TECHNICAL BULLETIN
DAIRY

QLF QUALITY LIQUID FEEDS

REDUCING STARCH & NFC AND INCLUDING DAIRY TMR 20 PREVENTS MFD IN RUMENSIN® DIETS

Many producers and nutritionists feed Rumensin® to improve milk production efficiency. Rumensin® alters rumen bacteria populations and fermentation patterns to increase propionate production, while reducing acetate and butyrate production. While this change is more energetically efficient for the cow, under sub-optimal rumen conditions, it can lead to milk fat depression (MFD).

Risk of MFD is increased by feeding a low fiber, high starch diet, due to effects of concentrate fermentation on rumen bacteria populations, pH and fiber digestion. This bulletin details results of two research studies which emphasize importance of diet starch and fiber levels when feeding Rumensin®.

Adding chopped straw to a low-fiber, high-starch Rumensin® diet does not prevent MFD

Researchers at the USDA Dairy Forage Research Center investigated whether adding chopped straw to a low physically-effective NDF (peNDF), high starch diet with Rumensin® will prevent MFD. Lactating dairy cows were fed a low fiber ration for 4 weeks in preparation for the study. After 4 weeks, cows were assigned to a 19% peNDF, 27% starch basal diet, fed with or without 5% added wheat straw substituted for high-moisture corn. (Note that 19% peNDF is below recommended diet peNDF level of 22%.) Both diets were fed with or without Rumensin®. Results are shown in the table below:

Treatment	Starch %	NDF %	peNDF %	Rumensin, g/ton DM	Milk Fat %
Basal Diet	27.0	27.0	19.0	0	2.69
Basal Diet + R	27.0	27.0	19.0	14.6	2.61[a]
Basal Diet + straw	23.5	31.0	23.0	0	3.30[b]
Basal Diet + straw + R	23.5	31.0	23.0	14.6	2.85[a,b]

[a]Significant effect of Rumensin® to decrease Milk Fat (P=0.039)

[b] Significant effect of straw to increase Milk Fat (P=0.003)

Mertens, D. (2007) J.Dairy Sci. 90:Suppl. 1:W311

As the above table shows, Rumensin® lowered milk fat %, and straw increased milk fat % in this study. However, note that adding straw did not alleviate MFD when added to the low peNDF, high starch Rumensin® diet. In fact, straw increased milk fat % significantly less when Rumensin® was fed (P = 0.022). Highly available starch produces large quantities of VFA in the rumen, which can reduce ruminal pH, and subsequent fiber digestion. In addition, high concentrate diets and/or highly available starch favor ruminal bacteria populations which perform alternate-pathway biohydrogenation, increasing the risk of milk fat depression (Lock et al., 2008). In this study, rumination of the straw did not provide enough buffering activity to counteract effects of starch and Rumensin® on rumen bacteria, fiber fermentation, and subsequent MFD.

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Lowering starch & NFC, increasing NDF, feeding Dairy TMR 20 in Rumensin® diet prevents MFD.

Liquid supplements contain sugars, which are utilized by rumen microbes as rumen-fermentable carbohydrate. In addition, degradable protein provides nitrogen to rumen microbes. Research has demonstrated that formulating QLF Dairy TMR 20 into a Rumensin® lactation ration while decreasing starch and NFC levels maintains milk fat %. A diet with "traditional" starch and NFC levels was compared to a Rumensin® diet with decreased starch and NFC levels. The Rumensin® diet also contained QLF Dairy TMR 20. Results are shown in the table on the below:

Item	No Dairy TMR 20 Control	5.3 lb/d Dairy TMR 20
Rumensin, g/ton DM	0	11.5
Starch, % DM	27.4	19.0
Sugar, % DM	4.1	8.9
Supplemental Sugar, lb/d	0	1.9
NFC, % DM	41.1	37.7
NDF, % DM	32.6	35.5
Dry Matter Intake, lb/d	52.7	54.0
Energy Corrected Milk, lb/d	83.6	83.8
Milk Fat %	3.31	3.31
Firkins et al. (2008) J.Dairy Sci. 91:1969-1984		

Note that dry matter intake and milk fat production were maintained when diet starch and NFC were decreased, and NDF increased in the Dairy TMR 20 and Rumensin® treatment. This research demonstrates well that a combination of dietary sugars and starches optimizes rumen function. Sugars provided by liquid supplements improve microbial growth and fiber digestion, which helps maintain milk fat production. Lowering dietary starch helps prevent depressed rumen pH and fiber utilization, and moderates microbial populations which perform alternate-pathway biohydrogenation, while still providing valuable energy to stimulate maximum microbial growth. Please see TB-4316 for additional details on how liquid supplements improve microbial growth and fiber digestibility.

In addition, liquid supplements help enhance rumen function by improving ration palatability, intake consistency and forage intake. Consequently, a healthy, balanced rumen microbial population is maintained through uniform daily consumption of effective fiber, rumen fermentable carbohydrate and degradable protein. Please see TB-4317 for additional details on how increasing dietary forage level maintains healthy rumen pH, and TB-4318 for information on benefits of healthy rumen pH.