

## CATERING TO BOSSY'S SWEET TOOTH

By

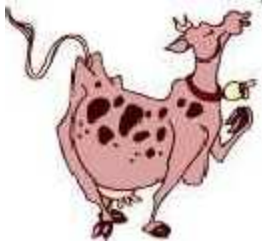
Kristen E. Stevens and Hank Mayland

We recently joined a group of producers gathered at Sawtooth Farms to hear about forage\* quality. Invited speakers included Bossy Cow, Dolly Sheep and Dr. John Doolittle, who served as interpreter for the animals. They discussed forage sugars and animal preference\*.



Dr. Doolittle began the meeting by talking about how plants grew. He pointed out that plants growing in sunlight make soluble\* sugars from carbon dioxide, oxygen, and water. Actually, to quote the good doctor, “There is an accumulation\* of sugars in the plant during the daylight hours, but at night concentrations of these sugars decline. This causes a diurnal\* cycling of soluble sugar concentration in plants.” He said that probably one-third of the sugar goes into making new plant material, a third is lost by respiration\* and a third is sent to the roots. Sugar going to the roots provides the energy plants need to absorb water and nutrients. The doctor ended by saying that forage plants can lose 2 to 3% and sometimes even more soluble sugar (dry matter basis) from sundown to sunup the next morning.

Mrs. Cow and Miss Sheep told Dr. Doolittle that they had been part of a taste panel in North Carolina where they evaluated afternoon (PM) and morning (AM) cut grass and alfalfa hays grown in the wonderful state of Idaho. The animals were shocked to learn that humans could not tell the difference between the two hays. It was more than obvious to the two animals that PM-cut hays were sweeter than AM-cut hays. Also, they readily ate more of the PM-cut hay that was offered. They explained that AM-cut was to PM-cut what baking chocolate is to a chocolate bar. The animal’s advice to all farmers present was to cut hay during a period of time from mid-afternoon until several hours after sundown to capture the highest sugar levels. That delay might allow many farmers to market dairy quality hay more consistently. Bossy confided to Dr. Doolittle that she could identify hays that differed by less than 0.7% soluble



sugar. She prided herself in being so discriminating\*, but admitted that her ancestors had developed these keen skills after generations of dependence on forages.

Bossy also informed Dr. Doolittle that some of her cousins in Idaho had been on a grazing panel to evaluate actively growing pasture grasses. They had the opportunity to graze eight different varieties of tall fescue\*. The panelists identified varieties that were really liked and other varieties that were just okay and several that were...let's face it, not so appealing. It would be the same as cardboard pizza for humans. Bossy had later learned that the panelists' preferences were positively related to the level of soluble sugars in the different varieties. Their advice to the plant breeders was to pick forage plants that contained high concentration of soluble sugars, because these were relished by her friends.

Dolly, not to be outdone by her bovine\* counterpart, chimed in about another preference study of the same tall fescue forages that were grazed in the Idaho pastures. In this case eight hays were grown and harvested in Idaho, shipped to North Carolina, and offered to some of her friends and to some...ugh...goats. Well, the goats *did* come to the same conclusion as Dolly's friends. Who can trust a goat though? Some think that goats will eat just about anything if they get the chance. That is probably a myth. The goats' preference among the tall fescue



hays was similar to the grazing preference determined by Bossy's friends in Idaho. Now folks, that's not so unusual because all of these preferences were based largely on the concentration of soluble sugars in the forage. Dolly says to tell forage breeders that they need to include the

concentration of soluble sugars in their selection criterion\*. Genetic differences in soluble sugars occurring in fresh forage should also hold when the forage is harvested as hay.

**Bossy recalled a report from her “pen” pal, Abigail, in England. Abigail and her herd mates spend most of their time out to pasture. They were given the run of a new pasture each day and could eat whenever and however much they wanted. Each morning the pasture fence was moved in this Strip-grazing\* system giving the cows access to un-grazed forage for yet another day. Bossy’s friend noted that the grasses and clovers tasted much sweeter when the fence was moved in the late afternoon. There was a note in the *Dairy Herd Reporter* that milk production increased about 5% in that herd because the cows had access to forages containing more readily fermentable\* energy which they liked, and as a result ate more and produced more milk. Another pal from Australia wrote about an increase of 10% milk production when cows were given access to new pastures in the afternoon versus the morning. “That daily cycling in sugar is very useful to animals that eat grass,” said Bossy**

**Dr. Doolittle then remembered a lactation\* study conducted in the beautiful Cache Valley of northeastern Utah. Two groups of Holsteins were given mixed rations containing a total of 40% alfalfa hay. The rations were identical except that in one, the alfalfa was cut in the afternoon and the other was cut the following morning. Barely containing his excitement, he announced that those cows on the PM-cut hay actually ate more and produced significantly more milk WOW!! What a concept, increased milk production with only a change in management and a little more feed.**

**This amazing announcement triggered a light bulb in the back of one dairyman’s mind. All of a sudden it hit him. He jumped to his feet and began his exciting news. “Scientists report red clover and alfalfa forages accumulate soluble sugars throughout the day. Not only that, but accumulated sugars in afternoon harvested hay make better silage\* and have higher levels of starch than hay harvested in the morning.” This astonishing announcement set the dairymen to buzzing like they were at a beekeeper convention.**

Bossy rolled her eyes<sup>👁️👁️</sup> toward Dolly; then focused on Doolittle. She said, “It seems the good Lord developed photosynthesis\* to benefit both plants and animals. Grazing, hay quality, and silage all benefit from the accumulation of soluble sugars.” Then my friend the doctor said, “Yep.” “Baa-aa,” bleated Dolly. “Moo-oo!” lowed Bossy.



..... You may send your comments to [Kristen](#) .....

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## Definitions

**Accumulation:** material that collects over a period of time

**Bovine:** dairy and beef cattle are in this classification

**Criterion:** standard way of testing or judging so that a conclusion can be reached

**Discriminating:** careful judgment or good taste

**Diurnal cycling:** daily occurrence

**Fermentable:** sugar that can be converted into CO<sub>2</sub> and alcohol

**Fescue:** type of grass with wide flat leaves, used in pastures and often used as hay

**Forage:** food for domestic animals for example sheep, cows, and rabbits

**Lactation:** when female animals, like cows and ewes, produce milk

**Respiration:** how something without lungs like a plant (or fish) exchanges gasses with the environment

**Photosynthesis:** green plants make carbohydrates from carbon dioxide and water using light, the end result is the plants releasing oxygen as waste

**Preference:** when given several choices it is the one that is picked above all the others

**Silage:** fodder that is prepared by storing, usually in a silo

**Soluble:** something easily dissolved. Soluble sugars are easily absorbed by the body

**Strip-grazing: allowing a parcel of fresh pasture to be grazed for a short time before moving the fence to a new part with all fresh grass while the other grows back**

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