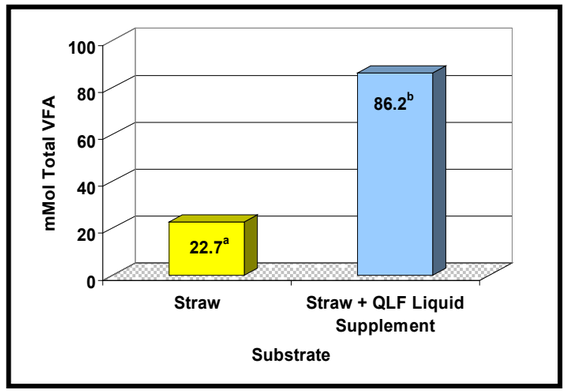

As the graph to the left shows, incubating low-quality forage with a QLF liquid supplement (22% CP, 27% total sugar) stimulates microbial growth, improving VFA production four-fold!

In Vitro DVRAMM data (Courtesy of Diamond V Mills, Inc.).

[a,b] Total VFA mMol with different superscripts is significantly different at $P < 0.05$.

The application of increased microbial protein and VFA production, is improved forage digestion and intake! Research has demonstrated improved dry matter and NDF digestion and increased forage intake for cattle consuming low-quality forages and fed a 28% protein liquid supplement.

Bowman et al. 1995. Proc. WSAS. 46:391-394

It's recommended to feed QLF supplements so that total diet sugar levels on lactating dairy cattle is 6-8%. To meet these levels, feeding 3 to 5 lbs of a QLF supplement to supply 1 to 2 lbs of supplemental sugar is recommended.

Additional benefits of QLF Molasses-based liquid supplements

Dry corn silage may be less palatable than corn silage with higher moisture content. Consequently, dry corn silage may increase cows' sorting activity and lessen TMR intake. QLF liquid supplements also aid ration utilization by increasing ration palatability improving daily intake consistency, reducing ration sorting and waste.

Consequently, TMR efficiency is increased! In addition, since dry corn silage may have less-than-ideal feed quality due to reduced packing density and altered fermentation, preservatives may be needed to enhance microbial stability of the TMR. QLF liquid supplements provide a convenient, palatable method to deliver and distribute MYCO CURB® or Ultra CURB® in the TMR.

FEEDING DRY CORN SILAGE & HOW QLF LIQUID FEEDS CAN HELP IMPROVE CORN SILAGE QUALITY

What Can You Expect From Dry Corn Silage?

1. **Poor Feed Stability:** Dry corn silage will not pack well and there will be aerobic fermentation from yeasts and fungi. Corn silage with greater than 38% dry matter will undergo an extended period of heating after ensiling. Yeasts and fungi will continue to grow and consume nutrients in the silage which will lower the energy content of the silage. High wild yeast counts in corn silage have been reported to reduce dry matter intake and milk fat production.

2. **Mold Growth:** Molds require oxygen to grow and dry corn silage does not pack well, leading to pockets of aerobic fermentation where molds can grow. You will likely see Mucor molds on corn silage with greater than 40% DM. These Mucor molds are white to gray in color and are not harmful (don't produce toxins) but do reduce the nutrient content of the corn silage. These molds will consume the readily fermentable carbohydrates, thereby reducing the energy content of the silage. Fusarium molds are the molds that can produce toxins. These molds are reddish-pink in color and can reduce intake of the corn silage and long term exposure to Fusarium toxins can damage the intestinal tract, liver and kidneys. Poor feed efficiency that cannot be explained by poor forage quality may indicate damage to the intestinal tract or liver due to toxins produced by Fusarium molds.

3. **Reduced NDF and Starch Degradability in the Rumen:** The new and improved corn hybrids for silage have improved corn silage quality but even the new corn hybrids for silage suffer from a loss in NDF and starch degradability when DM content exceeds 38%. Not all varieties mature at the same rate and not all varieties decline in digestibility at the same rate. In the table below, estimated milk per ton is listed as harvest DM is increased for 4 corn hybrids. Change in milk per ton of DM when harvest DM was 34% - 36% compared to 40% is listed in the last column.

Corn Hybrid Harvest DM %	30	32	34	36	38	40	Change in Milk/Ton
Hybrid 1	3300	3425	**3460**	3450	3420	3420	-1.2%
Hybrid 2	3100	3300	3425	**3480**	3450	3275	-5.9%
Hybrid 3	3075	3190	**3200**	3180	3150	3150	-1.6%
Hybrid 4	3000	3190	3250	**3260**	3200	3125	-4.14%

All hybrids had reduced milk per ton DM when harvest DM exceeded 38% DM

Bal and coworkers (Animal Feed Sci. and Technology (2000) 86:83-94) reported that ruminal digestibility of DM, NDF and starch was reduced when harvest DM was 42% compared to 32%. The NDF 24-h digestibility of corn silage was reduced from 21% to 14% which is a reduction in NDF digestibility of 33.3%. In this same trial, 24-h ruminal starch digestion was reduced from 95.2% to 86.2% which is a reduction of 9.5%.

Continued...

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In a second experiment Bal and coworkers compared immature corn silage harvested at 36 – 37.6% DM to the same hybrid harvested as mature corn silage at 48.5% - 53% DM. Dry matter, NDF and starch ruminal in situ digestibility was lower in the drier mature corn silage (Table 2).

Table 2: Ruminal In situ DM, NDF and Starch digestibility of whole plant corn silage harvested at different DM contents

Corn Silage Type	DM % at Harvest	DM Digestibility, %	Starch Digestibility, %	NDF Digestibility %
Immature with kernel processing	**37.6**	**67.1**	**84.4**	**32.6**
Mature with kernel processing	**48.5**	**62.2**	**79.0**	**25.1**
Immature without kernel processing	**36.0**	**58.1**	**66.4**	**30.2**
Mature without kernel processing	**53.2**	**52.4**	**52.5**	**21.5**
Impact of Harvest DM %		***P = 0.02***	***P =0.01***	***P* = 0.05**
Impact of kernel processing		***P =0.01***	***P = 0.01***	**NS**

Even with the use of kernel processing, the dry corn silage had a reduction in starch digestion of 6.4% and a reduction in NDF digestion of 23%. The negative impact of harvesting corn silage at a DM % of greater than 40% is even greater when kernel processing is not used. When kernel processing was not used during harvest, dry corn silage had a reduction in starch digestion of 21% and a reduction in NDF digestion of 29%. Clearly, dry corn silage is going to have less useable energy than wetter, less mature corn silage. With a reduction in NDF digestibility, dry matter intake is likely to be lower on diets containing dry corn silage as the primary forage source. To maintain dry matter intake, you are going to have to use ingredients that stimulate NDF digestion. QLF liquid feeds contain molasses and corn milling byproducts that have been shown to stimulate NDF digestibility.

Bottom Line: Corn Silage harvested at 40% or greater DM is going to be less stable, likely to have high yeast and mold counts and have lower DM, NDF and starch digestibility than wetter and less mature corn silage. Dry corn silage is going to produce less milk per ton because it will contain less fermentable energy and generate less microbial protein than wetter corn silage. You are going to have to compensate for the lower fermentable energy content of the corn silage by using ingredients in combination with this corn silage that have a high fermentable energy content. Feeds that will complement dry corn silage are molasses based liquid feeds that supply readily fermentable sugar and NPN.

Continued...

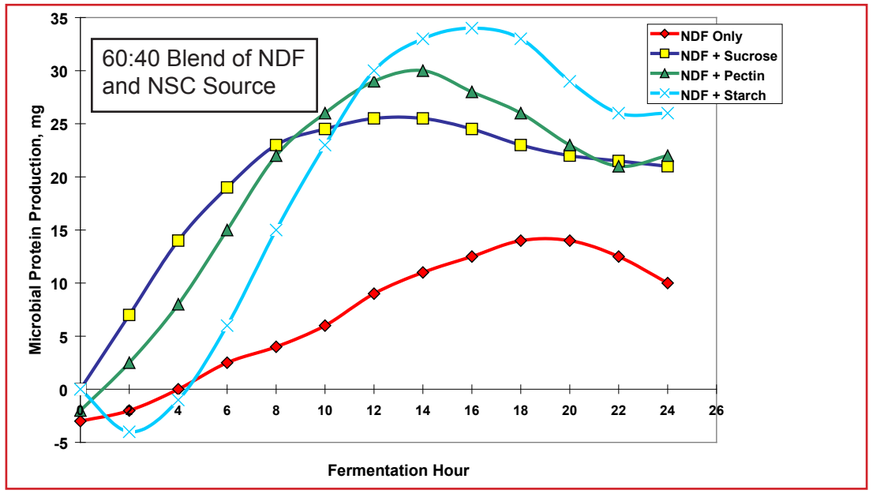
QLF Liquid Supplement Application for Dry Corn Silage

Background Summary:

In some years, growing and harvest conditions result in ensiling a corn silage crop that is drier than desired (>38% DM). Dry silages reduce packing density, facilitating nutrient loss by aerobic fermentation. In addition, corn plants ensiled at >38% DM have increased maturity and harder kernels, which reduces fiber digestion and starch availability to the rumen. Consequently, rumen microbial growth and VFA production are lessened, reducing the nutrients available for milk production. Processing will help facilitate dry corn silage utilization, but does not fully overcome effects of plant maturity on fiber digestion and starch availability.

Enhancing Rumen-Available CHO

Hard kernels in dry corn silage will reduce starch availability in the rumen, which will "starve" rumen microbes of available energy. Sucrose, the main sugar in cane molasses-based liquid supplements, is available in the rumen more quickly than starch, as shown in the graph below. Notice that microbial protein production from sucrose begins immediately, while there is a short lag time before microbial protein production from starch begins. (This lag time occurs as the microbes are cutting apart the starch matrix to begin the digestion process.) Consequently, sucrose complements the slowly available starch from dry, mature kernels and provides vital energy to enhance rumen microbial growth. Using a molasses-based liquid supplement to "fill the gap" in rumen-available energy will aid TMR utilization and milk production efficiency.



Hall & Herejk. (2001) J. Dairy Sci. 84:2486-2493

Optimizing fiber digestion from ensiled corn plants

As moisture of the whole corn plant decreases, in vivo fiber digestion decreases due to lessening of the soluble CHO and protein fractions in the plant's cells and increased lignification. Consequently, fewer nutrients available for growing rumen microbes, which increases rumen fill and decreases dry matter intake, forage digestion, and VFA production in the rumen. As a result, less nutrients are available to fuel milk production. Sugars and degradable protein in liquid supplements provide quickly available energy and nitrogen to rumen microbes, to jump-start their growth and stimulate VFA release.

Continued...