Bridging the Summer Slump with Warm Season Grasses and Seasonal Changes in Forage Quality of Pastures

Brad Heins, PhD
Assistant Professor, Organic Dairy Management
West Central Research & Outreach Center, University of Minnesota, Morris, MN

Pasture is the primary source of forage for grazing dairies, and for organic dairies, the National Organic Program livestock production regulations require a minimum of 120 days grazing per animal. In the northern United States, this requirement is typically met by a May–September grazing season, and profitability depends on pastures that provide a uniform, season-long supply of high quality forage. However, in the northern United States, seasonal variation in temperature and precipitation creates a challenge, as the predominant forage plants, which include perennial grasses such as Kentucky bluegrass and smooth bromegrass, and legumes such as white clover, undergo a "summer slump" in production. To create a more uniform and extended forage supply, research studies have recommended diversifying pasture systems to include warm season species in the summer. An approach to increasing diversity in a farm's forage base is to combine annual and perennial crops in separate fields. An example for the northern United States would be to use cool season grasses and legumes for forage in spring and early fall, and warm season annuals like teff and sudangrass for forage in summer. Grazing systems using these different approaches to achieve diversity require biological, environmental and economic analysis.

Why should summer annuals be considered by livestock producers? They are very drought tolerant and can fill a gap in feed when other species experience the "summer slump". They are great emergency forages during dry weather and are multipurpose, so you can be use them for grazing, silage, or for baling.

During the summer of 2013, we planted two summer annuals for grazing for the first time at the University of Minnesota WCROC dairy in Morris. BMR Sorghum-Sudangrass and Teff grass were planted to extend our forage supply. These grasses were seeded with a drill on May 28, 2013, but because of the late spring, this was about 2 weeks later than what we planned.

BMR Sorghum-Sudangrass has increased in popularity due to the BMR gene and increased NDF digestibility (5-10% higher than regular sorghum-sudangrass). The plants have thick stems and are very leafy. Sorghum-sudangrass has moderate regrowth potential, but you should not graze or cut for forage until the plants are at least 18 inches tall to reduce prussic acid concentration. The ideal height for forage is 18 to 36 inches tall. When grazing sorghum-sudangrass animals should be moved so they leave 6 to 8 inches of stubble, but they might waste 20-30% of the forage through grazing. Lastly, sorghums and sudangrasses are luxury consumers of potassium, so they should not be used for dry cow forages. For seeding rate, we seeded our fields and pastures at 20 lbs/acre.

Teff grass is native to Northern Africa. Teff is drought tolerant and can be seeded into many different soil types. With this grass, you will have high yield with competitive forage quality, and will have rapid growth for 9 to 12 weeks. The seed is very, very small, and we seeded our pastures at 8 lbs/acre. Both of these annuals should be planted at 60 to 65 degree soil temperature and planted 1 to 1.5 inches deep. Perhaps, manure should be added as a fertilizer before planting because they have nitrogen requirements that are similar to corn.

The table below has averages for forage quality of BMR sorghum-sudangrass, teff grass, and cool-season grasses during 2013. The cool-season species consist of mixtures of smooth bromegrass, orchardgrass, red and white clover, and alfalfa. The dry matter of the sorghum-sudangrass was low because the cattle grazed the fresh forage in the early vegetative state. The summer annuals were not as high in crude protein as the cool-season grasses. However, with lower crude proteins, we probably improved nitrogen utilization of the milking herd. The ADF values of the grasses were very similar and are within the range of low 30's to mid-50's. All of these grass species were high in digestibility. The NDF levels were higher for the summer annual grasses compared to cool-season species. However, the total tract NDFD (TTNDFD) was lowest for the teff grass. TTNDFD is a measure of how much fiber is digestible, how fast the fiber digests, and how long a cow holds the fiber in the digestive system. The summer annuals were similar to the cool-season grasses for sugar and non-fiber carbohydrates, and they provided similar net energy for lactation and milk per ton as the cool season grasses.

Remember, sorghum-sudangrass and teff grass are not replacements for cool-season forages, but should be added to a forage program to compliment the cool-season grasses. If there is a drought or dry weather, these two forages may prevent you from having to buy expensive hay during a drought.

Results for forage quality of BMR sorghum-sudangrass, teff grass, and cool-season grasses during 2013 at the University of Minnesota-WCROC dairy.

	Grass Species		
Description (% of DM)	BMR Sorghum-Sudangrass	Teff Grass	Cool-season Grasses
Dry matter	17.0	29.0	27.0
Crude protein	12.9	13.7	19.9
Acid-detergent fiber (ADF)	37.6	40.2	35.5
Neutral detergent fiber (NDF)	58.1	61.8	52.7
TTNDFD	53.9	46.4	52.5
Lignin	5.4	3.6	5.7
Sugar	6.3	5.8	7.3
Non-fiber carbohydrates (NFC)	18.8	14.1	18.1
Net energy for lactation (Mcal)	0.56	0.53	0.59
Milk per ton	2476	2028	2450

Notes