Swath Grazing Versus Native Range Grazing for Wintering Beef Cows in South-central North Dakota

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Highlights

- Cattle grazing swaths of big bluestem, crested wheatgrass, or foxtail millet do not differ in body weight or body condition score from those grazing native range.
- Using foxtail millet in a swath grazing system increased grazing days more than other forages tested.

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Introduction

Many comparisons of swath grazing versus baled-forage feeding have been completed with varying results (Turner and Angell, 1987; Munson et al., 1999; Volesky et al., 2002). However, to our

knowledge no direct comparison of a cool-season perennial, a warm-season perennial, or a warm-season annual exists in published literature. Volesky et al. (2002) reported that calves swath grazing windrows on sub-irrigated meadows had greater weight gains than bale-fed calves in the first year of a two-year study. However, in the second year, the two groups had similar gains. Schleicher et al. (2001) reported that windrow-fed cows on flood-irrigated meadows were 31.8 lbs heavier and had a greater body condition score (BCS) than bale-fed cows. Turner and Angell (1987) reported similar results in a study that compared hay-fed, standing forage-fed, and rake-bunch-fed cows on flood-irrigated meadow. In their study, rake-bunch-fed cows were on average 22 lbs heavier than the hay-fed group at the conclusion of the study. Munson et al. (1999) detected no differences in weight gain or BCS when heifers grazed windrowed foxtail millet compared to those fed baled foxtail millet. In contrast, Nayigihugu et al. (2002) reported that cows grazing standing corn forage had greater average daily gain (ADG) than cows grazing windrowed corn forage. Turner and Angell (1987) reported that cows grazing standing flood-irrigated meadows maintained weight but had lower BCS then bale- or windrow-fed cows.

All of the previous studies have used only one class of forage. To our knowledge, no research has compared three different forage classes in a swath grazing system. Therefore, our objectives were to evaluate cow performance in a swath grazing system on three different forages: crested wheatgrass (*Agropyron cristatum*, CWG), big bluestem (*Andropogon gerardii*, BBS), and foxtail millet (*Setaria italica*, FM).

Materials and Methods

Animals

All animal care and handling procedures were approved by the NDSU Institutional Animal Care and Use Committee prior to the initiation of the study. One-hundred-forty-four crossbred gestating beef cows were used in a completely randomized design with three replications. Cows grazed one of four treatments: 1) positive control grazed native range (NR), 2) swath grazed crested wheatgrass, 3) swath grazed big bluestem, or 4) swath grazed foxtail millet. All swath grazing treatment pastures were contiguous and the NR treatment pastures were 1 mi. south on similar soil types. Grazing occurred from 19 October through 15 December 2005. Two day individual body weights and body condition scores were taken at the beginning and end of the trial. Cows were assigned BCS by visual appraisal using methods of Richards et al. (1986).

Forage sampling

During the growing season, forage samples were collected on CWG, BBS, and FM with ten 2.7 ft^2 plots clipped per treatment on each sampling date. Samples were collected on 28 June, and then mid-month each month throughout the growing season, with the last clipping collected immediately prior to swathing on 15 September. Native range pastures were not selected until late August, so production data were not collected until the beginning of the grazing period.

The CWG pasture contained a high proportion of legumes, including yellow sweet-clover (*Melilotus officinalis*) and alfalfa (*Medicago sativa*). Crested wheatgrass pastures were 63% CWG, 37% legume at first clipping, with legume decreasing to 31% of total weight dry matter (DM) at swathing. The BBS pasture also contained a large amount of other species, the majority of which was quackgrass (*Agropyron repens*). Proportions of BBS to quackgrass in the BBS pasture were 37:63 and 31:69 at first clipping and swathing, respectively. The most prevalent species on the NR in 2000 were blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), sunsedge (*Carex heliophila*), western snowberry (*Symphoricarpos occidentalis*), and Kentucky bluegrass (*Poa pratensis*) (Schauer 2000).

Swath Grazing

Swath grazing treatment pastures were swathed on 15 September. The CWG and BBS pastures were first cut with a sickle mower, then raked into windrows. The FM pasture was swathed using a hay conditioner. Each treatment pasture, except NR, was divided into three 10-ac paddocks using electric fence, providing three replications for each swath grazing treatment. Electric cross fencing was used to limit access in an attempt to increase forage utilization and decrease waste. Nine to 10 days of forage was provided at each fence move. The first area grazed was immediately adjacent to a water source, and cross fences were moved to allow access to water and previously grazed areas. Native range treatment groups were allowed to graze the entire pasture to simulate a typical fall-winter management scenario.

The supplement for the BBS treatment consisted of a 40% crude protein (CP) cooked molasses block (Ridley, Inc., Mankato, MN). Cattle in each of the BBS replicates were allowed access to one tub (125 lbs) per week. All treatments were provided with trace mineral salt blocks (Cutler-Magner Co., Duluth, MN) on an *ad libitum* basis.

Stocking rates were determined at swathing and were based on estimated forage production. Estimated forage production was multiplied by two factors: an 80% harvesting efficiency and a 75% swath utilization, to determine available forage. Stocking densities were 0.9, 0.7, 2.3, and 0.2 head**/**ac for CWG, BBS, FM, and NR, respectively.

Sub-samples of the CWG, BBS, and FM swaths were collected for analysis. Swath samples were taken as random grab samples on each day the cross fences were moved. Forage samples from the NR were collected by clipping 2.7 ft^2 plots on days when the cross fence was moved.

Results and Discussion

Forage Production

Forage data were compiled from clipped plots that were collected throughout the growing season and analyzed for CP, acid detergent fiber (ADF), and neutral detergent fiber (NDF). Nutrient analysis indicated that swath grazing treatments had similar changes in nutrient composition. Crude protein values decreased from initiation of sampling until swathing for all forages. At swathing, FM had the greatest CP (9.34%, DM basis) and BBS had the lowest CP content (4.2%, DM basis). Values for CWG were intermediate (7.38% CP, DM basis; Figure 1). Acid detergent fiber and neutral detergent fiber values increased throughout the growing season (Figures 2 and 3, respectively).

Forage production for BBS, CWG, and FM was 2399, 3012, and 6620 lbs/ac, respectively, at time of swathing. Production for CWG peaked in mid July, but was increasing slightly in September at the time of swathing. A major factor in the CWG production was the percent of legume present in the pasture. From late July to early August, the legume portion of CWG decreased as the forage matured. Big bluestem pastures reached peak production in mid August, and rapidly declined in CP and increased in ADF and NDF concentrations. Foxtail millet production doubled in the last month prior to swathing. These data indicate that the date of swathing is a major factor in the overall quality and quantity of the forage provided to swath grazing cattle. The CP content of swath sub-samples was similar throughout the grazing trial (Figure 1). Acid detergent fiber and neutral detergent fiber increased throughout the grazing trial (Figure 2 and 3, respectively). A study by Lux et al. (1999) showed similar findings, with ADF content increasing from September through November. Both

Lux et al. (1999), and Munson et al. (1999) had similar results, with NDF increasing as the feeding period progressed.

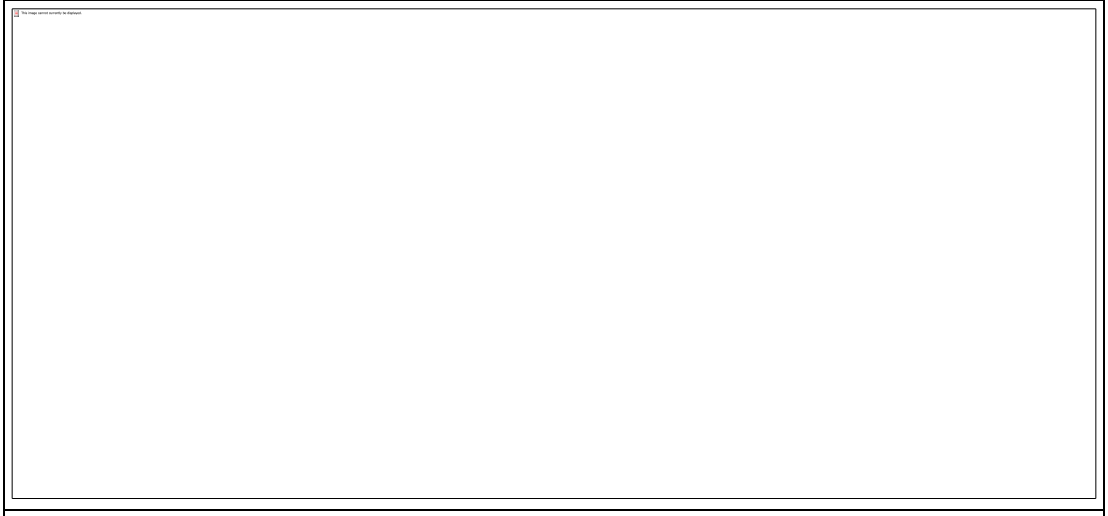

Figure 1. Effect of sampling date on CP of crested wheatgrass (CWG), big bluestem (BBS), foxtail millet (FM), and native range (NR) at Central Grasslands Research Center, Streeter, ND in 2005.

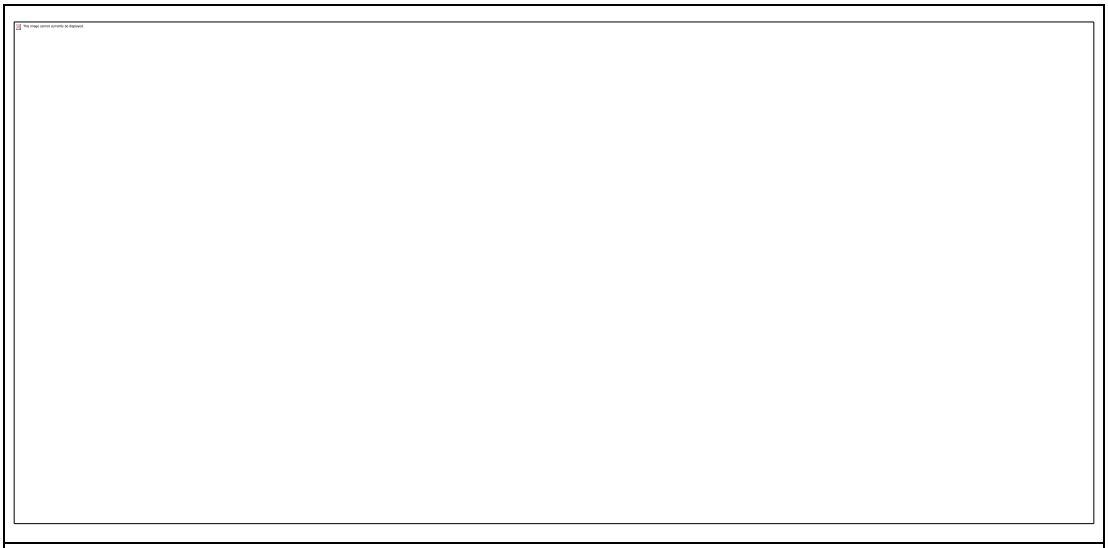

Figure 2. Effect of sampling date on ADF of crested wheatgrass (CWG), big bluestem (BBS), foxtail millet (FM), and native range (NR) at Central Grasslands Research Center, Streeter, ND in 2005.

Figure 3. Effect of sampling date on NDF of crested wheatgrass (CWG), big bluestem (BBS), foxtail millet (FM), and native range (NR) at Central Grasslands Research Center, Streeter, ND in 2005.

Cow Performance

There was no difference in final body weight between treatments (P = 0.97; Table 1). A negative ADG was observed in CWG and BBS treatment cows (-0.11 and -0.02 lb/head/day, respectively). Cows grazing FM and NR gained weight over the trial (0.15 and 0.18 lb/head/day, respectively). However, these changes in body weight were not significant (P = 0.44). No differences were noted in BCS change (P = 0.12). While weight gains were not significantly different, animal grazing days/ac were numerically different between treatments, with 39.2, 50.4, 128.8, and 12.6 animal days/ac for BBS, CWG, FM, and NR, respectively.

Table 1. Body weight (BW), body condition score (BCS), and average daily gain of windrowed forage and native range grazing cows at Central Grasslands Research Extension Center, Streeter, ND, in 2005.

Item	Treatments[a]				P-value[b]
	CWG	BBS	FM	NR	
Initial					
BW, lb[c]	1232	1232	1223	1223	0.10
BCS[c]	5.1	5.2	5.2	5.3	0.47
Final					
BW, lb[c]	1228	1230	1232	1232	0.97
BCS[c]	5.2	5.4	5.2	5.1	0.30
ADG, lb/d[d]	-0.11	-0.02	0.15	0.18	0.44
Change in BCS[e]	0.1	0.2	0.0	-0.2	0.12
Weight change/ac[f]	-4.0	-1.6	21.6	2.2	0.17

[a] Treatment abbreviations CWG = crested wheatgrass/legume, BBS = big

bluestem,
FM = foxtail millet, NR = native range
[b] Overall P-value for treatment
[c] Values are averaged across replicate within treatment
[d] ADG = (Average Final BW – Average Initial BW)/58d
[e] Change in BCS = Average Final BCS – Average Initial BCS
[f] Weight change/ac = total weight gain/lost by paddock/ac in paddock

Implications

Swath grazing is an acceptable method to provide forage for beef cows in central North Dakota in October, November, and December. While no differences were noted in cattle performance between grazing treatments, additional research is needed to determine optimum forage type and swathing date to optimize grazing returns. In addition, an economic analysis should be conducted to better understand these grazing systems.

Present Progress

Grazing began on 17 October 2006. There were differences in forage production, a direct result of drought conditions encountered during June and July of 2006. Forage production for BBS, CWG, and FM in 2006 was 1689, 1485, and 4422 lb/ac, respectively. Further, forage CP for these forages was 4.2 to 6.6, 7.4 to 14.3, and 9.3 to 12.9% for BBS, CWG, and FM, respectively. Cattle performance data were not available at time of publication.
