UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

Research Update 2017: Grazing Annual Forages For Supplemental Feed

Introduction

Summer annual forages such as pearl millet, sorghum-sudangrass, or sudangrass are used by pasture-based dairies as a way to supplement the "summer slump" growth period of cool season pastures.

One consideration for optimizing the energy content and digestibility of the forage is time of day when grazed. We know that cool season forages will accumulate some forms of sugar and/or starch (water-soluble carbohydrates, WSC) throughout the daytime period. This may result in better forage utilization if grazed later in the day. For pasture-based dairies, it is usually not practical to just limit grazing to that period of the day when energy content may be higher. However, if summer annuals are being included as a supplement for one-time-a-day grazing, would it be best to graze it later in the day if sugar levels are higher or, if WSC of summer annuals don't accumulate throughout the day, would it be best to graze them in the morning and save the cool season pasture for later in the day when we know they have higher water soluble carbohydrates?

The objective of this study was to evaluate hourly changes in water soluble carbohydrates of pearl millet when it reached maturities suited for grazing (18 to 20 inches in height) and harvesting for silage (25 to 30 inches). This study was conducted on the Choiniere Farm, a grass-based organic dairy in Highgate, VT. They have successfully grazed summer annual forages as a supplement to their pastures for several years.

On July 19 and July 26 of 2017, we collected two sets of samples at approximately one hour intervals starting at 7am and ending at 7pm. Samples were cut with electric hand clippers from a 20 x 20 inch quadrat leaving a 4-inch stubble. For each quadrat, the total number of tillers were counted and lamina (leaf blade) was separated from pseudostem (grasses at this stage do not have true stems but rather a combination of leaf sheaths, elongating culm, and pre-emerged new leaves all collectively called pseudostem). Samples were microwaved for one minute and then placed in a forced air dryer for 48 hours until dry. They were then ground and evaluated for WSC, crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), and NDF digestibility with 48 hour fermentation time (NDFd48) using near infrared reflectance spectrophotometry (NIRS).

Results

Hourly changes in WSC of pearl millet on both July 19 (optimum height for grazing) and July 26 (recommended height to harvest for hay or silage) showed a slight accumulation of WSC throughout the day period for both leaf blades and pseudostems (**Figure 1**); however, individual data points varied widely and overall trends were not very large. Based on this data, we would not expect much difference in animal performance whether grazed mid to late morning or later in the day. This implies that as a supplement, late morning grazing of pearl millet may be best in order to allow the animals access to cool season pasture later in the day when WSC content is higher.

On the average, the pseudostems had about 3% units higher WSC than the leaf blades (**Table 1, Figure 1**). However, NDF (which limits intake) of pseudostems was always higher compared to the leaf blades and NDF digestibility was always lower, respectively. So, overall forage quality of leaf blades was still higher than

pseudostems. This may have implications for stocking rate and grazing pressure especially if grazing more mature stands (such as that collected on 7/26) when the proportion of pseudostem is higher and, thus, digestibility is lower.

Pearl millet had a very high growth rate during this time of year (averaging 155 lbs of dry matter accumulated per acre per day), resulting in an additional 1000 lbs of d.m. per acre when the harvest was delayed from 7/19 to 7/26. However, forage quality did decline most likely due to increases in fiber and lignin content during this one week period.

Reducing grazing time and/or stocking rate could allow for more selective grazing of leaf blades which are higher in protein, lower in ADF and NDF and higher in NDF digestibility.

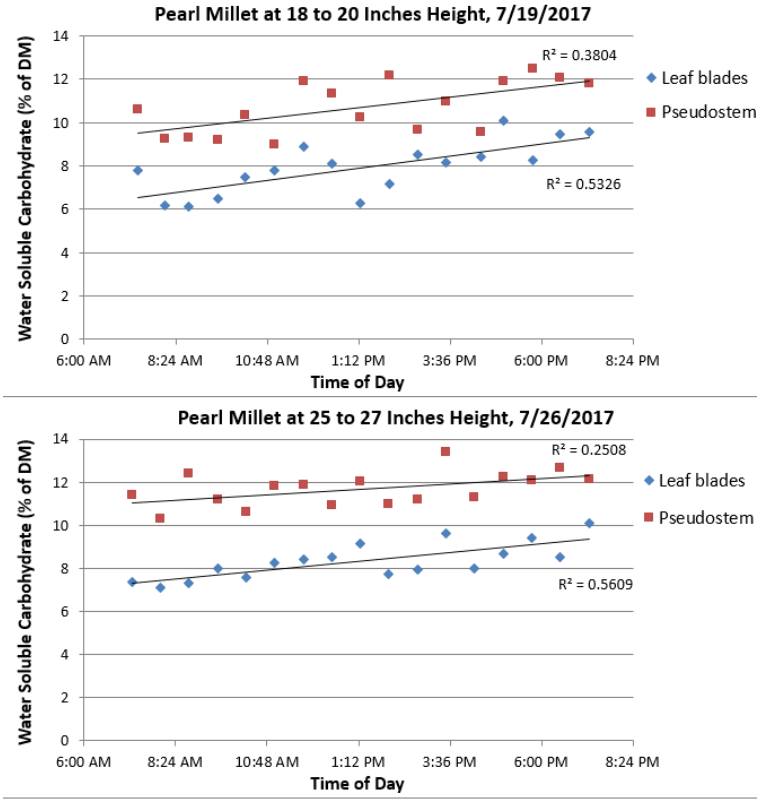

Figure 1. Changes in water-soluble carbohydrates of leaf blades and pseudostems of pearl millet on two dates, Highgate, VT

Table 1. Leaf, stem whole plant quality and yield components of pearl millet in 2017, Highgate, VT

		Sampled on 7/19/17			Sampled on 7/26/17		
Measurement	***Unit***	**Leaf**	**Stem**	**Whole Plant**	**Leaf**	**Stem**	**Whole Plant**
Leaf:Stem	*% of dm*	77%	23%	100%	70%	30%	100%
Crude Protein	*% of dm*	20.9	12.4	18.9	18.0	10.4	15.7
ADF	*% of dm*	25.0	32.4	26.8	27.9	33.7	29.7
NDF	*% of dm*	47.9	54.6	49.4	53.3	57.9	54.7
NDFdig.48	*% of NDF*	86%	82%	85%	78%	75%	77%
WSC	*% of dm*	7.9	10.7	8.6	8.3	11.6	9.3
Yield	*dm/acre*	1470	441	1911	2098	898	2996
Growth Rate	*lbs. dm/a/day*				90	65	155

- Sid Bosworth, UVM Extension Professor, and Allen Wilder, Summer Research Assistant, 12/20/17

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