Molasses in January, or any other time

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By Robert Westra

MOST OF US ARE familiar with the saying, 'Slow as molasses in January', a saying that refers to the slowness of an issue.

Yet, amusingly, it was in mid-January 101 years ago that a huge metal vat 50 feet high and 90 feet wide burst open in the Boston harbor with over two million gallons of molasses spilling onto the streets below. The wave of molasses was 15 feet high and 160 feet wide, travelling at 35 miles per hour and killing 21 people, including horses, and injuring countless others.

It took weeks to clean up the mess and pumping out numerous basements that were filled with the sticky stuff. It can only be imagined how tacky the streets were in Boston for weeks afterwards. Imagine the stench!

The history of molasses is fascinating. The British colonies in the United States first imported molasses from the West Indies to make rum. The British tried to tax this product with little success. Molasses was also a cheaper sweetener than white sugar and was used for years in most recipes. It was also a common item in Canadian homes during the 1900s.

In the Middle East and India molasses was a byproduct of sugar extracted from plants like grapes, corn, sorghum, mulberries, carob trees, dates, and many other plants. Also, rum was distilled from molasses at one time, but today, like so many other products, molasses is no longer used for making rum. Molasses is a byproduct of the sugar cane and sugar beet industries across North America. Today, it is fed mostly to livestock.

The amount of sugar remaining in molasses, whether it is from cane or sugar beets, is surprisingly high; it varies widely from 39 to 67% on a dry matter bases (J. Dairy Sci. 2020, In Press). The dry matter content, on the other hand, varies narrowly, from 76.8 to 78.3%.

The use of molasses in the feed industry varies between 2 and 3%, when manufacturing concentrate mixtures and making pelleted feeds. Molasses promotes the adherence of small particles with other larger particles in grain mixes and it prevents the pellets from becoming too hard while at the same time maintaining its integrity. Mineral clays are used to harden pellets, and molasses tends to soften them without the risk of breaking them up. Too much molasses in concentrate feeds will cause augering difficulties and increase the risk of bridging in storage bins.

Does molasses increase the palatability of rations? It is difficult to measure palatability. When dry matter intake increases after adding molasses to the total mixed ration (TMR) it may appear it does. However, digestibility may have been increased due to the ration not falling apart and decreasing the risk of cows sorting out the fines in TMRs, thus driving up dry matter intake.

Adding molasses to TMRs may increase dry matter intake, but so does adding water to rations, especially if the TMR is quite dry. The addition of molasses or other sugar compounds may increase dry matter intake, but not always. The stimulus of molasses to increase intake may be related to days in lactation and the levels of milk production. Cows more readily increase their intake later in lactation compared to cows in early lactation when fed sugary diets, which suggests that other factors are at play. The addition of molasses to rations may be more complex than merely palatability, as some suggest.

Molasses has little or no effect on rations that contain high digestible forages. It has been reported that various hay (grass and alfalfa) crops harvested in the late afternoon are consumed more readily and produce more milk than crops harvested before noon. Maceration of these crops has also been shown to increase intake and milk production. Maceration of crops decreases wilting time which decreases the time for plants to respire and loose soluble sugar content. Water soluble carbohydrates are higher in the afternoon than in the early hours of a day and have therefore been associated with increased dry matter intake and

increased milk production. Supplementation of molasses has little effect when these high digestible forages are fed.

It was logically thought that adding molasses to the diets of animals would cause fermentation in the rumen more rapidly, like it does with starch and lead to lower rumen pH, thus leading to a greater risk of causing subclinical rumen acidosis. But this has not been observed to be the case in most studies, but rather the reverse. Molasses in feeds causes the rumen pH to rise. This rise in pH is associated with increased concentrations of acetic acid and butyric acid in the rumen. A rise in butyric acid in the rumen increases butterfat concentrations in milk.

In another study (J. Dairy Sci. 97:1072, 2014), propionic acid in the rumen decreased when feeding dried molasses in rations, contrary to studies where the researchers fed liquid molasses. Propionic acid is known to increase body fat. Levels of added molasses in many of these research studies were as high as 8% (80 kg per tonne of TMR dry matter).

In a very recent study (J. Dairy Sci. 103:4327, 2020), it was reported that using sodium bicarbonate in a ration produced similar buffering results as did diets containing molasses. Surprisingly, both molasses and live bacteria provide equal protection against subclinical acidosis, like sodium bicarbonate does.

However, molasses added to rations in one study showed increased methane production compared to feeding wheat. Methane is negatively associated to climate warming. However, the amount of methane produced by nearby muskegs in some parts of Canada far exceeds the methane produced by all the cows in Canada.

In a study reported in 2015 (J. Dairy Sci. 98:443), the authors compared four nutrition treatments, two of which included liquid molasses, one combined with a protein mix and another with flaxseed meal. It was reported that both 4% corrected milk and energy-corrected milk were significantly reduced in cows fed liquid molasses.

However, milk yields were quite low (12.4 to 13.9 kg/day), which is consistent with other reports that when milk production is low the effect of molasses on intake and milk production is nil or negative.

The optimum level of molasses in rations is 6.75% (Prof. Animal Sci. 33:700; 2017). Generally, molasses added to rations increases milk production in cows when they produce more than 33 kg but tends to have little or no effect on milk production in cows producing less than 33 kg, similar to the report mentioned in the previous paragraph.

Feeding molasses in the diets also has been shown to change the fatty acid distribution in milk, which has been shown to increase the concentrations of medium chain fatty acids. Medium chain fatty acids are recognized as important in diets for improving human health. D

One more thing...

Lignans in foods are recognized as providing potential health benefits to humans. Cows fed molasses produced increased levels of lignan in milk compared to other diets. Lignan in the human gut is converted to enterolactone by bacterial digestion. Enterolactone is known to not only increase breast size but also prevent breast cancer. It has been reported that enterolactone is significantly lower in the breast tissues of cancer patients compared to cancer-free patients.

Molasses added to concentrate rations including TMRs benefits dairy cows. Though cows seem to like rations supplemented with molasses, there appears to be biochemical explanations that drives cows to consume more feed than just mere palatability. Contrary to what occurs in the rumen when digesting starch, digestion of molasses is different. Molasses in diets does not lead to subclinical acidosis but rather prevents it. The role of molasses in rations may have similar effects as mineral buffers and live yeast and thereby improve the efficiency of digestion.

Molasses in rations of cows has human benefits - it increases the medium chained fatty acids in milk and lignan, an important compound that may help to reduce breast cancer in women. Though molasses may flow more slowly in January, it may be a quick fix to improve ration digestibility in cows and provide humans an improved beverage.