

Can Brix Predict Sugar Content of Forages?



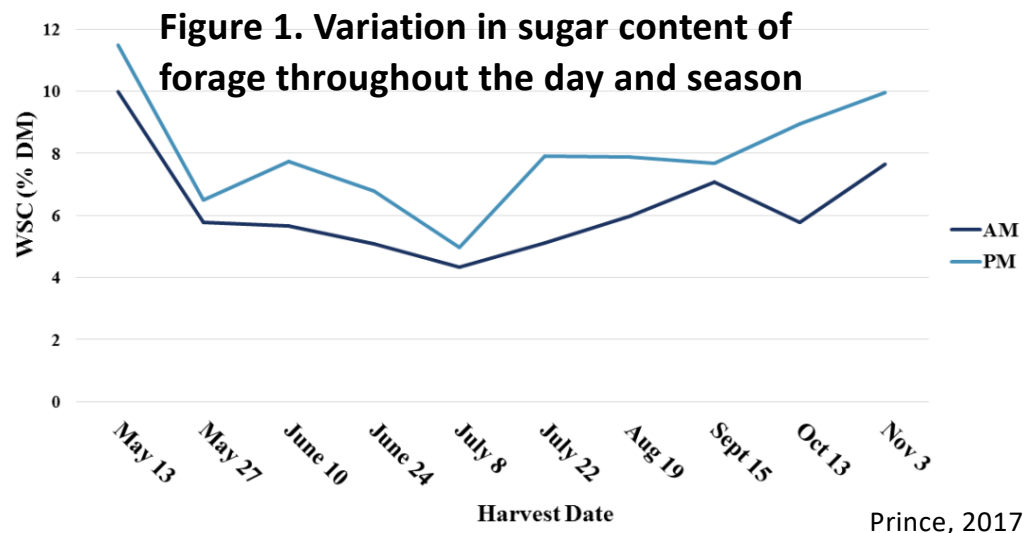
What is Brix?

- Sugar content of fresh forages varies throughout the day (Figure 1).
- Farmers want to graze or harvest forages when sugars are highest.
- Brix has been used to measure the concentration of sugar (wine, fruit, honey industries), salt (aquariums), or immunoglobulin (colostrum).
- Brix measures dissolved solids in a liquid using a refractometer, not just sugars.

Some farmers use Brix as an on-farm method to predict sugar content of forages to make grazing decisions.

- However, liquids extracted from forages may contain more than sugars, including oils, minerals, pectins, and proteins.

Can Brix be used as a reliable indicator of forage sugars?



Hypothesis. Brix is not a reliable predictor of sugar content in forages.

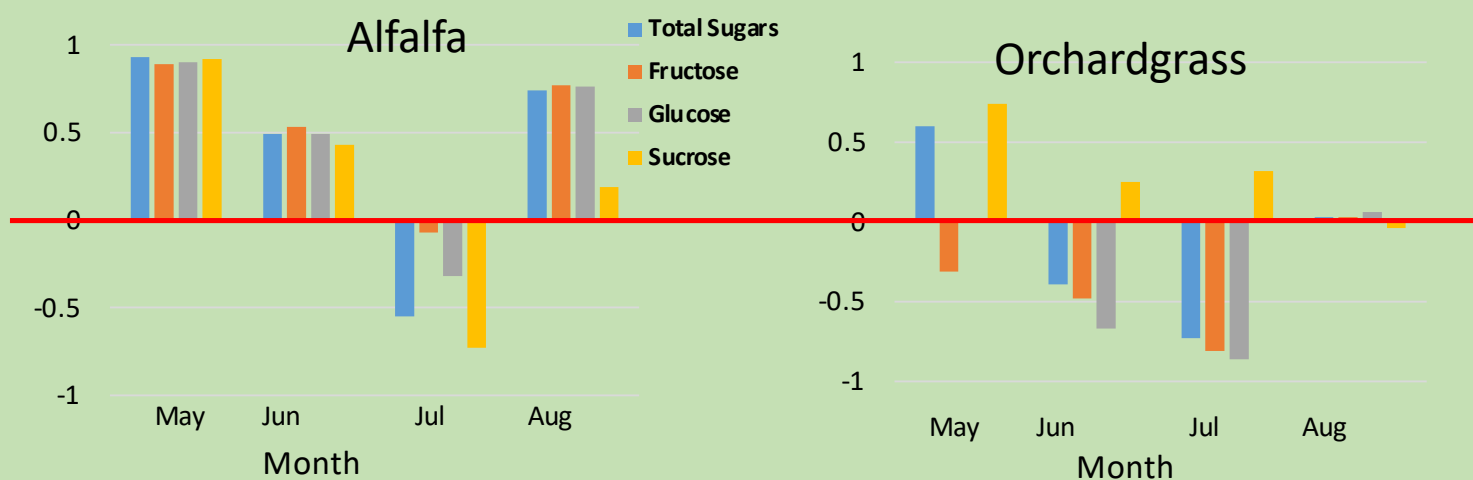
Approach

- Forage samples collected monthly (May-Aug) from established orchardgrass and alfalfa fields in central PA
- Samples collected on 75-80°F sunny days
- Plant tissue crushed in garlic press and read on a refractometer
- Remaining (uncrushed) forage frozen in liquid nitrogen for sugar analyses

Results

- **The relationship between Brix and forage sugar was not consistent** across species and harvests (Figure 2; the closer the correlation is to +1, the more accurate it is).
- **The higher the column is above the red line, the stronger the relationship between Brix and forage sugars** (higher sugar = higher Brix)
- **The lower the column is below the red line, the higher the negative relationship** (higher sugar = lower Brix)

Figure 2. Correlation between Sugar and Brix



What Do These Results Mean?

- **In alfalfa, Brix was a fair (but not excellent) predictor of forage sugars in the spring** (May-Jun) and in the late summer (Aug), but not in July when high Brix was observed when sugars were low.
- **In orchardgrass, Brix was a very poor predictor of forage sugars**, frequently predicting the opposite of what was measured or having no correlation (near zero).
- **Brix results can be affected by many factors**, including: time of year, drought/wet year, temperature, humidity, dew, human error

Take Home Message:

- **Brix refractometers may not be accurate enough to quantify sugars in forages**, which are in much lower concentrations than in other industries where Brix is used, such as fruits and honey.
- **Farmers may want to consider more accurate methods of assessing energy content of forages in decision-making.**

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