

# TECHNICAL BULLETIN

## DAIRY



### THE HIGH FORAGE ADVANTAGE

Liquid supplements provide soluble sugars and degradable protein to increase forage fiber digestion, which facilitates formulation of diets with decreased starch and NFC and higher forage/fiber levels. Research has demonstrated that reducing dietary starch and NFC, and increasing dietary forage/fiber levels maintains a healthy rumen pH and improves productivity.

#### High Forage Diets Maintain Healthy Rumen pH

Increasing diet forage level helps maintain a healthy rumen pH, through diet formulation and cow feeding behavior. A recent study evaluated the effects of forage harvest chop length, and diet forage level on eating behavior, rumen pH, and productivity. Researchers formulated two alfalfa haylage-based lactation diets with differing forage, starch, and NFC levels, as shown in the chart below. Within each diet forage level, researchers compared short and long-cut haylage. Haylage theoretical chop lengths compared were 0.31" ("short") and 0.75" ("long"). (Haylage is typically harvested at a theoretical chop length of 0.38").

Item	60:40 F:C <sup>a</sup>		35:65 F:C <sup>b</sup>		P Value	
	SHORT	LONG	SHORT	LONG	F:C <sup>c</sup>	FCL <sup>d</sup>
Starch, % DM	17.8	17.8	30.6	30.6		
NFC, % DM	35.0	35.0	44.0	44.0		
NDF, % DM	34.5	36.4	30.3	30.6		
DMI, lb/d	47.6	48.3	52.5	52.7	0.01	NS
Meals/day	9.6	10.1	8.3	8.2	0.04	NS
Intake rate, g of DM/min	100.9	103.7	119.6	115.5	0.01	NS
Total Chewing, min/d	670.7	739.8	643.7	654.6	0.07	NS
Rumen pH<5.8, hr/d	1.1	1.3	11.5	10.1	0.01	NS
3.5% FCM, lb/d <sup>e</sup>	69.2	68.8	71.0	71.7		
FCM:DMI	1.45	1.42	1.35	1.36		

<sup>a</sup>60:40 Forage:Concentrate diet      <sup>b</sup>35:65 Forage:Concentrate diet  
<sup>c</sup>Forage:Concentrate Ratio      <sup>d</sup>Forage Chop length      <sup>e</sup>calculated as per Sklan et al., 1992

Yang & Beauchemin. (2007) J. Dairy Sci. 90:2826-2838

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The fibrous nature of high forage diets slows intake and promotes rumen fill so cattle eat smaller, more frequent meals per day, which helps prevent production of VFA quantities that exceed the absorptive capacity of the rumen wall. In addition, the fibrous nature of the diet requires more chewing while eating and ruminating, producing saliva which improves rumen buffering capacity. As the above data shows, cows receiving the low-starch, low-NFC, high-forage diets had healthy rumen pH almost 24 hours per day.

Although 3.5% FCM was slightly lower for cows on the 60:40 F:C diet, milk efficiency was improved, indicating enhanced utilization of feed consumed. In this study, forage chop length did not have a significant impact on intake rate, chewing, or rumen pH, which demonstrates that moderation of diet fermentability has a greater effect on optimizing rumen health and fermentation than simply adding long particles to the diet. Likewise, research has shown that moderation of diet fermentability when feeding Rumensin® is more effective at maintaining milk fat production than addition of effective fiber to a low NDF, high starch diet. Please see TB-4319 for additional details. Healthy rumen pH helps ensure survival of the fiber-digesting bacteria which perform normal-pathway biohydrogenation, which is essential to maintain normal milk fat production (Fuentes et al., 2008). Increasing diet forage level, and decreasing diet starch and NFC level also helps prevent overgrowth of rumen bacteria that use alternate-pathway biohydrogenation, thereby reducing risk of milk fat depression (Lock et al., 2008).

### Liquid Supplements Enhance Forage Consumption

When long forage particles are left in the feedbunk due to sorting activity, ruminal buffering capacity decreases due to less rumination of forage fiber particles. However, liquid supplements enhance diet palatability, thereby reducing ration sorting, increasing forage consumption, and reducing feed wastage. Incorporating a QLF Dairy TMR liquid supplement into a high forage diet helps ensure success of this dietary approach!

### Improve DMI & Milk Production

Research has shown that formulating QLF Dairy TMR 20 into a lactation ration while decreasing dietary starch and NFC levels improves DMI and milk production. A diet with “traditional” starch and NFC levels was compared to a diet with decreased starch and NFC levels which included 2.7 lb/day QLF Dairy TMR 20. Results are shown in the table below:

Item	No Dairy TMR 20 Control	2.7 lb/d Dairy TMR 20
Starch, % DM	27.4	21.0
NFC, % DM	41.1	38.3
NDF, % DM	32.6	35.7
Dry Matter Intake, lb/d	52.7	55.6
Energy Corrected Milk, lb/d	83.6 <sup>b</sup>	87.5 <sup>a</sup>
ECM/DMI	1.61	1.64

<sup>a,b</sup>Values in the same row with different superscripts are significantly different P<0.10  
Firkins et al. (2008) J.Dairy Sci. 91:1969-1984.

As the above data shows, decreasing dietary starch and NFC levels while increasing NDF and incorporating QLF Dairy TMR 20 into the diet improves productivity. The improvement in energy corrected milk production provides \$0.07/hd/day advantage over the control diet (using \$16/cwt and \$0.55/day additional feed cost).

Increasing dietary forage level and decreasing dietary starch and NFC levels maintains a healthy rumen pH, and can improve dry matter intake and milk production. QLF Dairy TMR supplements provide soluble sugars and degradable protein to stimulate fiber digestion and utilization to maximize the nutritive value obtained dietary forages. Please see TB-4316 for specific details on how soluble sugars improve utilization of high quality dairy forages. Also, please see TB-4318 for specific details on the economic importance of maintaining healthy rumen pH.