Comparing Sudangrass & Sorghum-Sudangrass in the Field & in Dairy Cow Diets

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One of the "big picture" goals at U.S. Dairy Forage Research Center (USDA Agricultural Research Service) is to increase the amount of forages in dairy cattle diets without affecting milk production or milk production efficiency. Potentially, there are many ways this could be accomplished, so the "big picture" must be built from several smaller pictures, including a better understanding of alternative forages and how they can be combined in rations to bring about the desired result.

Sudangrass and sorghum-sudangrass are alternative forages that use less water, are high in digestibility, and are already being grown in drier regions of the U.S. or as emergency forages. The USDFRC chose to study these grasses from an agronomic perspective and a dairy cattle diet perspective. Preliminary studies show sorghum-sudangrass performs better with a single harvest, and sudangrass performs better with multiple harvests, including grazing; and up to 10% of corn silage and alfalfa haylage in dairy cattle diets can be replaced with sudangrass silage with no detrimental effect on milk production. The following are brief summaries of this ongoing research.

Sudangrass harvest at the Prairie du Sac location.

In the Field

The objective of the agronomic study (Brink) was to compare yield and regrowth potential of brown mid-rib (BMR) sudangrass and BMR sorghum-sudangrass grown at two locations. At Prairie du Sac in south central Wisconsin, plots were seeded on June 6, 2016, and harvested on July 25 and September 19. At Marshfield in central Wisconsin, plots were seeded on June 8 and harvested on August 4 and October 6.

At the more southern location, forage production of sudangrass and sorghum-sudangrass was relatively equal for the first and second harvest period because the climate is conducive to growth of both warm-season grasses. At the more northern location, sorghum-sudangrass had higher yield potential than sudangrass for the first harvest period, but lower yield potential for the second harvest period. At the more southern location, both sudangrass and sorghum-sudangrass had a higher regrowth potential compared to the more northern location; regrowth will be better the farther south the crop is planted.

The USDFRC will be conducting a similar study in 2017. But the take-home message from this first year of data can be summarized as follows. If a farmer wants multiple harvests, as in a grazing system, sudangrass has higher yield potential because of its improved regrowth. But if a farmer wants maximum yield with a single harvest, such as when used as an emergency forage crop or as a replacement for corn silage, sorghum-sudangrass has higher yield potential.

In the Diet

The objective of the dietary study (Kalscheur) was to evaluate the replacement of corn silage and alfalfa haylage with increasing concentrations of sudangrass silage in the diets of lactating dairy cows. Sudangrass was chosen for the study because there is less research on it compared to sorghum-sudangrass and sorghum. A BMR sudangrass variety was chosen for the feeding trial because of its higher digestibility.

In the study, 48 Holstein cows in mid-lactation were assigned to treatments in a randomized complete block design. Diets were formulated to contain 40% corn silage, 20% alfalfa haylage, and 40% concentrate. Sudangrass silage was included in experimental diets at 0, 10, 20, and 30% of the diet dry matter (Table 1). Proportionally, sudangrass silage replaced two parts corn silage and one part alfalfa haylage. All other ingredients (e.g., high-moisture corn, canola meal, roasted soybeans, soyhulls, minerals and vitamins) were included equally for all diets, and crude protein levels were similar for all diets.

Table 1. Experimental sudangrass silage diets.

	Percent sudangrass silage in the diet			
	0%	10%	20%	30%
DMI, lb/day	62.4	57.8	57.1	55.3
Milk, lb/day	95.0	94.8	88.2	86.4
ECM, lb/day	99.0	100.8	93.5	90.0
ECM/DMI*	1.60	1.74	1.65	1.63

*Measure of feed efficiency

As expected, dry matter intake (DMI) decreased linearly as sudangrass silage replaced corn silage and alfalfa silage. Similarly, milk production decreased from 95 lbs/day for cows fed 0% sudangrass silage to 86 lbs/day for cows fed 30% sudangrass silage. However, even though DMI decreased from the 0% sudangrass ration to the 10% ration, pounds of milk produced stayed nearly the same (95.0 and 94.8 lbs/day), and energy corrected milk (ECM) increased slightly (99.0 and 100.8 lbs/day).

Feed efficiency, defined as ECM/DMI, was not affected by changes in forage because milk production changes and DMI changes were the same. While it was expected increased digestibility of the BMR sudangrass silage (compared to regular sudangrass) would benefit the dairy cow, it is possible the increased fiber in the sudangrass diets limited intake, resulting in a linear decrease in milk production.