Evaluating Beef Cow Performance: Comparing Crested Wheatgrass/legume, Big Bluestem, and Foxtail Millet in Swath Grazing

B. W. Neville, G. P. Lardy, K. K. Sedivec, Department of Animal and Range Sciences, North Dakota State University, Fargo, North Dakota

P. Nyren, B. Kreft, Central Grasslands Research Extension Center, Streeter, North Dakota

---

Table of Contents

Introduction

Previous research on swath grazing has been conducted in Wyoming, Nebraska, Colorado, and Canada. Many comparisons of swath grazing versus baled-forage feeding have been completed with varying results. However, no direct comparison of a cool-season perennial, a warm-season perennial, or a warm-season annual has been documented. Volesky et al. (2002) found that calves grazing windrows on sub-irrigated meadows had greater weight gains than bale-fed calves in the first year of his study, however in the second year the two groups had similar gains. Schleicher et al. (2001) stated that windrow-fed cows on flood irrigated meadows were 31.8 lbs heavier and had a body condition score of 0.2 greater than that of bale-fed cows. Turner and Angell (1987) had similar results in a study which compared hay fed (control), standing forage fed, and rake-bunch fed cows on flood irrigated

meadows with rake-bunch fed cows ending the trial 22.1 lbs heavier than the control group. Munson et al. (1999) stated that significant differences were not detected in weight gain or body condition score at any period when heifers grazed windrowed foxtail millet compared to foxtail millet that was bale fed. In contrast, Nayigihugu et al. (2002) found that cows grazing standing corn forage had greater average daily gains than cows grazing windrowed corn forage. Turner and Angell (1987) reported cows fed standing flood irrigated meadow maintained weight but had lost body condition score over the winter.

Data on nutrient quality has also been examined. A study by Lux et al. (1999) showed acid detergent fiber and neutral detergent fiber percentages increased with weathering from August through November. Volesky et al. (2002) found that crude protein of bales and windrows was similar, while crude protein of standing forage decreased; acid detergent fiber and neutral detergent fiber were similar in windrow and standing forage all months, but higher than bales from November through February. Munson et al. (1999) reported that the crude protein percentage decreased in both bales and windrows, total digestible nutrients decreased for windrows but not bales, acid detergent fiber and neutral detergent fiber increased for windrows but remained consistent for bales over the course of their experiment (August through February).

Turner and Angell (1987) stated that feeding rake-bunched hay to mature cows appeared to be very cost effective. Associated costs included: commercial rates for putting up baled hay ($27/ton), swathing and bunching ($11/ton), supplement costs, labor ($4/hr), and electric fencing costs (Turner and Angell, 1987). Volesky et al. (2002) estimated that the cost for producing and harvesting hay were about $25/ac greater for bale feeding compared to windrow grazing. Associated costs in this study included fertilizer, market value of calves, interest on that value, mowing, and raking for both treatments; baling, and bale-moving costs were added in bale fed group (Volesky et el. 2002). Schleicher et al. (2001) found costs associated with windrow grazing to be $61/ton, compared to $45/ton for baled forage. Associated costs of windrow grazing were cutting and raking windrows, fencing, watering/checking ($7/hr), and wasted forage. Baled forage costs included cutting, raking, baling, stacking, feeding, and wasted forage (Schleicher et al. 2001).

There are differences between these economic comparisons that should be taken into account, for instance the difference in cost of labor $4/hr (Turner and Angell, 1987) versus $7/hr (Schleicher et al. 2001). Differing fencing techniques also lead to contradictory results, for example, using poly wire or high tensile wire with one or two strands. The availability of a water source

will also influence the overall economic success of implementing swath grazing. All of these previous studies have used only one class of forage. To our knowledge, no research has compared three different classes of forages. Therefore this study would provide a new perspective on the effectiveness of swath grazing.

Materials and Methods

Experimental Procedures

Approximately 144 Angus, Simmental, and Angus X Simmental crossbred mature cows were utilized in a complete random design at Central Grasslands Research Center. Each 30-acre treatment pasture, except native range, was divided into three, 10-acre paddocks using electric fence, providing three 10-acre replications per swath grazing treatment. The native range group was allowed to graze the entire pasture to simulate a typical management scenario. Cross-fencing was used to limit access thus increasing forage utilization and decreasing waste; 9-10 days worth of feed was provided at each fence move. The first area to be grazed contained water, and cross-fences were moved to allow access to water and previously grazed areas. Cows grazed one of four treatments: typically grazed native range (control), or crested wheatgrass (a cool-season perennial) with a legume, big bluestem (a warm-season perennial) with protein supplement, and foxtail millet (a warm-season annual), each swath grazed. A comparison of cow performance was made between treatments. Two-day individual body weights were taken on October 17th and 19th, and December 15-16th 2005, as well as body condition scores, to determine cattle performance.

During the growing season, forage samples were collected on crested wheatgrass, big bluestem, and foxtail millet with ten 0.25 m^2 plots clipped per treatment at each sampling date. Samples were collected on June 28th, and proceeded at dates mid-month throughout the growing season, with the last clipping taking place immediately prior to swathing. Production data for the native range treatment was provided from other sources. Crested wheatgrass, big bluestem, and foxtail millet treatments were swathed on September 15th. Grazing of the native range, crested wheatgrass, big blustem, and foxtail millet occurred from October 19th to December 15th, 2005 and will be repeated in 2006 for collection of sufficient data. Protein supplements were provided as 40% crude protein dried molasses lick tubs. A new tub was set out every seven days, one to each replicate. Water was provided in stock tanks, which were filled every other day. Stock tanks were heated with propane tank heaters to allow cattle constant access to water, and heaters were used from November 18th until the end of the grazing season.

Stocking rates were determined at swathing, and based on forage quantity and estimated waste, with a goal of beginning and ending grazing for each treatment at the same time. The amount waste that was used was twenty-five percent, which is based on first year data by Volesky et al. (1999) who found that combined wastage of cows and calves was eighteen percent. The percent waste used in year two will be modified to more accurately represent year one data. Sub-samples of crested wheatgrass, big bluestem, and foxtail millet swaths (newly allotted feed, and orts) were also collected for analysis. Swath samples were collected as random grab samples taken each treatment, and for native range treatments, two 0.25 m^2 were clipped.

Laboratory Analysis

Forage samples were dried using a forced-air oven (131 degree F; The Grieve Corporation, Round Lake, IL) for 48 hours. Dried samples were ground in Wiley mill (Arthur H. Thomas Co., Philadelphia, PA) to pass a 2 mm screen. Forage samples were analyzed for percent dry matter, ash, and crude protein (AOAC, 1990). Percentage of neutral detergent fiber (Robertson and Van Soest, 1991, as modified by Ankom Technology, Fairport, NY) and acid detergent fiber (Goering and Van Soest, 1970, as modified by Ankom Technology, Fairport, NY) were determined using an Ankom 200 Fiber Analyzer.

Observations

While results are not available at the time of submission, a few observations or problems have been identified and can be discussed. The first is one of low palatability apparent in both the crested wheatgrass and big blustem treatments. The second is the low quality of forage present in the big bluestem treatment. Crude protein levels at the final clipping were 4.24% which prompted the inclusion of the protein supplement. Initial observations show that an average of 2 lbs/hd/day of the protein supplement is being consumed.

Future Research Projects

A metabolism trial will also be conducted, using forage collected from the foxtail millet, crested wheatgrass, big bluestem, and a native range site. The swathed forages were allowed to age in windrows for approximately 30 days; the native range forage was swathed and baled in a typical manner. The objective of this research is to determine the effects of swath grazed forage on intake, nutrient digestibility, and ruminal fermentation. This project is scheduled to begin January 2nd, 2006 at the NDSU Animal Nutrition and Physiology Center in Fargo, ND.