

## OH-THE POWER OF SUGAR

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**S**ugar is the backbone of many biological processes Agriculture depends on:

- ① Plants grow by producing sugar.
- ① Grain is produced by the conversion of sugar to starch.
- ① Silage is preserved by bacteria converting sugars to acids.
- ① The sugar in milk makes it nature's most perfect food.

No matter the carbohydrate type (fiber, sugar, or starch) fed to dairy cattle, all are degraded to simple sugar by rumen bacteria before being fermented to volatile fatty acids and used for energy. Cellulose (fiber) is converted to glucose, starch to glucose, and sucrose (sugar) to glucose and fructose.

### Sugar & the ruminant animal:

To better understand the need for sugar in the ruminant diet, we need to understand the basic principles of ruminant digestion. The ruminant stomach consists of four distinct compartments: the rumen, reticulum, omasum and abomasum. It is the rumen that enables dairy cattle to utilize large quantities of forage. The rumen is the "fermentation vat" where feed material is digested by a population of microorganisms that develop in accordance with the amount and type of feed consumed. An idea of the quantity of rumen microorganism is indicated by the fact that one teaspoonful of rumen juice contains millions of microorganisms.

These rumen microorganisms:

- ① Convert carbohydrate (sugar, starch and fiber) to volatile fatty acids.
- ① Convert protein and non-protein nitrogen to microbial protein.
- ① Produce B-vitamins.

Digestion in the rumen accounts for 70 – 85% of the total utilization of digestible dry matter. So, in feeding the ruminant animal we are actually feeding the rumen bacteria.

### Why feed sugar?

Renewed interest in feeding sugar results from improved understanding of ruminant digestion. A typical diet has < 3% sugar because grains are low in sugar and silages have had their sugar fermented to preserving acids. Feeding sugar provides needed energy at the right time in relation to starch and fiber to increase ration nutritive value.

Basically, sugars give rumen microbes a jump-start. Sugar supplements have been shown to increase the digestibility of fiber (starch decreases fiber digestibility), as well as increase feed intake and microbial protein production, resulting in improved milk and milk fat production. This suggests sugars help rumen microbes capture and use more of the protein in the diet, especially that coming from rapidly digestible sources such as urea and soluble protein in ensiled forages. Thus, sugars generally boost microbial protein production and improve digestion of fiber and starch resulting in improved milk production efficiency.

### Sugar from molasses based supplements . . . more productive:

Molasses is more than just a palatability or appetite enhancer. Rapidly fermented sugar and branched-chain fatty acids in molasses play a specific role in stimulating microbial growth and digestion in the rumen. Unidentified factors required by rumen microorganism have been shown to be present in molasses. Sugars are digested and rapidly used by rumen microbes. So, we need to make sure both soluble protein and degradable protein are not limiting in the diet.

Feeding  $\frac{3}{4}$  – 1.0 lbs sugar from QLF Supplements to lactating dairy cattle can increase feed intake, organic matter digestion and microbial protein production. This occurs because sugar in combination with non-protein nitrogen, sulfur, phosphorus, vitamins and trace minerals enhances rumen function by supplying needed, rapidly fermented carbohydrate and nitrogen to rumen bacteria. Also, adding QLF supplements to a TMR improves ration component mixing and distribution while reducing sorting to help ensure each animal receives a more balanced intake of energy, protein, vitamins, trace minerals and additives.

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