts samples were collected during the last 7 days of each period for nutrient analyses, and the last 3 days of each period for particle size separation. Sorting activity for each fraction of the Penn State Particle Separator (0.75", 0.31", 0.05" screens, and bottom pan) was calculated as the actual intake of each fraction expressed as a percentage of that fraction's predicted intake.

Table 1. Diet Composition

Item	Dry	Wet
Corn Silage	27.04	
Alfalfa Haylage	27.04	
HMC	28.10	
Concentrate Pellet	17.83	
DM	57.6	47.9
CP, % of DM	17.4	
NDF, % of DM	29.6	
Starch, % of DM	28.5	
NFC, % of DM	43.3	

Note: Diets were identical nutrient composition except for dry matter.

Table 2. Particle Distribution at Put-Down

Particle Length	Dry	Wet
Long (>0.75")	8.8	9.1
Medium (0.31"-0.75")	46.6	49.3
Short (0.05"-0.31")	33.5	34.5
Fine (<0.05")	11.0	7.2

Results:

Cows receiving the "Wet" diet exhibited significant sorting behavior, preferring short and fine particles ($P < 0.05$) and refusing long particles ($P < 0.05$). Cows receiving the "Wet" diet likely sorted against the long haylage particles, the wettest part of the diet, and selected for short and fine particles because they were the driest ingredients in the diet. In contrast, cows receiving the "Dry" diet had more uniform consumption of all particle sizes, and tended to sort against short particles ($P < 0.10$). Cows receiving the "Wet" diet had significantly more sorting activity against long particles ($P = 0.07$) and for short particles ($P = 0.001$) compared to cows receiving the "Dry" diet.

Table 3. Effect of dietary treatment on sorting activity

Particle Length	Dry	Wet	P
Long (>0.75")	100.7	93.4*	0.07
Medium (0.31"-0.75")	100.4	99.4	0.30
Short (0.05"-0.31")	98.7 [†]	101.3*	0.001
Fine (<0.05")	101.2	104.4*	0.25

Difference in sorting values from 100% expressed as [†] $P < 0.10$, * $P < 0.05$.

In the table at left,

- 100% = no sorting
- <100% = selective refusals (sorting against)
- >100% = preferential consumption (sorting for)

TMR water addition significantly lowered DMI, increased feed water intake, and lowered starch intake as shown in Table 4 below. Researchers hypothesized that the large amount of water absorbed by the TMR and consumed in the “Wet” treatment may have physically limited intake via increased rumen fill.

As shown in Table 4 below, sorting activity by cows receiving the “Wet” diet resulted in significantly lower NDF, and higher starch concentration of the diet consumed. Numerically, these concentration differences are small. However, an actual farm setting with group-fed cows likely would magnify these differences and increase potential for rumen upset.

Lower DMI, NDF, and starch intakes for cows on the “Wet” diet indicate that cows received less nutrients to fuel milk production, which is shown through 1.8 lb/day less milk yield, as shown in Table 4 below.

Table 4. Effect of dietary treatment intake, nutrient composition, and productivity

Item	Dry	Wet	P
DMI, lb/d	72.3	65.3	0.03
As-fed Intake, lb/d	121.5	133.0	0.08
Feed H2O Intake, lb/d	49.2	67.9	<0.001
NDF Intake, lb/d	21.4	19.2	0.027
cNDF, % of DM*	29.5	29.3	0.07
Starch Intake, lb/d	20.5	18.7	0.046
cStarch, %of DM [†]	28.2	28.6	<0.001
Milk yield, lb/d	81.8	80.0	0.30
*NDF concentration of the diet consumed			
[†] Starch concentration of the diet consumed			

This research demonstrates that water addition for ration conditioning of silage-based TMR’s can lower dry matter intake and alter nutrient composition of the ration consumed, which may negatively impact cow productivity. Likewise, increasing free water content of the ration may increase TMR spoilage during warm weather. A more effective strategy of ration conditioning is use of a QLF Liquid Supplement, which provides soluble sugars and degradable protein to enhance ration density, rumen microbial growth, dry matter intake, and milk production. Please see QLF Brochure B-9350 for details on how QLF liquid supplements help minimize sorting behavior and enhance cow productivity!

Reference: E. K. Miller-Cushon & T. J. DeVries. 2009. Journal of Dairy Science 92:3292-3298.