


UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

Research Update 2016: Grazing Annual Forages For Supplemental Feed

Sufficient grazing availability is important to organic farmers and especially to producers of increasingly popular "grassmilk" products produced without any grain feeding. Annual forages are being used by dairy farmers to maximize their grazing, supplement perennial pasture, and/or to renovate pastures. Cool season annuals can provide grazing before perennial pasture has fully emerged from dormancy. Summer annuals are similarly used to provide grazing in mid-summer, with C_4 photosynthesis allowing increased productivity relative to traditional C_3 pasture plants.

One challenge with annual forages is that they quickly drop in nutritional value and fatty acid content with increasing plant maturity. However, as a stand of an annual forage species matures, cows selectively grazing primarily leaf blades may help to mitigate the drop in both nutritive quality and fatty acid content of dairy cows' intake.

This study evaluated the changes in nutritional quality and FA content of annual forages (winter rye and pearl millet) with increasing maturity. The stands were divided and evaluated by pseudostem ("stem") and leaf blade fractions as well as their summation on a whole plant basis.

Results showed that quality decreases associated with later maturity are resultant from both declines in the nutritive quality of stem and leaf components, and a greater amount of stem material relative to the total. While NDF content increased 8 percentage points in rye and pearl millet leaves, the already higher stem NDF content increased from 9 percentage points in rye and pearl millet. When this is coupled with more stem elongation than leaf growth, we see overall increases in NDF content 45% to 63% in rye and from 57% to 69% in pearl millet, on a whole plant basis. Over the course of the grazing cycle, rye leaf yields showed almost no increase, while rye stem portions more than tripled their dry matter content. Pearl millet leaf yields doubled, while stem components increased by a factor of 40. Fatty acid content of rye leaf and stem components declines near the end of the grazing cycle, but overall content is more greatly impacted by the higher proportion of stem material

Best practice is to utilize succession plantings to ensure vegetative grazing, however monitoring the proportion of leaf and stem that your animals are grazing may help you to find the balance of dry matter intake and forage quality that you need.

- Caleb Goossen, UVM PhD Graduate Student, and Sid Bosworth, UVM Extension Professor, 8/20/16

NORTHEAST SARE Sustainable Agriculture Research & Education

This research is sponsored with a partnership grant from NE SARE. Much thanks to Guy Choiniere and the Choiniere Family Farm of Highgate, VT for their partnership and cooperation in this project.

Overwintered cereal rye sampled at 2 inches, yield and nutritive quality.

Day of grazing	Height (*in*)	Component	DM Yield *(lb/acre)*	Crude Protein *(% of DM)*	NDF *(% of DM)*	dNDF48 *(% of DM)*	NDFD48 *(% of NDF)*	Sugars *(% of DM)*
Day 1 5/12/16	16	**Entire plant**	**1889**	**13.6**	**45.2**	**36.0**	**79.6**	**16.4**
		Leaf 36.7%	676	20.4	44.0	35.4	80.5	12.4
		Stem 63.3%	1213	9.6	45.9	36.3	79.0	18.6
Day 5 5/18/16	22	**Entire plant**	**2425**	**12.7**	**51.4**	**38.4**	**75.0**	**14.7**
		Leaf 28.8%	697	20.4	47.2	37.6	79.8	10.3
		Stem 71.2%	1728	9.5	53.1	38.7	72.9	16.4
Day 9 5/24/16	36	**Entire plant**	**4550**	**8.2**	**62.7**	**41.0**	**65.7**	**12.2**
		Leaf 15.5%	720	18.0	51.7	39.1	75.8	9.9
		Stem 84.5%	3830	6.5	64.7	41.4	63.9	12.7

Overwintered cereal rye sampled at 2 inches, fatty acid (FA) content

Day of grazing	Height (*in*)	Component	Total FA *(mg/kg forage DM)*	ALA[1] *(mg/kg forage DM)*	ALA *(% of total FA)*	PUFA[2] *(mg/kg forage DM)*	PUFA *(% of total FA)*
Day 1 5/12/16	16	**Entire plant**	**27.3**	**16.4**	**55.2**	**21.2**	**75.3**
		Leaf 36.7%	41.6	29.5	70.9	34.3	82.5
		Stem 63.3%	19.0	8.8	46.3	13.5	71.2
Day 5 5/18/16	22	**Entire plant**	**25.3**	**15.1**	**54.5**	**19.6**	**74.7**
		Leaf 28.8%	41.7	30.7	73.5	34.9	83.6
		Stem 71.2%	18.7	8.7	46.8	13.3	71.2
Day 9 5/24/16	36	**Entire plant**	**18.0**	**9.8**	**49.5**	**13.4**	**72.6**
		Leaf 15.5%	36.9	27.1	73.2	30.2	81.7
		Stem 84.5%	14.5	6.5	45.1	10.3	70.9

[1]ALA = alpha-linolenic acid, the primary omega-3 fatty acid in plants. [2]PUFA = polyunsaturated fatty acids

Pearl millet sampled at 6 inches, yield and nutritive quality.

Day of grazing	Height (*in*)	Component	DM Yield *(lb/acre)*	Crude Protein *(% of DM)*	NDF *(% of DM)*	dNDF48 *(% of DM)*	NDFD48 *(% of NDF)*	Sugars *(% of DM)*
Day 1 7/18/16	21	**Entire plant**	**1078**	**18.4**	**57.3**	**40.9**	**71.5**	**6.0**
		Leaf 95.5%	1025	18.8	57.0	40.7	71.5	5.9
		Stem 4.5%	53	8.0	63.5	44.6	70.2	7.8
Day 4 7/21/16	29	**Entire plant**	**1727**	**16.4**	**56.9**	**39.3**	**69.1**	**7.5**
		Leaf 86.7%	1487	17.5	56.3	39.0	69.3	7.4
		Stem 13.3%	240	9.3	60.8	41.3	67.9	7.9
Day 9 7/26/16	39	**Entire plant**	**2480**	**17.1**	**62.0**	**40.5**	**65.6**	**4.8**
		Leaf 75%	1849	19.0	60.1	40.1	66.7	4.7
		Stem 25%	631	11.4	67.5	41.9	62.1	5.0
Day 12 7/29/16	42	**Entire plant**	**2240**	**14.7**	**64.1**	**41.8**	**65.5**	**4.3**
		Leaf 68.8%	1525	17.5	61.3	41.3	67.3	4.2
		Stem 31.2%	715	8.6	70.2	43.2	61.5	4.6
Day 15 8/1/16	48	**Entire plant**	**2712**	**12.0**	**66.7**	**43.8**	**65.8**	**6.2**
		Leaf 62%	1684	15.0	63.4	42.5	67.1	5.8
		Stem 38%	1027	7.1	72.2	45.9	63.6	6.7
Day 19 8/5/16	55	**Entire plant**	**4926**	**9.0**	**69.3**	**44.3**	**63.9**	**7.4**
		Leaf 43%	2106	14.4	64.5	42.1	65.3	5.8
		Stem 57%	2820	4.9	73.0	45.9	62.9	8.7

Overwintered cereal rye
Available pasture: Pre-grazing
and calculated intake: Mid-grazing Post-grazing