

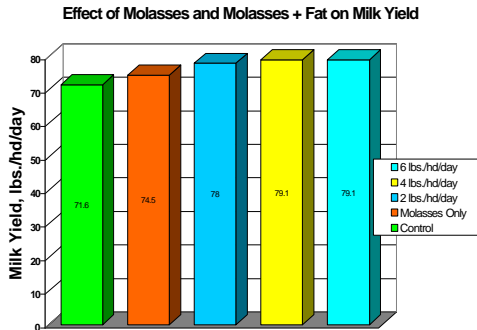
QLF LIQUID SUPPLEMENTS ENHANCE RUMEN FUNCTION

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Why do your customers buy QLF Liquid Supplements for their lactating dairy cows and growing heifers? Their answer might often be to provide protein, energy, vitamins and

minerals to supplement other feedstuffs. This is a good reason, but the real value QLF liquid supplements bring is that they increase total ration palatability, they increase total ration digestibility and dry matter intake, they increase microbial protein production and they improve non-protein nitrogen utilization. They do this by enhancing rumen function.

To better understand the need for QLF products in the diet, it is necessary to understand the basic principles of ruminant digestion. The ruminant stomach consists of four distinct compartments: the rumen, reticulum, omasum and abomasum. The ruminant stomach accounts for approximately 25% of the total body weight. The simple stomach in an animal such as the pig differs from the ruminant stomach since it contains only the true stomach similar to the abomasum of the ruminant and accounts for approximately 4% of the total body weight. It is the rumen that enables dairy cattle to utilize large quantities of forage. This ability of ruminants to use large amounts of



roughage depends entirely on the microbial reactions that take place in the rumen compartment of the stomach and to a lesser extent in the intestines. An idea of the quantity of rumen microorganism is indicated by the fact that one teaspoonful of rumen juice contains millions of microorganisms. The rumen microorganisms convert the carbohydrates to volatile fatty acids, converts nitrogen to microbial protein and produce B vitamins.

In feeding the ruminant animal we are actually feeding the rumen bacteria. Thus the first consideration when feeding the ruminant animal

should be producing microbial protein but optimum fermentation is not automatic. The quantity of microbial protein produced daily in the rumen is not constant. Actual measurements in high-producing cows range from 2 to 6 lbs./day. The amount of organic matter and carbohydrate digested in the rumen has a direct impact on the quantity of microbial protein produced when rumen degradable protein is not limiting.

Molasses is more than just a palatability or appetite enhancer. Rapidly fermented carbohydrates and branched-chain VFA's in molasses play a specific role in stimulating microbial growth and digestion in the rumen. All carbohydrates are not equal when it comes to supporting and stimulating microbial growth and digestion in the rumen. Most rations balancing software does not distinguish between TDN and NEL from different energy sources. For this reason these programs underestimate the value of molasses in dairy cattle diets.

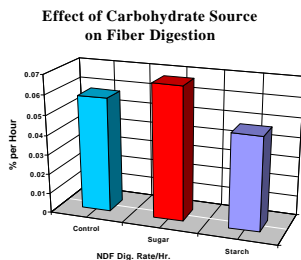
As a byproduct of the sugar industry, molasses contains approximately 60% sugar on a dry matter basis. Of late, there has been a renewed interest in feeding molasses as a result of our improved understanding of nutrient

CONTRIBUTION OF MICROBIAL PROTEIN TO TOTAL PROTEIN REQUIREMENT			
Efficiency of Microbial Synthesis	Milk Yield, Pounds		
	55	77	99
Grams N/lb OM Digested	Contribution of Microbial Protein, %		
9	49	42	39
14	73	64	59
18	98	85	79

Source: Stern et al., 1993

digestion. Sugar supplements have been shown to increase the digestibility of a diet's dry and organic matter, as well as increase feed intake and microbial protein production in the rumen. Unidentified factors that are required by rumen microorganisms have been shown to be present in molasses.

These benefits are seen on silage-based diets because silage is low in rapidly fermentable carbohydrates. When alfalfa or grasses are put up as silage, bacteria to produce lactic acid and acetic acid that preserves the silage ferment the soluble carbohydrate present in the forage. Simultaneously, extensive fermentation of the protein in the alfalfa or grass takes place. This converts most of the protein in the silage to non-protein nitrogen. When silage is fed to cattle, the major carbohydrates available for rumen fermentation are the slowly fermented plant cell walls. The protein in silage is very soluble and passes out of the rumen quickly. To use this forage protein efficiently, carbohydrates as offered through QLF Supplements that are fermented



rapidly in the rumen need to be fed with the silage. In more mature forages QLF Liquid Supplements stimulate the digestion of fiber and dry matter intake.

Rumen microorganisms can utilize non-protein nitrogen (NPN) products such as urea, ammonia and diammonium phosphate provided all other nutrients are available for maintaining maximum rumen function. The microorganisms produce protein from the NPN. This protein is stored in the microorganisms as they grow and multiply. Digestion of the microorganism in the lower digestive tract of the ruminant then supplies the amino acids required by the animal. Although rumen microorganisms can produce all of the different amino acids required, they are not able to meet the total amino acid requirements of the animal for high milk production by the conversion of NPN to microbial protein. Therefore, natural protein must be supplied for optimum performance and some rumen by-pass protein may be required.

QLF supplements provide the carbohydrates, non-protein nitrogen, and natural protein, vitamins and trace minerals to enhance rumen function. Because QLF supplements impact the digestion and utilization of the total ration feeding 2-3 lbs./HD/day can have a major impact on animal performance.

QLF Liquid Supplements can be added to a TMR, top-dressed on forages, or provided free choice through a lick tank. A QLF supplement can complement forages that are low in sugar such as corn silage, sorghum silage, low-protein grass silage or hay. It can also be used to improve the palatability of high-fiber hay or silage. QLF Energizer products provide rapidly fermented sugars and soluble starch, which could improve the utilization of rapidly fermented protein from forages. Energizer supplements would also allow the dairy producer to add animal fat to the ration without a reduction in ration palatability. When liquid supplements like Energizer is used in a ration, remember they do not contain any effective fiber. Make sure the ration contains adequate effective fiber from forages, whole cottonseeds or extruded or roasted soybeans.

Summary

1. Feeding 2-4 lbs. of QLF Liquid Supplements to dairy cattle increases feed intake, organic matter digestion, and microbial protein production.
2. Response from feeding QLF Liquid Supplements occurs because the sugar in combination with non-protein nitrogen, sulfur, phosphorus, and trace minerals enhances rumen function by supplying

needed rapidly fermented
carbohydrates and nitrogen to
the rumen bacteria.