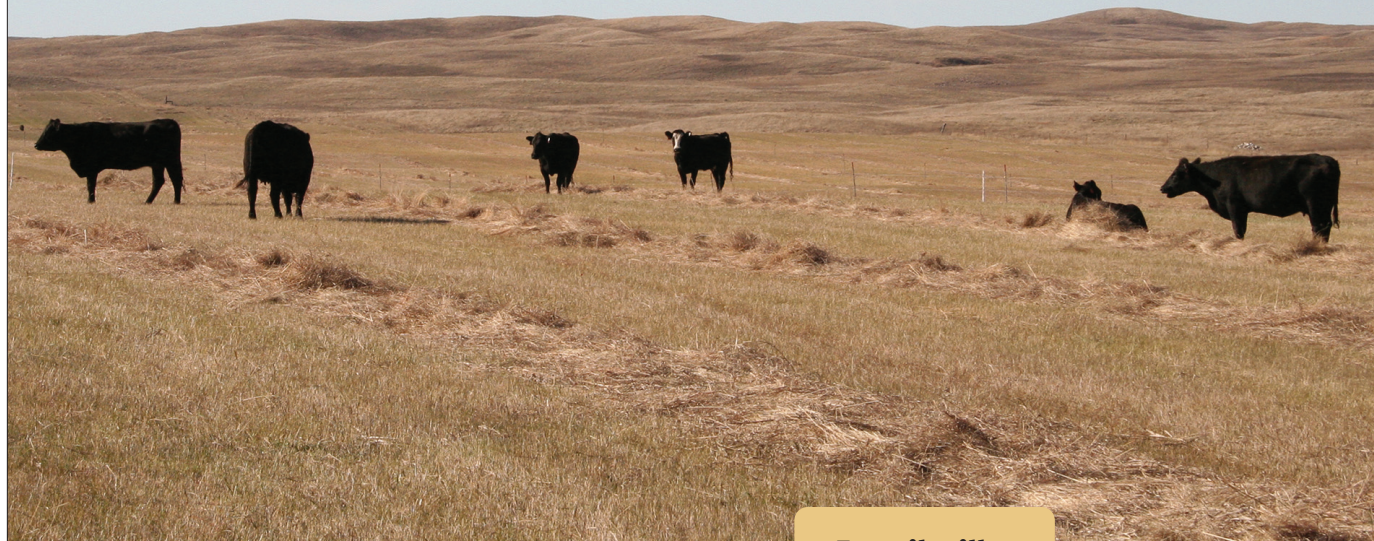


# Millet Makeover

As a last-minute, hardy forage, millet boasts drought resistance and swath-grazing potential.

by Ed Haag



PHOTOS COURTESY OF NDSU CENTRAL GRASSLANDS RESEARCH CENTER

**Foxtail millet had stocking rates 2.6 to 3.3 times that of other forages in the North Dakota study.**

There comes a time when all planting logistics fail, it is late spring and you are faced with an empty field and the prospect of trying to figure out how you are going to get your herd through the winter without mortgaging the ranch to buy feed.

Enter millet to save the day. "It is the ideal last-minute forage," says Greg Lardy, North Dakota State University (NDSU) professor and beef feed specialist. "You can plant it in late June and with a little moisture it will produce substantial yields by September."

Lardy and NDSU Extension Range Management Specialist Kevin Sedivec have been evaluating millet as a forage and have concluded that its feeding cost per animal per day was considerably lower than any comparable perennial forage crop in the region.

"In our study, the tonnage on our foxtail millet was two and a half to three times that

of the crested wheatgrass and big bluestem," says Lardy, adding that the difference in yield more than compensated for the additional labor and cost associated with seeding an annual crop.

He notes that the foxtail lends itself particularly well to swath-grazing, an in-the-field cattle feeding system that has proven to be more cost-effective than baling and hauling forage to a central location.

With swath-grazing, the forage is cut and left in the field in large swathrows, approximately 4-foot (ft.) wide × 3-ft. tall. When feed is needed, usually through the late fall and in the winter, cattle are released onto the field. An electric fence is used to restrict their movement to specific areas, referred to as feeding cells. Fences are moved to create new feeding cells as required.

"The nice thing about the foxtail forage, when you get them into a swath it does shed moisture fairly well," Lardy says. "It is not like an alfalfa swath that if you got rained on you are going to get spoilage and nutrient loss."

Sedivec points out that the ability of the millet forage to maintain its quality in the

field, under all conditions, is particularly important to producers who intend to field-feed it through the winter. "You can go out in December, brush away the snow, and it is still green," he says. "When it is in the swath it takes a lot to reduce its quality."

## Challenging perennial alternatives

Much of the information on producing foxtail millet for forage in North Dakota has been acquired by Lardy and Sedivec through their participation in studies comparing the forage qualities of the millet with early season perennial crested wheatgrass and late-season perennial big bluestem. Both researchers believed that such a study was necessary to help determine how extensive a role foxtail millet would play in North Dakota's beef production future.

"The primary objective of the studies (2005, 2006) was to compare an annual forage with a cool-season and a warm-season perennial," says Lardy, adding that the

CONTINUED ON PAGE 328

**Feeding & Feedstuffs**

► **Above:** Swath-grazing late-planted foxtail millet offers Northern Plains beef producers an excellent winter feed source for their mother cows.

## Millet Makeover CONTINUED FROM PAGE 326

project was not only meant to evaluate millet as a forage but also to see how well the perennials would perform in a swath-grazing environment.

The research project was conducted at NDSU's Central Grasslands Research Center. Each of the three forages being studied was represented by its own 30-acre pasture. These pastures were then divided into three 10-acre paddocks. A fourth 30-acre pasture of native grass functioned as a control and was grazed in its entirety to simulate a typical management scenario.

Millet was planted in the spring, and the two perennial pastures and the native-grass pasture were allowed to grow and accumulate biomass throughout the

summer. On Sept. 15, the millet, wheatgrass and bluestem pastures were cut and left in the fields in swathrows.

"Millet takes from 70 to 80 days from planting to cutting as forage," Sedivec says. "If you have all of July and August, the timing is perfect for putting it down in mid-September."

On Oct. 17, 2005, 144 crossbred gestating beef cows were weighed and evaluated for body condition score (BCS) on two consecutive days and assigned randomly to one of four treatments. Stocking rates were determined at swathing and were based on yield, forage quantity and estimated waste, with a goal of beginning and ending grazing for each treatment at the same time.

At the mid-December conclusion of the experiment, body weights and BCSs were again collected on two consecutive days. A second study using the same parameters was repeated in 2006.

### More forage, better quality

For Lardy and Sedivec, some of the most dramatic data to emerge from their study were the yields. While crested wheatgrass and big bluestem yielded 3,009 pounds (lb.) per acre and 2,396 lb. per acre, respectively, foxtail millet tipped the scales at 6,614 lb. per acre.

This variation in yields was most clearly reflected in stocking rates, with crested wheatgrass at 0.89 cows per acre, big bluestem at 0.68 cows per acre, and foxtail millet at 2.3 cows per acre. Stocking rates for the foxtail millet were 2.6 to 3.3 times that of the two perennials. The stocking rate on the native grass control site was 0.2 cows per acre.

Lardy notes that yields play a particularly important part in determining whether or not a crop works in a swath-grazing system.

"You do need a forage that will get you some decent production," he says. "When you start to spread the fixed costs of mowing and raking along with moving the fences and that sort of thing, you need good production to get it all to fit together from an economic standpoint."

That is why the foxtail millet seems to work in the system and the crested wheatgrass and the big bluestem don't, he adds.

Other factors that limited the success of the perennials were their low palatability when compared to the millet and the very low crude protein (CP) levels in the big bluestem stand. While the foxtail millet tested 14% CP at cutting and 12% in the swath, the big bluestem tested 4.24% just before cutting. Based on this information, it was determined by the researchers that the animals eating the big bluestem forage required a protein supplement in the form of a molasses tub. Supplement consumption by the bluestem cows averaged 2 lb. per day per head.

While the NDSU researchers have yet to finalize their calculations on the cost per animal per day of the three forage treatments, figures for millet are available from beef producers in Canada. Trevor Atchison of Pipestone, Man., Canada, a community on the other side of the border from North Dakota — has been swath-grazing millet for six years. His total cost, including land value and labor, is approximately 57¢ per cow per

**Table 1: Body weight (BW), body condition score (BCS), and average daily gain (ADG) of cows grazing windrowed forage and native range**

Item	Treatments <sup>a</sup>				P-value <sup>b</sup>
	CWG	BBS	FM	NR	
<b>Initial:</b>					
BW, lb. <sup>c</sup>	1,232	1,232	1,223	1,223	0.10
BCS <sup>c</sup>	5.1	5.2	5.2	5.3	0.47
<b>Final:</b>					
BW, lb. <sup>c</sup>	1,228	1,230	1,232	1,232	0.97
BCS <sup>c</sup>	5.2	5.4	5.2	5.1	0.30
ADG, lb./d <sup>d</sup>	-0.11	-0.02	0.15	0.18	0.44
Change in BCS <sup>e</sup>	0.1	0.2	0.0	-0.2	0.12
Weight change/ac <sup>f</sup>	-4.0	-1.6	21.6	2.2	0.17

<sup>a</sup>Treatment abbreviations: CWG = crested wheatgrass/legume, BBS = big bluestem, FM = foxtail millet, NR = native range.  
<sup>b</sup>Overall P-value for treatment.  
<sup>c</sup>Values are averaged across replicate within treatment.  
<sup>d</sup>ADG = (average final BW – average initial BW) ÷ 58 days.  
<sup>e</sup>Change in BCS = average final BCS – average initial BCS.  
<sup>f</sup>Weight change/ac = total weight gain/lost by paddock/ac in paddock.

**Source:** Study conducted at Central Grasslands Research Extension Center, Streeter, ND, in 2005.



► NDSU researchers conclude that as a last-minute emergency forage, foxtail millet is unrivaled.

day. He estimates that a comparable hay-based ration would have exceeded 90¢ per cow per day.

### **Making it all work**

Because foxtail millet is a warm-season crop, Lardy cautions not to plant it too soon. “You don’t want to get it in too early because the plant will overmature as a forage and you will start to lose your leaf mass,” Lardy says. “That June 15-July 1 window fits pretty well in North Dakota.”

In some varieties of foxtail millet, delayed harvests can also result in lump jaw or eye injury of livestock from the bristly heads.

Sedivec adds that the planting window during the last half of June fits ideally with a Sept. 15 swath date when the plant is heading out. “You don’t want it in the swath too long before the frost,” he says. “As you get into the freeze-up, swathed millet is better at holding its quality.”

Foxtail millet has about 220,000 seeds per pound. Recommended seeding rates are 4 to 12 lb. of pure live seed (PLS) per acre, seeded at a depth of 0.5 to 0.75 inch (in.). Sedivec prefers planting in rows rather than solid seeding.

“With solid seeding you can get too much competition between individual plants and your production can actually go down,” he says, noting that 6-in. spacing between rows works well.

One of the real benefits of planting foxtail millet vs. other crops is how it responds to precipitation, Sedivec says. He estimates that one-half to three-quarters of an inch of rainfall is needed for seed germination. “Once the plants are growing, most varieties of foxtail millet are quite drought-resilient,” he says, adding that unlike some annuals that require moisture immediately after seeding, once foxtail is in the ground, the seed will remain viable until the appropriate rains arrive.

Lardy agrees. “Last year we seeded mid-June, and some of our millet crop didn’t germinate until we got some rain at the end of July,” he says. “After that it did very well.”

### **Tips on swath-grazing millet**

When selecting a location for swath-grazing, Sedivec believes two questions should be on the beef producer’s lips. First: “Does the site have easy access to water?”

Second: “Does it lend itself well to controlled grazing?”

Both Lardy and Sedivec share the view that one of the most important tasks facing a beef producer who swath-grazes crops like millet is controlling cattle access to the forage in order to increase utilization and reduce waste. It is an axiom of swath-grazing that the less fresh feed that is exposed to livestock at any given time, the less waste is likely to occur.

Exposing cattle to fresh feed involves moving fence or animals and represents a tradeoff between forage waste and increased labor costs. For the NDSU researchers, the most cost-effective frequency to move the fence was around once a week, depending on cow consumption. By using the water trough location as a starting point for the swath-grazing study, they were able to provide access to fresh forage on a regular basis without disrupting the water supply to the cattle.

“Once we had our water source in place, we just moved our fence every seven to nine days, further away from the water,” Lardy says. “So we were able to minimize waste while the cattle always had access to water.”

