



Sugar coat your ration

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COWS, AND THEIR RUMEN microbes, have a 'sweet tooth' that isn't satisfied with the TMRs typically found on Ontario dairy farms. Sugar works very differently in the rumen than the starchy grains, and adding some sugar to the ration can help increase gut health and production.

Dry forages, such as hay, can have variable levels of sugars depending on variety and harvest timing. Plants make sugar all day and then consume it at night, so hay harvested in the after-

noon should have more sugar than hay harvested in the morning. Fermented feeds may contribute very little sugar to the ration, as much of the sugars are used up in the fermentation process. Mature grains also have very little sugar as, by harvest time, most of the sugar has been converted into starch.

Typical dairy rations, with fermented forages and mature grains, only contain low levels of sugar, about 2 – 4% DM. However, a recent research review has suggested that an ideal sugar level for milking cows is around 6 – 8% DM, along with moderate starch and soluble fibre. Supplementing diets with a sugar source can boost the total level of sugar into the ideal range. Adding sugar works especially well in high corn

silage rations and rations that have low fibre digestibility.

Bakery by-product is a source of sugar, and can be a good partial replacement for corn. It may actually have a higher energy value than corn and is very palatable; however the sugar levels can be quite variable depending on the mixture of bakery products used. Feeding sucrose on-farm can also be an easy way to get sugar into cows. Commercial liquid sugar supplements often use both whey and molasses in combination.

These two ingredients have different sugar profiles, with molasses having mostly sucrose and whey containing mostly lactose, which makes these work well together in the rumen. Liquid sugar



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supplements have the added benefit of reducing TMR sorting, as they can help the different components of the TMR stick together.

Fibre, the main energy source in most forages, passes slowly through the rumen and can take over a day to digest. Starch is digested faster than fibre but it still takes several hours to degrade, which helps provide a steady source of energy between meals. Sugars are digested much more quickly; they ferment within an hour.

Even though sugars ferment more rapidly than starches, they don't pose the same risk for rumen acidosis and reduced butterfat. When sugars are broken down in the rumen, they tend to increase the levels of butyrate, and this plays a big role in how sugars benefit the cow.

Butyrate produced in the rumen is used as a fuel for the cells that make up the rumen lining. Butyrate has also been shown to be more effective at increasing the development of rumen papillae (the

microscopic projections from the lining of the rumen) than the other volatile fatty acids created during fermentation. This implies that by increasing the levels of butyrate, by feeding sugar, the absorptive surface of the rumen can be increased. Cows with higher levels of butyrate may also be more resistant to subacute rumen acidosis. Multiple studies have supported this mode of action of sugars through butyrate by showing that supplementing diets with additional sugar has improved rumen pH, fibre digestion, milk fat and milk production.

Cows fed additional sugar will often respond with higher butterfat percentage and yield. Butyrate is used for milk fat synthesis, so the increase in butyrate helps explain this increase in butterfat. Also the breakdown of sugars in the rumen, unlike starches, does not contribute to the production of trans fatty acids, which are linked to decreasing milk fat levels. Actually, sugars may help reduce the build up of these fatty acids. This, combined with

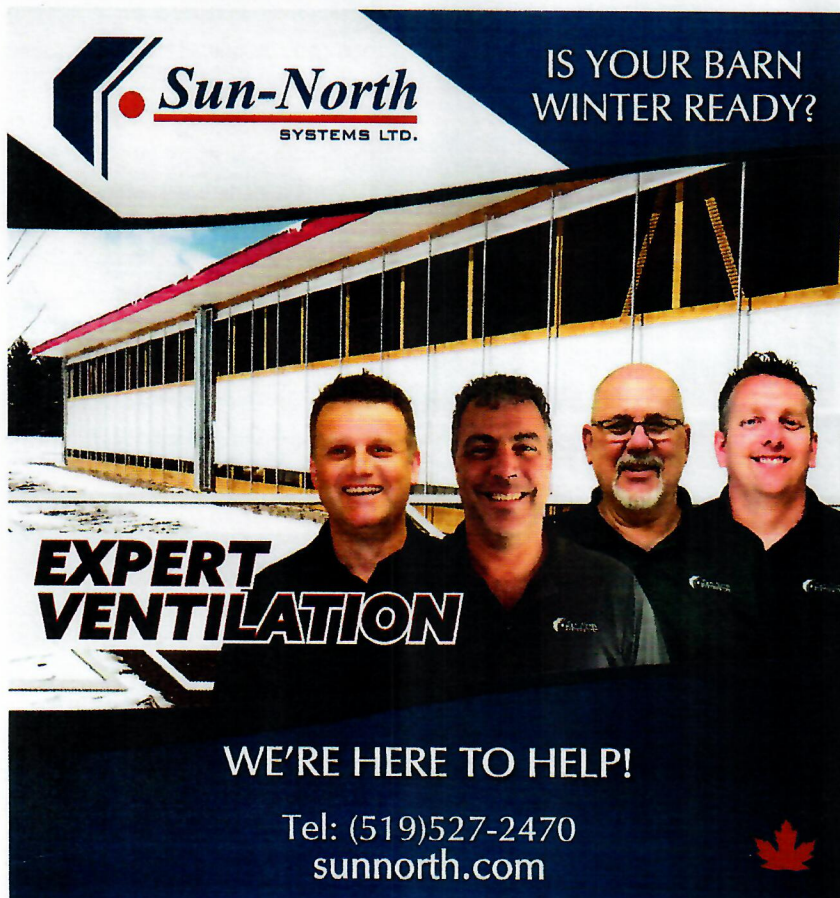
the more stable rumen pH, contributes to the higher butterfat levels associated with feeding sugars.

Feeding sugars can also increase feed intake in milk cows. One obvious reason is that it sweetens the feed and, as every producer knows, cows have a sweet tooth. Another reason that cows may eat more is that by increasing butyrate, and lowering propionate in the rumen, the cows don't feel full as fast. High levels of propionate are responsible for 'telling' the cow that she is full, which is why some diets with high starch levels can reduce intakes because the cows are receiving signals that they need to stop eating.

What sugars really do is feed the rumen microbes. Rumen microbes use the fast energy supplied by sugars to convert dietary fibre into energy for the cow. Adding sugar to the diet changes the population of microbes and can increase the production of microbial protein. This microbial protein is then used by the cow as it is an excellent source of amino acids (protein) that can be used for milk production.

When feeding supplemental sugars, it is important to ensure that the ration provides enough rumen degradable protein to support the growth of the microbes. If there isn't enough protein for the microbes to use, the extra energy won't have as big of an impact. The change in rumen environment, from the higher pH to the increase in absorptive surface, contributes to the increase in fibre digestion observed when additional sugar is fed. This increase in fibre digestion, along with the increased intakes and improved gut health, explains why feeding sugars can increase both milk production and milk fat.

Satisfying your cow's sweet tooth can increase production in a healthy way. Replacing some of the fast-acting starch in the ration with sugar can increase intakes, milk production and components. Look at adding sugar to your ration to help improve your cows' performance. **D**



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