Effect of Sampling Date on the Nutrient Content of Stockpiled Native Range in Southwestern North Dakota

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Abstract

Nutrient content of stockpiled native range in southwestern North Dakota may limit it's usefulness as a grazing resource for beef cows in late fall and early winter. Objectives of this study were to characterize changes in nutrient concentrations of stockpiled native range from early November to late January. In each of two years, dry beef cows were grazed on a single stockpiled native range pasture. For sampling purposes, the pasture was separated into an east and a west section. Five permanent sampling sites were established in each section. Forage samples were collected from each site at 14-day intervals. Forage samples were pooled within section and sampling day for nutrient analysis. Forage samples were analyzed for crude protein (CP), acid (ADF) and neutral (NDF) detergent fibers, calcium (Ca), phosphorus (P), magnesium (Mg) and potassium (K). Total digestible nutrient (TDN) concentration was calculated using a standard procedure. Nutrient concentrations were similar across the years (P> .10), with the exception of K (P= .09). K concentrations were greater in year one versus year two (.34 and .16, respectively). ADF (P=.01) concentrations increased, while TDN (P=.02) and Mg (P=.1) concentrations decreased, over time. CP (P=.04) and Ca (P=.05) concentrations increased and then declined over time. Changes in NDF (P=.03) concentration were different between years; however, in both years NDF concentrations increased linearly over time. P (P>.1) and K (P>.1) concentration remained constant over time. Changes in nutrient concentration of stockpiled native range were relatively consistent across years in this study and most changes, although significant, were relatively minor.

Introduction

The Northern Great Plains is suffering from depopulation, particularly in its production agricultural industries. Low profit margins in production agriculture are thought to be main contributors for this exodus. Reducing agricultural production costs may help improve profitability for the livestock producer and, thus, partially reduce this endemic outmigration. A major contributor to production costs for beef cow operations is harvested forage for winter-feeding programs. Extending the grazing period can potentially reduce the dependence on harvested forage for the winter. The forage availability and nutrient content in native range pastures in southwestern North Dakota may limit it's usefulness as a grazing resource for beef cows in late fall and early winter. Forage stockpiling is a method considered to be somewhat successful at extending the grazing period past the normal growing season. This method allows forage to grow during the times of active growth and saved for use at some other time of the year. Stockpiling native range have been shown to be a viable mechanism for extending the grazing season. However, stockpiled forage may not always meet the cattle's nutrition requirements and additional dietary supplementation may be required. An understanding of the nutrient composition of stockpiled native range throughout the extended grazing period is essential for designing effective supplementation strategies.

Objectives

To characterize changes in nutrient concentrations of stockpiled native range from early November to late January.

Materials and Methods

In each of two years (2001-2002 and 2002-2003; Table 1), dry pregnant beef cows were grazed on a single stockpiled native range pasture (approximately 288 ac) from early November to late January. Prior to the initiation of grazing cows were randomly allotted into four groups and groups then assigned one of four supplement treatments. Treatments included an unsupplemented control (CON) and three supplemented groups. Supplemental treatments were a barley-, field pea- and sunflower meal-based pellet. Supplemental treatments were chosen to supply additional energy and gradient levels of rumen-degradable protein. Supplements were provided to individual cows in the supplemental treatments three times a week. Supplemental intake was limited to 3.0 lb/hd per day or 7.0 lb/hd per feeding.

Herbage available for grazing was sampled at 14-day intervals throughout the grazing period to detect changes in dry matter available for grazing. For sampling purposes, the pasture was virtually divided into an east and a west section and five permanent sampling sites were established in each section. On

each sampling date, total forage was removed from two 0.25 m^2 areas at ground level at each site and separated into forbs and grasses. Forage samples were dried (55° C until constant weight) and dry matter yields calculated. Forage samples were then pooled within section and sampling day for nutrient analysis. Forage samples were analyzed for crude protein (CP), acid (ADF) and neutral detergent fiber (NDF), calcium (CA), phosphorus (P), magnesium (Mg), and potassium (K) in a commercial laboratory. Total digestible nutrients (TDN) concentrations were calculated using a standard procedure.

Forage composition was analyzed for the effects of sampling year and date using a randomized complete block design. Pasture section represented the blocking factor. A commercial statistical software program (SAS; Cary, NC) was used to perform all analytical procedures.

Results

Changes in nutrient concentrations with advancing season are shown in Figure 1.

- Nutrient concentrations were similar across the years (P > .10), with the exception of K (P = .09).
- K concentrations were greater in the first versus second year (.34 and .16% DM, respectively).
- ADF (P = .01) concentrations increased, while TDN (P = .02) and Mg (P = .1) concentrations decreased, over time.
- CP (P = .04) and Ca (P = .05) concentrations increased and then declined over time.
- Changes in NDF (P = .03) concentrations were different between years; however in both years, NDF concentrations increased linearly over time.
- P (P > .1) and K (P > .1) concentrations remained constant over time.

Conclusion

Changes in nutrient concentrations of stockpiled native range were relatively consistent across years in this study and most changes, although significant, were relatively minor. Stockpiling native forage during times of active growth for use later in the year is an effective way of extending the grazing season. Beef cattle have been shown to exhibit dietary selectivity, which simply implies that cattle may choose diet of higher quality than the average of all the forage available to them. Selective grazing to some extent may compensate for the lower concentration of essential nutrients in stockpiled native range forage.

Implications

Extended grazing seasons can be an effective way to decrease production costs associated with winter feeding to the beef cattle producer. These data suggest that the nutrient concentration of stockpiled native range is relatively consistent across years and that most seasonal changes are relatively minor. Comparing average forage composition to cattle requirements during the fall and early winter period can provide the basis for formulating effective supplementation regimens.

Table 1. Animal and grazing information.

	2001-2002	2002-2003
Number of cows	21	24
Initial:		
Body weight, lb	1386 ± 142	1122 ± 86
Body condition score	6.8 ± .64	4.5 ± 1.1
Grazing Dates:		
Beginning	November 14	November 6
End	January 23	January 29
Total grazing days	70	85
Cow grazing days/ac	5.1	7.1
Acres/cow/month	6.0	4.3

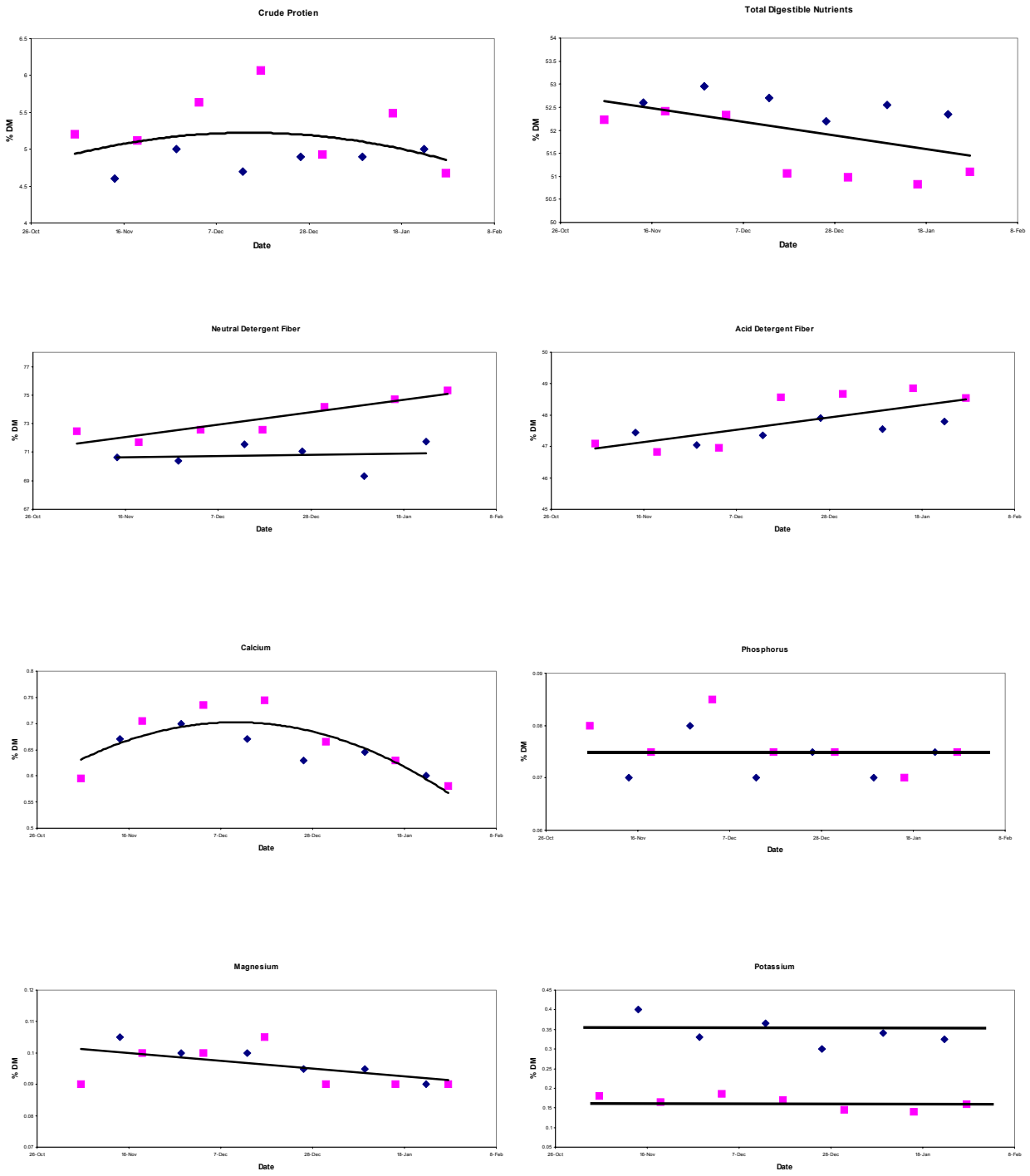

Figure 1. Effect of advancing season on the concentration of selected nutrients from stockpiled native range in southwestern North Dakota in each of two years (diamonds from 2001-2002 and squares from 2002-2003).