

Integrating Teff into Livestock Operations

Allen Young, Extension Dairy Specialist

Earl Creech, Extension Agronomy Specialist

Dale ZoBell, Extension Beef Specialist

Clark Israelsen, Cache County Extension Agent

Jong-Su Eun, Associate Professor, Animal, Dairy, and Veterinary Sciences

Teff [*Eragrostis tef* (Zucc.) Trotter] is a relatively new forage crop that is attracting much interest among hay growers in the United States and Utah (Creech, et al., 2012). Teff plants have fine stems, shallow roots and are not frost tolerant. This annual, warm-season grass grows best during the hottest months of the year when cool-season grasses suffer their “summer slump.” Since Teff does not compete directly for acreage with traditionally-grown, cool-season grasses, an increasing number of agricultural producers are considering integrating this grass into their crop rotations.

Opportunities for Teff in Utah Cropping Systems

High yield and quality hay at a low cost

Teff can be harvested multiple times during a growing season. The first harvest for teff will normally occur within 45 to 55 days after planting, depending on location and year, with the second cutting following 40-50 days thereafter. With two cuttings under good production practices, teff grown in Utah should yield 4-5 tons per acre with 10-14 percent protein. Inputs of seed, fertilizer, water, and pest control are very low for teff compared to other warm season grasses like corn and sorghum. An added benefit of teff as compared to other warm-season grasses is that teff is not

known to have concern with prussic acid or nitrate accumulation.

Emergency forage

As a short-season crop and a plant that grows best during the hot summer months, teff can fill the role of an “emergency” forage crop in the event of delayed planting, poor stands, or winter kill of another crop.

Double cropping

Teff grass also opens the window to the potential for “double-cropping.” If, for example, an alfalfa stand is in decline, Utah growers can take a first cutting of alfalfa, remove the stand, and then rotate to teff for an additional two cuttings. Another option is to plant a small grain in the fall, harvest it for forage in the spring, and then plant teff in June.

Grazing

Grazing timing and intensity are of utmost importance with teff. Teff is a shallow rooted, annual plant, so grazing before the root system has fully developed, or on wet or sandy soils, has the potential to uproot plants and destroy the stand. Consider taking the first cutting for hay and then grazing the regrowth to ensure proper root establishment. Also, teff requires a 4 inch stubble

height for rapid regrowth, so overgrazing will limit future production.

Teff for Horses

As a relatively new forage to Utah and the United States, very little information exists on feeding teff in livestock diets. To date, most teff hay has primarily been produced for the horse hay market, where it has been marketed as having a similar nutritional profile to timothy. Very little has been published in scientific journals. One study was conducted in Pennsylvania to look at Teff hay harvested at three different stages of maturity (Staniar et al., 2010). Researchers found that feeding only teff hay was sufficient to meet 90 to 97% of the nutritional needs of mares, especially at the boot and early heading stage. Also, because of the lower non-structural carbohydrates (NSC), it was suggested that it would be a good hay source for obese horses and those with metabolic problems. In spite of its potential as an animal feed, no other published research, other than for horses, has explored teff use in other domestic species. Therefore, scientists at Utah State University conducted a study to determine growth performance and ruminal fermentation of growing beef steers and dairy heifers when fed teff hay-based diets.

USU Study on Teff for Cattle

Twelve growing beef steers and 12 dairy heifers (~400 lb) were used in a 12-week study conducted comparing rations containing alfalfa hay with teff grass. Because of the differences in hay composition (Table 1), rations were formulated to meet the dietary needs of the animals on the study (Table 2). In beef steer diets, the alfalfa-based diet contained 20.5% alfalfa hay and 43.0% corn silage (% of diet on a dry matter basis), whereas the teff hay diet contained 44.0% teff hay and 20.7% corn silage. In dairy heifer diets, the alfalfa-based diet contained 54.1% alfalfa hay and 24.8% corn silage (% of diet on a dry matter basis), while the teff grass diet had 8.5% alfalfa hay, 42.0% teff hay, and 11.3% corn silage. All animals were in individual pens.

Intake of DM significantly increased by feeding the teff grass diet to beef steers and dairy heifers ($P=0.01$) (Table 3). Dietary treatments did not affect body weight gain or average daily gain (ADG) of

beef steers (Table 3). However, feeding teff grass diet to dairy heifers increased body weight gain and ADG ($P=0.02$). Dietary treatments did not affect Gain:Feed in both beef steer and heifer diets (Table 4).

The dairy heifer rations were a little more involved in order to meet their nutritional needs. Using a cost for alfalfa of \$220/ton; the teff hay ration becomes equal to the alfalfa hay ration at a teff cost of \$185/ton (less than this would be an advantage for teff). Researchers conclude that teff grass can be a viable, lower-cost, palatable alternative to feeding alfalfa in growing beef steers and dairy heifer diets. Authors speculate that teff grass would also be a good feed source for other ruminants such as sheep and goats.

References

- Creech, E., M. Laca, J. Barnhill, and S. Olsen. 2012. Teff hay production guidelines for Utah. Utah State Univ. Ext., Logan. AG/Forages/2012-01pr.
- Staniar, W.B., J. R. Bussard, N.M. Repard, M.H. Hall, and A.O. Burk. 2010. Voluntary intake and digestibility of teff hay fed to horses. *J. Anim. Sci.* 88:3296–3303.

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions.

Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities.

This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Kenneth L. White, Vice President for Extension and Agriculture, Utah State University.

Table 1. Composition of alfalfa and teff hay used in study.

Item, % DM	Alfalfa	Teff Grass
Organic matter	88.9	89.5
Crude protein	22.6	13.6
NDF	35.5	65.1
ADF	25.9	28.3
Fat (ether extract)	2.14	1.83

Table 2. Ration composition and analysis for beef and dairy animals used in study.

Item	Beef Steer Diet		Dairy Heifer Diet	
	Alfalfa TMR	Teff TMR	Alfalfa TMR	Teff TMR
Ingredient, %DM				
Alfalfa hay	20.5		54.1	8.48
Teff grass hay		44.0		42.0
Corn silage	43.0	20.7	24.8	11.3
Barley, rolled	32.6	31.4		
Corn, steam-flaked			21.2	13.7
DDGS				24.5
Nutrient, %DM				
DM	54.8	68.6	64.2	75.8
CP	10.9	10.8	15.6	15.5
NDF	38.6	44.7	32.5	34.6
ADF	24.5	25.0	20.2	23.1

Table 3. Growth performance for beef steers after 12 weeks of study.

Item	Dietary Treatment	
	Alfalfa	Teff
Dry matter intake, lb/d	16.3	17.7
Body weight gain, lb	211.9	230.8
Average daily gain, lb/d	1.94	2.14
Gain:Feed ratio	0.119	0.121

Table 4. Growth performance for dairy heifers after 12 weeks of study.

Item	Dietary Treatment	
	Alfalfa	Teff
Dry matter intake, lb/d	13.1	14.9
Body weight gain, lb	217.8	256.0
Average daily gain, lb/d	2.49	2.95
Gain:Feed ratio	0.191	0.199